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Have U.S. Financial Institutions' Real Estate Investments Exhibited "Trend-Chasing" Behavior?

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Have U.S. Financial Institutions' Real Estate Investments Exhibited "Trend-Chasing" Behavior?

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Abstract

This paper uses real estate investment data for major groups of U.S. financial institutions---commercial banks, thrifts and life insurance companies to evaluate their investment timing performance over the 1970-1989 period. Our major finding is that real estate investments by these institutions have largely been driven by ex post or past real estate returns rather than future expected returns. This apparent "trend-chasing" investment strategy---of buying high and selling low---offers an explanation for the poor performance in their real estate investments. We argue that imposing market value accounting on such institutions may actually reinforce their "trend-chasing" behavior. (JEL G12, G21, G22, G28)

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[1] Associate Professor of Finance and John M Schiff Professor of Finance, Stern School of Business. Any comments can be sent to the authors at: 44 West 4th Street, New York, NY 10003, or JMEI@rnd.stern.nyu.edu. (Tel:212-998-0354) We are grateful to Jmaes Stock (the editor) and two anonymous referees for many helpful comments and suggestions. We wish to thank John Campbell for letting us use his latent variable model algorithm and Doug Herold, Wayne Ferson and Crocker Liu for providing the data. We are also grateful to Bin Gao for able research assistance. We have benefited from helpful comments from Mitchell Berlin, Crocker Liu and seminar participants at the Federal Reserve Board of Governors, Northwestern University, New York University, and Rutgers University. We acknowledge financial support from the Salomon Center at New York University.

I. Introduction

The 1980s posed serious profitability and stability problems for U.S. financial institutions --- especially in the area of real estate investment. For example, at the end of September 1992, the 50 banks in Salomon Brothers 50 bank composite, reported that 10.3% of their real estate loans were non-performing.[1] The 1980s were also replete with thrift industry failures in states such as Texas, California and Florida where rules concerning real estate investments of state-chartered thrifts were often more liberal than for nationally chartered thrifts (see White (1990)). While real estate investment problems in the life insurance industry did not receive as much attention, recent insurance company failures and the lingering recession in commercial real estate suggest that the worst may be yet to come.

This unfolding of bad real estate loan problems for major U.S. financial institutions raises an important empirical question, namely, what business strategy---beside fraud and gross mismanagement --- lies behind these problems and what strategic and regulatory changes need to be made to avoid repeating these problems in the future?

While a number of studies have analyzed the link between moral hazard and excessive risk taking by financial institutions, resulting from mispriced deposit insurance guaranty schemes (see Berlin, Saunders and Udell (1991) for a review) no study has formally sought: (i) to establish the relationship between financial institutions' real estate investments and real estate pricing (returns), and (ii) to address the question as to whether the ex post poor performance of such investments have been due to *ex post* bad luck under excessive risk taking (moral hazard) or due to risk taking under *ex ante* unfavorable odds.

In this paper we use real estate investment data for 1970-1989 for commercial banks, savings and loans, and life insurance companies to address the above issues. These institutions report on a regular and homogeneous basis, e.g., in bank call report and other statistical releases, their positions in real estate assets. As such they present a unique laboratory to analyze investment behavior over time and the rationality of such behavior in light of asset pricing theories. Our major finding is that financial institutions' real estate investments have generally been driven by past (ex post) real estate return performance, and that this "trend-chasing" strategy offers a possible explanation for the poor performance of financial institutions' real estate portfolios.

The paper is organized as follows: Section II outlines a framework for real estate asset pricing. In particular we employ a multi-factor latent-variable model along the lines of Campbell (1987), Ferson (1989) and Mei and Saunders (1993) to derive time-varying *ex ante* risk premiums (or expected excess returns) on various real estate investments. We then employ the approximate accounting identity of Campbell (1991) to discuss the relationship between *ex post* returns and *ex ante* future expected excess returns on assets such as real estate as well as on the optimal investment strategy for an investor (here a financial institution). This is followed by a description of data and the empirical methodology in Section III. Section IV presents the empirical results in which we discuss our major findings: (i) U.S. financial institutions' real estate investments have largely been driven by past (*ex post*) real estate excess returns over the last twenty years, ii) we observe increases in real estate investments at times when *ex ante* (expected) excess returns on real estate may be below their mean levels and declines in real estate investments at times when their *ex ante* returns may be above their mean levels, iii) we show that this "trend-chasing" strategy offers one explanation for the poor real estate investment performance of U.S. financial institutions. We also discuss the role of regulation, and how this may have contributed to financial institutions' poor investment timing. In addition, the implications for proposed regulatory reforms---such as market value accounting---are identified. Section V is a summary and conclusion.

II. Time-varying Expected Returns and the Dynamics of Asset Returns

A. *A Simple Model for Real Estate Expected Excess Returns*

To construct proxies for *ex ante* real estate expected returns, we follow previous studies such as Campbell (1987), Fama and French (1988) by assuming that the conditional expectations for asset excess returns are linear in several pre-specified economic forecasting variables:

$$E_t[e_{i,t+1}] = \sum_{p=1}^{L} \alpha_{ip} X_{pt}, \tag{1}$$

where $e_{i,t+1}$ is the continuously compounded return on asset i, held from time t to time t+1, in excess of the risk-free rate. $E_t[e_{i,t+1}]$ is the expected excess return on asset i for time period t+1, conditional on information set I_t being known to market participants at end of time t. Equation (1) implies that expected excess returns are time-varying and can be predicted by economic variables, X_{pt}, in the information set. This allows us to use equation (1) to examine the degree to which economic (or "forecasting") variables, X_{pt}, explain the *ex ante* time-variation in expected excess returns on various real estate assets. We note here that equation (1) can be derived formally from a multi-factor arbitrage pricing model and we can also verify that the expected return given by (1) is consistent with equilibrium asset pricing. (See Appendix for a detailed discussion of these points.)

In the next subsection below we examine the relationship between ex post excess returns today and future expected excess returns. This relationship, along with equation (1), are used as "building blocks" in formulating empirical models and tests of the relationship between real estate returns and the real estate investment decisions of financial institutions.

B. The Campbell (1991) Approximation to the Present Value Model

In a world of constant required rates of return, we know that the price of an asset should be equal to the present value of the current and future cash flows on that asset discounted by a constant required rate of return. However, future required rates of return may not be constant if the economic environment and investment opportunity sets are changing.[2] To study the implications of time-variation in expected returns on asset valuation, we employ the approximate loglinear present value relationship of Campbell (1991) to characterize the dynamic relationship between unexpected excess return in the current period (from t to t+1) and expected excess returns in the future. More formally, when both "dividend" (asset cash flows) and future required returns are uncertain,[3] Campbell (1991) shows that current unexpected excess return on an asset can be decomposed into the following accounting relationship:

$$e_{t+1} - E_t e_{t+1} = (E_{t+1} - E_t)\sum_{j=0}^{\infty} \rho^j \Delta d_{t+1+j} - (E_{t+1} - E_t)\sum_{j=0}^{\infty} \rho^j r_{t+1+j} - (E_{t+1} - E_t)\sum_{j=1}^{\infty} \rho^j e_{t+1+j} \quad (2)$$

where E_t is the expectation formed at the end of period t, d_{t+1} is the log of the real dividend (cash flow) paid to investors during period t+1, r_{t+1} is the real interest rate for the time period t+1, Δ denotes a 1-period backward difference operator, and $(E_{t+1} - E_t)$ represents a revision of expectations given any new information arriving at time t+1. The (discount rate) parameter ρ is a constant and is constrained to be smaller than one. A detailed derivation of the identity can be found in Campbell (1991) and Campbell and Ammer (1993). The main point of identity (2), with respect to this paper, is that when the unexpected excess return on an asset is positive, it follows that either the expected future growth in the asset's cash flows must be increasing, expected future real interest rates must be decreasing, or expected future excess returns on the asset must be decreasing. Or some combination of these three effects must occur simultaneously if expectations are internally consistent.

