

REITs EXPLANATORY VARIABLES DURING THE EARLY 1990s RECESSION
AND TODAY

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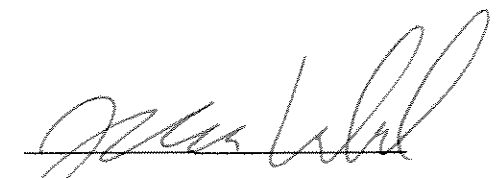
Economics

Abstract

This thesis explores what economic factors had the greatest affects on the early 1990s commercial real estate recession and the current commercial real estate recession. Equity Real Estate Investment Trusts (REITs) are used as the measure of the commercial real estate market. The Hypothesis states that because of the fundamental differences between the two recessions, the influential factors will also be different. Through the use of an ordinary least squares regression, the hypothesis is tested using a series of asset pricing explanatory variables. The findings suggest that the hypothesis was correct and the two recessions are influenced by different explanatory variables.

KEYWORDS: (REITs, Recession, Commercial Real Estate)

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TABLE OF CONTENTS

ABSTRACT	ii
ACKNOWLEDGMENTS	vii
1 INTRODUCTION	1
1.1 Commercial Real Estate in the 1980s.....	3
1.2 Commercial Real Estate After 2007.....	7
2 LITERATURE REVIEW	13
2.1 Stock Market.....	15
2.2 Interest Rates.....	19
2.3 Predictability of REITs.....	23
3 METHODOLOGY	28
3.1 Theory and Methodology.....	28
3.2 Data.....	29
3.3 Expected Relationships.....	31
4 RESULTS AND ANALYSIS	37
4.1 Regressions 1, 2 and 3 Results.....	37
4.2 Regressions 1, 2 and 3 Analysis.....	40
4.3 Regressions 4 and 5 Results.....	42
4.4 Regressions 4 and 5 Analysis.....	44
4.5 Conclusion.....	46
5 CONCLUSION	48
5.1 Conclusion.....	49
SOURCES CONSULTED	53

LIST OF TABLES

2.1	Relevant Literature	14
3.1	Dependent and Independent Variables	30
3.2	Variables Expected Relationships	32
4.1	Results for Regression 1	38
4.2	Results for Regression 2	39
4.3	Results for Regression 3	39
4.4	Results for Regression 4	43
4.5	Results for Regression 5	43

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CHAPTER I

INTRODUCTION

Investing in real estate can be a very profitable investment and has created large fortunes for many people in the United States. Unfortunately, it has also lost fortunes for those who have not invested wisely. While millions of Americans actively continue to invest in real estate, there are millions more that are unable, due to their financial situations, to get involved. Whether they have no extra expendable income, or their credit is poor, for one reason or another buying property is not realistic for them. This is the purpose of Real Estate Investment Trusts (REITs). They enable ordinary people to invest in real estate with very little risk. An individual may simply invest one thousand dollars instead of the tens of thousands that is required to traditionally invest in real estate. It also gives investors the ability to buy and sell their investment much quicker than buying and selling actual property. The speed and liquidity of the investment has some significant advantages, including an active investment strategy. By completing transactions quickly, investors can mold their investment portfolios to maximize their returns depending on the market. If the investor owned actual property, it could take months to sell and in a poor market even longer. The downside of REITs is that they are vulnerable to fluctuations in the real estate market and if there is a recession, REITs will suffer because of it.

This study will look at the effects of real estate recession on REIT returns and what factors most strongly affect those returns. It will examine the early 1990s recession and compare that with the recession taking place currently. The results will provide a better understanding of the nature of the current recession.

There are two main types of REITs, equity and mortgage. Mortgage REITs deal with buying and selling securitized real estate mortgages. Equity REITs buy and sell mainly commercial real estate properties and profit from either selling the property at a higher price than it was purchased, or collecting income from renting out the property. There are some Equity REITs that invest in residential housing, but most buy commercial real estate. Because this study is concerned with REITs as a tool to invest in real estate, Equity REITs will be the main focus. For Equity REITs to be profitable, they need the assistance of certain tax laws. The key to REITs success is that they are exempt from corporate income taxes if they give at least 95% of their profits back to investors in the form of dividends. This is a huge incentive for REITs to make sure they reach the 95% mark to ensure they get the tax exemption. Without this exemption, REITs would almost all fail and the industry would be non-existent. Over the last 20 years though, the industry was thriving.¹ The 1980s and 1990s saw a large increase in the number of REITs, both equity and mortgage, and with the booming real estate industry from 1992 to 2007, the companies have been very profitable.

REITs are very similar to mutual funds traded on the general stock market. Mutual funds are a collection of general stocks bunched together in a portfolio that is traded as a single mixed investment package. REITs are similar because they are also

¹ Brown, David T.. "Liquidity and Liquidation: Evidence from Real Estate Investment Trusts." *The Journal of Finance* 55, no. 1 (2000)

traded on the stock market. Also, they are a collection of different commercial real estate investments bunched together to create a mixed asset fund for investors to buy. This gives investors more diversity in their real estate investing because not many investors have the ability to buy multiple properties, especially commercial properties. Since the majority of Equity REITs invest in commercial real estate, this study also looks at the causes of the commercial real estate recession in the late 1980s and early 1990s compared with the current recession.

Commercial Real Estate in the 1980s

The most common real estate investment acquired by REITs is commercial real estate. Consequently, there is an obvious relationship between what happens in the commercial real estate market and the performance of REITs. With the widespread economic downturn today, there must be some adverse effect to REITs due to the struggling real estate industry. Comparing the current recession to the early 1990s recession can determine if the two are affected by similar factors. Garner's (2008)² article provides in depth analysis of this recession and the similarities and differences of today.

Commercial real estate has always been a very cyclical industry. These fluctuations are caused by overall economic health of the country such as employment and stock market conditions. Other reasons may be because there are typically multiple years between the start and finish of a commercial real estate project. This can be a problem because the economic conditions may not be the same as when the project

² C. Alan Garner, "Is Commercial Real Estate Reliving the 1980s and Early 1990s?" *Economic Review* 93, no. 3 (2008)

began. Where the real issue is, is when an investor is unwilling to scrap a project because of the money already invested. The end result is a building that may no longer be in demand.³ The building that took place in the 1980s was far beyond the normal cyclical nature of the industry. There was a sharp increase from 1979 to 1985 of commercial real estate construction as a percentage of GDP. This was not a problem at the time because the economic growth kept up with the office space, and vacancy rates stayed very low. This invited more and more investors into the thriving industry looking to capitalize on the growth.⁴

There were many factors that contributed to the commercial real estate boom. Changing economic factors required more office space than before. The baby boom generation was entering the workforce as well as more and more women. Also, jobs began changing from goods production to service production. This resulted in a 4% annual increase in office space needed starting in the late 1970s.⁵ Adding to this, there were new federal tax laws that made it more profitable than before to develop commercial real estate. The Economic Recovery Tax Act of 1981 (ERTA) was the policy that made investing so profitable. In 1986, however, policy makers decided that the ERTA gave too much incentive and initiated the Tax Reform Act of 1986 (TRA). This took away many of the tax benefits that strengthened the building boom, and investors

³ Ibid.

⁴ Ibid.

⁵ Ibid.

were not able to purchase already constructed buildings. The drop in demand contributed to the drop in real estate prices.⁶

An important factor that also increased commercial real estate building was the willingness of banks to lend money. It is necessary for almost every real estate project to have outside financing in order to complete them. Because there was such demand for office space, lending money to investors appeared to be very profitable, and it was, especially because of the large upfront fees. Banks were also dealing with greater competition for financing the projects as more investors were using commercial paper financing. This caused the banks to lower the standards of the loans they were distributing.⁷

By the late 1980s, commercial real estate construction had nearly halted because of the high vacancy rates and new tax laws that began in the mid 1980s. Despite the sharp decrease in construction, it was too late to stop the rising vacancy rates of many of the buildings. The national vacancy rate was an astounding 19% by 1992. Naturally, the increase in supply of office space greatly reduced the price of rents and in turn the price of the property. Commercial investors experienced huge losses as a result. The decline in commercial real estate was a large influence on the recession in the early 1990s. While the recession didn't last very long, the recovery time was much slower than usual. The reason for the slow recovery was attributed to the lack of credit available

⁶ Ibid.

