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The Impact of Implied Volatility Index (VIX) and Disposable Income on Real Estate Investment Trust (REITS)

Aditya R. Limaye

THE IMPACT OF IMPLIED VOLATILITY INDEX (VIX) AND DISPOSABLE INCOME ON REAL ESTATE INVESTMENT TRUSTS

A Dissertation

by

ADITYA RANJAN LIMAYE

Submitted to Texas A&M International University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

August 2015

Major Subject: International Business Administration

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Approved as to style and content by:

Chair of Committee,	Andres E. Rivas Chavez
Committee Members,	Antonio Rodriguez
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	Jeffrey Brown
Head of Department,	Antonio Rodriguez

August 2015

Major Subject: International Business Administration

DEDICATION

I dedicate this dissertation to my family and friends without whose support and guidance it would not have been possible to finish this.

ABSTRACT

The Impact of Implied Volatility Index (VIX) and Disposable Income on Real Estate Investment Trusts (August 2015)

Aditya Ranjan Limaye, M.S. Finance, University of Houston

Chair of Committee: Dr. Andres E. Rivas Chavez

This dissertation expands on the literature on investor sentiment and REITs returns by correlating an alternative measure of investor sentiment, the Implied Volatility Index (VIX), published by the Chicago Board of Options Exchange, and REITs returns. The empirical results show that changes in VIX are negatively correlated to REITs returns. This indicates that an increase in the VIX leads to greater fear among investors thus reducing the REITs returns. Equally or more significantly, this study adds to the REITs returns literature by examining the impact of changes in the ratio of labor income to consumption on REITs returns. The empirical results show that changes in the ratio of labor income to consumption are negatively correlated to REITs returns. This research is important for individuals and financial institutions seeking to invest in REITs. Individuals' income plays an important role in determining their ability to invest in REITs and REITs are an important source of diversification today due to the reduction of regulations in the REITs industry and their level of income. Institutions seeking to invest in REITs require the participation of individuals and the ability of the individuals to participate in the REITs market depends on their income.

ACKNOWLEDGEMENTS

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Thanks also go to my friends and colleagues and the department faculty and staff for making my time at Texas A&M International University a great experience.

Finally, thanks to my mother and father for their encouragement.

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CHAPTER I

INTRODUCTION

Investors seeking to invest in the financial markets may have different objectives. While some investors would like to have capital appreciation, other investors would aim for stability with a steady income. Investors may invest in different financial securities based on their preferences. Before 1960, the forms of investment available to investors were equity (stocks), debt (bonds), derivatives such as futures, options or swaps, and real estate. In the real estate market, traditionally, investing in real estate meant to actually own, lease or rent land and/or property. Thus, investors interested in commercial real estate had to invest in the real assets, which demanded greater investment sums tied up in a relatively less liquid secondary market.

Real estate investing changed in 1960 when Congress created the REITs or the Real Estate Investment Trusts. REITs are closed-end investment-type funds. The creation of REITs allowed investors to earn income by investing in commercial real estate such as offices, hotels, warehouses, shopping malls and other commercial properties without locking in a larger base investment in a less liquid secondary market. The US Securities and Exchange Commission (SEC) define a REIT as a "company that owns and typically operates income producing real estate or real estate-related assets" (US SEC, 2012).

The number of REITs and their market capitalization has been growing since their inception in 1960. Figure 1 shows the change in the number of REITs from 1971 to 2013. Similarly, Figure 2 shows the change in the market capitalization of REITs from 1971 to 2013.

This dissertation follows the style of *Journal of Banking and Finance*

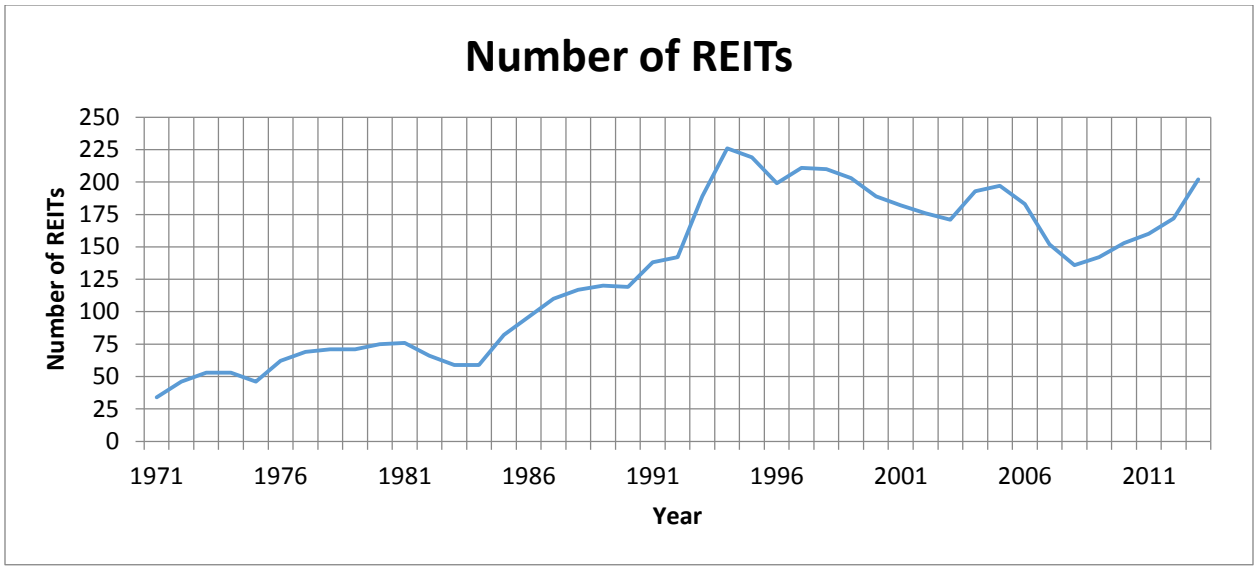


Fig. 1. Number of REITs

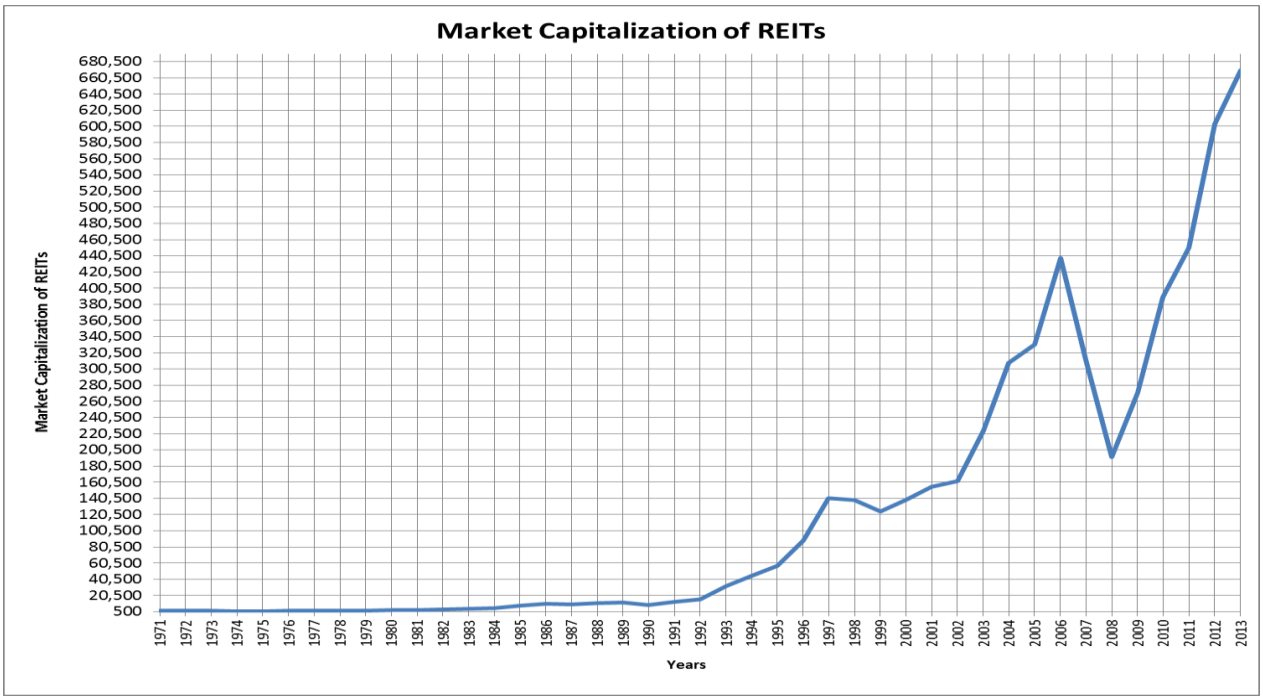


Fig. 2. Market capitalization of REITs

There were 34 REITs at the end of 1971. The market capitalization of REITs was a little less than one and a half billion dollars at the end of 1971. During the next ten years the market capitalization increased 1.6 times to reach around two and a half billion dollars by the end of 1981 while the number of REITs more than doubled during the same period from 34 to 76.

The next decade from 1981 to 1991 saw an increase in the number of REITs by 1.8 times while the market capitalization increased by 5.3 times during this period. The period from 1991 to 2001 saw an increase in the number of REITs by 1.3 times but the market capitalization increased by 11.9 times. The increase in the market capitalization of the REITs was much more drastic compared to the increase in the number of REITs during this period. During the past decade the number of REITs increased because of several legislations which resulted in better efficiency and greater transparency in the REITs market and provided increased access to investors, except for the decline in the number of REITs during the 2006–2008 period. Overall, the number of REITs increased from 171 to 202 during the 2003–2013 period while the market capitalization of the REIT Industry increased from $224,211.9 million in 2003 to $670,334.1 million by the end of 2013.

The downward cycle in the number of REITs and the market capitalization of REITs is correlated with a general economic downturn in the U.S. economy during the 2006-2008 period. That is, REITs possess significant systematic or market risk similar to stocks and other risky securities. The heightened volatility of REITs is also evidenced by the volatility of the FTSE NAREIT Index during the past decade as shown in Figure 3 below. Moreover, a study by Basse et al. (2009) showed that the financial crisis of 2008-2009 made REITs a riskier investment when compared to stocks and bonds.

The risk-return relation of REITs has been compared to other securities like stocks and bonds (Ambrose et al., 1992; Chan et al., 1990; Karolyi and Sanders, 1998; Liu et al., 1990; Liu and Mei, 1992). A study by Liu et al. (1990) showed evidence of segmentation in the REITs

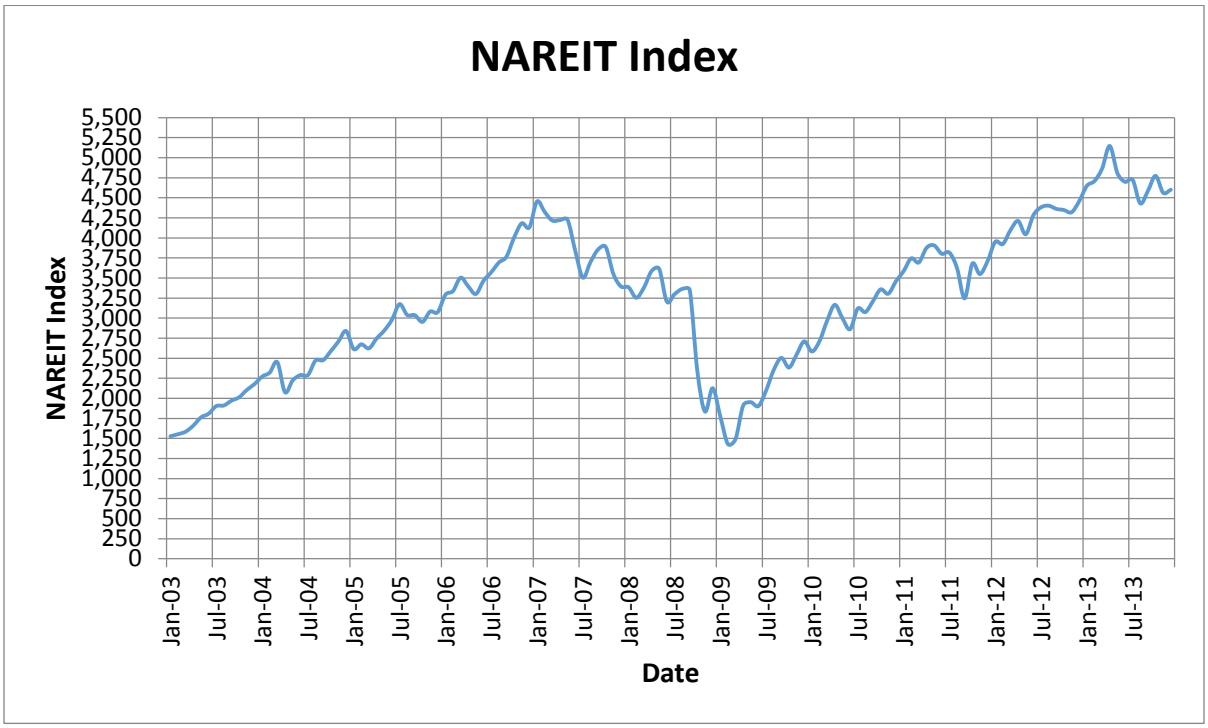


Fig. 3. NAREIT Index

market while other studies such as Ambrose et al. (1992) and Mei and Lee (1994) showed no evidence of segmentation determining prices in the REITs market. Alternatively, a study by Chan et al. (1990) showed that REITs market prices were only 60% sensitive to unexpected inflation, increases in long term interest rates, and increases in bankruptcy costs as compared to stock market prices. Additionally, a study by Liu and Mei (1992) showed that REITs returns were more predictable when compared to stocks and bonds returns. However, Karolyi and Sanders (1998) analyzed the sensitivity of REITs, stocks, and bonds returns using a number of

economic variables and found that the sensitivity of REITs returns to economic changes was more similar to that of stocks than to that of bonds. The less than perfect correlation between REITs returns and stock returns as well as other risky security returns expanded the set of possible investment opportunities to investors and provided them with further portfolio investment risk diversification opportunities.

REITs, like similar securities such as mutual funds had to fulfil several criteria given by the tax code of the Internal Revenue Service to be classified as REITs. REITs were required to pay a minimum of ninety percent of its taxable income in the form of shareholder dividends to be classified as REITs for tax purposes. In addition, REITs and investors enjoy a federal tax exemption which, unlike other corporations, does not subject REITs income to double taxation. REITs provide better investor protection since REITs is subject to significant scrutiny by the SEC. The nature of the REITs, however, changed due to reforms passed by the US Congress from the mid 80's to the mid 2000's. These reforms led to changes in the structure of REITs, their sources of income, their investments, their pricing, and their risk. Some of the most notable legislations include the US Tax Reform of 1986, The Umbrella Partnership REIT of 1992, the Revenue Reconciliation Act of 1993, The Real Estate Investment Trust Simplification Act of 1997, the REIT Modernization Act of 1999, the REIT Improvement Act of 2003 and the REITs Investment and Diversification Act of 2007.

The changes in the structure of the REITs started with the US Tax Reform Act of 1986. This was followed by the Umbrella Partnership REIT (UPREIT) in 1992 that enabled REITs to avoid capital gains tax and allowed them a limited partnership. UPREIT also fueled the "New REITs Era", as referred to by different industry professionals and academicians (Oikarinen et al., 2011; Pagliari et al., 2005), helped REITs in setting up partnerships without incurring large

investments and high costs of taxation. These opportunities gave REITs more transparency and improved their market efficiency (Oikarinen et al., 2011).

The next major legislation that impacted the REITs was the Revenue Reconciliation Act of 1993. This act made changes to the tax brackets and the level of taxation on assets and depreciation of real estate property and removed the requirement that 50 % of any REIT had to be owned by five or fewer investors. This resulted in lower unsystematic risk in the REITs industry, which in turn reduced the riskiness of REITs. This decrease in risk led to an increase in the prices of REITs (Crain et al., 2000; Downs, 1998). Several studies started using different models to analyze the pricing of REITs. Liu and Mei (1992) and Yuming and Wang (1995) used multifactor models to determine the nature of REITs and found that varying levels of risk premiums for stocks and bonds explain the REITs returns. Another study by Peterson and Cheng-Ho (1997) showed that the Fama and French model factors (Fama and French, 1992, 1993) explained the REITs returns. This study led to several other studies that used the Fama and French factors as control variables (Buttimer et al., 2005; Lee et al., 2008; Lin et al., 2009; Ro and Ziobrowski, 2011) and showed that they explain large variances in REITs returns.

