



Effects of structural changes on the risk characteristics of REIT returns

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ABSTRACT

This investigation provides evidence and identifies two important structural changes in the risk characteristics of real estate investment trusts (REITs), namely, the 1993 tax reform and the inclusion of REITs in the mainstream S&P indices in 2001. Using daily data from 1989 to 2008, this study finds that institutional investors tended to increase their investment in REITs following the 1993 tax reforms, and these increases in institutional investment are significantly reducing exposure to interest rate risk, which may result from the benefits of external monitoring. Additionally, the inclusion of REITs in the Standard and Poor's mainstream indices since 2001 has increased the market risk of REITs, led to associated returns behaving more like those of stocks, and improved the market efficiency in processing new information. These observation results demonstrate these two structural changes in the risk characteristics of REIT returns. Finally, the study results confirm that the shape of the distribution of REIT returns varies among sub-samples, indicating that risk management is increasingly important.

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1. Introduction

Real estate investment trusts (REITs) have been important in real estate investment since Congress created them in 1960. REITs not only provide alternative investment opportunities and tools that individual investors can use in the real estate market, but also enable individual investors to invest in commercial properties that would otherwise be too large for them. Additionally, because REITs are treated differently for tax purposes than general corporations investing in real estate, the importance of securitized real estate as an asset class has grown considerably. Historical statistics indicate that the market capitalization of the REITs industry amounted to NT\$ 312,009 million at the end of 2007, representing an increase of 209 times since 1972.

In fact, REITs have displayed astonishing growth considerably in terms of market capitalization, which can be attributed to the increasing number of REITs listed between 1990 and 1999 and the strong share price performance from 2000 to 2006.¹ Particularly, these changes also imply some key information. For instance, two break points may exist in the REITs market, which are the Omnibus Reconciliation Act (OBRA) of 1993 and the inclusion of REITs in the S&P 500 index in 2001. Before 1993, to avoid excessive centralization of REIT shares, pension plans were limited in terms of the amount they could invest in REITs based on the five-or-fewer rule, which prohibited excessively concentrated ownership of REITs by specifying that five or fewer shareholders could collectively own no more than 50 percent of the shares of REITs. The 5/50 restriction regarding REIT holdings was modified following the implementation of the 1993 Tax Act. The reform permitted institutions to count each of their own investors in REITs and thus increased more institutional investment in these vehicles.

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¹ The numbers of REITs listed at the end of 1999 reflected an increase of nearly 70 percent compared with 1990. In particular, the numbers increased rapidly after 1992. In addition, the price index for all REITs rose from 78.23 to 198.53 between 2000 and 2006. These statistical data were obtained from the National Association of Real Estate Investment Trusts (NAREIT).

Additionally, the inclusion of REITs in the mainstream benchmark indices of S&P has increased the influence of sentiment in the REITs market since 2001, and has also increased investor awareness of REITs, making them particularly attractive to fund managers. Consequently, it is important that investors be well-informed of the variations in REITs performance and associated risks. In contrast to the existing literature, this study uses high frequency data to examine whether the risk characteristics of REITs have significantly changed in the two break points. The analytical results presented in this study can help investors improve their understanding when making investment decisions and engaging in hedging activities.

In the existing literature, several authors have examined the influence of tax reforms on real estate values or REIT returns. However, these studies have generally focused on the effects of the amendments to the 1976 or 1986 Tax Reform Acts (TRAs), which eliminated many investment incentives related to REITs that had been part of earlier tax reforms. For example, [Follain, Hendershott, and Ling \(1987\)](#) used simulation modeling to analyze the effects of tax reform on real estate demand, and argued that the 1986 Tax Reform Act was unlikely to discourage real estate activity at the aggregate level. Depreciable real estate was slightly disfavored due to the increase in the equilibrium level of rents. In contrast, owner-occupied housing was favored, both directly by reduced interest rates and indirectly by increased rents. [Nourse \(1987\)](#) estimated the influence of the tax acts on capitalization rates for real estate using appraisal data. His study demonstrated that the 1976 TRA did not significantly change the capitalization rate, but the rate was still significantly reduced in 1981. Similarly, [Sanger, Sirmans, and Turnbull \(1990\)](#) used market data, involving samples of REITs and non-REIT real estate firms, to evaluate the empirical effects of the 1976 and 1986 TRAs. They argued that the systemic risk of REITs decreased significantly during the period surrounding the passage of each act. Specifically, the discovery is relevant to this investigation because the conclusion clearly identifies the above structural changes as affecting the risk characteristics of the REITs industry.

