

## The response of real estate investment trust returns to macroeconomic shocks

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Received 13 November 2001; accepted 20 May 2003

### Abstract

To date, there has been considerable concern with evaluating the performance of real estate returns or determining the significance of fundamental state variables. This paper differs from the existing literature by identifying the response of real estate investment trust (REIT) returns to *unexpected* changes in the real output growth, the inflation, the default risk premium, and the stance of monetary policy utilizing the newly developed technique of *generalized* impulse response analysis. The generalized impulse response method does not impose a priori restrictions as to the relative importance each of these variables may play in the transmission process. The results show the extent and the magnitude of the relationship between the REIT market and macroeconomic factors. In particular, we find that shocks to monetary policy, economic growth, and inflation all lead to lower than expected returns, while a shock to the default risk premium is associated with higher future returns.

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*JEL classification:* G120; E440

*Keywords:* Real estate; Vector autoregression; Macroeconomic factors

### 1. Introduction

In recent years, interest in the performance of real estate markets and real estate investment trusts (REITs) has become increasingly popular (Chandrashekar, 1999). The impact that macroeconomic variables have on real estate markets and REITs plays a crucial role in the risk management strategies of financial market participants. In fact, a number of papers support the notion of a relationship among the returns of various asset markets and macroeconomic variables (e.g., Chen et al., 1986; McCue and Kling, 1994; Thorbecke, 1997; Chen et al., 1997, 1998 to name just a few). However, much of the existing research on real estate and REIT returns tends to focus on identifying important state variables and determining which factors are significantly priced (e.g., Chen et al., 1997, 1998; Chandrashekar, 1999; Naranjo and Ling, 1997) or on evaluating return performance (e.g., Brueggeman et al., 1992; Peterson and Hsieh, 1997).

McCue and Kling (1994) examine the time series dynamics of REIT returns by estimating an unrestricted vector autoregressive (VAR) model incorporating the influence of four macroeconomic variables on REIT returns, specifically, prices, nominal short-term interest rates, output, and investment. However, as pointed out by Karolyi and Sanders (1998), an important variable to consider is the default risk premium in explaining REIT returns. Thus, this paper extends the time series work of McCue and Kling (1994) on the influence of the macroeconomy on REIT returns on three basic fronts. First, we examine the impact of default risk premium on REIT returns. Second, following the work of Jensen et al. (1996), we explicitly incorporate the influence of monetary policy shocks in addition to variables reflecting business cycle conditions on REIT returns. Third, to circumvent the “orthogonality assumption” and the corresponding variability of the results due to the ordering of the variables in the VAR models, we employ the *generalized* impulse response functions developed by Pesaran and Shin (1998) and Koop et al. (1996). This methodology has two advantages over standard impulse response analysis. It does not presuppose any ordering that has theoretical implications and thus does not depend on the

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researcher's choice of ordering the variables. The methodology also provides meaningful interpretation of the initial impact of shocks, a feature that is missing in the traditional methodology and which might be important in the analysis of financial markets where information is transmitted quickly. A more thorough discussion of generalized impulse response analysis is provided in Section 4.

The paper focuses on four fundamental macroeconomic variables thought to affect asset returns. The macroeconomic variables are chosen based on previous findings that have identified the stance of monetary policy, the inflation, the default risk premium, and the real economic activity, as important state variables in asset pricing and REIT returns. The relationship between an index of REIT prices and each of these macroeconomic factors is examined by estimating a five-equation VAR model. In addition to the parameter estimates of the VAR model, the generalized impulse response functions allow us to compare and contrast the effects of unanticipated changes in the macroeconomic factors on the REIT market. The paper employs this recently developed econometric technique of generalized impulse response analysis (Koop et al., 1996; Pesaran and Shin, 1998). An innovation to any of the variables may be interpreted as (unexpected) economic *news*. In an earlier work, Fleming and Remolona (1999) find that the reactions of the bond markets depend on the unexpected component of a given macroeconomic announcement. Clearly, firms, financial market participants, households, and thus the REIT market, may be affected by movements in any of these variables. Knowledge of what leads to movements in REIT returns and how long shocks may last might be of concern to financial practitioners, real estate investment companies, and academics. This is particularly true because the REIT market is a unique market that, on one hand, shares characteristics of the broad real estate market, and on the other hand, also possesses characteristics of the public stock market. In fact, Chen et al. (1998, p. 270) note that the financial literature indicates that, when compared to ordinary common stocks, REITs "may possess distinct risk-return characteristics." Adding further justification to why the study of REIT returns is an important endeavor, Chandrashekar (1999, p. 111) concludes that "REIT stocks may have an important role to play in dynamic asset allocation strategies."

## 2. Macroeconomic factors and the REIT market

In choosing the macroeconomic factors to include in our analysis, we borrow from the literature that has studied the relationship between stock market returns, as well as real estate returns, and macroeconomic factors. For instance, He and Ng (1994) found several measures of macro risk to be important when examining the relations among market fundamentals, economic forces, and the stock market. Of course, the seminal article in this area is that of Chen et al.

(1986). In particular, we examine how REIT returns respond to shocks in monetary policy, real output, default risk, and inflation.

At the aggregate level, the stage of the business cycle—whether the economy is in a growth period or recession—affects the level of activity in real estate markets and REITs. A steadily growing, robust economy may go hand-in-hand with a robust real estate market; however, *unexpected* changes in production and output may actually lead to lower real estate returns (McCue and Kling, 1994; Naranjo and Ling, 1997). For example, if the news contained in an output shock signals future inflation or a tightening by the Fed to relieve price pressures, then the real estate market may respond negatively in anticipation of higher future borrowing costs and prices. Additionally, if investors expect stocks to perform better following a positive output shock, relative to real estate, then there may be a substitution away from REITs and into equities, with REIT returns falling in the process.

Inflation affects input and output prices and therefore can influence firm performance and profitability as well as household purchasing power. The rate of expected inflation affects the real cost of borrowing and the real return from lending and would, therefore, affect the balance sheets of firms and households. Furthermore, unanticipated inflation, by creating volatility and uncertainty in price changes, may restrict contracting and alter economic activity. Stokes and Neuburger (1998) provide empirical evidence that inflation influences bond prices and returns, while McCue and Kling (1994) as well as Naranjo and Ling (1997) identify unexpected inflation as an important driver of REIT and commercial real estate returns.

It is well documented that both corporate bankruptcy and default rise markedly during business downturns (Friedman and Kuttner, 1998). If investors believe that a downturn is imminent, then default rates will rise as they will demand a higher interest rate on those instruments with the higher probability of default. Jarrow and Turnbull (2000) relate the probability of default to the state of the economy. Thus, the default risk premium may act as a signal of investors' expectations about future economic conditions. As investors find corporate bonds and equity relatively less attractive, the demand for other (real) assets should increase and the returns to owning REITs and real estate should rise. Examining REITs, Karolyi and Sanders (1998) found bond market risk premiums to capture much of the variation in returns.

Jensen et al. (1996), Thorbecke (1997), and Ewing (2001a), among others, examine how the stance of monetary policy affects asset markets. Monetary policy affects interest rates and aggregate demand. Changes in interest rates may affect the real return from lending and the real cost of borrowing, at least in the short run. Naranjo and Ling (1997) also argued that short-term interest rates systematically affect REIT returns. The inclusion of another short-term interest rate would be redundant in our model as we include

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