Another legislation which changed the taxation policies of the REITs was the REIT Simplification Act of 1997. This act led to the creation of timber REITs and also revoked the rule of double taxation on capital gains for REITs shareholders. This led to a reduction in the systematic risk of REITs (Xu and Yiu, 2010). One of the most significant legislations that changed the structure of the REITs was the REITs Modernization Act of 1999. This act allowed REITs to form subsidiaries and relaxed the regulatory requirements of REITs by ensuring that the operation of REITs became similar to other companies as long as REITs pay taxes. This act also helped in improving the income of REITs and increased interest of investors in REITs

(Howe and Jain, 2004). This increased interest of investors attracted enough attention of all types of investors and led to creation of the REIT Improvement Act of 2003. This gave uniform treatment to foreign shareholders in publicly traded REITs similar to the treatment given to foreign shareholders of publicly traded companies (Edwards and Bernstein, 2005). It also allowed REITs to make certain loans without threat of their disqualification and led to a sharp increase in the dividends in the REITs industry. This sharp increase in the dividends led to a study by Kallberg et al. (2003) that showed that dividends explained REITs returns.

The increased access to foreign shareholders and the increased interest among investors resulted in the REITs returns being affected by behavior biases. A study by Lee and Lee (2003) showed the existence of the January effect (the returns in January are significantly higher than during other months of the year) in REITs after the Revenue Reconciliation Act of 2003. Additionally, another study by Chan et al. (2004) showed the existence of the Monday effect (returns on Monday are observed to be significantly lower than the average return on Tuesday to Friday) and found that REITs with higher institutional holdings were less influenced by the Monday effect. Also, another study by Joel-Carbonell and Rottke (2009) showed the existence of significant underpricing in REITs IPOs from 1991 to 2008.

Finally, the REITs Investment and Diversification Act of 2007 helped REITs to better manage their property portfolios and allowed them easy access to capital. This led to a significantly positive increase in REITs returns (Xu and Yiu, 2010). The increased access to REITs resulted in the REITs being influenced by investor sentiment (which states that the attitude of the investors often determine their decisions in the financial markets) and several studies have shown that different measures of investor sentiment affect REITs returns (Boney, 2007; Giacomini, 2011; Huerta, 2013).

The legislations mentioned above had a huge impact in allowing investors greater access to REITs. This gave individual and institutional investors possibility to diversify portfolio risk. Hartzell et al. (1999) show that the percentage allocation of REITs in a portfolio depends on the return and risk preferences of the investors with allocations ranging between 20-80%. Another study by Craft (2001) showed that optimal allocation of REITs in a portfolio can be as high as 40%. Individual investors have also considered REITs to be an important source of diversification. Studies by Doug and Don (2004) and Grandmont-Gariboldi (2010) found that investment in REITs by individuals led to a reduction in the risk of their portfolios. Also, as REITs became more important investments to individuals in their portfolios, investments in REITs became a function of the income and savings of individual investors. A strand of literature (Benzoni et al., 2007; Bodie et al., 1992; Galor and Zeira, 1993; Viceira, 2001) showed that the investment preferences in a portfolio of any investor depend on their income. Additionally, a similar strand of literature showed that labor income and consumption significantly affected stock market returns (Afonso and Sousa, 2011; Santos and Veronesi, 2006; Sousa, 2010) Hence it is important to consider investor attitude and investor income in the determination of investor portfolio preferences for REITs and their impact on REITs returns.

Thus, the objectives of this study are to extend the research of the impact of investor sentiment on REITs returns using an alternative measure of investor sentiment and to add new research to the literature by studying the impact of investor's income and availability of credit on REITs returns. Specifically, this study contributes to the literature in two ways. First, it provides additional evidence on the impact of investor sentiment through the Implied Volatility Index (VIX) on REITs returns. Second, it provides evidence for the first time on the impact of labor income, and consumption on REITs returns.

Problem statement

Previous studies that have examined REITs can be divided into the following groups: 1) Studies that analyzed the pricing of REITs (Liu and Mei, 1992; Peterson and Cheng-Ho, 1997); 2) Studies that analyzed the impact of behavior biases and investor sentiment (Boney, 2007; Giacomini, 2011); and 3) Studies that show the benefits of diversification of investing in REITs (Ghosh et al., 1996; Giliberto and Mengden, 1996).

Within the first group, different researchers have analyzed the determinants of REITs returns using different models. Liu and Mei (1992) found that the determinants of REITs returns are more related to those of small capitalization stock returns than to those of large capitalization stocks and bonds returns. Additionally, another study by Yuming and Wang (1995) found that the risk premiums for both stocks and bonds returns explain the REITs returns. Alternatively, Peterson and Cheng-Ho (1997) showed that the Fama and French factors (Fama and French, 1992, 1993) explained REITs returns while a study by Kallberg et al. (2003) determined REITs returns using the dividend pricing model.

Within the second group, different studies have shown that changes in behavior and sentiment of investors determine the returns of REITs. Some researchers have analyzed the impact of behavioral biases such as January effect (Lee and Lee, 2003) or the Monday effect (Chan et al., 2004) on the REITs returns. Alternatively, other researchers have analyzed the impact of investor sentiment on the REITs returns by regressing indices of investor sentiment on REITs returns (Boney, 2007; Giacomini, 2011; Huerta, 2013). Investors can be classified as individuals or institutions and the American Association of Individual Investors (AAII) tracks the individual investor sentiment while the Investor Intelligence (II) tracks the institutional investor sentiment. Other forms of classification include the consumer sentiment or consumer

confidence. Other studies within this group such as Lin et al. (2009) found that investor sentiment significantly impacts REITs returns but institutional investor sentiment does not have an effect on REITs returns while Huerta (2013) showed that both institutional and individual investor sentiment have a positive and a significant impact on REITs returns.

The third set of studies show the benefits of diversification that investments in REITs and in real estate provide. Studies in this stream of literature either find support for the notion that REITs behave differently from stocks (Ghosh et al., 1996) or similar to real estate (Giliberto and Mengden, 1996; Giliberto, 1990) while others show that REITs behave more like stocks (Ling and Naranjo, 1999; Oppenheimer and Grissom, 1998) or that REITs returns show a relationship to the business cycle (Glascock et al., 2000). Moreover, other studies like Ghosh et al. (1996) found that the nature of the assets in REITs played an important role in REITs being different from stocks while Giliberto and Mengden (1996) and Giliberto (1990) found that REITs behave more like real estate because of high correlations between real estate variables and REITs. This last result is also supported by Mei and Lee (1994). Finally, other studies such as Glascock et al. (2000), Clayton and MacKinnon (2001), Serrano and Hoesli (2007) and Hoesli and Oikarinen (2012) found that the nature of REITs was cyclical and the relationship to other securities depended on the time period under study. There is greater evidence, however, that REITs and the stock market are positively correlated and that an increase in the stock market leads to an increase in REITs returns (Ambrose et al., 1992; Gyourko and Linneman, 1988; Ling and Naranjo, 1999; Liu et al., 1990; Liu and Mei, 1992; Neil Myer and Webb, 1993; Oppenheimer and Grissom, 1998; Ross and Zisler, 1991; Scott, 1990).

In addition to the strands of research summarized above, other studies have shown that the income of the individual plays an important role in determining the investor's preferences

while forming an investment portfolio (Benzoni et al., 2007; Bodie et al., 1992; Galor and Zeira, 1993; Moos, 2011; Viceira, 2001). Yet, another strand of literature showed that consumption has an impact on stock market returns (Duffee, 2005; Engsted and Pedersen, 2012; Malloy et al., 2009; Yogo, 2006). Similarly, other studies have shown that both labor income and consumption have an impact on stock market returns (Afonso and Sousa, 2011; Santos and Veronesi, 2006; Sousa, 2010).

The analysis of the current literature of the determinants of REITs returns suggests the following. First, despite several studies showing that the level of income has an impact on the choices of the investors and their preferences in a portfolio (Benzoni et al., 2007; Bodie et al., 1992; Galor and Zeira, 1993; Viceira, 2001) and that REITs have been extensively used as vehicles of diversification (Craft, 2001; Hartzell et al., 1999), no study has analyzed the impact of labor income on the REITs returns. Since REITs are publicly traded securities and REITs have been used as vehicles of diversification, it is conceivable that the level of investment in REITs depends on the availability of wealth to investors. Since wealth is a function of income, and housing prices are driven by consumption and income, then income should be a driver of REITs investment. This issue raises a number of research questions. How does the level of income affect REITs returns? Does an increase in the level of income increases REITs returns? Does an increase in the consumption level increases REITs returns? This study aims to address these questions and to provide evidence regarding the impact of disposable income that is the ratio of labor income and consumption on REITs returns. This evidence is critically important to individual investors, institutional investors, regulators, researchers, academicians and other financial advisors that are interested in investing in REITs and provide advice to investors seeking to invest in REITs so as to diversify their portfolio.

Second, despite the existing literature on the impact of investor sentiment on the returns and risk of REITs (Boney, 2007; Giacomini, 2011; Huerta, 2013; Lin et al., 2009) and the impact of volatility in the REITs market (Devaney, 2001; Huerta, 2013; Najand and Lin, 2004; Stevenson, 2002; Winniford, 2003), no study has analyzed the impact of the Chicago Board of Exchange's (CBOE) Implied Volatility Index (VIX) on REITs returns. Recent research has shown that the VIX is an investor fear gauge factor (that is, the higher the VIX, the higher the fear in the market and the lower the market returns) and can be used as a measure of investor sentiment (Brown and Cliff, 2004; Da et al., 2015; Kurov, 2010). This raises the following questions. How does the VIX perform as an indicator of investor sentiment and its impact on REITs returns as compared to the traditional indicators of individual and institutional investor sentiment? Does VIX act as an investor fear gauge and an increase in VIX reduces REITs returns? Does VIX indicate fear in the REITs market similar to the results of other research of fear indices in the stock market? This research seeks to address these questions. This research should be important to individual and institutional investors or portfolio managers.

Organization

This dissertation is organized as follows. Chapter 2 shows an analysis of the literature related to REITs and provides a summary of the hypothesis. Chapter 3 provides a description of the data and the methodology used in this study. Chapter 4 presents results of model 1 which analyzes the impact of VIX on REITs returns. Chapter 5 presents the results of model 2 which analyzes the impact of disposable income on REITs returns. Chapter 6 presents the conclusions, and related issues that require further study.

CHAPTER II

LITERATURE REVIEW

The increasing popularity of Real Estate Investment Trusts (REITs) has provided investors with an option to invest in real estate without having to worry about the problem of liquidity (ability to easily liquidate assets). This has generated tremendous interest in REITs among investors, finance professionals, and academicians. Traditionally, studies involving REITs focused on analyzing different models to explain REITs returns. For example, Yuming and Wang (1995) analyzed the predictability of the REITs returns using the pricing factors of stocks and bonds and found that the dividend yield, term premium and the default premium have a significantly positive impact on the REITs returns. Alternatively, Peterson and Cheng-Ho (1997) explained the REITs return using the Fama and French (1993) factors and found that the stock market factors have a significant positive impact on the REITs returns.

These studies laid the foundation for the growing interest in REITs as a source of diversification for investors. The benefits of investing in REITs were observed by individual and institutional investors. Individual investors were encouraged to invest in REITs by financial advisors and portfolio managers. The property market that was seen to be an illiquid form of investment requiring a lot of paperwork and involvement of different agencies could now easily be accessed using REITs that could be bought and sold like any other financial security. Additionally, the problem of illiquidity while investing in the property market was also resolved by investing in REITs.

Institutional investors like banks, insurance companies, pension funds, hedge funds, and savings and loans institutions also found REITs to be an attractive source of investment. REITs provided these investors with an alternative source of investment that could be easily traded in

the financial markets. Additionally, a boom in the property market increased the interest among institutions seeking to invest in REITs. Also, different legislations such as the REITs Modernization Act of 1999 helped in attracting more investors.

The growing interest in REITs among investors led to increased interest among researchers and academicians analyzing REITs. Around the same time, in the early 1990s, a number of studies documented the effects of certain factors (known as anomalies) on the behavior of investors which questioned the concept of market efficiency and the rationality of investors. A strand of literature observed the "January Effect" which shows that the prices of financial securities increase in the month of January because investors try to sell their loss making securities at the end of the year (Brauer and Chang, 1990; Haugen and Jorion, 1996; Ritter, 1988). Also French (1980) examined the "weekend effect". Kahneman and Tversky (1979) proposed the "Prospect Theory" while Lakonishok et al. (1994) established the "Extrapolation Theory "and Shleifer and Vishny (1997) proposed the "Limit of Arbitrage Theory".

The research mentioned above analyzed the stock market return however, the increasing interest of investors in REITs led to several researchers analyzing the impact of some of these behavioral biases on the return from the REITs. Studies by Lee and Lee (2003) and Friday and Peterson (1997) showed the existence of January Effect in REITs. Alternatively, another study by Chan et al. (2004) showed the evidence of the Monday Effect. The Monday Effect is observed when financial returns are significantly lower on Monday as compared to the average return from Tuesday to Friday (Lakonishok and Maberly, 1990).

Additionally, a study by Lenkkeri et al. (2006) showed that the return from European REITs is highest on Fridays which they indicate is the "Friday Effect". Another study by Wiley

and Zumpano (2009) showed that the REITs return is highest at the turn of the month known as the "Turn of the Month Effect". The Turn of the Month Effect states that returns from financial securities are highest at the end of the previous month or at the start of the next month because of greater buying pressure during this time (Lakonishok and Smidt, 1988). However, a study by Hardin et al. (2005) found that the use of value weighted REITs index led to the elimination of calendar anomalies in REITs, and that the existence of calendar anomalies was dependent on the REIT Index, dividend yield, and capital yield components.

The studies listed above laid the foundation for the field of investor sentiment. The concept of investor sentiment states that the attitudes and behavior of investors often determine their decisions in financial markets and is defined as the "mood and the expectations of the investor" (Schmeling, 2007). Several researchers have analyzed the impact of investor sentiment on REITs returns. Some studies have found that investor sentiment has a negative and a significant impact on REITs returns (Almudhaf, 2010; Boney, 2007; Clayton and Ling, 2009). These studies show that an increase in investor sentiment leads to a decline in REITs returns. Alternatively, other studies have found that the investor sentiment has a significantly positive impact on REITs returns (Giacomini, 2011; Huerta, 2013; Lin et al., 2009; Ling et al., 2010). These studies show that an increase in the investor sentiment leads to an increase in REITs returns.

Researchers analyzing the impact of investor sentiment on REITs returns have traditionally used different measures of investor sentiment. Investor sentiment measures can be categorized into either survey based measures and indirect measures or based on the type of investors that is individual and institutional. The survey based measures of investor sentiment are based on the sentiment surveys that are conducted by different agencies either weekly, quarterly

or annually like the American Association of Individual Investors (AAII), Investor Intelligence (II) or the Real Estate Research Corporation (RERC) while the indirect measures of investor sentiment are based on proxies such as the first day return from the IPO or the change in the closed end fund discounts. Also other indirect measures of investor sentiment use a combination of these proxies like the Baker and Wurgler Index of Investor sentiment is constructed as the first principal component of six sentiment measures of Closed End Fund Discounts, NYSE Turnover, number of IPOs, Average First Day IPO Return, share of equity in total Aggregate Issuing and Dividend Premium (difference between market to book ratio of payers and non-payers), (Qiu and Welch, 2004).

Classifying investor sentiment based on individual and institutional is imperative because the behavior of individual and institutional investors is different and therefore the measures and the indices used to measure the sentiment are different. Individual investor sentiment measures are based on the behavior of the individuals that seek to invest in the financial markets. A seminal paper by Shiller (1984) rejected the efficient market hypothesis and showed that fads and fashions have an impact on the stock prices and individuals may overreact to news of earnings and dividends and influence stock prices. Another paper by Lakonishok et al. (1994) stated that individual investors make their decisions based on past growth rates.