⁷ Ibid.

from the banks. This is due to the fact that many of the banks had suffered losses associated with the mass real estate lending that had taken place in the previous decade.⁸

According to Browne and Case (1992), there were two main reasons why the banking industry took such a large hit from the fallout of the commercial real estate construction boom. First, banks had been very aggressive entering into commercial mortgages. This was all part of the increase in the amount of building that took place. It could not have happened without the willingness of banks to lend at an unprecedented pace. Second, many of the borrowers of the loans were partnerships or individuals who had set up LLCs.⁹ This meant that most of the borrower's assets were protected from the banks and could not be taken as collateral. Either that or their assets were in real estate and because real estate had taken such a hit, the worth of the assets had significantly decreased.¹⁰

The harsh blow dealt to financial institutions from the decline in real estate made the problem more widespread than just in the real estate industry. Since the financial institutions failed, the credit available for small and medium sized businesses was non-existent. So many businesses that would not have otherwise been affected by the overbuilding of commercial real estate were being hurt. Although there were other issues adding to the credit problem, there was an undeniable association with banks failing that had high concentrations of real estate lending. The banks that failed had

⁸ Ibid.

⁹ Lynn Browne and Karl E. Case, "How the Commercial Real Estate Boom Undid the Banks", In *Real Estate and the Credit Crunch*, ed. Lynn E. Browne and Eric S. Rosengren (1992)

¹⁰ Ibid.

much higher real estate loans to total assets.¹¹ Because of the large losses these banks incurred, they had very unfavorable capital to asset ratios. In order to reduce their assets to match up with their capital base, banks had to call in existing loans and would not extend any new credit. This further damaged small businesses because they rely heavily on bank financing and do not have the resources to access capital markets directly.¹²

This explanation of the late 1980s real estate recession demonstrates the importance of real estate in the economy. It is very prosperous when conditions are favorable, but can fall sharply if conditions weaken. The article by Garner (2008) moves on from the 1980s recession to look at the current real estate situation facing our economy. Did the same factors that caused the 1980 recession cause the recession that faces us today, or is there another explanation?

Commercial Real Estate After 2007

In the 1980s it has been made very clear that the extent of overbuilding was extreme and that that caused many of the problems in the late 1980s. Looking at today's real estate economy, it is clear that the situation is not as bad. As far as the supply side is concerned, the commercial and multifamily constructions have not been as extensive as they were in the 1980s. In order to accurately compare the two time periods, it is useful to look at commercial construction as a share of GDP. Despite the increased growth in the industry, the share of GDP is not to the levels in 2007 as it was in 1985. The 1985 percent of GDP growth was about 3 percent while in 2007 it was only about 1.5 percent. This is about half as much, which is significantly lower. The lower share of GDP growth

¹¹ Ibid.

¹² Garner, "Is Commercial Real Estate Reliving the 1980s and Early 1990s?"

is a hopeful sign that the overbuilding that took place in the 1980s is not being repeated. The demand, however, is also lower than in the 80s and may somewhat offset the smaller supply. The growth in employment for jobs that occupy commercial real estate is not as high as it was in the 1980s. From 2000-2007, the growth rate has been about 1.5 percent compared to a growth rate of around 3 percent in the 80s and 90s. It is unlikely that office employment will grow as fast as it had in the 1980s because of the aging population, which will reduce the overall labor force.¹³ While the demand growth is not the same as in the 1980s, it is still a strong growth rate and should keep up with the new construction.

Since there is a good balance between supply and demand in commercial real estate, the market is not overbuilt to the degree that it was in the 1980s. The problem facing the industry today is that the demand projections of 1.5 percent a year may not hold up considering the recent economic trends. The drop in employment and volatility of financial markets makes it an uncertain economy to try to predict. The national vacancy rates and commercial property prices are behaving differently than in the late 1980s and early 1990s so it is important to understand the differences in order to understand what might be expected in the future. The vacancy rates are not as severe as they were in 1989, which is a good sign. In the beginning of 2008 the national vacancy rate was 13 percent, which is significantly lower than the 19 percent in 1989. According to Chen and Southard (2008), "to push vacancy rates back to their 1990 levels would require a catastrophic scenario in which massive layoffs lead to unprecedented drops in

¹³ Ibid.

demand.”¹⁴ The prices of commercial property are declining quickly after a period of large appreciation. This is different from the price drops in 1990 because of the sharp appreciation that preceded it. The lower vacancy rates and less severe price changes are reason to believe that the commercial real estate recession will not be as harmful as the one in the late 1980s and early 1990s.¹⁵

The next comparison between the 1980s and today has to deal with commercial real estate financing. This was an important factor in the recession that took place in the 80s and may be significant today as well. First, we will look at the difference in securitization of commercial mortgages. Securitization is the process of taking commercial real estate loans and packaging them into a public security to be traded in public markets. The amount of securitization has increased substantially since the earlier recession. In 1990, only 2 percent of commercial mortgages were securitized opposed to the 26 percent that are in 2007. The growth of securitization is believed to help control commercial real estate cycles, but may also cause its own fluctuations. Securitizing commercial mortgages stabilizes the market because it spreads the risk of financing commercial real estate development to more investors. This can be very beneficial because it would help prevent the devastating blow that was felt by the banks when the commercial real estate fell so dramatically in the late 1980s. Securitization may also have a negative effect on commercial real estate by enabling financial shocks to have significant influence. Previously a shock to the financial market would have very little

¹⁴ Jun Chen, and Jon Southard. “Commercial Real Estate Loss Expectation and CMBS/CMBX Prices.” *TWR Viewpoint* 7, no. 2 (2008)

¹⁵ Garner, “Is Commercial Real Estate Reliving the 1980s and Early 1990s?”

effect on commercial real estate, but because the securitized mortgages are being traded on the market, real estate now has a connection to what happens in the market.¹⁶

The next aspect of financing that will be explored is the change in commercial mortgages in respect to GDP and the changes in who holds the mortgages. The amount of commercial and multifamily mortgages as a percentage of GDP has increased since the 1980s. More commercial developments are relying on increased financing to build their projects. The increase from the 1980s is 4 percent, which while significant, is not overly excessive. It is actually quite a bit lower than the increase in amount of financing for residential purchases. As discussed earlier, the major change in who holds the debt is the increase in securitization as well as an increase in the percent held by banks. The increased debt being held by investors is not a large amount but does warrant some attention. With an increase in a company's debt, their risks are also increased. The more use of debt financing, the higher the risk and investors and policy makers need to be aware of the risk.¹⁷

The third financial difference between the two recessions is dealing with the bank exposure to commercial real estate fluctuations. The percent of commercial real estate debt held by banks has increased from 36 percent in 1990 to 42 percent in 2007. Commercial construction loans have increased to almost 5 percent in 2007, which is near identical to their peak percentage in the late 1980s. This is a concern because banks, especially small and midsized banks are extremely reliant on commercial real estate not

¹⁶ Ibid.

¹⁷ Ibid.

collapsing like it did in the late 1980s. There is even more reason to be optimistic because the overbuilding that was present earlier is not as extensive recently.