Following Campbell and Ammer (1993), we will use a more compact version of equation (2) written as follows:

$$\upsilon_{e,t+1} = \varepsilon_{d,t+1} - \varepsilon_{r,t+1} - \varepsilon_{e,t+1} \quad (3)$$

where $\upsilon_{e,t+1}$ is the unexpected component of the asset return e_{t+1}, $\varepsilon_{d,t+1}$ represents news about cash flows, $\varepsilon_{r,t+1}$ represents news about future real interest rates, and $\varepsilon_{e,t+1}$ represents news about future excess returns. Our main objective here is to study the empirical relationship between $\upsilon_{e,t+1}$ and $\varepsilon_{e,t+1}$, i.e., the relationship between unexpected current returns and future expected returns. The estimation procedure is explained in Appendix.

C. The Variance Ratio Tests

In addition to analyzing the relationship between real estate unexpected current returns and future expected returns, we utilize a variance ratio test to ascertain whether real estate excess returns display mean-reverting behavior, similar to that found for stocks in general.[4] The variance ratio statistic V(K), which is defined as the ratio of the variance of K-period returns to the variance of 1-period returns, divided by K, can be calculated directly from the autocorrelations of 1-period excess returns by using the fact that:

$$V(K) = 1 + 2\sum_{j=1}^{K-1} \left(1 - \frac{j}{K}\right) Corr(e_t, e_{t-j}) \tag{4}$$

The variance ratio equals one for white noise excess returns (i.e. there is no serial correlation in the return series so that $Corr(e_t, e_{t-j})=0$); it exceeds one when returns are mostly positively autocorrelated and is below one when negative autocorrelations dominate.

III. Constructing Real Estate Expected Returns and Investment Variables

A. Real Estate Returns

Because of its inherent "lumpiness" as an asset, measuring the returns on real estate assets is not straightforward. Previous studies have generally relied on appraisal-based valuation data such as the quarterly Russell-NCREIF (RN) index. However, appraisal-based series suffer from serious data-smoothing problems since most real estate assets are not appraised on a regular and simultaneous basis.

In a recent study, Gyourko and Keim (1992) found that not only do stock returns on equity real estate investment trusts (REITs) and real estate related companies act as good proxies for real estate asset returns, but also that these "market based" series are correlated with the RN index and can predict the returns on the RN index. In addition, Fisher, Webb, and Geltner (1991) found that appraisal-based series such as the RN index move very closely with a REITs index after "de-smoothing" the appraisal-based series. Mei and Lee (1994) also showed that the RN index and equity REIT returns are driven by a common real estate factor. Consequently, these studies indicated that returns on REITs may serve as good proxies for returns to the underlying real estate assets themselves.

In this paper, we use monthly returns on REITs and real estate company stocks as our proxies for real estate asset returns. Specifically, we construct three real estate stock return based series: an equally-weighted return index of equity real estate investment trusts (EREITs), an equally-weighted return index of real estate holding companies (Owners), and an equally-weighted return index of mortgage real estate investment trusts (Mortgage). These series consist of all available REITs or real estate companies listed on NYSE, AMEX and NASDAQ over the sample period. On average there are approximately 50, 15 and 20 REITs or real estate companies respectively in the EREITs, Owners and Mortgage REIT portfolios each month. Based on the above classifications, three monthly real estate return series are derived from the CRSP (daily) tape.

It is also worth noting that mortgage REITs (MREIT) hold a portfolio of real estate loans and their returns are related to the performance of their underlying mortgage portfolios. From an investment perspective, the "payoff" structure of the real estate loan portfolio of financial institutions is likely to be similar to the mortgage loan asset portfolios underlying MREITs. Thus, MREIT returns appear to offer a particularly good proxy to the underlying returns on financial institutions' real estate loan portfolios.

B. Other Portfolio Returns

In addition to returns on the three real estate portfolios, monthly returns on the market portfolio and long-term (twenty year) U.S. treasury bonds are also derived from the CRSP tapes. The market portfolio comprises of a value-weighted index of NYSE and AMEX stocks. The market and bond portfolios are included in the study for two reasons: (i) as control portfolios to examine the relative behavior of real estate asset returns, (ii) to test the cross-sectional equilibrium asset pricing restriction of equation (A5) in Appendix for a "wide" range of assets.

C. Estimation of ex ante Risk Premiums

To obtain the ex ante risk premiums on the three real estate portfolios, a generalized method of moments (GMM) approach, similar to Campbell (1987) and Ferson (1989) is employed to estimate equation (1). The GMM approach is used to adjust for possible heteroskedasticity in regression (1). To ensure that the equilibrium pricing restriction (A5) holds for a wide range of assets, we use returns on the five asset portfolios discussed above: (i) the market portfolio, (ii) the government bond portfolio, (iii) the Equity REITs portfolio, (iv) the Owner portfolio, (v) the Mortgage REITs portfolio.

The economic or forecasting variables (X_{pt}) chosen to estimate equation (1) include those widely used in previous asset pricing studies (see Campbell (1987,1991), Fama and French (1988), Keim and Stambaugh (1986), and Ferson and Harvey (1991) among others). The variables included are the excess returns on the value-weighted market portfolio, the difference between the one month t-bill rate and inflation, the one-month t-bill rate relative to its past twelve-month moving average, and the dividend yield (on an equally weighted market portfolio).[5] While each of these variables have been found to be useful in explaining the time-variation in expected returns on regular stocks, the second and third variables may have particular relevance to the expected excess returns on real estate assets.

The difference between the one month t-bill rate and the inflation rate proxies for the level of real interest rates. Changes in the level of real interest rates can be expected to impact real estate assets in a number of ways. First, the real cost of funds for real estate development finance will increase as real rates rise. Secondly, changes in real rates impact the discounted present value of cash flows on such investments. Previous studies of real estate portfolios have concluded that, higher real interest rates are associated with lower expected real estate excess returns (see Liu and Mei (1991), Mei and Saunders (1992) for example). Thus, in periods when real interest rates are higher (or lower) than "normal" we might expect a real estate return that is below (above) its historical levels.