Some studies such as Chan et al. (1990) and Lin et al. (2009) have used the closed end fund discounts to measure the individual investor sentiment, but the use of closed end fund discounts as a measure of individual investor sentiment is contested in the financial literature. Previous studies such as Qiu and Welch (2004), Elton et al. (1998) and Chen et al. (1993) have found that the closed end fund discounts (CEFD) is not a good measure of individual investor sentiment. According to Chen et al. (1993) this is because the level of institutional ownership can

contribute to the measure of closed end fund discounts and therefore closed end fund discounts is not a robust measure of individual investor sentiment. For institutional investors the most popular has been the Investor Intelligence, II (Boney, 2007; Giacomini, 2011; Huerta, 2013). For real estate sentiment the most popular has been RERC or other types of sentiment such as consumer sentiment (Almudhaf, 2010; Clayton and Ling, 2009; Huerta, 2013).

A paper by Brown and Cliff (2004) showed that survey based measures of investor sentiment are better predictors of investor sentiment compared to the indirect measures of investor sentiment and therefore it is better to use the survey based measures of investor sentiment. The research by Brown and Cliff (2004), Qiu and Welch (2004), Elton et al. (1998) and Chen et al. (1993) have led to different studies using indices to measure individual investor sentiment. Of the several measures used, a quantitative measure of individual investor sentiment, and by far the most popular, has been published by the American Association of Individual Investors, AAII (Boney, 2007; Giacomini, 2011; Huerta, 2013).

Institutional investors like banks, insurance companies, pension funds and other organizations are often responsible for large price movements and bulk trades. Also they are generally more informed compared to individual investors but they also cause price disturbances and movements but for different reasons compared to individual investors. A seminal paper by Lakonishok et al. (1992) states that herding by institutional investors may or may not destabilize the prices. The price may not destabilize if the institutions react to the information based on fundamentals but would destabilize if the institutions made their decisions based on strategies that are not aligned to fundamentals such as agency problems. Additionally, herding by institutions can result from psychological factors and cause temporary price bubbles or collapses in the financial markets for example the 2007-2008 financial crisis began with the bursting of the

housing bubbles and resulted in severe losses for several financial institutions in USA. Alternatively, other studies such as Falkenstein (1996) have shown that institutional investors may herd when stocks attain a certain price level while some studies (Trueman, 1994; Welch, 2000) showed that security analysts exhibited herding behavior based on little information and release forecasts which may be similar to those announced by other analysts.

New research in the field of investor sentiment led to the use of new measures of investor sentiment such as the Net Asset Value (NAV) (Elton et al., 1998), bull bear spread (Zhao et al., 2007), trading volume (Simon and Wiggins, 2001), net position (Wang, 2003). Other studies have used UBS Gallup Index of Consumer Optimism (Almudhaf, 2010) or the MIT Transaction Based Index (Giacomini, 2011), but the most widely used index for measuring the sentiment of the individual investors is the AAII which is published weekly by the American Association of Individual Investors (Baker and Nofsinger, 2002; Brown and Cliff, 2004; Fisher and Statman, 2000, 2003; Huerta, 2013; Lee et al., 2002) . Similarly, the most widely used index for measuring the sentiment of institutional investors is the survey conducted by the Investor Intelligence (Brown and Cliff, 2004; Huerta, 2013; Indro, 2004; Kurov, 2010; Wang et al., 2006).

Several studies have shown that investor sentiment is one of the main drivers of changes in return and volatility, and that expectation differentials drive prices to either overreact or underreact (Amir and Ganzach, 1998; Barberis et al., 1998; Bloomfield and Hales, 2002; Bloomfield et al., 1998; Daniel et al., 1998; Daniel et al., 2001; De Bondt and Thaler, 1985, 1987, 1990; Larson and Madura, 2002; Lehmann, 1990; Lo, 1997; Montier, 2002; Poteshman, 2001; Shefrin, 2000; Theobald and Yallup, 2004; Thomson et al., 2003). Also another study by Lee et al. (2002) found that changes in investor sentiment negatively affected the volatility and a

recent study by Wang et al. (2006) showed that most sentiment indicators are caused by returns and returns predict the realized volatility.

These studies have led different studies to analyze the impact of investor sentiment using different measures of volatility. Traditionally, financial markets have used different measures of volatility. Pinches and Kinney (1971) state that the different measures of volatility for the stock market are range and midrange, variance, mean absolute deviation, coefficient of variation, semi variance and modified quadratic mean. However, the variance as a measure of the volatility of the stock market has been used for other financial assets as well (Shiller, 1981). The problem with using the variance as a measure of volatility is that it is based on past information and it is not a good predictor of volatility in the future.

Forecasting volatility requires models or indices that will be forward looking. Poon and Granger (2003) provide a review of different models that are used to forecast volatility. They classify the volatility forecasting models based on time series volatility forecasting models and Option based volatility forecasting models. The time series volatility forecasting models include the standard deviation of past prices, moving average, equally weighted moving average of past prices, Autoregressive Conditional Heteroskedasticity (ARCH), General Autoregressive Conditional Heteroskedasticity (GARCH) and other stochastic volatility models like Generalized Method of Moments (GMM). The Option Based Volatility forecasts include the Black Scholes Option Pricing Model which was formulated by Black and Scholes (1973).

The use of indices has recently gained importance in forecasting the volatility of financial markets. The Chicago Board of Options Exchange (CBOE) publishes and updates the values of more than 25 indices designed to measure volatility of different financial assets. The measurement of these volatility indices is based on the underlying prices of the options market.

Originally, the CBOE started publishing the VIX (Implied Volatility Index) based on the S & P 100 options prices in 1993 but in 2003 it changed the format of the VIX to be now based on the S & P 500 options prices (Whaley, 2009).

The VIX is based on the real term options prices and it measures the market's expectation of the future 30 day intraday volatility. VIX estimates volatility by calculating the average of the price on S & P 500 calls and puts over different strike prices. The calculation of the VIX differs from that of other stock market indices like the S & P 500. Traditional stock market indices like the S & P 500 are calculated based on the prices of their component stocks while the VIX consists of options with the price of each option indicating the market's expectation of future volatility. CBOE enhanced the calculation of the VIX in 2014 by including the S & P 500 weekly options, thus ensuring that the calculation of the VIX would more accurately measure the market's expectation of 30 day intraday volatility. The VIX is used as an investor "fear gauge" index because it shows the investor's view of future stock market volatility (Whaley, 2000). In some instances, when there is uncertainty about an underlying asset, this leads to fluctuations in price of the asset. This fluctuation in the price of the asset translates into increases in volatility in both the price of the asset and its corresponding derivative. This fluctuation in the price of the underlying asset and its derivative leads to an increase in the VIX.

The fact that VIX is an investor "fear gauge" makes it an important indicator of the return from the different financial markets. This is because a rapid decline in any one financial securities market, like the stock market, caused by a fear amongst investors often leads to contagion in other financial markets like bond markets or property markets. This can ultimately lead to a financial crisis similar to the 2007 Global Financial Crisis.

A strand of literature examined the relationship between VIX and the stock market return and has shown that VIX is negatively related to the stock market return (Fleming et al., 1995; Fu et al., 2013; Manda, 2010). Connolly et al. (2005) have analyzed the relationship between the VIX and the stock market, the VIX and the bond market, and have found that bond returns tend to be high relative to stocks when VIX is high. A higher VIX indicates a greater subsequent negative correlation between stock and bond returns. These results show that VIX is an "investor fear gauge" and therefore an increase in the VIX leads to greater fear among investors. As investors are worried they look to sell their stocks and this leads to a decline in the stock market.

Besides using VIX as a measure of volatility, recently another strand of literature has used VIX as a measure of investor sentiment. Kurov (2010), Da et al. (2015), Brown and Cliff (2004) used the VIX as an alternative investor sentiment measure and found that VIX has a negative and significant impact on S & P 500 returns. Based on this research it is clear that VIX is an important measure of investor sentiment. This is because investor sentiment is based on the attitude of investors (Schmeling, 2007) and VIX is an investor "fear gauge" hence using VIX as a measure of investor sentiment is appropriate.

Volatility in the financial markets is also dependent on the number of options that are available for investors to invest. Traditionally, equity (stock market) was considered to be the main source of investment. The evolution of REITs provides investors with an opportunity to invest in the property market without compromising their liquidity. The changes in the structure of REITs over time have provided investors an opportunity to diversify their portfolio using REITs. Several studies show that investors are able to diversify their portfolio by using REITs.

Despite REITs playing an important role in allowing investors to diversify their portfolio, the nature of REITs plays an important role in determining the extent of their use in the portfolio.

The correlation between REITs and other financial market securities plays an important role in determining the percentage of investment in REITs, relative to other financial securities, while forming a portfolio. For example, if REITs are positively correlated to any other financial security, like bonds, then an increase in REITs returns would increase the return from the bond market, and in that case if any investor expects the bond market return to increase that investor will also expect the REITs returns to increase.

This knowledge is important for portfolio managers, investors and finance professionals that are seeking to analyze their investment preferences because their decisions would be dependent on the nature of the relationship between the financial securities. This has led to increased research analyzing the relationship between REITs and other financial securities markets such as stocks or bonds. This has led to several studies seeking to analyze the relationship between typical stocks and REITs (Chan et al., 2002; Ghosh et al., 1996; Wang et al., 1995). Some studies such as Giliberto and Mengden (1996), Giliberto (1990), Mei and Lee (1994) showed that REITs behave more like real estate. Additionally, a study by Ghosh et al. (1996) found that the nature of REITs makes them different from the stock market.

Alternatively, there is greater evidence to show that the return from the stock market and REITs are complements for each other (Ambrose et al., 1992; Gyourko and Linneman, 1988; Ling and Naranjo, 1999; Liu et al., 1990; Liu and Mei, 1992; Neil Myer and Webb, 1993; Oppenheimer and Grissom, 1998; Ross and Zisler, 1991; Scott, 1990). According to these studies, an increase in the return from the stock market would increase REITs return.

The above research clearly indicates that the stock market has a positive impact on REITs returns and that the stock market and REITs are complements for each other. This clearly indicates that investors can invest in REITs when they observe that the stock market return is

increasing since both the stock market and the REITs move in the same direction. This also indicated that investor sentiment leads to changes in the return and volatility in the financial markets. This has led to a number of new measures of investor sentiment which show the change in volatility. Despite the popularity of the VIX as an indicator of volatility and a measure of alternative investor sentiment, no study has analyzed the impact of VIX on REITs returns.

Additionally, the relationship between VIX and the return from financial markets is shown to support the notion that VIX is an indication of the fear in the financial markets and therefore an increase in the VIX leads to a reduction in return from the financial markets. This is supported by Fleming et al. (1995), Manda (2010) and Fu et al. (2013) who found that VIX is negatively related to the stock market return and an increase in the VIX leads to a reduction in the return from the stock market.

Hence based on this research the first hypothesis can be stated as:

H1: An increase in the VIX should result in a reduction in the REITs returns.

Labor Income plays an important role in determining the availability of resources for investors and plays an important role in explaining the stock market return (Heaton and Lucas, 2000; Jacobs and Wang, 2004; Jagannathan and Wang, 1996). A strand of literature showed that labor Income had a positive impact on the stock market return (Jagannathan and Wang, 1996) or a negative impact on the stock market return (Heaton and Lucas, 2000). Also the evolution of Consumption CAPM by Breeden (1979) laid the foundation for a strand of literature analyzed the impact of consumption on the stock market return (Bansal et al., 2005; Jacobs and Wang, 2004; Lettau and Ludvigson, 2001; Parker and Julliard, 2005; Yogo, 2006). Furthermore, researchers analyzing the impact of consumption on the stock market return initially showed that consumption has a significant negative impact on the stock market return (Jacobs and Wang,

2004; Lettau and Ludvigson, 2001). However recent evidence showed that consumption has a significant positive impact on the stock market return (Bansal et al., 2005; Parker and Julliard, 2005; Yogo, 2006).

Lately, another strand of literature suggests the importance of considering the ratio of consumption and wealth (Duffee, 2005; Lettau and Ludvigson, 2001). A seminal paper by Santos and Veronesi (2006) analyzed the impact of disposable income (ratio of labor income/consumption) on the stock return. They found that disposable income has a significant negative impact on the stock market return. They argue that this is because the changes in the ratio of equilibrium return to the labor income affects the conditional covariance between the equilibrium return and consumption growth and this leads to changes in the premiums investors require to hold stocks. Also, they found that ignoring the ratio of labor income to consumption led to severe mispricing of the CAPM model.

It is important to consider both labor income and consumption when analyzing the preferences of investors because any investor who invests in financial markets has to choose between investing his available wealth in financial markets and consuming it for household or other purposes.

Additionally, a number of studies have shown REITs to be complements for stocks (Ambrose et al., 1992; Clayton and MacKinnon, 2003; Gyourko and Linneman, 1988; Ling and Naranjo, 1999; Liu et al., 1990; Liu and Mei, 1992; Neil Myer and Webb, 1993; Oppenheimer and Grissom, 1998; Ross and Zisler, 1991; Scott, 1990). This indicates that an increase in the stock market return would increase the REITs return. This is important for investors when they analyze whether to invest in Stock market or REITs or some other security.

Furthermore, the intention of REITs was to give investors (individuals or institutions) access to income producing real estate without having to own the real estate. This was made possible due to several legislations that changed the pricing and the risk of REITs. Several studies show that the institutional investment increased in REITs after the legislations and the reforms of the 1990s (Below et al., 2000; Crain et al., 2000; Ghosh et al., 1996; Han et al., 1998; Ling and Ryngaert, 1997). Specifically the study by Ling and Ryngaert (1997) found that the institutional ownership in REITs during the 1991 to 1994 period was 41.7%. This is a tremendous increase over the 10.1% institutional ownership in the 1980 to 1988 period shown by Wang et al. (1992).

Legislations such as the Revenue Reconciliation Act of 1993 eliminated the "five or fewer rule" which dramatically increased the institutional ownership and the pricing of REITs (Below et al., 2000; Downs, 1998). This led to a reduction in the unsystematic risk of investors (Crain et al., 2000). Additionally, Crain et al. (2000) state that institutional ownership increased after the Revenue Reconciliation Act of 1993 due to increased liquidity and the changes in taxation in the REITs market. This was followed by the REIT Tax Simplification Act of 1997 which reduced the systematic risk of investors (Xu and Yiu, 2010). Other legislations such as the Revenue Reconciliation Act of 2003 have reduced the barriers for foreign institutional investors to invest in REITs. This increased access of institutional investors to REITs has ensured that REITs are a source of diversification for the institutional investors thus increasing their involvement while forming a portfolio (Hartzell et al., 1999; Huerta, 2013).

These changes in the structure of REITs have also increased the involvement of individual investors. The fact that REITs are required to give back at least 90 percent of its earnings in the form of dividends serves as an attractive tool to individual investors.

Additionally, the American Tax payer Relief Act of 2012 signed by President Barack Obama on January 1, 2013 ensured that the maximum taxation on qualified dividends for individuals that earn less than $ 400,000 per year would be 15% and for individuals with income in excess of $ 400,000 per year, the rate would be 20%. This has ensured that REITs would not be denied their share of individual investors due to taxation policies as REITs earn a majority of their income from dividends.

These advantages have ensured that REITs and real estate would serve as an important recommendation for investing for individual investors. The importance of investing in real estate by individuals has also been highlighted by different financial professionals and investment advisors. Malkiel (2003) states "Basically there are only four types of investment categories that you need to consider: Cash, Bonds, Common Stocks and Real Estate." Additionally, the increase in the demand for REITs and their changing nature has ensured that the investment advisors have started recommending REITs as a form of investment instead of traditional real estate. This has been highlighted in the following recommended portfolio for individual investors by Swensen (2005). He recommends an investment of twenty percent invested in US REITs, fifteen percent each in foreign developed equities, US Treasury bonds and US TIPS, five percent in emerging market equity and the remaining thirty percent of the investment in US Equity. This is as per his book *Unconventional Success: A Fundamental Approach to Personal Investment*.