It appears that commercial real estate is in better shape than the late 1980s and early 1990s recession because of the lower vacancy rate and lower share of overall economic activity. Unfortunately, the economy is currently very weak and any drop in commercial real estate will only add to the problems facing the economy. The high price of energy and the large drop in residential pricing as well as the drop in the stock market may be accelerated by any commercial real estate weakness.¹⁸

There is clearly a connection between the factors that are spearheading the current economic crisis. There are debates over whether this recession could have been prevented and should the government have done something differently. Perhaps economists should have seen this coming and acted sooner. These accusations would be much more deeply founded if the recession had similarities to the early 1990s recession. Then it should be inexcusable for our government to an identical recession twenty years later. It would prove that history has not taught the United States anything. These are questions that should be answered, and knowing the main economic factors that affected both recessions can help with those answers.

The remaining chapters of this thesis are as follows. Chapter two gives an overview of the literature on the subject. It first reviews literature on factors that affect REITs. These include both stock market pressure and interest rate pressure. Finally it looks at literature that attempts to predict REIT returns. Chapter three will present the

¹⁸ Ibid.

methodology and data of the study. Chapter four articulates the findings of the research. Finally, chapter five will draw conclusions from the study.

CHAPTER II

LITERATURE REVIEW

Chapter two begins by presenting literature on the relationship between the general stock market and Real Estate Investment Trusts. This is to understand if stock market activity has been found to be an influential factor on REITs. If this is the case, we have to account for the differences between both stock market returns and REIT returns and not just rely on REIT returns to measure commercial real estate prices. Next, literature will be presented on the impact of interest rates on REITs. This is important because taking into account fiscal policy may be important. Finally, literature predicting REIT returns using different factors will be explored to determine which will be the best method for further research on the topic. Table 2.1 provides a summary of the major research topics and the major contributions given from each.

TABLE 2.1: RELAVENT LITERATURE

Category	Findings	Authors
REIT and the Stock Market	These examine the relationship between fluctuations in the stock market and REIT returns. Most determine that there is significant relationship.	Clayton, and Mackinnon (2003), Paladino, and Mayo (1998), Seck (1996), Karolyi and Sanders (1998), Peterson and Hsieh (1997), Wang, and Erickson, and Su Chan (1995), Glascock, and Michayluk, and Neuhauser (2004), Allen and Madura and Springer (2000)
REITs and Interest Rate	Examine the relationship between Interest Rate and REIT returns. Findings differ because equity REITs are more influenced by interest rates than mortgage REITs.	Allen and Madura and Springer (2000), Chen, and Tzang (1988), Mueller and Pauley (1995)
Predictability of REIT	These studies forecast REIT returns determining which factors most affect the returns. Factors include S&P 500 returns, long and short term interest rates, consumer price index, industrial production, monetary base and commercial bank loans.	Lizieri and Satchell and Zhang (2007), Bharati, and Gupta (1992), Pesaran and Timmermann (1995), Ling and Naranjo, and Ryngaert (2000), Gyourko and Nelling (1996), Fama and French (1993)

Stock Market

To understand REIT returns it is important to understand the factors that have the greatest affect on them. There are numerous studies on the relationship between the stock market and REITs. Some have convincing arguments outlining the significant correlation between stock market prices and REITs, while others give evidence that there is no correlation. Several researchers found that the correlation between the stock market and REITs is weak and they do not effectively diversify a portfolio. Clayton and Mackinnon (2003) question whether REITs are truly a good choice for investors to diversify their portfolios.¹ If REITs simply mimic stock market movement, they would have no real effect on a portfolio. Early studies show that there was little correlation between REITs and private unsecuritized income property.² As described by Paladino and Mayo, (1998) “The results suggested that inclusion of REITs does not diversify a stock portfolio.”³

Additional studies have shown the same relationship suggesting that REIT are quite different from private real estate and would therefore serve a very limited role in a mixed-asset portfolio.⁴ This further demonstrated the purpose of investing in a REIT, which is to add real estate into a portfolio without the large investment and illiquidity of

¹ Jim Clayton, and Greg Mackinnon, “The Relative Importance of Stock, Bond and Real Estate Factors in Explaining REIT Returns.” *Journal of Real Estate Finance and Economics* 27, no. 1 (2003)

² Ibid.

³ Mike Paladino, and Herbert Mayo. “REIT Stocks do not Diversify Stock Portfolios: an update.” *Real Estate Review* 27, no. 4 (1998), 39

⁴ Diery Seck “The Substitutability of Real Estate Assets.” *Real Estate Economics* 24 (1996)

putting money directly into a property. Instead of acting as a shortcut to real estate investing, it seems to be very similar to other stocks and bonds on the market.

Karolyi and Sanders (1998) examine the predictability of stock and REITs returns. They used a multi-beta asset pricing model and varying results between stock and REITs. They found that much of the predictability in the models came from the economic variables used in the asset pricing model. They also found a strong relationship between stock risk premiums and REIT returns.⁵

Another study that suggests the similarity of REITs to the stock market influence was done by Peterson and Hsieh (1997). They analyzed monthly returns on REITs from 1976 to 1992 and compared them to stock market risk premiums. The results show that Equity REITs have a strong relationship with the stock market. They also find that Mortgage REITs have a much weaker relationship. This further illustrates two things, first that Equity REITs are affected by the stock market and second that there is a significant difference between mortgage and equity REITs. It must also be noted that the time period only went to 1992. This is further support of the next research presented.⁶

After 1992 there was a huge boom in REITS and since then there has been a debate about whether the studies that discredit REITs diversifying role still holds true. Before then, REITs were much less popular than stocks. They had a smaller turnover ratio and less institutional investors. Because of the lack of activity and interest, there

⁵ Andrew G. Karolyi and Anthony B. Sanders. "The Variation of Economic Risk Premiums in Real Estate Returns." *Journal of Real Estate Finance and Economics* 17, no. 3 (1998)

⁶ James D. Peterson and Cheng-Ho Hsieh. "Do Common Risk Factors in the Returns on Stocks and Bonds Explain Returns on REITs?" *Real Estate Economics* 25, no. 2 (1997)

were not very many analysts that followed their activities.⁷ With the growth of REITs came a much broader analyst following and a more knowledgeable investor base. Due to these changes, there are now claims that the link between REITs and the real estate market have significantly increased.⁸ The results of the Clayton and Mackinnon (2003) study show that since the boom of 1992 there is in fact a much larger correlation between REITs and private real estate. In the data analyzed for the 1980s stock market factors explain 72% of volatility. While this is a significant percentage, the drop to only 9% volatility explained in the 1990s is of greater significance.⁹ This is a significant real estate factor that has emerged and can be expected to act very differently than common stocks.

However, there are several other researchers who suggest the opposite. Glascock, Michayluk and Neuhauser's (2004) results found the diversification abilities of REITs. The purpose of their study was to determine whether REITs provide diversification to portfolios as well as providing inflation hedging benefits.¹⁰ In order to test if REITs reduce risk in a portfolio they looked at the 1997 stock market decline. If REITs reduce risk, than they should not fall as far as other common stocks during the decline. This

⁷ Ko Wang, and John Erickson, and Su Han Chan. "Does the REIT Stock Market Resemble the General Stock Market?" *The Journal of Real Estate Research* 10, no. 4 (1995)

⁸ Clayton and Mackinnon, "The Relative Importance of Stock, Bond and Real Estate Factors in Explaining REIT Returns."

⁹ *Ibid.*

¹⁰ John Glascock and David Michayluk, and Karyn Neuhauser. "The Riskiness of REITs Surrounding the October 1997 Stock Market Decline." *Journal of Real Estate Finance and Economics* 28, no. 4 (2004)

turned out to be just the case and on average, REITs fell one-half as much as the overall stock market.¹¹ This is clear evidence that REITs and stock are entirely different entities and do not behave like one another. The question that must be answered though is what can explain the irregularities between both sides of the argument?