The one-month t-bill rate relative to its past twelve-month moving average (the relative bill rate) proxies for changes in nominal interest rates in the economy. A high relative bill rate is consistent with a sudden increase in the short-term interest rates in the economy and increased inflationary expectations, which could adversely impact the pay-off on financial institutions' commercial real estate assets---especially those assets with relatively fixed nominal rental incomes---see Miles, Webb and Guilkey (1991). Campbell (1991) and Campbell and Ammer (1993) use the relative bill rate in their models to forecast future real and excess returns on bonds and stocks.

The forecasting (economic) variables are derived from a number of sources. Yields on one-month bills are derived from the Federal Reserve Bulletin and Ibbotson and Associates (1990). The dividend yield variable, defined as the dividend paid during the last twelve months divided by current market price, is derived using dividend and price information on the CRSP file.

D. Real Estate Investments

To measure real estate investments by the nation's financial institutions, we use four seasonally adjusted series: i) monthly percentage changes in real estate loans at commercial banks, 1973:1-1989:12, ii) monthly percentage changes in mortgages and mortgage-backed securities at FSLIC-insured savings and loan associations, 1976:1-1989:12,[6] iii) monthly percentage changes in mortgage assets at life insurance companies, 1971:1-1989:12, and iv) housing starts, 1971:1-1989:12. These data are obtained from the Citibase data files.

IV. Empirical Results

Table 1 provides summary statistics for the variables used in this study. Panel A provides data on monthly means, standard deviations (SD's) and first-order autocorrelations of actual (ex post) excess returns on five portfolios: (i) the market portfolio, (ii) the government bond portfolio, (iii) the Equity REITs portfolio, (iv) the "Owner" portfolio, and (v) the Mortgage REITs portfolio.

As can be seen, two of the three real estate portfolios had higher excess returns on their portfolios than either the market or the bond portfolio over the entire 1971-1989 sample period.

Real estate returns in general also appear to exhibit a higher degree of volatility and first-order autocorrelation than other portfolios.

In Table 1 panel B, the correlation among the excess returns of the market, bond, Equity REITs, Owner and Mortgage REITs portfolios are shown for the whole sample period. As can be seen, all real estate portfolio returns are highly correlated.

Table 2 examines the extent to which the forecasting variables: the excess return on the value-weighted market portfolio, the real interest rate, the relative bill rate (rrel), and the dividend yield, explain the time-variation in *ex ante* excess returns on our asset portfolios---and in particular, the *ex ante* excess returns on real estate assets. (The t-statistic has been adjusted for heteroskedasticity.)

The results in Table 2 show a degree of predictability of real estate returns, with the lagged market returns, interest rate variable, the relative bill rate, and the dividend yield, exhibiting their expected signs. Specifically, approximately 5.4% of the variation in monthly excess returns on Equity REITs (compared to 5.5% for the market index) is accounted for by the four forecasting variables, after adjusting for degrees of freedom. Similar degrees of predictability are exhibited for the Owners and Mortgage REIT portfolios.

The predictability reported in Table 2 is consistent with other studies using similar variables to forecast future expected excess returns on stock and bond portfolios for different sample periods. For example, Campbell (1987) reported an unadjusted R^2 of 11.2% on the value-weighted index predicted by a set of term-structure variables. Harvey (1989) reported an average unadjusted R^2 of 10% on the value-weighted index and size-decile portfolios. While Fama and French (1988), using a slightly different set of variables, reported an unadjusted R^2 of 4% on the value-weighted index.

The time-varying forecasting variables in table 2 along with their estimated regression coefficients (α_{ip}) can be used to generate expected excess returns $E_t[e_{i,t+1}]$, or conditional risk premiums, for each portfolio---see equation (1). Figure 1 plots the expected excess return (risk premiums) for various real estate assets over the 1971:2-1989:12 period. Overall, these assets' expected excess returns move closely in tandem. As can be seen, the forecastable risk premiums on some real estate portfolios can be as high as almost 9% for some months. From Figure 1, we can see that the conditional expected excess returns on these assets vary over time, seeming to peak just before or after a trough and to bottom out at or near cycle peaks as defined by the NBER business cycle dates. In other words, investors in real estate appear to demand higher risk premiums during a recession but are willing to accept lower risk premiums when the economy is in an expansionary phase.

In order to confirm that the conditional excess returns for the various real estate asset portfolios, $E_t[e_{i,t+1}]$, given by equation (1), are consistent with equilibrium asset pricing, we also conducted a χ^2-test of the linear pricing restriction (A5) for several specifications of multi-factor models. The results are reported at the bottom of Table 2. We found that equation (1) is consistent with a three-factor model but is not consistent with either a one-factor or a two-factor model.[7]

A. The Decomposition of Real Estate Excess Returns

To achieve a better understanding of what drives real estate excess returns, we decompose excess returns into innovations (news) of cash flows, real interest rates, and future expected returns in equation (3). To estimate these innovations, we model excess returns to a real estate portfolio, excess returns to the value-weighted market portfolio, the real interest rate, the one-month t-bill rate relative to its past twelve-month moving average (the relative bill rate), and the dividend yield, according to a K-order VAR process. The estimation of the VAR system is explained in Appendix. We use excess returns on the three real estate portfolios as different proxies for returns to real estate investments. Since the number of parameters in the VAR system increases rapidly with the VAR lag length, and given the capacity of our data sample, we have estimated a first- and a second-order VAR process. Since the results for the two specifications are similar, we report results from a parsimonious first-order VAR model.

Table 3 presents a variance decomposition for real estate excess returns. These are normalized by the variance of unexpected excess returns so that the reported numbers add up to one. We can see that the cash flow innovations ($\varepsilon_{d,t+1}$) account for a large portion of the return variation in some of the real estate portfolios (e.g. 74% for EREITs and 87% for Mortgage REITs). Innovations in future expected returns ($\varepsilon_{e,t+1}$) also account for a large portion of the return variation in some of the real estate portfolios (e.g. 38% for EREITs). The variation in real interest rates and the covariation of the three components account for the rest of the variation in real estate excess returns.

The last row of table 3 reports the correlation between unexpected excess returns ($\nu_{e,t+1}$) and innovations in future expected excess returns ($\varepsilon_{e,t+1}$). The correlations are negative for all real estate portfolios, with small standard errors. This negative correlation implies that unexpectedly large excess returns today are associated with smaller future expected excess returns (or a downward revision in future expected excess returns), given no innovations in future cash flows and real interest rates. Thus, in the absence of news about future cash flows and real interest rates, an unexpected positive current return on an asset has negative implications for new investors since it implies, via the Campbell-Shiller accounting identity, that lower returns on the asset are to be expected in the future. For a risk-neutral investor (e.g. a profit-maximizing financial institution), the above relationship suggests that the investor should be more inclined to invest in an asset after an unexpected drop in an asset's excess return ($e_{t+1}-E_te_{t+1}$), since this price drop is consistent with an upward adjustment in future expected rates of return by the market. Likewise, the investor should be less inclined to invest in an asset after an unexpected increase in the asset's excess return because this price increase could be due to a possible downward adjustment of future expected returns on the asset. Or, put more simply, since past excess returns and future expected excess returns on real estate appear to be negatively related, financial institutions should not buy (invest) when unexpected excess returns have been high and not sell (disinvest) when they have been low.