This has also led to an increased interest amongst researchers portraying the importance of investing in REITs for individuals. Studies such as Doug and Don (2004), Grandmont-Gariboldi (2010) have found that optimal portfolio allocation was weighted heavily with REITs and investment in REITs by individuals led to a reduction in the risk of the portfolio. Also, another study by Bhuyan et al. (2014) showed that REITs outperform both stocks and bonds and

therefore according to them, investors should put higher weights on REITs in their portfolio. This has ensured that individual investors have started using REITs as a security to diversify their portfolio.

The above research indicates the importance of investing in REITs for institutional and individual investors. This has ensured that REITs have increasingly been considered as vehicles of investment for individuals and institutions.

Additionally, an investor often makes his decisions regarding the percentage of money to be invested in the financial markets based on the availability of income after spending on the necessities that are required to run a household which is known as consumption. An investor that does not have enough income would be forced to take on more debt if he still wishes to invest in the financial markets and would have to take on an increased risk of paying off the debt along with the interest payments.

This has led to an interest among a number of academicians and researchers regarding the impact of income on the nature of their investments. A strand of literature (Benzoni et al., 2007; Bodie and Crane, 1997; Bodie et al., 1992; Cocco et al., 2005; Galor and Zeira, 1993; Viceira, 2001) showed that the level of income of the individual plays an important role in the nature of investments that the person decides to undertake when forming his portfolio.

Specifically the study by Viceira (2001) showed that the optimal allocation of financial securities depends on the riskiness of the labor income and their stage in the life cycle. Also, they found that employed investors had a greater percentage of investment in stocks as compared to retired investors. Additionally, an increased variation in the labor income led to a reduction in the willingness of the investor to invest in the risky asset and a greater willingness among the investor to save the money. Hence the level of income of the individual plays an important role

in determining his preferences when allocating his portfolio. Therefore, if the investors that invest in REITs are going to be individuals then their labor income will have an impact on their decisions to invest in REITs.

Also institutional investors that invest in REITs include banks, insurance companies, investment advisors, mutual funds and others (Devos et al., 2013). These institutions get their sources of income from the individual investors that invest in them. The individual investors make their decisions to invest in any particular financial institution based on their level of income. Thus the level of income of the individual would have a great impact on the availability of the funds with the institutions. This would greatly impact the nature of investments made by the institutions and would have an impact on whether the institutions are willing to invest in REITs or not.

This shows that the labor income and consumption of the individual plays an important role in determining the return from the REITs. Hence, it is important to analyze the impact of labor income and consumption on the REITs return.

Based on all these strands of literatures the second hypothesis can be stated as

H2: Disposable income or the ratio of labor income to consumption as measured by the SWTC will have a negative and a significant impact on the REITs return.

As discussed in the section of investor sentiment, the increasing interest in REITs and its increased accessibility to investors due to changes in legislations such as the REITs Modernization Act of 1999 led to a surge in REITs as a source of investment for both individuals and institutions. The increasing popularity of REITs led to REITs being affected by the psychology and the irrationality of investors similar to other financial markets such as the stock and bond markets.

A study by Boney (2007) found that individual investor sentiment (measured by AAII) and institutional investor sentiment (measured by II) had a significant negative impact on REIT CEF. The results of recent studies contradict the findings of Boney (2007). A study by Lin et al. (2009) analyzed the impact of investor sentiment on REITs returns and found that an increase in the individual investor sentiment led to an increase in REITs returns; however they failed to find a significant relationship between institutional investor sentiment and REITs returns. Lin et al. (2009) measured individual investor sentiment as the change in the closed end fund discount and institutional investor sentiment as the change in institutional ownership. Additionally, a study by Almudhaf (2010) found that consumer sentiment significantly negatively impacts the REITs returns and REIT returns are negatively related to media pessimism (number of negative words in the press) while media optimism significantly positively impacts the REITs volume.

The results of studies shown above differ from the results of recent research. Recent studies by Giacomini (2011) and Huerta (2013) have shown that an increase in the level of individual investor sentiment (measured by the change in AAII) led to an increase in the REITs returns and an increase in the institutional investor sentiment (measured by the change in II) led to an increase in the REITs returns. Also Huerta (2013) has examined the relationship between sentiment and REITs returns during the financial crisis and has found that both the individual investor sentiment (measured by the change in AAII) and the institutional investor sentiment (measured by change in II) have a positive and a significant impact on the REITs returns. Additionally, REITs have become more accessible to investors due to several new legislations such as the REITs Modernization Act of 1999 which ensured that the operation of REITs became similar to other companies as long as they pay taxes. This helped in increasing interest in REITs among investors (Howe and Jain, 2004) and the REITs Investment and Diversification Act of

2007 that allowed REITs to have easier access to money and helped in increasing the interest among investors (Xu and Yiu, 2010). This increased access to REITs for investors along with the increased interest in investing in REITs has led to changes in the relationship between investor sentiment and REITs returns. Hence based on recent evidence such as Giacomini (2011) and Huerta (2013) and changes in the nature of REITs due to several legislations that have changed the relationship between investor sentiment and REITs returns, the third and fourth hypotheses can be stated as

H3: An increase in the individual investor sentiment (as measured by the AAII) will increase the REITs returns

H4: An increase in the institutional investor sentiment (as measured by the II) will increase the REITs returns

Recently another measure of sentiment that is used in the literature is the commercial real estate sentiment that is measured by the change in the Real Estate Research Corporation (RERC). The RERC surveys different types of investors including institutions, real estate investors, advisors and managers in United States and publishes the results of a survey known as the "investment conditions" for ten types of commercial property. The RERC index is constructed based on the results of the "investment conditions" survey. This index was used by Ling et al. (2010) and Huerta (2013) to measure the commercial real estate sentiment. Ling et al. (2010) and Huerta (2013) have found evidence that this index has a positive and a significant impact on the REITs returns. Also the commercial real estate market behaves similar to institutions. Hence based on this evidence the fifth hypothesis can be stated as

H5: An increase in the commercial real estate sentiment (as measured by the RERC) will increase the REITs returns.

CHAPTER III

DATA AND METHODOLOGY

Data

This study examines both the impact of the Implied Volatility Index, VIX, on REITs returns and of disposable income on REITs returns. In order to analyze the impact of VIX on REITs returns, the data for the VIX is obtained from the Wharton Research Data Services (WRDS) database. The proxy for the REITs returns is the FTSE NAREIT U.S. Real Estate Index. The data for the FTSE NAREIT U.S. Real Estate Index is obtained from Thomson's DATASTREAM.

The sentiment indices used in this study are survey based measures of investor sentiment as per the findings of Brown and Cliff (2004). The proxy for the individual investor sentiment used in this study is the American Association of Individual Investors (AAII) survey. AAII conducts a survey among a random sample of its members. The respondents of the survey are asked to provide their market perception for the following six months. AAII classifies the respondents of its survey into bullish, bearish and neutral and publishes its results every week. The individual investor sentiment index is constructed as the difference between the number of bullish and bearish investors from the survey known as the bull bear spread as per Brown and Cliff (2004).

The proxy for the institutional investor sentiment used in this study is the Investor's Intelligence (II) survey. Investor's Intelligence survey is based on the perception of a number of investment advisory newsletters. The perception of these investment advisory newsletters is labelled as bullish, bearish and neutral by the Investor's Intelligence. The institutional investor sentiment index is constructed as the bull bear spread or the difference between the number of

bullish and bearish investors from the Investor's Intelligence as per Brown and Cliff (2004). The data for the sentiment indices of individual and institutional investor sentiment was obtained from Thomson's DATASTREAM.

The importance of using the Fama and French (1992) factors as control variables has been illustrated by Peterson and Cheng-Ho (1997). Since this study a number of studies have used the Fama and French (1992) and Fama and French (1993) factors as control variables (Buttimer et al., 2005; Huerta, 2013; Lee et al., 2008; Lin et al., 2009; Ro and Ziobrowski, 2011).

The Fama and French (1992) factors are SMB, HML, and the excess market return. SMB (small minus big) shows the difference between the average return of three small portfolios and the average return of three large portfolios based on the market capitalization. A higher SMB shows that the portfolio manager is willing to invest more in small market capitalization stocks compared to large market capitalization stocks. HML (high minus low) shows the difference between the average return on two value portfolios and the average return on two growth portfolios. A higher HML shows that the portfolio manager is willing to invest more in value stocks as compared to growth stocks. The excess market return shows the difference between the return from the market portfolio and the risk free rate. The data for Fama and French (1992) factors was collected from Wharton Research Data Services (WRDS) database.

Fama and French bond market factors are DEF and PREM. DEF is the default risk premium and is calculated as the difference between the Moody's Seasoned Aaa Corporate Bond Yield and Moody's Baa Corporate Bond Yield. PREM is the term premium and is calculated as the difference between the twenty year Treasury bond rate and one month Treasury bill rate. The data for Fama and French bond market factors was obtained from Thomson's DATASTREAM.

In order to measure the influence of disposable income on REITs returns, the data for disposable income, that is, the ratio of labor income to consumption was obtained from the Bureau of Economic Analysis website. Data was also collected for wages and salaries, proprietors' income, rental income, personal dividends and interest income, personal taxes, nondurables, and services. In the first step the calculations of labor income and consumption were done. Labor Income and Consumption were calculated as per Santos and Veronesi (2006). Consumption is calculated as the sum of nondurables and services excluding shoes and clothing. The formula used to calculate labor income is as shown below.

$$Labor\ Income$$
$$= Wages\ and\ Salaries + Transfer\ Payments + other\ labor\ income$$
$$- personal\ contributions\ for\ social\ insurance - taxes$$

Also taxes are calculated as shown below.

$$Taxes = \frac{Wages\ and\ Salaries * personal\ tax\ and\ non\ tax\ payments}{Wages\ and\ Salaries + Proprietors\ Income\ with\ IVA\ and\ Ccadj + rentalincome + personal\ dividend\ and\ interest\ income}$$

Finally disposable income was calculated as the ratio of labor income to consumption.

Additionally, this model uses a sentiment indicator based on the perception of market conditions of commercial real estate investors. The Real Estate Research Corporation (RERC) captures a perception of investment conditions for ten different types of commercial properties including REITs, pension funds, insurance companies, banks, private funds, opportunity funds, financial companies and union funds. The RERC index is constructed as the average of the investment conditions from these ten types of commercial properties as per Huerta (2013).

Also as control variables, this model uses SMB, HML and Mktrf as per model 1.

Methodology

As shown in the previous section, this study seeks to analyze 5 hypotheses. Model 1 seeks to analyze the first hypothesis while Model 2 seeks to analyze the second, third, fourth and fifth hypotheses. The methodological framework used to analyze these models is similar to Lin et al. (2009) and Huerta (2013). The first step of this framework involves univariate regressions of the sentiment measures on the REITs returns. The general equation for these regressions is of the form

$$NAREITRETrf_t = \alpha + \beta Sent_t + \mathcal{E}_t$$

where $NAREITRETrf_t$ indicates the excess REITs return or the difference between the REITs return and the risk free rate. $Sent_t$ indicates the three measures used to analyze the investor sentiment. These measures are individual investor sentiment and institutional investor sentiment at time t for model 1 and individual investor sentiment, institutional investor sentiment and commercial real estate sentiment in model 2. The symbol α indicates the regression constant while β indicates the standardized regression coefficient and $\mathcal{E}_t$ denotes the error term. Additionally Model 1 analyzes the univariate regression of VIX on the REITs returns. The general form of this equation is

$$NAREITRETrf_t = \alpha + \beta VIX_t + \mathcal{E}_t$$

where $NAREITRETrf_t$ indicates the excess REITs return or the difference between the REITs return and the risk free rate. VIX_t indicates the return from the Chicago Board of Exchange's Implied Volatility Index (VIX). The symbol α indicates the regression constant while β indicates the standardized regression coefficient and $\mathcal{E}_t$ denotes the error term.

Similarly, Model 2 also analyzes the univariate regression of disposable income (ratio of labor income to consumption) on REITs returns. The general form of this equation is

$$NAREITRETrf_t = \alpha + \beta SWTC_t + \mathcal{E}_t$$

where $NAREITRETrf_t$ indicates the excess REITs return or the difference between the REITs return and the risk free rate. $SWTC_t$ indicates the disposable income or the ratio of labor income to consumption at time t. The symbol α indicates the regression constant while β indicates the standardized regression coefficient and $\mathcal{E}_t$ denotes the error term.

The second step in the framework of Lin et al. (2009) involves including all the sentiment indicators together in the form of multivariate regression model. The general form of this equation is as shown below.

$$NAREITRETrf_t = \alpha + \sum_{i=1}^{n} \beta_i Sent_{it} + \mathcal{E}_t$$

The equation for model 1 takes the form

$$NAREITRETrf_t = \alpha + \sum_{i=1}^{n} \beta_i Sent_{it} + \beta_j VIX_t + \mathcal{E}_t$$

where $Sent_{it}$ includes the individual investor sentiment index of American Association of Individual Investors (AAII) and institutional investor sentiment index of Investor's Intelligence (II) while VIX indicates the Implied Volatility Index. The symbol α indicates the regression constant while β_i indicate the standardized regression coefficients from the sentiment variables while β_j indicates the standardized regression coefficient from the VIX and $\mathcal{E}_t$ denotes the error term.

The equation for model 2 takes the form

$$NAREITRETrf_t = \alpha + \sum_{i=1}^{n} \beta_i Sent_{it} + \beta_j SWTC_t + \mathcal{E}_t$$

where $Sent_{it}$ includes the individual investor sentiment index of AAII, institutional investor sentiment (II) and the commercial real estate sentiment index of the Real Estate Research Corporation (RERC). $SWTC_t$ indicates the disposable income (ratio of labor income to consumption) at time t. The symbol α indicates the regression constant while β_i indicate the standardized regression coefficients from the sentiment variables while β_j indicates the standardized regression coefficient from SWTC and $\mathcal{E}_t$ denotes the error term.

The third step in the framework of Lin et al. (2009) involves adding control variables. The general equation is of the form

$$NAREITRETrf_t = \alpha + \sum_{i=1}^{n} \beta_i Sent_{it} + \sum_{j=1}^{n} \beta_j c_{jt} + \mathcal{E}_t$$

The general equation for model 1 takes the form

$$NAREITRETrf_t = \alpha + \sum_{i=1}^{n} \beta_i Sent_{it} + \beta_j VIX_t + \sum_{k=1}^{n} \beta_k c_{kt} + \mathcal{E}_t$$

where $Sent_{it}$ includes the individual investor sentiment index of American Association of Individual Investors (AAII) and institutional investor sentiment index of Investor's Intelligence (II) while VIX indicates the Implied Volatility Index and c_{kt} includes the set of control variables that is SMB (Small minus big), HML(High minus low), and Mktrf (excess market return). The symbol α indicates the regression constant while β_i indicate the standardized regression coefficients from the sentiment variables while β_j indicates the standardized regression coefficient from VIX and β_k indicate the standardized regression coefficients from the control variables of SMB, HML and Mktrf and $\mathcal{E}_t$ denotes the error term.

The general equation for model 2 takes the form

$$NAREITRETrf_t = \alpha + \sum_{i=1}^{n} \beta_i Sent_{it} + \beta_j SWTC_t + \sum_{k=1}^{n} \beta_k c_{kt} + \mathcal{E}_t$$

where $Sent_{it}$ includes the individual investor sentiment index of AAII, institutional investor sentiment (II) and the commercial real estate sentiment index of the Real Estate Research Corporation (RERC) while SWTC indicates the disposable income (ratio of labor income to consumption) and c_{kt} includes the set of control variables that is SMB (small minus big), HML (high minus low), and Mktrf (excess market return), DEF (default risk premium) and PREM (term premium).. The symbol α indicates the regression constant while β_i indicate the standardized regression coefficients from the sentiment variables while β_j indicates the standardized regression coefficient from SWTC and β_k indicate the standardized regression coefficients from the control variables of SMB, HML, Mktrf, DEF and PREM and $\mathcal{E}_t$ denotes the error term

Model 1 extends the literature on investor sentiment by analyzing the impact of VIX on REITs returns. The variables smb, hml and mktrf are the Fama and French (1992) factors. The equation for model 1 is as shown below:

$$NAREITRETrf = \beta_0 + \beta_1 * lnvixret + \beta_2 * caaiibullbear + \beta_3 * cAdvbullbear + \beta_4 * hml + \beta_5 * smb + \beta_6 * mktrf + \mathcal{E}$$

where:

- NAREITRETrf is the dependent variable, as per Lin et al. (2009) and Huerta (2013), and indicates the difference between the REITs return as captured by the NAREIT U.S. Real Estate Index and the risk free rate.
- lnvixret is the return from the VIX (Implied Volatility Index). VIX is published by the Chicago Board of Exchange (CBOE) and serves as an indicator of investor sentiment as

per Kurov (2010), Da et al. (2015), and Brown and Cliff (2004). An increase in the VIX indicates greater fear and uncertainty among investors. The expected sign of lnvixret is negative, that is, an increase in the return from the VIX should result in a reduction in REITs returns.