There are a couple explanations that may account for the conflicting findings beginning with the length of time used in the data sets. If there is a long length of time used to compare REIT and stocks, chances are that they may more closely resemble actual real estate prices because REIT income is derived from real property earnings.¹² This is not the case for short-term valuation because it is much more subject to market volatility. The correlation between a long time period of valuation and real estate prices is weak, though, and continue to drop in recent years. The long term and short term approaches of looking at REITs are very significant when considering portfolio diversification. If the short-term characteristics are more accurate, than REITs would do little to protect against a market decline. If the long-term characteristics dominate, than REITs would help to insulate a portfolio from a market decline.¹³

Allen, Madura and Springer's (2000) study provided other explanations for strong and weak relationships between stocks and REITs. They looked at four characteristics of REITs, asset structure, financial leverage, management strategy, and degree of specialization in the REIT portfolios, and how they reacted differently to changes in the stock market. Their findings determined that it is possible to increase or

¹¹ Ibid.

¹² Ibid.

¹³ Ibid.

decrease a firm's sensitivity to market changes through two of the characteristics. REITs that minimize their financial leverage and firms that self-manage investments have significantly less reaction to stock market change.¹⁴ By taking different samples of REITs very different results can be found after analyzing the data. If a sample is taken that only contains REITs that are highly leveraged, they will get different results than another sample from the same period, but using REITs that are not highly leveraged.

Despite the different results, there does seem to be strong evidence that in recent years, REITs reflect actual real estate opposed to just mimicking the stock market.¹⁵ As to the effect of the stock market on REITs, it can be said that there is some movement, which correlates, but that movement is much milder.¹⁶

Interest Rates

Another factor that would presumably have a strong influence on REITs is interest rates. Interest rates are strongly connected to real estate because of the need for borrowed money in order to purchase real estate. When looking at REITs and interest rates it has to be understood that in this case, the two different types of REIT may react very differently. Mortgage REITs deal in trading and buying mortgages while equity REITs deal with purchasing actual property. Studies in this area have found that equity

¹⁴ Marcus Allen, and Jeff Madura, and Thomas M. Springer. "REIT Characteristics and the Sensitivity of REIT Returns." *Journal of Real Estate Finance and Economics* 21, no. 2 (2000)

¹⁵ Glascock, and Michayluk, and Neuhauser. "The Riskiness of REITs Surrounding the October 1997 Stock Market Decline."

¹⁶ Clayton, and Mackinnon, "The Relative Importance of Stock, Bond and Real Estate Factors in Explaining REIT Returns."

and mortgage REITs react differently to changes in the interest rate. Chen and Tzang (1988) conducted a study to determine the sensitivity of REITs to interest rates using a regression model. In their study they used two different data sets, one from 1973-1979 and another from 1980-1985. They also looked at mortgage and equity REITs separately. Their findings strongly supported the hypothesis that equity and mortgage REITs react differently to changes in interest rates. Mortgage REITs were sensitive to both short and long term interest rates.¹⁷ Their study also attempted to explain the cause of the sensitivity to interest rate changes that are apparent in mortgage REITs. Equity REITs had almost no sensitivity to changes in the short-term interest rate, but did have some correlation to changes in the long-term interest rate. They suggested that for equity REITs, the long-term interest rate sensitivity is due to the change in expected inflation unlike mortgage REITs that are sensitive to both interest rates and expected inflation.¹⁸

Mueller and Pauley (1995) went further into the relationship between REITs and interest rates to clarify the effect on REIT prices. Their study found that the relationship between the two is not very strong as well as negative with changes in the interest rate. Because of this relationship, the authors hypothesize that, "REIT price movement cannot be adequately explained by interest-rate movement."¹⁹ Also the low correlation may mean that REITs would be good to diversify a portfolio because they

¹⁷ K. C. Chen, and Daniel Tzang. "Interest-Rate Sensitivity of Real Estate Investment Trusts." *The Journal of Real Estate Research* 3, no. 3 (1988)

¹⁸ Ibid.

¹⁹ Glenn Mueller, and Keith Pauley. "The Effect of Interest-Rate Movements on Real Estate Investment Trusts." *The Journal of Real Estate Research* 10, no. 3 (1995)

would not drop as much as some bonds might with an increase in interest rates.²⁰ The authors continue to hypothesize how REITs will react to future changes in the interest rate. One important factor to look at is how leveraged is the trust? When this study was done, the industry as a whole was not highly leveraged. This allowed increases in interest-based costs to be offset by an increase in rent income from properties already owned.²¹ The extent of the rent offsetting costs is reliant on whether the company is more leveraged with long-term fixed-rate loans or short-term variable rate loans. Companies that are more leveraged with long-term fixed rate loans will have much greater growth in the short run. Companies with short-term variable rate loans will decrease operating income, especially ones that have long-term leases with fixed rents.²² Lastly, Mueller and Pauley (1995) point out that higher interest rates inhibit the ability of companies to acquire new property at a positive spread. This slows the growth of the company and puts more pressure on their existing investments.²³

Another more recent study that examines REIT and interest rates was done by Allen, Madura and Springer (2000). Their study looks at the sensitivity of REITs to stock market and interest rate changes and how these effects differ depending on the organization of the REITs.²⁴ For now only the interest rate will be discussed. The

²⁰ Ibid.

²¹ Ibid.

²² Ibid.

²³ Ibid.

²⁴ Allen, and Madura, and Springer. "REIT Characteristics and the Sensitivity of REIT Returns."

authors point out three reasons that interest rates would affect REITs, and as discussed earlier, there are different reactions for both mortgage and equity REITs. First, the amount that real estate investment relies on financing means that an increase in interest rate will make it less affordable. This means that the demand for real estate will go down and thus the overall price will fall.²⁵ Clearly this is not ideal for REITs and it may greatly reduce the value of the trust. Second, the cost of debt financing will rise and make it more difficult for the fund to grow by acquiring new property. Third, real estate investors rely on good rates to make their profit so if the rates rise, then the investors will be forced to buy at a lower price in order to still make their profit. This will also lower the demand, and therefore price, of real estate.²⁶

These three reasons for the impact of interest rates on REITs certainly have an influence, but it cannot be assumed that this is always the case. Equity REITs may not have strong relationships to interest rates because of stronger economic factors. Generally, an increase in interest rates means that the economy is strong and growing, while a low interest rate indicates a weak economy. So the growth in a strong economy may offset the negative effects of a higher interest rate because a strong economy means inflationary pressure and as a result, higher real estate values.²⁷

Allen and Madura and Springer (2000) also looked at the organization of the REITs and considered four different characteristics. They are asset structure, financial leverage, management strategy, and degree of specialization. They concluded that REITs

²⁵ Ibid.

²⁶ Ibid.

²⁷ Ibid.

were sensitive to both long-term and short-term interest rates, but that there was no significant evidence to suggest that any of the four characteristics were a factor.²⁸ This study is in contrast to that done by Gyourko and Nelling (1996) because it finds that different management strategy is not significant in the success of REITs.²⁹ This could be because the REIT returns are being compared to different benchmarks, one looks at both the stock market and interest rates, while the other only focuses on interest rates.

Predictability of REITs

The search for predictability in the returns of financial assets has captured many economists and produced many studies. Ling, Naranjo and Ryngaert (2000) continue the search in their study trying to determine the predictability of REITs.

Other recent studies have found that because of advances in asset pricing theory, stock prices are to some extent predictable. Avramov (2004) found in his study that stock return predictability can be explained by asset pricing models. When asset allocations are used with asset pricing models, they outperform other allocations.³⁰ In cooperation with these studies, there has been research on the predictability of traded real estate securities. Another study by Qi (1999) uses nonlinear predictability to predict

²⁸ Ibid.