Figure 2 provides a plot of the variance ratio calculations for the three real estate portfolios, EREITs, Owners, and Mortgage REITs, based on the VAR estimates. The variance ratios are calculated at six month intervals and go from six out to ninety months. Figure 2 reveals that the variance ratios for EREITs and Owners are very similar to one another while the variance ratios for Mortgage REITs are always larger (except for the six month horizon). The variance ratios for these portfolios are greater than one for the six month and twelve month horizons, implying that the autocorrelations for holding period returns less than one-year are predominantly positive. For holding period returns greater than one year, the variance ratios become less than one, implying that negative autocorrelations dominate for holding period returns which are longer than a year. This suggests that mean reversion may exist in real estate excess returns. However, this mean reversion is weaker for Mortgage REITs relative to the two other real estate portfolios.

The mean reversion results in Figure 2 reinforce our earlier statement about the optimal investment strategy for a risk-neutral investor. If real estate market excess returns display a long-term negative serial correlation, or revert to some mean level of return, then a strategy of investing after a return run-up and selling after a return fall will tend to underperform a simple buy-and-hold investment strategy.

B. What has Driven Financial Institutions' Real Estate Investment Decisions?

To find out what has driven financial institutions' real estate investment decisions at the aggregate level, we regress the monthly real estate investments of banks, thrifts, and life insurance companies on their past investments, lagged real estate unexpected excess returns, and lagged interest rates. In order to determine how many lags we should use in these regressions, we began by using a fairly long lag length, and then performed t-tests to eliminate those lagged variables that were statistically insignificant. The final results are presented in Table 4. The top panel of Table 4 reports the regression results for commercial banks' real estate investment behavior. The first line reports the regression equation using EREITs as the real estate return proxy. The second and third lines report the regression equations using the Owners and Mortgage REIT portfolio returns respectively as the real estate return proxies.

As can be seen from the top panel of Table 4, banks' current real estate investments (I_t) are positively related to their one period lagged real estate investments (I_{t-1}), and positively related to lagged real estate unexpected (ex post) excess returns ($v_{e,t-1}$ and $v_{e,t-2}$). The higher are the lagged real estate unexpected excess returns at time t-1 and t-2, the larger is the increase in real estate investment at time t. The second and third panels of Table 4 report the same regression results for our sample of savings and loans and life insurance companies. In general, we see some similarity in investment behavior to that found for commercial banks, with the exception that the relationship between investment and lagged unexpected excess returns at t-1 for life insurance companies is statistically insignificant. A possible regulatory explanation for the different relative sensitivities, across financial institutions, to past returns is discussed later in this section. The goodness of fit ($\overline{R}^2$) for the investment equation is approximately 68% and 65% for commercial banks and thrifts, and approximately 37% for life insurance companies after adjusting for degrees of freedom. We also conduct F-tests on the joint significance of the independent variables in all regressions. The variables were jointly significant in all such tests.

C. Robustness Checks

As a robustness check, we also performed the regression analysis of Table 4 on real estate specific (or abnormal) returns (defined as real estate returns minus market returns times beta). In each case, we continued to find evidence of "trend-chasing behavior". This suggests that our sample of financial institutions were not just chasing some overall or aggregate market trend but also a specific real estate return trend as well.

To test the possibility that financial institutions' real estate investments were simply passively responding to increases and decreases in overall financial institutions' investments, we regressed the percentage changes in financial institutions' real estate investments against percentage changes in total investments and past real estate returns for each class of financial institutions.[8] We found that real estate returns were only partly responsive to total investment changes. For example, a 1% increase in total bank investments led to a 0.44% increase in bank's real estate investments. Moreover, past real estate returns still had a significant effect in determining real estate investments after controlling for total investment changes.[9]

As further confirmation of our results, we performed a similar study on the monthly movement of housing starts. Since housing starts are generally financed by financial institution loans, we should observe similar time-series behavior in housing starts as in the real estate investments of financial institutions. This is confirmed in the bottom panel of Table 4. We see that housing starts are positively related to lagged housing starts, positively related to lagged real estate excess returns, and negatively related to interest rates.

To test further the robustness of our results, we also performed the same analysis on quarterly real estate investments by financial institutions and quarterly unexpected excess returns on various real estate portfolios as well as re-estimating our results in Tables 1-4 with a different set of forecasting variables. We found that our results were quite robust to different specifications of time intervals, forecasting variables and VAR lag lengths. Finally, we performed our regression analysis using the Russell-NCREIF appraisal based return index instead of real estate equity returns. We found similar positive relationships between lagged unexpected returns and current financial institution investments, as those shown in Table 4.[10]

D. "Trend-Chasing" Behavior

Importantly, the positive relationship found between past returns and current financial institution investments represents a "trend-chasing" investment strategy on behalf of financial institution managers. This strategy appears to involve increasing real estate investments after returns have gone up and reducing real estate investments after returns have gone down. From Campbell's accounting identity---equation (2)---and our empirical results in Table 3 discussed earlier, this strategy is consistent with financial institutions' increasing real estate investments when future expected excess returns are falling or are low since high unexpected excess returns today imply falling (low) expected excess returns in the future and vice versa. In other words, U.S. financial institutions appear to have increased real estate investments at times when the *ex ante* future excess returns on real estate are decreasing and to have reduced real estate investments at times when the *ex ante* future real estate returns are increasing.

This view is further supported by panel A of Table 5. We show correlations between financial institutions real estate investments (I_t) and their future expected excess returns ($E_t[e_{i,t+1}]$) as calculated from equation (1). We can see that these correlations are negative in all cases.

Since financial institutions have been adopting an apparent investment strategy based on past returns for most of the last twenty years, it is perhaps no surprise that they have exhibited mediocre or bad performance on their real estate investment portfolios. A "gambler" is doomed to lose money in the long run if he constantly plays with unfavorable odds. Panel B of Table 5 supports this claim by showing that there has been a negative correlation between financial institution's real estate investments in time period t and their *ex post* excess returns for time period t+1.[11] We also show in Panel C of Table 5 that there has been a mostly negative correlation between investments in time t and the average monthly *ex post* excess returns over the holding period from t+1 to t+12. These results confirm that a poor investment strategy, i.e., a belief that high past excess returns imply high future excess returns, has resulted in poor investment performance.[12]

Moreover, it should be noted that our "trend-chasing" evidence contradicts the moral hazard (mis-priced) insurance view since this would argue against finding reductions in financial institutions' real estate investments in bad real estate markets. Specifically, in a moral hazard world with underpriced or subsidized insurance guarantees, financial institutions would increase their real estate investments in bad real estate markets since they could capture the upside of a recovery and not worry about the downside of a prolonged recession given their potential bailout protection from regulators.[13]

E. A Comparison between the Performance of "Trend-Chasing" vs. a Buy-and-Hold Strategy

To further gauge the economic significance of the negative correlation between financial institutions' real estate investments and expected future returns, we formed three real estate portfolios based on out-of-sample excess return forecasts and specific types of investment strategy assumed for financial institution managers. The out-of-sample excess return forecasts are formed using 10-year rolling regressions with the forecasting variables listed in Table 2. For any time period t, we estimate equation (1) using data from t-1 to t-120. This regression is then used to form an excess return forecast, $E_t[e_{i,t+1}]$, using X_{pt}. The excess return forecasts (expected excess returns) are calculated for the time period of 1981.2-1989.12. Based on the return forecast, we form a passive buy and hold portfolio and two active portfolios: a Long(-) portfolio and a Long(+) portfolio.