- cAAIIBullBear indicates the change in the individual investor sentiment, as per Huerta (2013). The individual investor sentiment indicator is found by calculating the difference between the number of bullish and bearish investors obtained from the index published by the American Association of Individual Investors. The expected sign of cAAIIbullbear is positive, as per Huerta (2013).
- cAdvbullbear indicates the change in the institutional investor sentiment, as per Huerta (2013). The institutional investor sentiment indicator is found by calculating the difference between the number of bullish and bearish investors obtained from the Investors' Intelligence Index. The expected sign of cAdvbullbear is positive, as per Huerta (2013).
- SMB (small minus big) is the difference between the average return on three small portfolios and average return on three large portfolios. This variable indicates whether the portfolio manager is more inclined on investing in small market capitalization firms compared to large market capitalization firms. A positive SMB indicates that the portfolio manager was investing more in stocks of low market capitalization firms to capture the abnormal return. SMB seeks to capture the small firm effect as generally smaller firms tend to outperform larger firms. The expected sign of SMB is positive, as per Huerta (2013), and Lee et al. (2008).

- HML (high minus low) is the difference between the average return on two value portfolios and the average return on two growth portfolios. This variable indicates whether the portfolio manager is more interested in investing in value stocks (that have higher book to market ratio) rather than growth stocks. Higher book to market stocks show abnormal returns. A positive HML indicates that the portfolio manager was investing more in value stocks. The expected sign of HML is positive, as per Huerta (2013), and Lee et al. (2008), and
- Mktrf- is the excess market return calculated as the difference between the return from the market portfolio and the risk free rate. The return from the market portfolio is the value weighted return on all NYSE, AMEX and NASDAQ stocks, and the risk free rate is the one-month Treasury bill rate. The expected sign of the excess market return is positive as per Huerta (2013) and Lee et al. (2008).

A description of the variables and their expected sign is shown in the table 1 below. The NAREITRETrf is the dependent variable in model 1. The expected sign of lnvixret is negative as explained above. The expected sign of the individual investor sentiment indicator of caaiibullbear is positive and the expected sign of the institutional investor sentiment indicator of cadvbullbear is positive. Both the investor sentiment indices are available weekly. The VIX, Fama and French variables of smb, hml and mktrf are available daily. These variables were converted to weekly because of the availability of weekly data for sentiment indices and the data was analyzed weekly.

Table 2 shows a list of the data sources and their frequency. The NAREIT U.S. Real Estate Index used to measure REITs return is available daily and was obtained from Thomson's

Table 1
Description of variables for model 1.

Variable	Description	Expected Sign
NAREITRETrf	The difference between the return from the NAREIT U.S. Real Estate Index and the risk free rate	Dependent Variable
lnvixret	Return from the VIX (Implied Volatility Index)	Negative
aaiibullbear	Difference between the percentage of bullish and bearish investors of the American Association of Individual Investors (AAII) Index	Positive
caaiibullbear	Change in aaiibullbear	Positive
advbullbear	Difference between the percentage of bullish and bearish investors of the Investor Intelligence (II) index	Positive
cAdvBullbear	Change in Advbullbear	Positive
smb	Difference between the average return on three small portfolios and the average return on three large portfolios	Positive
hml	Difference between the average return on two value portfolios and average return on two growth portfolios	Positive
mktrf	Difference between the return from the market portfolio and the risk free rate	Positive

Datastream. The VIX is available daily and was obtained from Thomson's Datastream. The individual and the institutional investor sentiment indices of AAII published by the American Association of Individual Investors (AAII) and Investor Intelligence (II) are available weekly and were obtained from Thomson's Datastream. The Fama and French (1992) factors of smb,

hml and mktrf are available daily and were obtained from Thomson's Datastream. Thus all the data are available daily except the individual and institutional investor sentiment indices which are available weekly. Therefore the analysis of the model is done weekly by converting all the data to weekly.

Table 2
Sources and frequency of variables for model 1.

Variable	Frequency	Source
NAREIT U.S Real Estate Index	Daily	Thomson's DataStream
VIX	Daily	Wharton Research Data Services (WRDS)
AAII	Weekly	Thomson's DataStream
II	Weekly	Thomson's DataStream
SMB	Daily	Wharton Research Data Services (WRDS)
HML	Daily	Wharton Research Data Services (WRDS)
mktrf	Daily	Wharton Research Data Services (WRDS)
rf	Daily	Wharton Research Data Services (WRDS)

Model 2 of this study analyzes the impact of disposable income on REITs returns. Disposable income is calculated as the ratio of labor income to consumption. The calculation of labor income and consumption is done as per the formula used in Santos and Veronesi (2006) and Lettau and Ludvigson (2001). The equation for model 2 is as shown below:

$$NAREITlogRETrf$$

$$= \beta_0 + \beta_1 * aaiibullbear + \beta_2 * Advbullbear + \beta_3 * crerc + \beta_4 * swtc + \beta_5 * smb$$

$$+ \beta_6 * hml + \beta_6 * mktrf + \beta_7 * def + \beta_8 * prem + \mathcal{E},$$

where:

- NAREITlogRETrf is the dependent variable of this regression. This is calculated as the difference between the log of the return from the NAREIT index and the risk free rate.
- AAIIBullBear is used as an indicator of individual investor sentiment. The individual investor sentiment indicator is found by calculating the difference between the number of bullish and bearish investors obtained from the index published by the American Association of Individual Investors, as per Brown and Cliff (2004) and Huerta (2013). The expected sign of AAIIbullbear is positive as per Giacomini (2011) and Huerta (2013).
- Advbullbear is used as an indicator of institutional investor sentiment. The institutional investor sentiment indicator is found by calculating the difference between the number of bullish and bearish investors obtained from the Investors' Intelligence Index. The calculation of this variable is as per Brown and Cliff (2004) and Huerta (2013). The expected sign of Advbullbear is positive as per Giacomini (2011) and Huerta (2013).
- cRERC indicates the change in the RERC. The change in the RERC is used as an indicator of commercial real estate sentiment as per Huerta (2013). The RERC indicator is found by calculating the average of the "investment conditions" obtained for ten types of commercial properties by the Real Estate Research Corporation, as per Huerta (2013). The expected sign of RERC is positive as per Huerta (2013).
- SWTC is used as an indicator of disposable income (ratio of labor income to consumption). Labor income and consumption are calculated as per Lettau and Ludvigson (2001), Santos and Veronesi (2006). Labor income is calculated as the sum of wages and salaries, transfer payments and other labor income minus personal

contributions for social insurance minus taxes. Taxes are defined as the product of personal tax and non-tax payments and the ratio of wages and salaries to the sum of wages and salaries, proprietors' income with inventory evaluation and capital consumption adjustments, rental income, personal dividends and personal interest income. Consumption is defined as the sum of non-durables and services excluding clothing and shoes. The expected sign of SWTC is negative.

- SMB (small minus big) is the difference between the average return on three small portfolios and average return on three large portfolios. This variable indicates whether the portfolio manager is more inclined on investing in small market capitalization firms compared to large market capitalization firms. A positive SMB indicates that the portfolio manager was investing more in stocks of low market capitalization firms to capture the abnormal return. SMB seeks to capture the small firm effect as generally smaller firms tend to outperform larger firms. The expected sign of SMB is positive, as per Huerta (2013) and Lee et al. (2008).
- HML (high minus low) is the difference between the average return on two value portfolios and the average return on two growth portfolios. This variable indicates whether the portfolio manager is more interested in investing in value stocks (that have higher book to market ratio) rather than growth stocks. Higher book to market stocks show abnormal returns. A positive HML indicates that the portfolio manager was investing more in value stocks. The expected sign of HML is positive, as per Huerta (2013) and Lee et al. (2008)
- Mktrf- is the excess market return calculated as the difference between the return from the market portfolio and the risk free rate. The return from the market portfolio is the

value weighted return on all NYSE, AMEX and NASDAQ stocks. The risk free rate is the one-month Treasury bill rate. The expected sign of the excess market return is positive as per Huerta (2013) and Lee et al. (2008).

- DEF is the default risk premium. DEF is calculated as the difference between the Moody's seasoned Aaa Corporate Bond Yield and Moody's seasoned Baa Corporate Bond Yield. The calculation of this variable is as per Huerta (2013). DEF shows the additional amount that a borrower must pay to compensate the lender for assuming default risk. Default premiums tend to be high during recessions (Fama, 1986). The expected sign of DEF is negative, as per Lee et al. (2008) and Huerta (2013), and
- PREM is the term risk premium. It is calculated as the difference between the 20-year Treasury bond rate and one month Treasury bill rate. The term risk premium increases with maturity when the business cycle is strong (Fama, 1986). The expected sign of PREM is positive as per Lee et al. (2008) and Huerta (2013).

Table 3 shows the description of the variables used in Model 2 and their expected signs. The dependent variable in model 2 is NAREITlogRETrf. The expected sign of the investor sentiment indicators of aaiibullbear (individual investor sentiment), advbullbear (institutional investor sentiment), cRERC (commercial real estate sentiment) is positive as explained above. The expected sign of swtc (disposable income or ratio of labor income to consumption) is negative as explained above. Additionally, the expected sign of the Fama and French (1992) indicators of smb, hml and mktrf is positive as explained above. Alternatively, the expected sign of the Fama and French bond market indicator of DEF is negative and the expected sign of the Fama and French bond market indicator of PREM is positive as explained above.

Table 3
Description of variables for model 2.

Variable	Description	Expected Sign
NAREITlogRETrf	The difference between the log return from the NAREIT U.S. Real Estate Index and the risk free rate	Dependent Variable
aaiibullbear	Difference between the percentage of bullish and bearish investors of the American Association of Individual Investors (AAII) Index	positive
advbullbear	Difference between the percentage of bullish and bearish investors of the Investor Intelligence (II) index	positive
cRERC	Change in the average of the "investments conditions" of ten commercial properties published by RERC	positive
swtc	Ratio of labor income to consumption	negative
smb	Difference between the average return on three small portfolios and the average return on three large portfolios	positive
hml	Difference between the average return on two value portfolios and average return on two growth portfolios	positive
mktrf	Difference between the return from the market portfolio and the risk free rate	positive
DEF	Difference between Moody's seasoned Aaa Corporate Bond Yield and Baa Corporate Bond Yield	negative
PREM	Difference between the 20 year Treasury Bond rate and the 1 month treasury bill rate	positive

The following table, Table 4, shows the list of all data sources used in the model and their frequency. The NAREIT U.S. Real Estate Index used to calculate the REITs return was obtained from the NAREIT website and is available monthly.

Table 4
Sources and frequency of variables for model 2.

Variable	Frequency	Source
NAREIT U.S. Real Estate Index	Monthly	NAREIT website
AAII	Weekly	Thomson's DataStream
II	Weekly	Thomson's DataStream
RERC	Quarterly	Real Estate Research Corporation (RERC) website
Labor Income variables	Quarterly	Bureau of Economic Analysis
Consumption variables	Quarterly	Bureau of Economic Analysis
SMB	Daily	Wharton Research Data Services (WRDS)
HML	Daily	Wharton Research Data Services (WRDS)
mktrf	Daily	Wharton Research Data Services (WRDS)
DEF	Monthly	Thomson's DataStream
PREM	Monthly	Thomson's DataStream
rf	Daily	Wharton Research Data Services (WRDS)

Also, the individual investor sentiment index, AAII, published by American Association of Individual Investors was obtained from Thomson's Datastream and is available weekly, Similarly, the institutional investor sentiment index, II, published by Investor's Intelligence was obtained from Thomson's Datastream and is available weekly. The commercial real estate sentiment index, RERC, published by the Real Estate Research Corporation (RERC) was obtained from the RERC website. The labor income and consumption variables that are used to calculate the disposable income were obtained from the Bureau of Economic Analysis (BEA) website. The frequency of these variables is quarterly. The analysis had to be done quarterly because the data for the RERC and the labor income and consumption variables is available quarterly therefore all the other variables are converted to quarterly.

CHAPTER IV

INVESTOR SENTIMENT ON REITS REVISITED USING VIX

Financial markets today have been influenced by the behavior and the attitude of investors known as investor sentiment. Previous studies have shown that investor sentiment affects the return from different financial markets (Brown and Cliff, 2004; Giacomini, 2011; Huerta, 2013; Lin et al., 2009; Wang, 2003). Traditionally the measures of investor sentiment have either been survey based measures (such as AAII published by the American Association of Individual Investors or the II published by Investor Intelligence) or proxies based on different formulas such as the Net Asset Value (NAV) or the put call ratio. These measures have been used extensively however all these measures are based on historical information. Financial advisors often use these sentiment indicators to analyze the behavior of the investors and predict the direction at which the market is expected to move that is whether the market will increase and show a bullish trend or would reduce and show a bearish trend. Hence, the expected future changes in the financial markets or volatility is an important factor in the decision making process.

The financial advisors and consultants would have better information regarding the expected future volatility if they use measures that show the market's expectation of the volatility in the future. Traditionally, the Implied Volatility can be measured by using different models such as the Black Scholes model. However, calculation of the implied volatility from different models requires selecting the appropriate model and also information about the inputs of that model for example to calculate the Implied Volatility from the Black Scholes model, information is needed about the strike price, risk free rate, time to expiration, observed option price and dividends.

The problems mentioned above have been eliminated by using indices to show the implied volatility. The availability of an index to show the implied volatility eliminates the need to have information about the different inputs and also the calculation of the implied volatility. The Chicago Board of Options Exchange (CBOE) publishes a number of different indices showing the markets expectation of the volatility in the future such as the CBOE NASDAQ 100 Volatility Index (VXN), CBOE DJIA Index (VXD). However, the most widely used index published by the CBOE is the Implied Volatility Index (VIX).

VIX was introduced by the CBOE in 1993 and was initially based on the market's expectation of 30-day implied volatility of the S&P 100 options. A decade later in 2003, CBOE changed the calculation of the VIX to be based on the S&P 500 options. Hence, after the change in the calculation, VIX measures the market's expectation of the 30-day Implied Volatility of the S&P 500 options. Additionally, in 2014 the CBOE introduced the SPX weekly's on the VIX. The inclusion of the weekly options on the VIX has helped in enhancing the VIX because its uses SPX options with more than 23 days to expiration and less than 37 days to expiration thus helping to more precisely match the 30-day timeframe that the VIX is required to consider.

The calculation of the VIX differs from the calculation of other stock indices. Stock market indices like the S&P 500 are calculated based on the prices of the underlying stocks. VIX is calculated based on the prices of the options with the price of each option indicating the expected volatility of the market. The calculation of the VIX involves three steps. The first step requires selecting the near term and next term call and put options. The second step involves calculating the volatility of these near term and next term options. The third step involves calculating the 30-day weighted average of the near term and next term volatilities.

As discussed in chapter 2, VIX has been used as a measure of investor sentiment in the stock market (Brown and Cliff, 2004; Da et al., 2015; Kurov, 2010). This chapter seeks to extend the research on investor sentiment by analyzing the impact of VIX on REITs returns. This relationship is analyzed with the help of Model 1 as shown in chapter 3 of this study. The next section shows the descriptive statistics of this study. This is followed by the results and the conclusion of this study

Descriptive statistics

Table 5 shows the correlation among the variables employed in the empirical analysis for weekly data.