²⁹ Joseph Gyourko and Edward Nelling. "Systematic Risk and Diversification in the Equity REIT Market." *Real Estate Economics* 24, no. 4 (1996)

³⁰ Avramov, Doron. "Stock Return Predictability and Asset Pricing Models." *The Review of Financial Studies* 17, no. 3 (2004): 699-738

excess stock market returns. It finds that this approach generates higher profits with lower risk than other portfolio strategies.³¹

Lizeri, Satchell and Zhang (2007) look at the use of multivariable approaches to understanding REIT returns. They state that most studies focus on a macro-variable model to help predict returns. These models can be ineffective because of the high-frequency data, trading strategies, and risks of extreme events that are present when dealing with macro-variables.³² In their study, they introduce a less commonly used Independent Component Analysis model. This approach focuses on the latent factors that affect returns which are much more independent than macro-variables. They found that the Independent Component Analysis captures REIT return characteristics and can add to understanding them.³³

Bharati and Gupta (1992) determined that they could predict enough performance to use an active portfolio management strategy. That is, they can actively trade with the knowledge of what the REITs are going to perform in the future. Their findings were limited to a quarterly basis because at a more frequent time period, transaction costs become too costly. While their findings were not largely different from the benchmarks used, they were able to predict returns.³⁴

³¹ Qi, Min. "Nonlinear Predictability of Stock Returns Using Financial and Economic Variables." *Journal of Business & Economic Statistics* 17, no. 4 (1999): 419-429

³² Colin Lizieri and Stephen Satchell, and Qi Zhang. "The Underlying Return-Generating Factors for REIT Returns: An Application of Independent Component Analysis." *Real Estate Economics* 35, no. 4 (2007)

³³ Ibid.

³⁴ Rakesh Bharati, and Manoj Gupta. "Asset Allocation and Predictability of Real Estate Returns." *The Journal of Real Estate Research* 7, no. 4 (1992)

The research undertaken by Ling, Naranjo and Ryngaert (2000) was taken from an earlier study done by Pesaran and Timmermann (1995). Pesaran and Timmermann (1995) would use a method that used regression analysis with fundamental economic variables to identify periods in which S&P 500 returns would outperform T-bill returns. Their goal was to see if they could predict future excess earnings using these economic variables. They determined that the predictive variables changed throughout their time period of 1960 to 1992. This suggests that changing economies make it very difficult to predict with any investor significance the future excess returns of the S&P 500.³⁵

Ling, Naranjo and Ryngaert (2000) explore whether “REIT return predictability is economically, as well as statistically, significant.”³⁶ They use the same model as Pesaran and Timmermann (1995), but instead of predicting excess returns of the S&P 500, they attempted to predict the excess returns of REITs over the S&P 500. They use an expanded time-series of REIT from the 1990s because of the period’s large growth. In order to forecast the returns, they use different regressions that try each of the possible combinations of explanatory variables. Some of the variables that were tried were the percent change in nondurable consumption, the percent change in industrial production, and the percent change in the monetary base, which can be predictors of overall economic health. They also included current rates of T-bills as a representation of the interest rate. The combination that best explains the data is then used to predict the subsequent month.

³⁵ Hashem M. Pesaran and Allan Timmermann. “Predictability of Stock Returns: Robustness and Economic Significance.” *The Journal of Finance* 50, no. 4 (1995)

³⁶ David Ling and Andy Naranjo, and Michael Ryngaert. “The Predictability of Equity REIT Returns: Time Variation and Economic Significance.” *Journal of Real Estate Finance and Economics* 20, no. 2 (2000)

The best-fit models that were produced seemed to be accurate enough and produced high R squared values. Unfortunately, once this was applied as an active trading strategy, the results were not as successful. No matter the strategy applied, the best REIT strategy was buy and hold. This is taking into account the transaction costs involved with an active strategy. It appears that the predictability of REITs in this study were not strong enough to warrant an active trading strategy taking into account transaction costs.³⁷

Another approach taken was the study done by Gyourko and Nelling (1996).³⁸ In their study they looked at the different types of Equity REITs. They separated out the different investments that Equity REITs invested in and categorized them using different property types and the locations of their investments. This provided results that changed depending on the investments a firm was making. They compared the different categories of Equity REITs to stock market returns and got varying results from the different categories of REITs. Some of the categories were sufficient to diversify the portfolios, while others did not.³⁹

Serrano and Hoesli (2007) have a study that focuses on which method is the best to predict Equity REIT returns. The study looks at the affects of financial assets, direct real estate, and the Fama and French (1993)⁴⁰ factors in predicting REIT returns.⁴¹

³⁷ Ibid.

³⁸ Gyourko and Nelling. "Systematic Risk and Diversification in the Equity REIT Market."

³⁹ Ibid.

⁴⁰ E.F. Fama and K.R. French. "Common Risk Factors in the Returns on Stocks and Bonds." *Journal of Financial Economics* 33, no. 1 (1993)

⁴¹ Camilo Serrano and Martin Hoesli. "Forecasting EREIT Returns." *Journal of Real Estate Portfolio Management* 13, no.4 (2007)

It also uses three models to analyze the data and determines which has a more power predictive ability. The three models are time varying coefficient regressions, vector autoregressive systems, and neural networks. The factors that best describe REIT returns are the Fama and French factors. The best method to use is neural networks.⁴²

The literature reviewed is to provide a background for the study and help the reader better understand the topic. It also puts into perspective the topic and industry being studied. After reviewing the literature, no study focuses on REITs during both the late 1980s and early 1990s real estate recession and the current real estate recession. Determining what factors have the most influence on REITs during the late 1980s recession and seeing if those factors are still influential in the current recession can be helpful to better understand the current situation.

⁴² Ibid.

CHAPTER III

METHODOLOGY

This chapter will cover previous theory on the methodology used in this study and it will also explain the methodology being used to assess the main factors that affect REIT returns. Then the data will be explained including all the independent variables and the dependent variable. Along with the explanations of the variables, a prediction of the relationship each variable will have to the dependent variable will be explored.

Theory and Methodology

The methodology for this study is based off the multivariable approach first used by Pesaran and Timmermann (1995)¹ that predicted S&P 500 returns using economic variables. This study was followed by Ling, Naranjo and Ryngaert (2000) when they used the same method to predict REIT returns.² This study will use the same methodology as Ling, Naranjo and Ryngaert (2000) to compare the factors that most affect REIT returns during both the early 1990s recession and the current recession.

To determine the start of each recession, the equity REIT returns were used to find the first six-month period with a -15% return. The beginning of the six-month return was

¹ Pesaran and Timmermann. "Predictability of Stock Returns: Robustness and Economic Significance."

² Ling and Naranjo, and Ryngaert. "The Predictability of Equity REIT Returns: Time Variation and Economic Significance."

used as the start of each of the recessions. For the early 1990s recession the beginning will be April 1990, the 2007 recession will start February 2007. The end of the 1990 recession was determined by more than three months of positive returns, which was April 1992. The 2007 recession is still current and the data was collected through January 2009.

There will also be two regressions run for the two years prior to both recessions. This is to determine any similarities that may have caused the recessions. These regressions will run from April 1988 to March 1990 and from February 2005 to January 2007.

Data

The analysis used in this study is the market return on the equity REIT index. The market return analysis is a comparison between two periods of commercial real estate recession, 1989-1992 and 2007-2009. The information for this study comes from NAREIT, and uses an index of equity REIT returns from 1987-1993 and 2004-current. The REIT index that is used only contains equity REITs because this study wants to observe the effects on the commercial real estate industry and equity REITs deal almost exclusively with commercial real estate. Table 3.2 lists the variables, their abbreviations and the source they were obtained from.