Specifically, the Buy and Hold portfolio is formed by holding onto real estate assets over the full 1981.2-1989.12 period. The Long(-) portfolio is formed by taking a long position in the real estate asset whenever the excess return forecast is negative, closing the position and putting the proceeds in treasury bills whenever the excess return forecast is positive. The Long(+) portfolio is formed by taking a long position in real estate assets whenever the excess return forecast is positive, while closing the position and putting the proceeds in treasury bills whenever the excess return forecast is negative.

Table 6 reports the mean excess returns for the passive Buy and Hold portfolio and the two active portfolio strategies using three different proxies for real estate asset returns. It is interesting to see that not only is the Long(-) portfolio easily beaten by the Buy and Hold portfolio but that it also generates negative excess returns during the holding period. By contrast, the Long(+) portfolio beats the Buy-and-Hold portfolio by a significant margin. Although most banks cannot adjust their real estate loan portfolios as easily as buying and selling stocks of real estate companies and real estate investment trusts (as well as "shorting" real estate), the results tentatively suggest that a financial institution manager could do better by following a simple buy-and-hold strategy instead of using the trend-chasing strategy of increasing his real estate investments when past excess returns are positive (expected excess returns are negative) and decreasing positions when past excess returns are negative (expected excess returns are positive).[14]

Our study here is consistent with the empirical results of DeBondt and Thaler (1988), and Jegadeesh (1990), who find that a contrarian strategy could earn abnormal excess returns if asset returns follow a mean-reverting process. Here we show that a "trend-chasing" strategy leads to a poor return performance if asset returns are mean-reverting.

F. Rational Explanation for the "Trend Chasing" Strategy

Although we have shown above that a "trend-chasing" strategy is inconsistent with profit maximization, the strategy could be rational under certain conditions.

First, managers of financial institutions may not be risk neutral--due to human capital or other reasons (see Saunders, Travlos and Strock (1990)). In a world of risk-averse managers, where expected returns and systematic risk are partly related, higher expected future excess returns will imply high future risk exposures to managers. As a result, financial institution managers will rationally reduce their investments in real estate assets when expected future returns are high.

Secondly, as Gordon (1989) has shown, "herding behavior" can be rational if investors have short investment horizons. In the context of our model, buying when real estate prices are high and selling when they are low is consistent with herd-type behavior.

Thirdly, we have assumed explicitly that real estate loans are supply side determined, using financial institution managers in an analogous fashion to mutual fund managers actively managing a portfolio of assets. Such an approach is consistent with general condition of credit rationing being present in the market for bank loans (see Berger and Udell (1992)). Moreover, when we examined the investment behavior of more direct real estate investors, such as investments by equity REITs and mortgage REITs, we found no clear evidence of "trend-chasing behavior". This is at least consistent with the assumption that depository financial institutions' investments are more supply-driven rather than demand-driven at least when compared to more direct real estate investors such as REITs.[15]

G. Regulation and the "Trend-chasing" Strategy

One partial explanation for the "trend-chasing" strategy of financial institutions could be the examination procedures by financial institution regulators themselves. In general regulators/ examiners will be less aggressive and interventionist if a financial institution has an apparently "strong" current balance sheet. In particular, they are less likely to restrict investments in areas such as real estate if a financial institution's capital or net worth appears to be strong. In such a world, a run up in real estate prices may be perceived as improving a financial institutions' net worth position and lead to a relaxation of regulatory constraints on real estate investments.[16] On the other hand, a fall in real estate prices may lead to enhanced perceptions among regulators/examiners that the balance sheet and financial institutions' capital position are weak and lead to a tightening of regulatory constraints on real estate investments. This means relatively easy credit availability (increased real estate investments) during a real estate market boom and a possible credit crunch (decreased real estate investments) during a market fall.

If this is a fair characterization of the regulatory process, then the examination/regulation system may be partly to blame for reinforcing the "trend-chasing" behavior of financial institution managers. Further, it might be that the stronger the examination/intervention system, the more powerful the "trend-chasing" strategies of financial institutions. Our results partly support this view in that the relatively more examined/regulated banks show a stronger relationship between investment and ex post returns than the more weakly regulated life insurance companies. For example, the latter are mostly subject to off-site monitoring at the state level rather than being subject to both on-site and off-site monitoring (at the federal level) as is the case for most large banks.

Our analysis also casts some doubts on the value of using market value accounting systems for financial institutions. Under the stylized bank examination procedures described above, it is easy to see that market value accounting may actually enhance the "trend-chasing" behavior of financial institutions. This is because under historical-cost accounting systems the book values of real estate investments tend to be below market values after a market boom and to be above market values after a market fall; while under a market-value accounting system the real estate portfolio will be marked to market and show high actual returns in boom markets and low actual returns in slumps. If regulators (and managers) believe high past returns imply high future returns they may allow financial institutions to relax further any constraints on their real estate investments. Unfortunately, as we have shown, high returns today often imply low returns tomorrow.

V. Summary and Conclusions

In this paper, we used commercial bank, savings and loans association and life insurance company real estate investment data to address the issue of whether their poor performance in recent years has been consistent with a poorly formed investment strategy. We first employed a multi-factor latent-variable model to derive the time-varying *ex ante* (or expected) excess returns on various real estate investment portfolios. We then employed the approximate accounting identity of Campbell (1991) to infer an inverse theoretical relationship between past (ex post) excess returns on risky assets, such as real estate, and future ex ante (or expected) excess returns on those assets. We found that real estate investments made by the U.S. financial institutions have largely been driven by ex post real estate returns. This "trend-chasing" strategy ignored the potential negative correlation between current and past real estate returns and their future expected values. Indeed, we showed empirically that such a negative correlation is supported by available data. Tests that compared the performance of this "trend-chasing" strategy with a simple Buy-and-Hold strategy were shown to offer an explanation for the poor performance of financial institutions' real estate investment in recent years. We also argued that regulatory behavior may have contributed to this "trend-chasing" behavior and that the introduction of market value accounting for financial institutions may actually exacerbate such behavior.