On the other hand, it is important to consider what has affected the development of the REITs market apart from the influences of the tax reforms. Most previous investigations the characteristics of returns series have focused on the relationship between REITs and other markets. [Peterson and Hsieh \(1997\)](#), [Glascock, Lu, and So \(2000\)](#), and [Stevenson \(2002\)](#) demonstrated that stock market returns significantly influence REIT returns. Particularly, the inclusion of REITs in the S&P mainstream benchmark indices since 2001 has increased the influence of general market sentiment in determining REIT returns. [Cotter and Stevenson \(2006\)](#) noted that the potential for environmental change had implications for issues such as risk measurement and management. If a structural break occurs in the risk characteristics of REIT prices, investors will regard their risk control activities and their hedging portfolios as more important and complex. Therefore, the conclusions regarding the high growth of REITs market capitalization are relevant. High trading of the S&P mainstream indices may drive the changes in REIT risk characteristics. However, no such evidence exists in relation to the variation in the risk characteristics of REIT returns. Consequently, this investigation builds on the current literature by examining some of the key transitions in relation to the risk factors affecting REIT returns.

Regarding the REIT risk premia, interest rates are a significant future macroeconomic leading indicator. Particularly, the interest rate on ten-year government bonds has attracted increased market attention. A large number of studies, such as [Chen and Tzang \(1988\)](#), [Liang and Webb \(1995\)](#) and [He, Webb, and Myer \(2003\)](#), have identified the interest rate sensitivities of REIT returns. These studies consistently showed that increasing interest rates influence real estate returns via financing costs, real estate demand and higher required rates of return. With a view to concentrating on interest rate dynamics in the past two decades, the interest rate on ten-year government bonds displays great fluctuations. These influences increase the difficulty of hedging and decrease the effectiveness of investment portfolio allocation. In recent decades, [Devaney \(2001\)](#) was the first to examine the effects of interest rate volatility. Devaney argued that increased interest rate volatility leads to expectations changing more frequently, increasing transaction costs and uncertainty regarding the stance of the monetary authorities. Therefore, REIT returns are inversely related to changes in interest rate volatility. However, [Liang and Huang \(2006\)](#) identified ambiguous and time-varying effects from a study of structural changes in Asian property markets. Thus the magnitude and the direction of the interest rate volatility for the REIT returns must be determined empirically.

This investigation empirically addresses the following questions. First, what are the effects of the 1993 TRA on the risk characteristics of REIT returns. Second, what are the major risk factors associated with REIT returns after the inclusion of REITs in the mainstream benchmark index? It is important to be able to access and know the risk components of REIT returns. To do this, data on daily REIT returns are gathered from 1989 to 2008. Our sample considers two key characteristics of this study, namely, the 1993 TRA and the inclusion of REITs in the S&P 500 index. We examine the effects both before and after these two events based on the relationships between interest rate volatility and REIT returns, respectively. The analysis also clearly represents the risk properties of REIT returns and clarifies whether the two structural points give rise to changes in the risk factors of REIT returns. The empirical results demonstrate that the return-generating processes of REITs exhibit skewness and heavy tail properties, and that these properties are time variant. Additionally, the impact of interest rate volatility on REIT returns leads to different changes due to increases in both market participants and trading.

The remainder of this paper is organized as follows. [Section 2](#) reviews the related literature and discusses the structural changes occurring in the REITs market. [Section 3](#) then describes the empirical method, introduces the distribution type of traditional returns and develops a more suitable model than the traditional model for accurately capturing the pattern of REIT returns. [Section 4](#) describes the data sources and presents summarized statistics. [Section 5](#) presents the empirical results and compares the results for the different sub-samples. Finally, the conclusion summarizes the findings and analysis.

2. Literature review

2.1. The structural changes in the REITs market

Past studies report that real estate or REITs holdings can improve the hedging effectiveness of mixed-asset investment portfolios, but that their hedging ability becomes doubtful when the market holding structure changes. Previous studies such as

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