TABLE 3.1: DEPENDENT AND INDEPENDENT VARIABLES

Variable Name	Variable Abbreviation	Source
Equity REIT Returns	Equity REIT Return	NAREIT
S&P 500 Returns	S	Economagic.com
Short Term Interest Rate	IS	Federal Reserve Bank of St. Louis
Long Term Interest Rate	IL	Federal Reserve Bank of St. Louis
Unemployment	U	Economagic.com
% Change in Residential Housing Prices	H	Economagic.com
% Change in Consumer Price Index	PC	Federal Reserve Bank of St. Louis
% Change in Industrial Production	IP	Federal Reserve Bank of St. Louis
% Change in the Monetary Base	M	Federal Reserve Bank of St. Louis
% Change in Commercial Bank Loans	B	Federal Reserve Bank of St. Louis

The analysis investigates the impact of the independent variables – returns on the S&P 500 index, short term (3 month) treasury interest rate, long term (30 year) treasury interest rate, unemployment, % change in residential housing prices, % change in consumer price index, % change in industrial production, % change in monetary base and the % change in commercial bank loans – on the dependent variable, equity REIT returns. The information on the S&P 500, unemployment, and residential housing prices is obtained from Economagic.com for the years 1989-1992 and 2007-2009. The information on Short and long term interest rates, consumer price index, industrial production, monetary base, and the % change in commercial bank loans is obtained from the Federal Reserve Bank of St. Louis for the same years.

Equation 3.1 displays the basic empirical regression model. The variable S represents stock market returns, IS is the short term interest rate, IL signifies the long term interest rate,

U represents unemployment, H is residential housing prices, PC denoted the consumer price index, IP signifies industrial production, M is the monetary base, and B represents commercial bank loans.

$$\begin{aligned} \text{Equity REIT returns} = & \beta_0 + \beta_1 \times S + \beta_2 \times IS + \beta_3 \times IL + \beta_4 \times U + \beta_5 \times H + \beta_6 \times PC \\ & + \beta_7 \times IP + \beta_8 \times M + \beta_9 \times B + E \end{aligned} \quad (3.1)$$

Expected Relationships

The expectation for the comparison between REIT returns during the late 1980s and early 1990s recession and the current recession is that the factors that affect those returns the most will be fundamentally different. This is due to the nature of the recessions, which, according to the literature, have some very different driving forces behind them. As discussed in previous chapters, the fundamental differences between the two recessions are that in the late 1980s and early 1990s recession there was excess overbuilding. The current recession has been impacted some by overbuilding, but not to the extent of the earlier one.

The current commercial real estate recession is more on the receiving side and the major cause is the economy around it. Because of the weak economy, jobs are being lost and office vacancy rates are rising, which in turn lowers the price of commercial real estate. This would lead to the hypothesis that the REIT returns for the 1980s and 1990s recession will be more affected by factors that pertain to commercial real estate, such as construction starts, than the overall economic factors. The current commercial real estate recession should be just the opposite and be affected more by factors such as unemployment. Table 3.2 will show the independent variables expected relationship with Equity REIT returns.

TABLE 3.2: VARIABLES EXPECTED RALTIONSHIPS

Variable	Expected Relationship
S	Strong positive relationship for both time periods
IS	Weak negative relationship
IL	Strong negative relationship for both time periods
U	Strong negative relationship for both time periods
H	Positive relationship for both time periods
PC	Positive relationship for both time periods
IP	Strong positive relationship for both time periods
M	Strong negative relationship in the current recession and weak negative relationship in the 1990s recession
B	Positive relationship in both time periods

Looking at factors that may be influential to REIT returns can be very helpful in comparing the two recessions. This study looks at factors used in different studies and applies them to the time periods of the two recessions for comparison. The first factor is returns on the S&P 500 index. This is expected to be positively correlated to both time periods because of the similarity of REITs and stocks. The relationship between the two during the 1980s and 1990s should be stronger than in the current recession because of the current evidence that REITs are more accurate reflections of the real estate market than before.³ Also, the current state of the stock market is so extreme that it has had unrealistic

³ Clayton, and Mackinnon, "The Relative Importance of Stock, Bond and Real Estate Factors in Explaining REIT Returns."

returns as far as commercial real estate returns go. Similarly to the 1997 stock market decline, REITs will not fall as far as the stock market because they are different entities.⁴

In general, a higher lower interest rate will lead to increased profits for REITs. This follows the idea that REITs are more easily able to purchase new buildings because it is cheaper to do so. If they are purchasing new buildings, than their company is growing and the profits are growing, which is reflected in the REITs returns. Also, investors want to buy at a certain price in order to make their profit margins. This can be a problem for REITs because if rates are high, investors will be asking for lower prices in order to reach their profit margin. With investors asking for lower prices, the overall price of the market will drop because demand has dropped. This seems straight forward enough, but there are some other factors that need to be taken into consideration. First the regression is going to look at both long and short term interest rates. REITs may have very different reactions to short and long term rates, because they are very different economic indicators. Generally, an increase in interest rate means that the economy is strong and a strong economy means inflationary pressure. This will increase the value of real estate properties and increase the value of REITs.⁵ So the relationships between long and short term interest rate and REITs returns should be very different. Long term interest rate will have a strong negative relationship to REIT returns, but short term interest rates should have a much weaker negative relationship or even a positive one.

⁴ Glascock, and Michayluk, and Neuhauser. "The Riskiness of REITs Surrounding the October 1997 Stock Market Decline."

⁵ Allen, and Madura, and Springer. "REIT Characteristics and the Sensitivity of REIT Returns."

Expectations for the unemployment variable include a negative correlation to REIT returns in both the 1980s and 1990s recession and the current recession. Unemployment is a way to not only measure the economy, but to measure the office vacancy rate as well. A major problem in both recessions for commercial real estate was the high vacancy rates of office buildings. In the late 1980s and early 1990s recession, overbuilding caused an excess of supply, while in the current commercial real estate recession, a major contributing factor was that a weak economy dropped the demand for office space and raised the vacancy rate. High unemployment was the main cause of the rise in vacancy rates today so it should be a strong measure of it for the earlier recession.⁶

The percent change in residential housing prices should have a positive relationship with REIT returns. The strength of the relationship between the two will be relatively strong. Residential housing prices are connected to commercial real estate prices, which is the reason for the positive relationship.

Consumer price index is another measure of the overall economy. It indicates the price of goods on average throughout the country. There will be a positive relationship between the consumer price index and REIT returns. This is because the consumer price index is a measure of the health of the economy and a strong economy means higher prices for not only consumer goods, but commercial real estate as well.

Once again industrial production is a measure of the health of the economy. Industrial production includes manufacturing, mining and utilities. The industry will have a strong positive correlation with REIT returns because industrial production is closely linked

⁶ Garner, "Is Commercial Real Estate Reliving the 1980s and Early 1990s?"

with inflation. As was mentioned earlier, controlled inflation increases the value of real estate and will increase the returns for REITs.

Monetary base will have a positive relationship with REIT returns in the current recession but the relationship should be less strong or even negative in the late 1980s and early 1990s recession. Monetary base is a measure of the amount of money in the economy. The more money flowing through the economy, the stronger the economy will be. This also has a direct relationship to real estate because the monetary base includes all the money in commercial bank reserves. Commercial banks are the main financial investors in all of real estate. Not only do commercial banks lend to individuals, or companies, to buy real estate, they lend to construction projects to build the properties. As discussed earlier in the paper, a major contributing factor in the massive overbuilding that took place, and ultimately led to the recession, in the 1980s was the willingness of commercial banks to lend money. The monetary base includes the money they have available to lend and is therefore directly connected with any excess building that took place.

Lastly, the percent change in commercial bank loans will have a positive effect on REIT returns. This is because commercial banks regularly lend to commercial construction companies. With more commercial construction, there are more buildings for the REITs to buy and earn revenue on.

The regression used to analyze this data will be an ordinary least squares regression. The regression will measure the effects of the independent variables on REIT returns. In order to check the validity of the regression, a multicollinearity test will be run to make sure the independent variable are not related to each other. This is important because if the

variables are related, it will skew all the results of the regression and none of the data will be reliable. A white test will also be run to test for heteroskedasticity.

CHAPTER IV

RESULTS AND ANALYSIS

This chapter will present the results from the regression model described in the previous chapter. The regressions are much different from the original because of problems encountered while running the regressions. There is also analysis provided for each variable that contained a significant P value. The analysis attempts to explain the results as best as possible. There are some that variables that cannot be full explained, but a possible explanation is provided.