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APPENDIX

To construct proxies for *ex ante* real estate asset expected excess returns, we assume that asset returns are generated by the following K-factor model:

$$e_{i,t+1} = E_t[e_{i,t+1}] + \sum_{k=1}^{K} \beta_{ik} f_{k,t+1} + \varepsilon_{i,t+1} \tag{A1}$$

where $e_{i,t+1}$ is the excess return on asset i, held from time t to time t+1, in excess of the risk-free rate. $E_t[e_{i,t+1}]$ is the conditional expected excess return on asset i for time period t+1. Under either a no arbitrage condition or a general equilibrium condition, we should have:

$$E_t[e_{i,t+1}] = \sum_{k=1}^{K} \beta_{ik} \lambda_{kt}, \tag{A2}$$

where λ_{kt} is the "market price of risk" for the k'th factor at time t. Now suppose that the information set at time t consists of a vector of L (L > K) economic or forecasting variables X_{pt}, p=1...L, and that conditional expectations are linear in those variables. Then we can write λ_{kt} as:

$$\lambda_{kt} = \sum_{p=1}^{L} \theta_{kp} X_{pt}, \tag{A3}$$

and substituting (A3) into (A2), we have

$$E_t[e_{i,t+1}] = \sum_{k=1}^{K} \beta_{ik} \sum_{p=1}^{L} \theta_{kp} X_{pt} = \sum_{p=1}^{L} \alpha_{ip} X_{pt}. \tag{A4}$$

This allows us to use equation (A4) to examine the degree to which economic (or "forecasting") variables, X_{pt}, explain the *ex ante* time-variation in expected excess returns on various assets. We can see from equation (A4) that the coefficients α_{ip} are restricted by the following equation:

$$\alpha_{ip} = \sum_{k=1}^{K} \beta_{ik} \theta_{kp} \,. \tag{A5}$$

where β_{ik} and θ_{kj} are free parameters. See Ferson (1989) for details of estimation procedure.

To estimate innovations (news) of cash flows, real interest rates, and future expected returns in equation (3), we model excess return to a real estate portfolio, excess returns to the value-weighted market portfolio, the real interest rate, the one-month t-bill rate relative to its past twelve-month moving average (the relative bill rate), and the dividend yield, according to a K-order VAR process. We define a vector z_{t+1} which has k elements, the first of which is excess returns e_{t+1} on the asset in question (e.g. the real estate asset), and the second of which is real interest rates. We assume that the vector z_{t+1} follows a first-order VAR process shown in equation (A6) below:

$$z_{t+1} = Az_t + w_{t+1} \tag{A6}$$

Higher-order VAR models can be stacked into this VAR(1) format in the same manner as discussed in Campbell and Shiller (1988).

In addition to the vector z_{t+1}, we also define a k-element vector e_1, whose elements are all equal to zero, except the first element which is equal to 1, and another vector e_2, whose elements are all equal to zero except the second element which is equal to 1. Using equation (2), we obtain:

$$\varepsilon_{e,t+1} = e_1'\rho A(I - \rho A)^{-1}w_{t+1}, \qquad \varepsilon_{r,t+1} = e_2'(I - \rho A)^{-1}w_{t+1} \tag{A7}$$

In addition, given that the first element of w_{t+1} is $\upsilon_{e,t+1} = e_1'w_{t+1}$, equation (3) implies that we can calculate cash flow risk as follows:

$$\varepsilon_{d,t+1} = (e_1' + e_1'\rho A(I - \rho A)^{-1} + e_2'(I - \rho A)^{-1})w_{t+1}. \tag{A8}$$

We will use equations (A7) and (A8) to study the relationship between unexpected excess returns today ($\upsilon_{e,t+1}$) and expected excess returns in the future ($\varepsilon_{e,t+1}$) and decompose the variance of unexpected asset returns ($\upsilon_{e,t+1}$) into the cash flow risk ($\varepsilon_{d,t+1}$), real interest rate risk ($\varepsilon_{r,t+1}$), and future excess return risk ($\varepsilon_{e,t+1}$), and their covariances in section IV. See Campbell and Ammer (1993) for details of the estimation procedure.

Footnotes

[1]Salomon Brothers, U.S. Equity Research, Commercial Banks, February 12, 1993, Figure 2.

[2]The literature on time-varying asset returns is much too large to cite here adequately. A partial list of references might include Bernanke (1990), Campbell (1987), Fama and French (1988, 1989), Keim and Stambaugh (1986), Lo and Mackinlay (1988). Liu and Mei (1991) have studied this phenomenon in the context of real estate asset returns.

[3]Although the Campbell model is concerned with equity valuation, the valuation decomposition is generalizable to all risky assets. In the case of real estate, the subject of the paper, dividends can be substituted for by cash flows on real estate investment assets.

[4]Campbell (1990), Cochrane (1988), Lo and MacKinlay (1988), and Poterba and Summers(1988), have all used the variance ratio test to document the mean reverting behavior of stock returns. Kandel and Stambaugh (1988) also report a number of calculations of this type.

[5]A constant is also included. A number of other specifications were also examined as robustness checks.

[6]It should be noted that most mortgage-backed securities are created by direct swaps of mortgages for securities by banks and thrifts with agencies such as FNMA and FHLMC. As such the size of savings and loan mortgage-backed security portfolios reflect the creation of underlying mortgage assets.

[7]See Campbell (1987), Campbell and Hamao (1991), and Ferson (1989) for details on testing the linear pricing relationship (A5) in multi-factor models. The χ^2-tests also include excess returns to a real estate builder portfolio. For parsimonious presentation, results about the portfolio are not given in the paper. (They are similar to the three real estate portfolios used in the paper.) They were given in an earlier version of this paper, which is available upon request.

[8]For commercial banks, total investment used was total loans. However, because commercial and consumer loans are such small proportion of Savings and Loans and Life Insurance company

assets (approximately 5% or less on average), we used total assets as a measure of total investment variable.

[9]A complete table of these results are available upon request.

[10]Some of the results are presented in an earlier version of this paper. All of these results are available upon request.

[11]We also calculated the correlation between investment in time t and its *ex post* future excess returns for time t+2 to t+4. The results are quite similar to those for t+1. They can be obtained from authors upon request.

[12]Due to the lack of data, we could only study the relationship between investment and their short-term *ex post* excess return. It would be interesting to study the relationship between investment and their long-term *ex post* excess returns (i.e. beyond one year).

[13]This is likely to be particularly true for the largest financial institutions, especially those viewed as being ex ante "too big to fail".

[14]It is worth noting that although the Buy-and-Hold strategy offers higher excess returns over the Long (-) strategy (e.g., 0.550% vs -0.079% *per month* for EREITs, 0.653% vs -0.378%*per month* for Owners), it might be argued that it is also more risky (e.g., 3.09% vs 1.68% *per month* for EREITs, 5.90% vs 3.16%*per month* for Owners). However, a simple "asset allocation" approach of investing 50% in real estate (via Buy-and-Hold) and 50% in risk-free asset (t-bills) will cut the portfolio risk in half and still allow the investor to enjoy significant positive excess returns. This result is shown in the last column of table 6.

[15]We thank one of the reviewers for suggesting the following test to distinguish the supply-driven *vs* the demand-driven explanation. Following his/her suggestion, we constructed four time series from the quarterly Compustat data base: average investment per REIT for Equity REITs and Mortgage REITs and total real estate investments by Equity REITs and Mortgage REITs. The number of companies in the four samples varied over time. On average, there were about 90 companies in the Equity REITs samples and about 18 companies in the Mortgage REITs

samples. The sample period covers the period from 1982:Q1-1992:Q4. Using these investment series, we performed the same regression analysis as that used in Table 4. We found that the coefficients on past returns had mixed signs and only one out of thirty-two coefficients was statistically significant at the 5% level. These results are available from the authors upon request.