Table 5
Correlation matrix for model 1.

	NAREITRETrf	lnvixret	cAAIIBullBear	cAdvBullBear	smb	hml	Mktrf
NAREITRETrf	1						
lnvixret	-0.346	1					
cAAIIBullBear	0.085	-0.068	1				
cAdvBullbear	0.219	-0.223	0.213	1			
smb	0.159	-0.037	0.019	0.032	1		
hml	0.166	0.093	0.002	0.005	-0.018	1	
mktrf	0.234	-0.364	0.002	0.153	-0.062	-0.31	1

As shown in Table 5 above, all the correlations are below 0.5. The strongest correlation of 0.3645 exists between the independent variables lnvixret (VIX return) and the Fama and French factor of mktrf (excess market return). This is followed by the correlation between the dependent variable NAREITRETrf and the independent variable lnvixret (VIX return) of 0.3468. The sentiment indices of the cAAIIBullBear and cAdvBullBear have correlation coefficients of 0.0852 and 0.2198 with the excess NAREIT return. The Fama and French control variables of

SMB, HML and Mktrf have very negligible correlation with lnvixret and also extremely low correlation with the individual investor sentiment index of cAAIIBullBear and the institutional investor sentiment index of cAdvBullBear. The correlation among the sentiment indicators also does not show any problem of multicollinearity. There is no hint of any possible multicollinearity issues among the variables utilized in the analysis.

Table 6
Descriptive statistics for model 1.

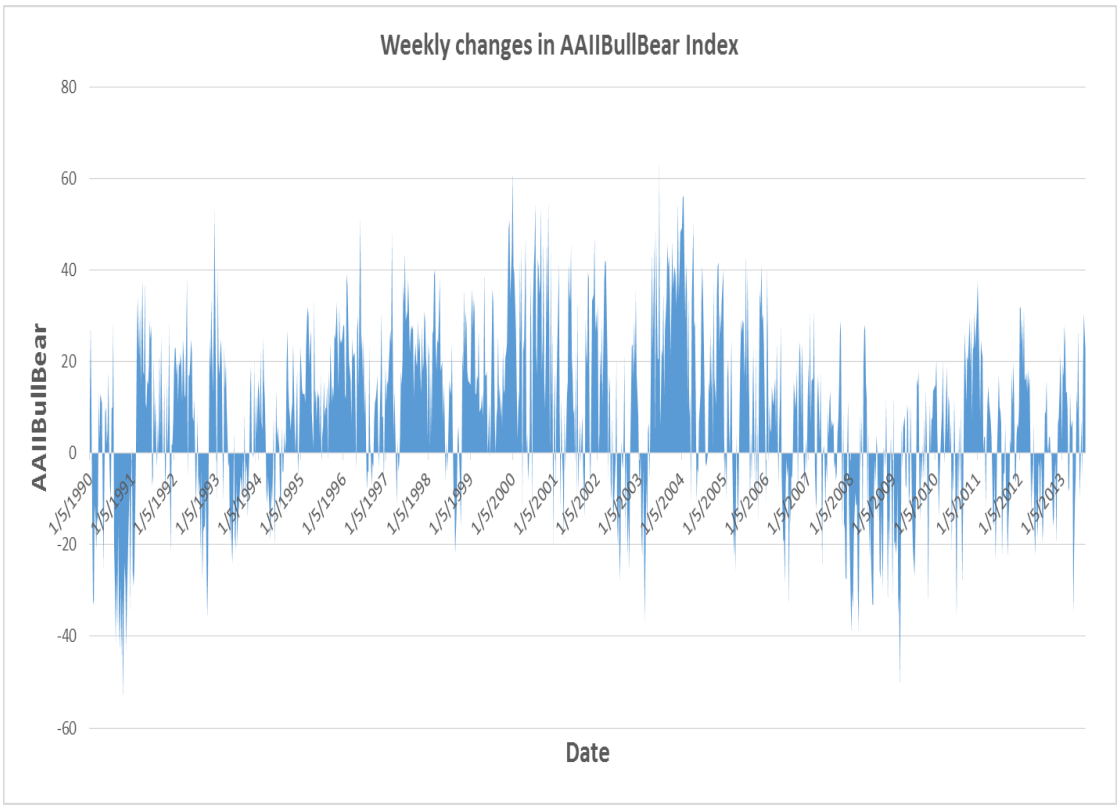
variable	mean	se(mean)	sd	median	max	min	range	sum
lnvixret	-0.0004	0.0034	0.118	-0.005	0.619	-0.49	1.115	-0.503
cAAIIBullBear	0.0587	0.4358	14.96	0.02	51	-64	115	69.46
cAdvBullbear	0.009	0.1400	4.817	0.1	18.1	-17.5	35.6	10.8
mktrf	0.0001	0.0003	0.010	0.0008	0.061	-0.067	0.128	0.1881
smb	0.0005	0.0001	0.005	0.0004	0.043	-0.020	0.063	0.6371
hml	0.0002	0.0001	0.005	0.0001	0.0326	-0.027	0.059	0.2307

Table 6 shows the descriptive statistics for model 1. The data includes weekly observations from the first week of January, 1990 to the last week of July, 2013. The highest standard deviation and range is of the change in the individual investor sentiment variable. Change in the individual investor sentiment (cAAIIBullBear) has a higher standard deviation of 14.96 as compared to the change in institutional investor sentiment (cAdvBullBear) which has a standard deviation of 4.81. This shows that the volatility of individual investor sentiment is much more than the volatility of institutional investor sentiment. This is primarily because individual investors are often uninformed investors and they make their decisions spontaneously and based on the recent news, while institutional investors are informed investors and they do not make their decisions based on news and other recent events.

VIX return (lnvixret) has a standard deviation of 0.118 which shows that VIX has lesser volatility as compared to individual and institutional investor sentiment. The Fama and French control variables of SMB, HML and Mktrf have approximately similar median values and similar standard errors of the mean. Range is difference between the minimum and maximum values. The lowest range is of the Fama and French control variable SMB, while the highest range is of the change in the individual investor sentiment cAAIIBullBear.

Figure 4 below shows the weekly changes in the individual and the institutional investor sentiment index from January 1990 to July 2013. As shown below the change in the volatility of the individual investor sentiment index is more than the change in the volatility of the institutional investor sentiment index. Specifically, as individual investors are uniformed investors compared to institutions therefore their change in the volatility is greater as compared to institutional investors. However, the volatility of institutional investors seems to be more bullish in nature which is greater during periods of financial crises or turbulence while the volatility of individual investors seems to be changing frequently from bullish to bearish. The volatility of both individuals and institutions was bullish in nature during the dot com bubble in 2000. However, during the financial crisis of 2007-2008 the volatility of institutional investors was bullish in nature while the volatility of institutional investors kept changing from bullish to bearish. This shows that institutional investors make informed decisions and are responsible for bulk trades while individual investors make decisions based on news or other unrelated events.

Figure 5 below shows the change in the Implied Volatility Index (VIX) from January 1990 to July 2013. As shown in figure 5, VIX exhibited the highest volatility in the 2005-2010 which was the period when the financial markets were unstable because of the housing bubble and the financial crisis of 2007-2008. This is because the burst of the housing bubble and the



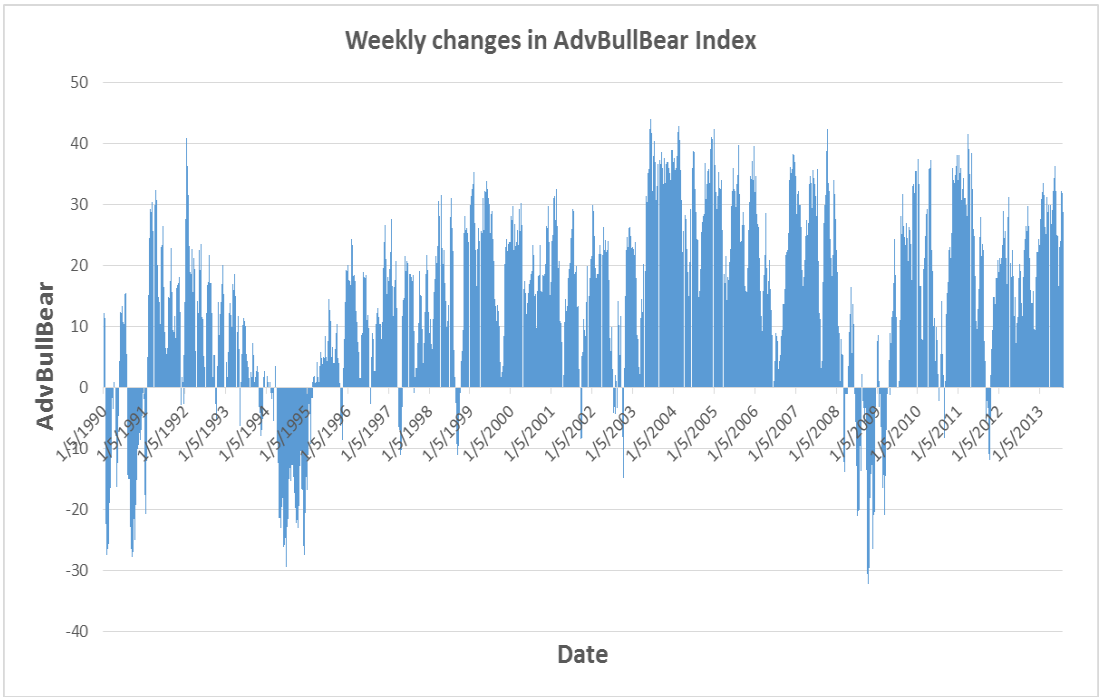


Fig. 4. Weekly changes in the AAIIBullBear and AdvBullBear Index

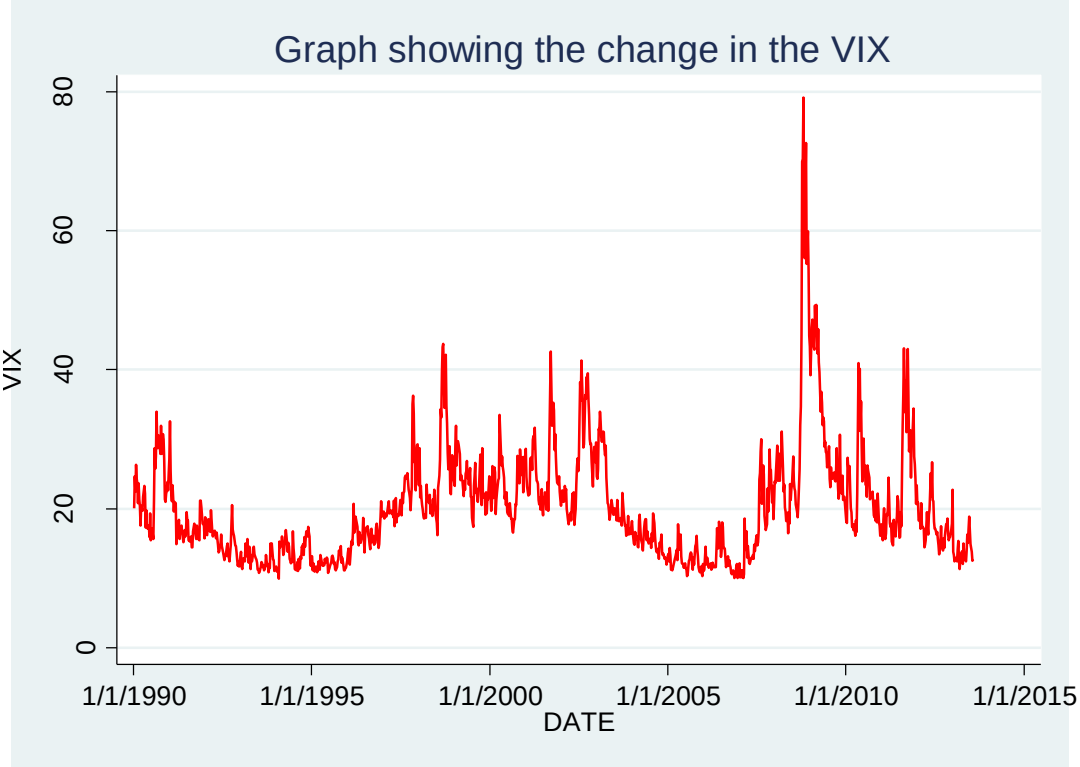


Fig. 5. Graph showing the change in the VIX

financial crisis led to the collapse of several institutions and caused a lot of panic among institutional and individual investors. This uncertainty and fear in the investors is exhibited in the VIX. Also an analysis of the VIX during the dot com bubble of 2000 reveals that even though the dot com bubble led to a decline in the financial markets, the financial crisis of 2007-2008 led to greater panic among investors.

The figure below, Figure 6, shows the histogram of the dependent variable NAREITRETrf which is the excess NAREIT Total Return. As shown below there are no problems of normality for the dependent variable.

Results

This study seeks to analyze the impact of Implied Volatility Index on the REITs returns. Table 7 shows the results of the regression analysis. The dependent variable in the regression

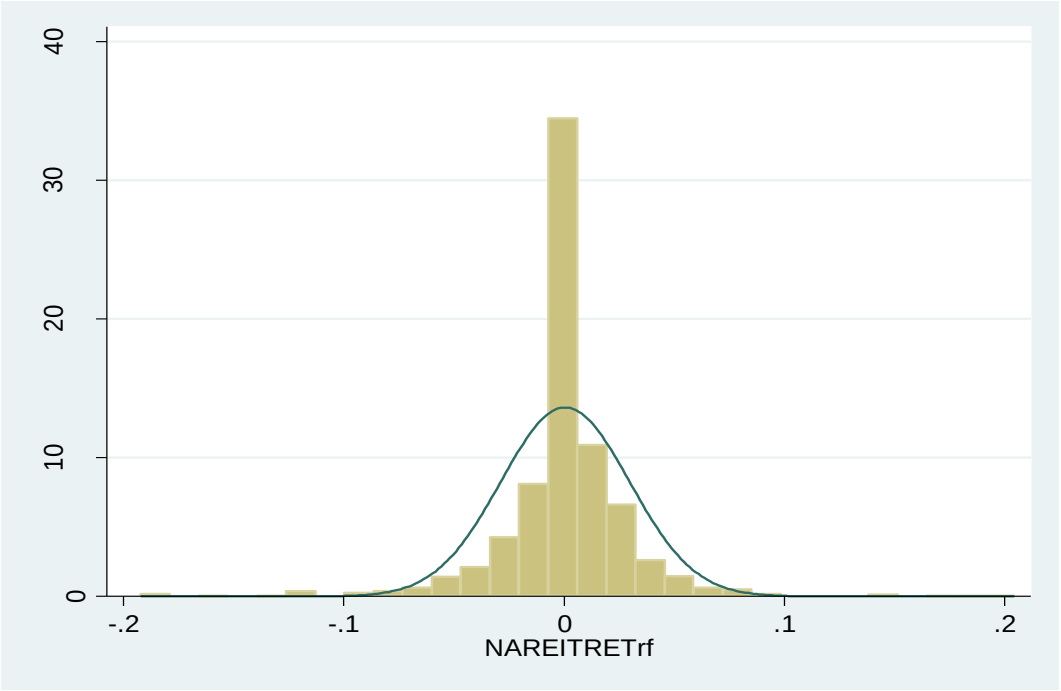


Fig. 6. Histogram of NAREITRETrf

analysis is the excess NAREIT total returns. Models 1, 2 and 3 provide results for the univariate regression analyses in which VIX (lnvixret), change in individual investor sentiment (cAAIIBullBear) and the change in institutional investor sentiment (cAdvBullBear) are included independently. The results from model 1 show that VIX has a significant negative impact on the REIT returns which is statistically significant at the 1% level. The results from models 2 and 3 show that the individual and institutional investor sentiment had a significant positive impact on the REITs returns. These results are statistically significant at the 1% level. Model 4 shows the results of the regression analysis in which all the 3 variables of VIX, change in individual investor sentiment and change in institutional investor sentiment are included concurrently.

The results in Model 4 show that when all the three variables are included concurrently then the individual investor sentiment index is not significant while the VIX and the institutional investor sentiment index remain statistically significant at the 1% level. Model 5 tests for

Table 7
Regression analysis showing the impact of the VIX on the REITs returns.

VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5
Lnvixret	-0.0859***			-0.0774***	-0.0643***
	(0.00677)			(0.0069)	(0.0069)
cAAIIBullBear		0.0001***		5.89e-05	7.58e-05
		(5.64e-05)		(5.36e-05)	(5.11e-05)
cAdvBullbear			0.0013***	0.000879***	0.0007***
			(0.000172)	(0.0002)	(0.0002)
smb					0.878***
					(0.138)
hml					1.436***
					(0.149)
Mktrf					0.596***
					(0.0810)
Constant	0.0004	0.0004	0.0004	0.0004	-0.0004
	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0007)
Observations	1,183	1,183	1,183	1,183	1,183
R-squared	0.120	0.007	0.049	0.142	0.237

Standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

The dependent variable in the regression analysis is NAREITretrf which is the difference between the REITs return from the NAREIT index and the risk free rate. Lnvixret represents an independent variable of the return from the Implied Volatility Index (VIX). cAAIIBullBear represents an independent variable of the change in difference between the number of bullish and bearish investors of the American Association of Individual Investors (AAII) index. cAdvBullBear represents an independent variable of the change in the difference between the number of bullish and bearish investors of the Investor's Intelligence (II) index. smb represents an independent variable of the difference between the return on three small and large portfolios. hml represents an independent variable of the difference between the return on the two value and growth portfolios. mktrf represents an independent variable of the difference between the return from the market portfolio and the risk free rate.

robustness by adding the Fama and French control variables of small minus big (SMB), high minus low (HML), excess market return (Mktrf). The results of Model 5 also show that the VIX (lnvixret) and the change in institutional investor sentiment indicator (cAdvBullBear) remain statistically significant at the 1% level while the change in the individual investor sentiment

indicator remains insignificant similar to Model 4. Also the three Fama and French control variables of SMB, HML and Mktrf are statistically significant at the 1% level. The results obtained above show that an increase in the VIX leads to a decline in the REITs returns thus confirming Hypothesis 1.

The results obtained in model 5 support the findings of similar studies that have analyzed the impact of VIX in other financial markets. Some studies have shown that an increase in VIX leads to a decline in the stock market return (Fleming et al., 1995; Fu et al., 2013; Manda, 2010).

Other studies such as Connolly et al. (2005) have compared the impact of VIX on the stock market return and the bond market return and have shown that a higher VIX is associated with greater bond market return compared to the stock market return. Additionally, this research also supports the theory that VIX is an investor "fear gauge" and an increase in the VIX shows greater market uncertainty that leads to a decline in the REITs returns.

These results are relevant to investors and financial professionals that use VIX as an indicator of volatility and investor sentiment as well as to financial advisors that advise investors to invest in REITs. The results of this study are also important to investors that seek to invest in REITs to diversify their portfolio because these results show that REITs, similar to other securities like stocks and bonds are also affected by the investor sentiment and the behavior and attitude of the investors. Finally, this study has extended the existing research in the field of investor sentiment by showing VIX as an indicator of investor sentiment.

Conclusion

This study sought to analyze the impact of the Implied Volatility Index (VIX) on the REITs returns which was analyzed in Model 1. The results show that an increase in the VIX leads to a decline in the REITs returns. In particular, the results show that a 1% increase in the

VIX leads to a 0.06% decline in the REITs returns. Also the results show that a 1% increase in the change in the institutional investor sentiment index leads to an increase of 0.006% in the REITs returns. However this model failed to find support for the relationship between individual investor sentiment and REITs returns. Thus the results obtained from model 1 find support for hypothesis 1 of this study.

The results of this study are important for investors, financial advisors, institutions and academicians. VIX is considered to be a trademark financial indicator for volatility by several financial and investment advisors. This result provides greater support for this fact because investors often refuse to trade in an environment of fear and greater volatility as they are not assured of getting a good return on their investment.

Additionally, since 2004, the CBOE has introduced VIX futures and in 2006, the CBOE introduced VIX options. Today the combined trading activity of VIX Options and futures contracts is around 80,000 contracts per day as per CBOE estimates (VIX White paper). The growing interest on the VIX options and futures contracts shows that VIX is closely watched by several investors and financial advisors. Thus the results of this model have added significance for the investors seeking to invest in REITs as a part of their portfolio. Investors seeking to invest in REITs as a part of the portfolio can gauge the volatility of the REITs by looking at the VIX. If the VIX is increasing, it shows that there is higher volatility and this volatility would cause a decline in the REITs returns.

Finally, the results of this model are important to academicians and researchers because they provide further support for a strand of literature finding similar results in the stock market showing an increase in VIX increases volatility and induces greater panic among investors.

Additionally, the results of this model also show VIX to be an indicator of investor sentiment in REITs as well thus supporting similar research obtained in the stock market.

CHAPTER V

DISPOSABLE INCOME AND REITS RETURNS

Investors are always encouraged to diversify their investments and form a portfolio so as to minimize the level of risk and maximize the return that investors would be able to achieve. Investors seek to form their portfolio depending on their ability to take risk. Risk seeking investors seek to invest more in high risk securities like mutual funds while risk averse investors seek to invest more in fixed income securities. Additionally, the total risk for any security in the portfolio consists of the diversifiable risk or the unsystematic risk and the non-diversifiable risk or systematic risk.

Researchers and Academicians were looking to develop a model that would relate these types of risks of the financial asset to the return from the market. Sharpe, Lintner and Mossin developed the Capital Asset Pricing Model (CAPM) in 1964 that fulfilled this purpose. According to the CAPM, the security return is positively related to the estimated systematic risk of the security. Several studies sought to empirically test and extend the Capital Asset Pricing Model. However, a study by Roll (1977) showed some of the problems existing in CAPM. According to Roll (1977), the CAPM could not be tested without having a portfolio of securities that represented the true market portfolio and testing the efficiency of the true market portfolio using a proxy for the true market portfolio was not enough to show that the true market portfolio was also efficient. Also he showed that the CAPM failed to explain a cross section of stock returns. The results of Roll (1977) led to several studies seeking to empirically test the CAPM and to extend the CAPM.

A study by Black (1972) extended the CAPM by showing that without access to the risk free asset investors can select a combination of securities that are uncorrelated with other

efficient market portfolios. Another study by Mayers (1973) showed the importance of considering human capital by stating that if all the financial assets are marketable then the relationship between the systematic risk of the security and the expected return as shown in the CAPM is more precise. Merton (1973) provided the intertemporal CAPM and extended the one period model to a multi-period framework. A few years later in 1979, CCAPM or the Consumption CAPM came into existence when Breeden extended the CAPM to include consumption. The CCAPM states that the security return is dependent on the expected systematic risk of the security and the expected future consumption level of the household in the economy. The introduction of the CCAPM led to an increased interest among researchers in this field analyzing the role of consumption in stock market return.

Also the ability to invest in the financial markets depends on the wealth of the individual which is a function of the level of income of the individual and the consumption. The wealth of the individual plays an important role in the financial and investment decisions of the individual. A study by Campbell (1996) showed that an intertemporal CAPM that included the human capital component was able to better explain the equity market equilibrium. Additionally, another study by Jagannathan and Wang (1996) showed strong support for the Consumption CAPM model that included a human capital component.

Thus recent studies have considered the impact of both labor income and consumption on stock market return. A study by Lettau and Ludvigson (2001) used a ratio of labor income and consumption to show that this ratio is a strong predictor of stock market return and Treasury bill rate. After this study, Santos and Veronesi (2006) analyzed the impact of disposable income (ratio of labor income to consumption) on the stock market return and showed that an increase in the disposable income led to a decline in the stock market return.

As discussed in chapter 2 of this study, recent evidence has shown that an increase in the stock market return leads to an increase in REITs returns. Hence based on these strands of literature this study seeks to determine the impact of disposable income (ratio of labor income to consumption) on the REITs returns. The equation for this study is as shown in model 2.

The next section shows the descriptive statistics, results and conclusion for this study.

Descriptive statistics

The following table, Table 8 shows the descriptive statistics for the quarterly data. As shown in the table the commercial real estate sentiment (cRERC) has the highest standard deviation of 3.2099. This is followed by the excess market return (mktrf) which has a standard deviation of 2.9051. The disposable income (SWTC), has a mean of 0.8262 and a standard deviation of 0.0318. The sentiment indicators of the individual investor sentiment (AAIIBullBear) and institutional investor sentiment (AdvBullBear) have very low standard deviation. The Fama and French bond market factor, PREM has the highest mean of 4.9707. Commercial real estate sentiment has got a highest range of 15.411 which can also be seen by the difference between the maximum and minimum values. The median values of the variables indicate the value at the 50^{th} percentile.

Table 9 below shows the correlation matrix. As shown below the highest correlation of 0.591 exists between the dependent variable NAREITlogRETrf and the independent variable mktrf which is the excess market return. This is followed by the correlation of 0.504 between SWTC and DEF. All other correlations are below 0.5. This shows that there are no problems of multicollinearity in the model.

Figure 7 below shows the variation in the individual investor sentiment (AAIIBullBear) and institutional investor sentiment (Advbullbear) from the 2^{nd} quarter of 1992 to the 2^{nd} quarter

Table 8
Descriptive statistics for model 2.

Variable	mean	se(mean)	sd	median	max	min	range	sum
NAREITlogretrf	0.0035	0.0017	0.0152	0.0045	0.0397	-0.0658	0.1055	0.2852
SWTC	0.8262	0.0035	0.0318	0.8380	0.8836	0.76159	0.1220	66.100
AAIIBullBear	0.0573	0.0006	0.0057	0.0578	0.0672	0.04655	0.0206	4.5846
AdvBullBear	0.1515	0.0144	0.1296	0.1582	0.362	-0.1948	0.5568	12.124
cRERC	0.2220	0.3588	3.2099	0.5555	7.1111	-8.3	15.411	17.766
Smb	0.2047	0.1872	1.6744	0.3483	4.11	-3.6133	7.7233	16.383
Hml	0.2925	0.2416	2.1612	0.1933	7.7666	-6.77	14.536	23.4
Mktrf	0.5443	0.3248	2.9052	0.9083	6.4633	-7.7833	14.246	43.543
DEF	-0.955	0.0499	0.4467	-0.84	-0.55	-3.38	2.83	-76.4
PREM	4.9707	0.2052	1.8361	5.05905	7.9856	-0.0032	7.9888	397.66

Table 9
Correlation analysis for model 2.

	NAREITlogretrf	SWTC	AAIIBullBear	AdvBullBear	cRERC	smb	hml	mktrf	DEF	PREM
NAREITlogretrf	1									
SWTC	0.029	1								
AAIIBullBear	-0.013	-0.032	1							
AdvBullBear	0.337	-0.176	0.427	1						
cRERC	0.316	0.026	-0.218	0.105	1					
Smb	0.366	-0.065	0.136	0.166	0.159	1				
Hml	0.415	0.130	0.093	0.148	0.012	-0.16	1			
Mktrf	0.591	0.008	-0.156	0.256	0.244	0.378	-0.236	1		
DEF	0.466	0.504	-0.171	0.231	0.183	-0.098	0.226	0.3041	1	
PREM	-0.016	0.155	0.347	-0.088	-0.086	-0.001	-0.080	0.042	0.2541	1

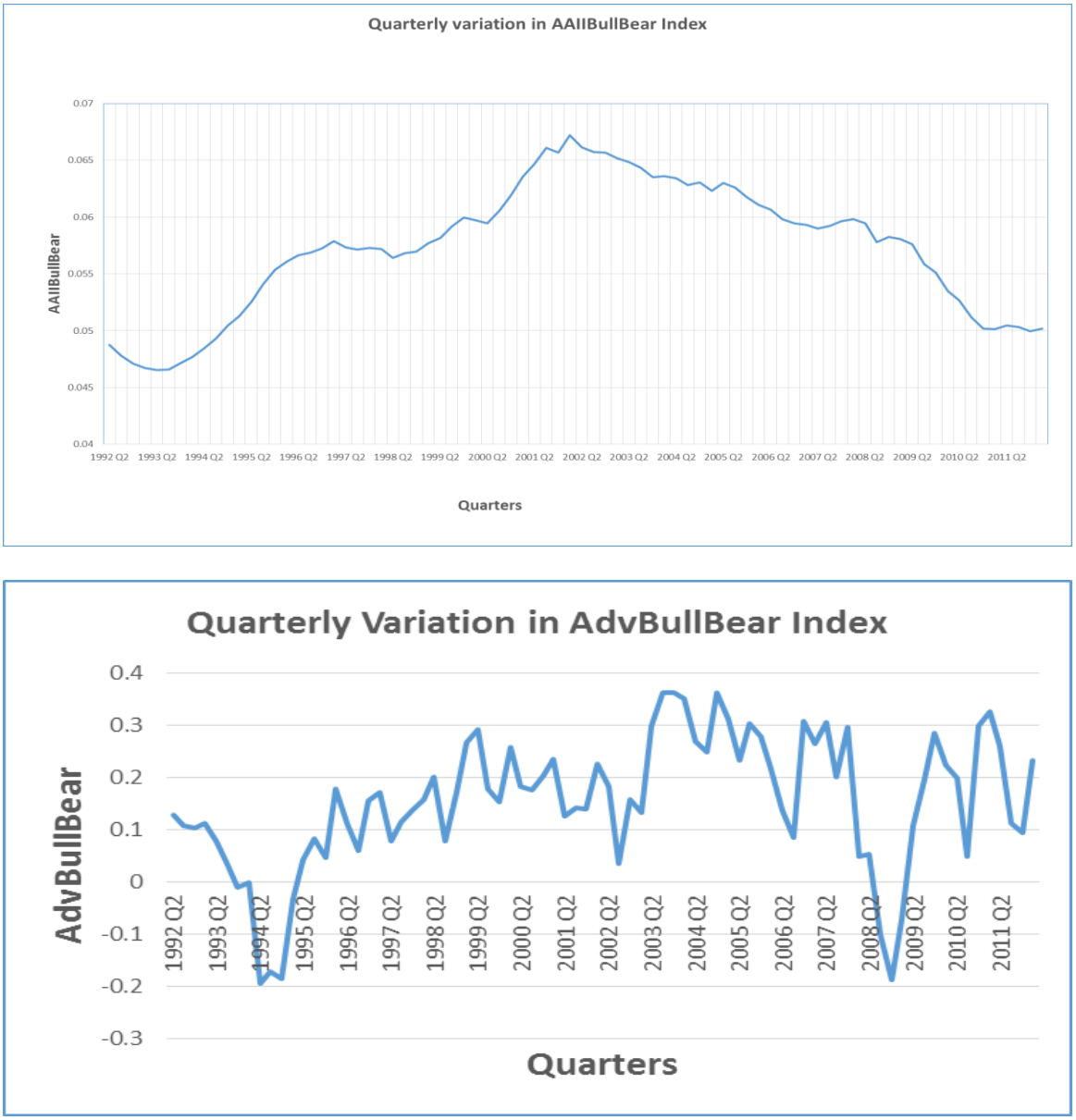


Fig. 7. Quarterly variation in AAIIBullBear and AdvBullBear Index

of 2012. As shown below the changes in the institutional investor sentiment (AdvBullBear) appear to be more volatile than the changes in the individual investor sentiment (AAIIBullBear). Also the changes in the institutional investor sentiment seem to have a greater standard deviation than the changes in the individual investor sentiment.

Additionally, the normality test was performed on the depenedent variable NAREITlogRETrf which indicates the excess NAREIT return. Figure 8 below shows the histogram of NAREITlogRETrf. As shown below the dependent variable shows a normal distribution.