Regressions 1, 2 and 3 Results

The results from the regressions show that there are fundamental differences between the two recessions. In the late 1980s and early 1990s recession there are only two independent variables that are significant, industrial production and the consumer price index. In the current recession, the regression found three significant independent variables, unemployment, the monetary base and industrial production. The only common factor to both recessions was percent change in industrial production.

The final regression for the early 1990s recession (regression 1) is shown below. Table 4.1 shows the results from the ordinary least squares regression for regression 1.

$$\text{Equity REIT returns} = 3.55 - 7.61 \text{ PC} - 21.6 \text{ H} - 2.67 \text{ IP} - 0.27 \text{ M} + \text{E}$$

(4.1)

TABLE 4.1: RESULTS FOR REGRESSION 1

Variable	Coefficient	Standard Error	T-Statistic
PC	-7.61	3.626	-2.10
H	-21.6	22.48	-0.96
IP	-2.67	1.399	-1.91
M	-0.27	1.458	-0.18

The R squared was .34 while the adjusted R squared was .208 which shows that the model explains 20.8% of the variance in REIT returns. As is shown from the T statistics, only the consumer price index and industrial production are significant explanatory variables.

The coefficients in the model show the impact of the consumer price index variable and the industrial production variable on the dependent variable, equity REIT returns. Both the variables are negatively correlated so with an increase of 1% in the consumer price index, REIT returns will decrease by 7.61% and if there is a 1% increase in industrial production, REIT returns will decrease 2.67%.

Continuing to the current recession taking place the final regressions (regressions 2 & 3) are shown below. Table 4.2 shows the results for regression 2.

$$\text{Equity REIT returns} = 39.2 - 225 B - 4.79 IP - 7.74 U + E$$

(4.3)

TABLE 4.2: RESULTS FOR REGRESSION 2

Variable	Coefficient	Standard Error	T-Statistic
B	-224.6	188.0	-1.19
IP	-4.789	2.013	-2.38
U	-7.737	2.265	-3.42

The R squared for the regression is .426 and the adjusted R squared is .34. The coefficients for both significant variables are negative, meaning that for every 1% increase in industrial production, REIT returns fall by 4.79%. Also, for every 1% increase in unemployment, REIT returns fall by 7.74%.

The second regression run for the 2007 recession is shown below. A second regression was necessary because of multicollinearity, which will be explained more later.

Table 4.3 shows the results for regression 3.

$$\text{Equity REIT returns} = -3.2 - .724 M - 3.68 IP + .48 IS + E$$

(4.3)

TABLE 4.3: RESULTS FOR REGRESSION 3

Variable	Coefficient	Standard Error	T-Statistic
M	-0.7241	0.2744	-2.64
IP	-3.675	1.780	-2.06
IS	0.476	1.446	0.33

The R squared for the regression is .423 and the adjusted R squared is .336. The coefficient for monetary value is -.724 which indicates a decrease of that amount for every 1% increase in monetary base. The coefficient for industrial production is very similar to the regression explanation above.

Regressions 1, 2 and 3 Analysis

Regressions one, two and three differ greatly from the original regression proposed in the methods chapter. This is mainly due to multicollinearity between many of the independent variables. Multicollinearity is when two or more independent variables are correlated. This correlation causes huge errors in regressions that are trying to determine the correlation of the independent variables and the dependent variable. On regression one, the correlations matrix showed multiple variables that had strong correlations to each other. Variables such as the long term interest rate and the short term interest rate were no surprise because short term interest rates can have an affect on long term interest rates. Others however were more startling such as the S&P 500 returns and residential housing prices. After running the correlation matrix, it was necessary to mix and match the different independent variables that were not correlated and run multiple regressions. This was done to make sure that each variable was run in a regression in case it was significantly correlated to the dependant variable. For the time period 1990 to 1992, a regression was used that captured all the significant independent variables and had a strong adjusted R squared statistic and is the one presented above.

In regression one, shown by the T statistics, only the percent change in the consumer price index and the percent change in industrial production were significant. The negative coefficient for the consumer price index was not what was expected. An increase in the index means that there is some inflation taking place. Inflation would increase the price of commercial real estate and it was expected that the price of REITs would go up. An explanation for the negative correlation could be the characteristics of a publicly traded

security. The price of the security is supposed to take every detail into account, including inflation.

The negative correlation between REIT returns and industrial production also went different from the hypothesis. It was believed that industrial production was a good measure of economic health and growth and with economic growth there is inflation. As was mentioned earlier, inflation would increase the price of commercial real estate and in turn increase the price of REITs.

Regression two is for the time period 2007-2009 and deals with the current recession. This regression was also greatly changed from the original proposed regression. After trying different combinations there were three independent variables that were significant to the dependant variable. Those were the percent change in unemployment, the percent change in industrial production and the percent change in the monetary base. Two of those variables, however, were correlated, monetary base and unemployment. In order to discover the significance of both the correlated variables, two regressions were run for this time period. Percent change in industrial production is common to both regressions two and three, but unemployment only appears in regression two, while monetary supply only appears in regression three.

Regression two had two significant variables, percent change in industrial production and percent change in unemployment. As before the coefficient for the change in industrial production was negative. The reason for this could be the ability of a traded security to anticipate inflation and therefore the reaction to a smaller amount of inflation than expected could cause a negative correlation. The negative correlation between unemployment and REIT returns was hypothesized. With greater unemployment, commercial real estate

buildings have higher vacancy rates. Rent is where REITs make their income in order to provide dividends. High vacancy rates in the buildings owned by REITs means lower profits for the trusts and as a result, lower values.

In regression three there were also two significant variables, the percent change in industrial production was again significant and the percent change in the monetary base. The coefficient for industrial production was very close to that in regression two and it is for the same reasons as was stated earlier. The coefficient for the percent change in monetary base is not positive as was expected. While it is a small number, only $-.724$, it is still negative. This goes against the hypothesis that more money in the economy means a stronger economy and more money for commercial banks to lend. It may be that simply more commercial bank lending does not increase REIT returns. This seems the case because in the correlation matrix, commercial bank lending has a strong correlation to the change in monetary base of $.973$. So if the hypothesis was right about a stronger monetary base resulting in more commercial lending, then the fault must lie in the belief that more commercial lending would help REIT returns. A possible explanation for the negative correlation could be that fact that this regression takes place during recession years. It may be that despite an increase in the monetary base, commercial banks are still unwilling to lend because of the economic situation around them.

Regressions 4 and 5 Results

This study also looked at the two year period leading up to both recessions in order to find insight to some problems that may have caused them. The regression for 1988-1990, the two years leading up to the early 1990s recession is shown below. Table 4.4 shows the results for regression 4.

$$\text{Equity REIT returns} = -7.40 + .857 \text{ IS} + .342 \text{ IP} + 1.05 \text{ M} + 48.74 \text{ B} + \text{E}$$

(4.4)

TABLE 4.4: RESULTS FOR REGRESSION 4

Variable	Coefficient	Standard Error	T-Statistic
IS	0.8570	0.5364	1.60
IP	0.3424	0.8166	0.42
M	1.0458	0.4811	2.17
B	48.74	76.29	1.95

The T statistics for the percent change in monetary base and the percent change in commercial loans mean that both are significant explanatory variables. The R squared variable is .286 and the adjusted R squared is .136. This is a much lower adjusted R squared and means that 13.6% of REIT returns are explained by these factors.

The coefficients in this model for the significant independent variables show the impact they have on equity REIT returns. An increase of 1% in the monetary base will increase REIT returns by 1.05% and an increase in commercial loans of 1% will increase REIT returns by 49%, except for the high standard error value of 76.29, which means that this variable is unreliable.