[16] Here we are talking about implicit regulation via the examination process rather than the explicit constraints such as maximum amount of funds that can be invested in certain assets as a proportion of bank capital.

Table 1

A. Summary Statistics for 1971.2-1989.12

	Mean(%)	S. D.(%)	ρ_1
Dependent Variables:			
Excess return on the market portfolio	0.315	4.727	0.051
Excess return on government bond portfoilio	0.072	3.265	0.057
Excess return on Equity REITs portfoilio	0.621	4.828	0.120
Excess return on Owner portfoilio	0.760	8.511	0.129
Excess return on Mortgage REITs portfoilio	-0.006	6.511	0.013

B. Correlations among Excess Returns of Different Assets

	Market	Bonds	REITs	Owner	Mortgage
Market	1.000	0.316	0.623	0.681	0.440
Bonds		1.000	0.180	0.211	0.283
REITs			1.000	0.843	0.735
Owner				1.000	0.700
Mortgage					1.000

Notes: The sample period for this table is 1971.2-1989.12, with 227 observations. Units on excess returns are percentage point per month. ρ_1 is the first-order autocorrelation coefficient of the series.

Table 2

Regression of excess returns on each asset class at time t+1 on the excess return on the value-weighted market portfolio, the real interest rate, the relative bill rate (rrel), the dividend yield at time t. Regression coefficients are given by the first line of each row, while the t-statistics are given in parenthesis in the second row. The sample period is 1971.2-1989.12.

$$r_{i,t+1} = \text{Cons.} + \alpha_1 \text{VWret}_t + \alpha_2 \text{real-rate}_t + \alpha_3 \text{rrel}_t + \alpha_4 \text{DivYld}_t + \tilde{\varepsilon}_i$$

Asset Class	Constant	VWret	real rate	rrel	DivYld	$\bar{R}^2$	DW
Market	-2.118	0.015	0.092	-0.622**	0.631	.055	1.96
	(-1.29)	(0.21)	(1.21)	(-3.13)	(1.48)		
Govt. Bonds	-1.736	-0.079*	0.115**	-0.065	0.454	.028	1.91
	(-1.51)	(-1.68)	(2.14)	(-0.47)	(1.52)		
Equity REITs	-2.669	0.151**	0.046	-0.454**	0.862**	.054	1.93
	(-1.59)	(2.19)	(0.59)	(-2.24)	(1.98)		
Owner	-3.779	0.236*	0.143	-0.631*	1.160	.037	1.91
	(-1.27)	(1.92)	(1.02)	(-1.75)	(1.49)		
Mortgage REITs	-3.153	0.066	0.172	-0.667**	0.792	.044	2.14
	(-1.39)	(0.70)	(1.62)	(-2.42)	(1.34)		

χ^2-statistic of the linear pricing restriction (4): 37.69 (K=1, DF=25) Significance level: P=0.009
χ^2-statistic of the linear pricing restriction (4): 20.60 (K=2, DF=16) Significance level: P=0.056
χ^2-statistic of the linear pricing restriction (4): 7.152 (K=3, DF=9) Significance level: P=0.306

Note: Asterisk * indicates significance level at 10% while asterisks ** indicates significance level at 5%. K is the number of systematic factors in the economy. Units on the one-month real interest rates, the relative bill rate, and the dividend yield are percentage per annum.

Table 3

Variance Decomposition for Excess Real Estate Returns

	EREITs		Owner		Mortgage	
Share of						
$Var(\varepsilon_d)$	0.740	(0.21)	0.682	(0.26)	0.870	(0.37)
$Var(\varepsilon_r)$	0.276	(0.12)	0.093	(0.04)	0.150	(0.06)
$Var(\varepsilon_e)$	0.381	(0.27)	0.238	(0.19)	0.313	(0.19)
$-2cov(\varepsilon_d,\varepsilon_r)$	-0.582	(0.29)	-0.313	(0.16)	-0.378	(0.22)
$-2cov(\varepsilon_d,\varepsilon_e)$	0.495	(0.21)	0.417	(0.11)	0.192	(0.27)
$2cov(\varepsilon_r,\varepsilon_e)$	-0.310	(0.28)	-0.116	(0.11)	-0.148	(0.17)
$corr(\nu_e,\varepsilon_e)$	-0.767	(0.07)	-0.796	(0.07)	-0.599	(0.19)

Note: ε_d, ε_r and ε_e represent news about future cash flows, real interest rates, and news about future expected returns respectively. The numbers in parentheses are standard errors. They are calculated from a first-order VAR system. The variances and covariance are normalized by the variance of unexpected excess returns (ν_e) so that the numbers reported on the top panel add up to one. The sample period is 1972.1-1989.12.

Table 4

Regression of real estate investment (I_t) on a constant, lagged real estate investment(I_{t-1}), lagged real estate unexpected excess returns ($v_{e,t-1}$ and $v_{e,t-2}$), and lagged interest rate($Tbill_{t-1}$).

	cons	I_{t-1}	$v_{e,t-1}$	$v_{e,t-2}$	$Tbill_{t-1}$	F-test	$\overline{R}^2$
Bank I_t		1973.1-1989.12					
EREITs	4.107**	0.760**	0.077*	0.103**	-0.166**	0.00	0.677
Owner	4.043**	0.764**	0.049**	0.053**	-0.163**	0.00	0.677
Mortgage	4.001**	0.776**	0.051	0.060*	-0.174**	0.00	0.671
Savings & Loans I_t		1977.1-1989.12					
EREITs	3.347**	0.741**	0.153**	0.201**	-0.175	0.00	0.669
Owner	3.508**	0.742**	0.102**	0.070*	-0.188*	0.00	0.665
Mortgage	3.444**	0.758**	0.089	0.162**	-0.193*	0.00	0.666
Life Insurance I_t		1972.1-1989.12					
EREITs	1.990**	0.639**	-0.022	0.119**	0.032	0.00	0.394
Owner	2.012**	0.636**	-0.008	0.063**	0.032	0.00	0.392
Mortgage	2.085**	0.636**	0.012	0.042	0.022	0.00	0.381
Housing Statrs I_t		1972.1-1989.12					
EREITs	3.253**	0.859**	0.036*	0.019	-0.137**	0.00	0.879
Owner	3.258**	0.857**	0.023**	0.015	-0.134**	0.00	0.880
Mortgage	3.246**	0.859**	0.043**	0.017	-0.136**	0.00	0.883

Note: Real estate investments (I_t) by various financial institutions are measured by: i) the monthly (%) changes in real estate laons made by all commercial banks, ii) the monthly (%) changes in mortgage loans outstanding for FSLIC insured savings and loan associations, iii) the monthly (%) changes in total mortgage assets of life insurance companies, iv) housing starts. The lagged uxpected return, $v_{e,t}$, is defined as $e_{i,t} - E_{t-1}(e_{i,t})$. All variables are seasonally adjusted and obtained from the CITI-base. Asterisk * indicates significance level at 10% while asterisks ** indicates significance level at 5%.