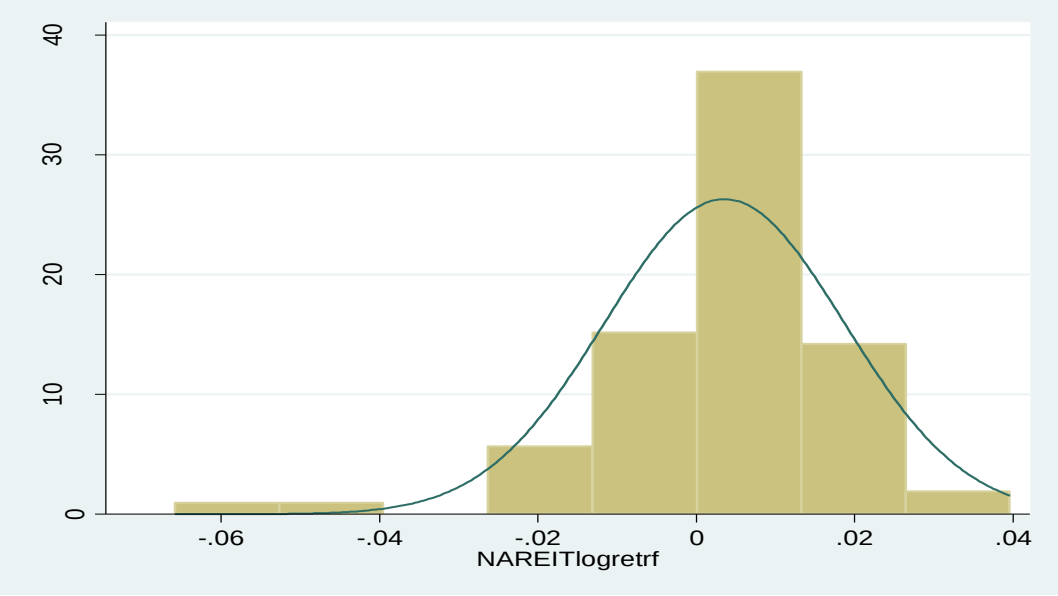


Fig. 8. Histogram of NAREITlogretrf

Results

This study seeks to analyze the impact of disposable income (ratio of labor income to consumption) on the REITs returns. The following table, Table 10 shows the results of the regression analysis for model 2. The dependent variable in the regression analysis is the log of the excess NAREIT return. Models 1, 2, 3 and 4 provide results for the univariate regression analyses in which disposable income (SWTC), individual investor sentiment (AAIIbullbear), institutional investor sentiment (Advbullbear) and the commercial real estate sentiment (cRERC) are included independently. The results from model 1 show that disposable income does not have

an impact on REITs returns in the simple regression. The results from model 2 do not provide evidence on the impact of individual investor sentiment (AAIIBullBear) on REITs returns. The results from models 3 and 4 show that the institutional investor sentiment (AdvBullBear) and the commercial real estate sentiment (cRERC) have a significant positive impact on the REITs returns that is statistically significant at the 1% level. Model 5 shows the results of the regression analysis in which all the four variables of disposable income (SWTC), individual investor sentiment (AAIIbullbear), institutional investor sentiment (Advbullbear) and the commercial real estate sentiment (cRERC) are included concurrently. The results in model 5 show that institutional investor sentiment (AdvBullbear) has a significant positive impact on REITs returns and is statistically significant at the 1% level, while the commercial real estate sentiment (cRERC) has a significant positive impact on REITs returns and is statistically significant at the 5% level. Also the disposable income (SWTC) and individual investor sentiment (AAIIBullBear) do not have a significant impact on REITs returns. Models 6 and 7 show the results of the regression analyses after adding the Fama and French factors. Model 6 shows the results for the model which includes the Fama and French factors of SMB, HML and Mktrf along with disposable income (SWTC), individual investor sentiment (AAIIBullBear), and institutional investor sentiment (AdvBullBear). The results from model 6 show that the commercial real estate sentiment (cRERC) has a significant positive impact on REITs returns and is statistically significant at the 10% level. However the effects of disposable income (SWTC), individual investor sentiment (AAIIBullBear), and institutional investor sentiment (AdvBullBear) do not have any significant impact on REITs returns, while the Fama and French factors of SMB, HML and Excess Market Return are statistically significant at the 1% level of significance.

Table 10
Regression analysis showing the impact of disposable income on the REITs returns.

VARIABLES	(1) Model 1	(2) Model 2	(3) Model 3	(4) Model 4	(5) Model 5	(6) Model 6	(7) Model 7	(8) Model 8
SWTC	0.0136				0.0402	-0.0182	-0.119**	-0.116***
	(0.0539)				(0.0498)	(0.0302)	(0.059)	(0.034)
AAIIBullBear		-0.0352			-0.310	0.0360	0.478	0.530**
		(0.300)			(0.315)	(0.199)	(0.382)	(0.231)
AdvBullBear			0.039***		0.0439***	0.00365	0.0039	-0.0201**
			(0.0125)		(0.0139)	(0.00901)	(0.0166)	(0.0100)
cRERC				0.0014***	0.00117**	0.0006*	0.0011**	0.0005*
				(0.000508)	(0.000511)	(0.0003)	(0.0005)	(0.0003)
Smb						0.0018***		0.0023***
						(0.0006)		(0.0006)
Hml						0.0041***		0.0036***
						(0.0005)		(0.0004)
mktrf						0.0032***		0.0028***
						(0.0004)		(0.0004)
DEF							0.0210***	0.0143***
							(0.0050)	(0.0031)
PREM							-0.00143	-0.0012*
							(0.0010)	(0.0006)
Constant	-0.0077	0.0055	-0.0024	0.0032**	-0.0188	0.0125	0.101**	0.0886***
	(0.0446)	(0.0173)	(0.0025)	(0.0016)	(0.0440)	(0.0264)	(0.0490)	(0.0288)
Observations	80	80	80	80	80	80	80	80
R-squared	0.001	0.000	0.114	0.100	0.209	0.734	0.365	0.797

Standard errors in parentheses*** p<0.01, ** p<0.05, * p<0.1

The dependent variable in Models 1 to 8 is NAREITlogretrf which is the difference between log of REITs return and the risk free rate. SWTC or disposable income represents an independent variable which is the ratio of labor income to consumption. AAIIBullBear represents an independent variable which is the difference between the number of bullish and bearish investors of the American

Association of Individual Investors (AAII) index. AdvBullBear represents an independent variable which is the difference between the number of bullish and bearish investors of the Investors' Intelligence (II) index. cRERC represents an independent variable which is the change in the RERC index published by Real Estate Research Corporation. smb represents an independent variable of the difference between the average return on three small and large portfolios. hml represents an independent variable of the difference between the average return on two value and growth portfolios. mktrf represents an independent variable of the difference between the return from the market portfolio and the risk free rate. DEF represents an independent variable of the difference between the corporate bond yield of Moody's Aaa and Baa bonds. PREM represents an independent variable of the difference between 20 year treasury bond rate and 1 month t bill rate

Model 7 shows the results when the effects of disposable income (SWTC), individual investor sentiment (AAIIBullBear), institutional investor sentiment (AdvBullBear) and commercial real estate sentiment (cRERC) are considered concurrently along with the Fama and French factors of SMB, HML, Mktrf and the Fama and French Bond market factors of DEF and PREM. Results from this model show that the disposable income (SWTC) has a significant negative impact on REITs returns and is statistically significant at the 5% level of significance. Also the commercial real estate sentiment (cRERC) has a significant positive impact on REITs returns and is statistically significant at the 5% level of significance. Additionally, the individual investor sentiment (AAIIBullBear) and institutional investor sentiment (AdvBullBear) do not have a significant impact on REITs returns. The Fama and French factors of SMB, HML and Mktrf are statistically significant at the 1% level. The Fama and French bond market factor of DEF is statistically significant at the 1% level of significance and PREM is also statistically significant at the 10% level of significance. Model 8 shows the actual model after including all the variables. The results in model 8 show that the disposable income (SWTC) has a significant negative impact on REITs returns and is statistically significant at the 1% level indicating an increase in disposable income leads to a decline in REITs returns. The individual investor sentiment (AAIIBullBear) has a significant positive impact on REITs returns and is statistically significant at the 5% level of significance indicating an increase in individual investor sentiment leads to an increase in REITs returns. Also, the institutional investor sentiment (AdvBullBear) has a significant negative impact on REITs returns and is statistically significant at the 5% level of significance. This shows that an increase in the institutional investor sentiment leads to a decrease in REITs returns. Additionally, the commercial real estate sentiment (cRERC) has a significant positive impact on REITs returns and is statistically significant at the 10% level of

significance which shows an increase in the commercial real estate sentiment leads to an increase in the REITs returns. Alternatively, the Fama and French market factors of SMB, HML, Mktrf and DEF are statistically significant at the 1% level of significance while PREM is statistically significant at the 10% level of significance.

The results of this research show that the effect of disposable income on REITs returns is statistically significant when analyzed concurrently along with Fama and French control variables of SMB, HML, Mktrf and Fama and French bond market factors of DEF and PREM. This is because the Fama and French control variables of SMB, HML and Mktrf control the effect of stock market while the Fama and French bond market factors of DEF and PREM control the effect of bond market. Additionally, it is important to control for the effects of stock market and bond market because investors have the choice to invest in either the stock market, bond market or REITs and therefore an increase in the ratio of labor income to consumption gives investors greater access to REITs, stocks and bonds too.

The results of this study show that an increase in the disposable income of the individuals leads to a decline in the REITs returns. This finding supports hypothesis 2. Hence, this study supports the finding of Santos and Veronesi (2006) who find similar relationship between disposable income and stock market return. Additionally, the results also find a positive relationship on the impact of individual investor sentiment on the REITs returns which supports hypothesis 3. This shows that individual investors are interested in investing in REITs. However, the results also find an increase in the institutional investor sentiment leads to a decline in the REITs returns. This result fails to find support for hypothesis 4 of this study. This shows that institutional investors try to avoid investing in REITs. Alternatively, these results also find a positive relationship on the impact of commercial real estate sentiment on the REITs returns.

This supports hypothesis 5 of this study. This indicates that commercial real estate investors are interested in investing in REITs.

The results of this study are important for financial advisors and investment professionals because they show the importance of considering the level of income and consumption of the individuals. The income and the consumption of the individuals play an important role in determining their investment preferences. Also any individual may decide to invest part of his income in the securities and financial instruments of the institutions. Hence the level of income of the individual would have an impact on his ability to invest in the financial instruments such as stocks or bonds of the institution. Additionally, the results of this study are important for academicians and researchers interested in pursuing research in REITs and real estate as a form of investment.

Conclusion

This study seeks to analyze the impact of disposable income (ratio of labor income to consumption) on the REITs returns. The results show that an increase in the disposable income leads to a decline in the REITs returns supporting Hypothesis 2 of this study. In particular, the results show that a 1 % increase in the disposable income leads to a decline of 11.6% in the REITs returns. This result shows that similar to the stock market, REITs are also affected by the labor income and consumption of the individuals which further establishes REITs as a vehicle of diversification for investors. Additionally, this result also supports the findings of Santos and Veronesi (2006) who have obtained similar results in the stock market.

This study also examined the impact of investor sentiment of individuals, institutions and commercial real estate investors. The results show a 1 % increase in the individual investor sentiment leads to an increase of 53% in the REITs returns. This indicates that the individual

investor sentiment has a significant positive impact on REITs returns thus supporting Hypothesis 3 of this study. Additionally, the results show that a 1 % increase in the institutional investor sentiment leads to a 2% decline in the REITs returns. This indicates that the institutional investor sentiment has a significant negative impact on REITs returns. Alternatively, the results show that a 1% increase in the commercial real estate sentiment leads to an increase of 0.05% in the REITs returns. This indicates that the commercial real estate sentiment has a significant positive impact on REITs return. Thus the results obtained from this study find support for hypotheses 3 and 5 however fail to find support for hypothesis 4.

The results of this study show that the disposable income which is a ratio of labor income to consumption of the individuals plays an important role in determining the REITs returns. This finding is interesting especially with the increase in the level of institutional holdings in REITs returns. However, the results of this study are not surprising because even though the level of institutional holdings in REITs is increasing, most of the institutions like banks, insurance companies and other financial intermediaries get their income from the individuals who invest in these financial institutions. This shows that irrespective of whether the investor seeking to invest in REITs is an individual or an institution, the labor income and the consumption of the individual will impact the REITs returns.

These findings presented above have important implications for both investors and financial professionals interested in investing in REITs as a part of their portfolio and also financial advisors that provide advice to individual investors. Additionally, the findings are also relevant for different institutions like banks and other financial intermediaries that invest in REITs as a part of their portfolio. The findings of this paper support the theory that the decisions

made by the investors depend on their ratio of income and consumption which ultimately impact the REITs return.

CHAPTER VI

CONCLUSION

Real Estate Investment Trusts (REITs) were created to enable investors to invest in commercial real estate without the need to own the real estate. However similar to other securities in the financial markets, REITs are also affected by investor sentiment. This study intended to do two things: This study extends the literature on investor sentiment by analyzing the impact of VIX on the REITs returns and intended to answer the question of whether the VIX had an impact on the REITs returns. Additionally this study also intended to find whether the disposable income that is the ratio of labor income to consumption had an impact on REITs returns?

The first question that was examined was whether the Implied Volatility Index (VIX) had an impact on the REITs returns? This study found that an increase in the VIX resulted in a reduction in the REITs returns. This result supports the notion that VIX is an "investor fear gauge" and an increase in VIX indicates greater fear and greater uncertainty among investors thus leading to a reduction in the REITs returns. This also shows that greater uncertainty and fear among investors leads to a reduction in the REITs returns.

The second question that was examined was whether the disposable income (ratio of labor income to consumption) had an impact on the REITs returns. This research hypothesized that an increase in the disposable income leads to a reduction in the REITs returns. It was found that an increase in the disposable income that is an increase in the ratio of labor income to consumption leads to a reduction in the REITs returns. This indicates that when investors have greater access to resources due to an increase in labor income compared to level of consumption or a decrease in consumption compared to the level of labor income, they do not wish to invest in

REITs. Additionally it was also found that an increase in the individual investor sentiment leads to an increase in the REITs returns. Also an increase in the commercial real estate sentiment leads to an increase in the REITs returns. This indicates that individual and commercial real estate investors prefer to invest in REITs as a part of their portfolio. Alternatively, this study also found an increase in the institutional investor sentiment leads to a decline in the REITs returns. This indicates that institutional investors try to avoid REITs and invest in other securities.

The results of this research are important for individuals and financial institutions seeking to invest in REITs as a source of diversification because the income and consumption of the individuals plays an important role in determining the REITs return. Additionally, the results of this study are also important to financial advisors and other investment advisors seeking to advice the investors that invest in REITs because the volatility in the financial markets and the sentiment of the investors also determine the REITs returns.

Limitations and suggestions for future research

The contributions of this study are significant and important to investors and financial professionals and financial advisors that are interested in investing in Real Estate Investment Trusts. The results of this study show that investors try to avoid REITs if they have greater access to resources compared to their consumption level. Additionally, the findings of this research show that while individuals and commercial real estate investors prefer to invest in REITs as a part of their portfolio, institutions tend to avoid REITs while forming their portfolio.

These findings provides an interesting avenue for future researchers to think about. What is the type of security that investors seek to invest when they have greater access to resources? Where do institutions like to invest? Why are they trying to avoid REITs as a form of

investment? Also why are individuals and commercial real estate investors still attracted to REITs as a form of investment?

This study has some limitations. The time period under consideration in this study was limited due to the availability of data. The American Association of Individual Investors started publishing the individual investor sentiment index in 1987. This limited the availability of data from 1987 onwards. Also the individual and the institutional investor sentiment indices are published weekly which ensured that the analysis had to be done on a weekly basis.

In the context of disposable income all the data for the variables used to calculate labor income and consumption was available quarterly from the Bureau of Economic Analysis website. Additionally the commercial real estate sentiment published by the Real Estate Research Corporation (RERC) is also published quarterly. Hence the analysis of this study had to be done quarterly.

The individual and institutional indicators of investor sentiment used in the study were the American Association of Individual Investors (AAII) and the Investor Intelligence (II) which divided their respondents into bullish, bearish and neutral based on the respondents who were most likely in USA. The labor income and consumption data was collected from the Bureau of Economic Analysis which collects the data quarterly.

Future studies can extend this research in other countries using international data on investor sentiment or can consider the use of new measures of investor sentiment. Additionally, future research can consider the use of other variables to calculate labor income and consumption. Also, the analysis of labor income and consumption can also be done weekly or monthly if the data for these variables is available weekly or monthly in the future.

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