Table 5

A. Correlations Between Increase in Real Estate Investment (I_t) and Their *ex ante* Expected Excess Return ($E_t[e_{i,t+1}]$)

	Bank	S & L	Life	Housing Start
EREITs	-0.464	-0.419	-0.108	-0.495
Owner	-0.440	-0.426	-0.114	-0.465
Mortgage	-0.460	-0.395	-0.135	-0.479

B. Correlations Between Real Estate Investment (I_t) and Their *ex post* Excess Return ($e_{i,t+1}$)

	Bank	S & L	Life	Housing Start
EREITs	-0.068	-0.055	-0.014	-0.026
Owner	-0.059	-0.049	-0.021	-0.013
Mortgage	-0.078	-0.122	0.017	-0.042

C. Correlations Between Real Estate Investment (I_t) and the Average Monthly *ex post* Excess Return from t+1 to t+12.

	Bank	S & L	Life	Housing Start
EREITs	-0.083	0.167	0.011	-0.268
Owner	-0.052	0.095	0.003	-0.264
Mortgage	-0.216	-0.201	-0.159	-0.355

Note: Real estate investments by various financial institutions are measured by: i) the monthly (%) changes in real estate laons made by all commercial banks, ii) the monthly (%) changes in mortgage loans outstanding for FSLIC insured savings and loan associations, iii) the monthly (%) changes in total mortgage assets of life insurance companies, iv) housing starts. All variables are obtained from the CITI-base and seasonally adjusted.

Table 6

Mean Portfolio Excess Returns Based on Out-of-Sample Predictions

Strategy	Long(-)	Buy & Hold	Long(+)	50% Buy & Hold, 50% t-bill
EREITs	-0.079	0.550	0.629	0.287
	(1.68)	(3.09)	(2.58)	(3.04)
	[-0.48]	[1.84]*	[2.56]**	[1.84]
Owner	-0.378	0.653	1.032	0.327
	(3.16)	(5.90)	(4.89)	(2.95)
	[-1.23]	[1.14]	[2.17]**	[1.14]
Mortgage	-0.392	0.344	0.737	0.172
	(2.35)	(4.06)	(3.21)	(2.03)
	[-1.72]*	[0.87]	[2.36]**	[0.87]

Note: The out-of-sample excess return forecast is based on a 10-year rolling regression using the forecasting varibles listed in Table 2. The numbers in the parentheses are the standard deviations of the excess returns of the portfolios. The numbers in the square brackets are the t-statistic for the test of mean excess return being zero. Asterisk * indicates significance level at 10% while asterisks ** indicates significance level at 5%. The Long(-) portfolio is formed by taking a long position in the real estate asset whenever the excess return forecast is negative, closing the position and putting the preceeds in treasury bills whenever the excess return forecast is positive. The Buy & Hold portfolio is formed by holding the real estate portfolio. The Long(+) portfolio is formed by taking a long position in the real estate asset whenever the excess return forecast is positive, closing the position and putting the preceeds in treasury bills whenever the excess return forecast is negative. The portfolios are formed over the period of 1982.2-1989.12.

Figure 1: Conditional Risk Premium on Real Estate Assets

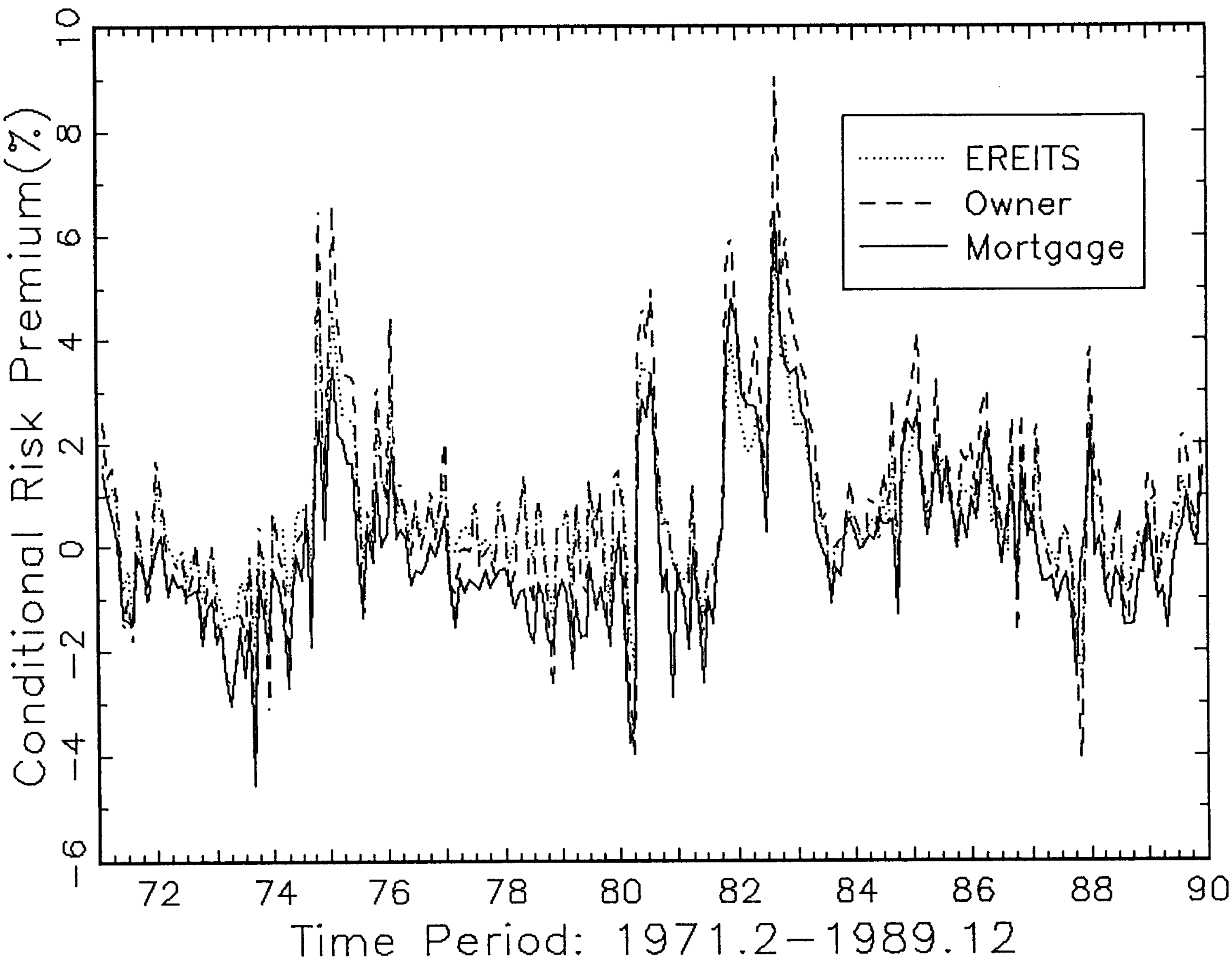

Figure 2: Implied Variance Ratio