The next regression shown below is the two years preceding the current recession, 2005-2007. Table 4.5 shows the results for regression 5.

$$\text{Equity REIT returns} = 3.56 - 79.7 \text{ S} - 3.6 \text{ PC} - 2.41 \text{ IP} + 70 \text{ B}$$

(4.5)

TABLE 4.5: RESULTS FOR REGRESSION 5

Variable	Coefficient	Standard Error	T-Statistic
SP	-79.67	37.32	-2.13
PC	-3.601	1.804	-2.00
IP	-2.413	1.527	-1.58
B	69.8	152.1	0.46

The percent change in the S&P 500 index and the percent change in the consumer price index as well as the intercept all had significant T values. The R squared was .281 and the adjusted R squared was .13, meaning that the model only accounts for 13% of the REIT returns.

The coefficients for the significant variables in this model are -79.7 for the S&P 500 variable which means that for every 1% increase in the S&P 500 REIT returns will drop 79%. This is extremely high and may have to do with the much lower R squared value as well as the high standard error. The coefficient for the percent change in the consumer price index is -3.6, indicated a 1% increase in the index will decrease REIT returns by 3.6%.

Regressions 4 and 5 Analysis

The regressions of the periods leading up to the recessions had the same problem as regressions one, two and three, and that was multicollinearity. The variables that were correlated were similar and it was necessary to try and find regressions that did not have correlated variables, but still had a strong R squared statistics and significant independent variables. The adjusted R squared for the regression was much lower than the other regressions at only 13.6%. Since this was the best percentage attainable, it can be deduced that the independent variables do not explain REIT returns as well for the period leading up to the early 1990s recession. Despite this, 13.6% is not an insignificant number and something can be learned from the variables with significant T statistics.

Regression four was for the years 1988-1990 and the T statistics showed that only two variables were significant, percent change in the monetary base and percent change in commercial bank loans. Unlike regression three (years 2007-2009), the coefficient for the

monetary base variable was a positive 1.05. This is what was predicted in the hypothesis and looking back makes a lot more sense considering what was taking place in the commercial real estate industry. A high monetary base indicates a strong and growing economy. As stated before, in a growing economy commercial real estate prices will rise and this relationship causes the positive correlation.

The second significant variable is the percent change in commercial bank loans. Earlier in the paper there was discussion on the overbuilding that took place during the late 1980s, and during the overbuilding, commercial banks were very willing to lend out money. First they were too lenient with their loans, and second, they had plenty of money because of the high monetary base. The overbuilding was caused by a high demand for new office space and REITs profited from new properties which provided more rent income. The coefficient for commercial bank lending is extremely high and this is because it is unreliable due to the high standard error.

The last regression is the two years leading up to the current commercial real estate recession. In regression five, there are two variables with significant T values. The first is the return on the S&P 500 index and the second is the percent change in the consumer price index. The R squared statistic is 13% which is also a lot lower than the other regressions. There seems to be more unexplained REIT returns in the years leading up to the recessions. The coefficient for the S&P 500 index returns is negative and very high. The high negative correlation is understandable as real estate would not have fallen as much as the extreme drops in the stock market that occurred during 2008. The coefficient for the consumer price index variable is -3.6 which is once again surprising. The predicted relationship was positive because of the effect inflation should have on REITs. The explanation for this could also

have to do with the extreme fluctuations in the stock market that clearly has had some effect on REIT returns.

Conclusion

When comparing the factors that affect REIT returns during the two different commercial real estate recessions, there are fundamental differences. The one independent variable that is significant for both time periods is the percent change in industrial production. In both regressions industrial production has a negative coefficient, which is different from the expected relationship.

In the early 1990s recession the other variable that was significant was the percent change in the consumer price index. This also had a negative relationship which was opposite from the expected outcome. After examining these two variables, it appears that inflation does not have a positive effect on REIT returns. Inflation can also hurt the buying power of the population and thus slow the economy. The fact that these correlations are during a time of recession must be the reason that inflation is not helping REIT returns. This is the only common economic factor that affects REIT returns the same in both recessions.

When comparing the two factors from the earlier recession to the significant factors that are affecting the current recession, there are some large differences. Unemployment and monetary base play a large role in the current drop in commercial real estate prices. Unemployment is no surprise because of the increase in vacancy rates it will cause. It also leads to the assumption that the commercial real estate recession was influenced by the overall nation wide economic recession. The space is available for jobs, but the economy is not supporting enough jobs to fill the office space. The low and negative relationship between monetary base and REIT returns suggests that more commercial lending decreases

REIT returns. This is because the monetary base correlates positively with commercial lending. Overall, during neither recession is inflation good for commercial real estate, while the poor economy has added to the real estate recession today.

The two regressions leading up to the recessions have less predictive power than the others. In 1988 overbuilding was a problem and this is shown by the large impact of commercial bank lending on REIT returns. Also inflation was increasing the values of REITs instead of hurting them. In the two years before the current recession started REITs had a strong correlation to the stock market and the consumer price index. So in both time periods leading up to the recession, inflation was a positive influence on REIT returns. The high negative correlation to the S&P 500 hundred returns is skewed because of the extreme drops during 2008.

CHAPTER V

CONCLUSION

There were some short falls with the methodology and analysis done for this thesis. The original nine factors used in this study were not as well suited as had been anticipated. This is mainly due to the large amount of multicollinearity between the variables. There was much more correlation than expected which resulted in regressions with very few variables. In order for a more accurate representation of REIT returns, all the variables that may possibly be significant must be regressed. In order for this to happen, more unrelated variables are necessary. There also may have been some variables in the data set that are significant to the dependant variable, but it was impossible to run a regression with them because there were not enough none correlated variables to produce results with high enough adjusted R squared values. As a result, it is more difficult to compare the two periods of recession because there are not many variables that appear in all the regressions.

For further research it is important to adjust the data set to include more explanatory variables that are not correlated. These variables could include commercial real estate construction starts and dividend yield on the S&P 500. With a wider range of usable variables the comparison between the two recessions could be much more accurate. It was also made clear from the study done by Gyourko and Nelling (1996). They found that there is a significant difference in the returns for different types of REITs. Depending on what the specific REIT invests in and the location of the investments, the returns may

vary. So in further research, it would be necessary to use specific, categorized, Equity REITs instead of an index of all of them. Also, if another study were done in the future, after the current recession has ended, it would be very interesting to do analysis using the post recession years as a data set. This would give even more insight to the differences between the two recessions. Finally, separating the equity REITs into a more specialized data set depending on the focus of each REIT, instead of using an index, would further the accuracy of the results. If this was done the study could add variables to differentiate between the different management styles of the trusts.

Conclusion

The purpose of this study was to compare the factors that affected the commercial real estate recession during the early 1990s and the factors that are affecting the recession today. In order to do this, regressions were run during the time periods of both recessions and during the two-year period leading up to the recessions. Discovering the similarities and differences of what factors were most significant to both recessions will help us understand if we are reliving our mistakes from twenty years ago. It also gives insight into the nature of the commercial real estate industry. It may become clearer what to expect from the industry if the major economic factors that influences commercial real estate are known. Commercial real estate is strongly rooted in the overall economy and has significant influence. It is important to know what has caused the recessions and if there is something to be learned, of perhaps, if we should have already learned it.

The results of this study were somewhat disappointing. This is due to the unforeseen excessive multicollinearity between many of the different independent variables. Because of these correlations, the regressions that were run on the different time periods had a lot less

explanatory variables than was anticipated. However, there are still conclusions to be made from the results. Beginning with the two-year time periods leading up to the recessions, there was one strong similarity, and that was the affect of inflation. Both periods REIT returns responded positively to inflation. This can be attributed to the increase in real estate prices that is associated with inflation. The main difference was the reaction to the problem of overbuilding during the first recession. This was verified by the strong correlation between commercial bank lending and REIT returns. After the earlier period of inflation, vacancy rates went up which was the main cause of deflated prices. After the current inflation, the economy around commercial real estate fell and deflation occurred. Inflation has an affect on commercial real estate prices, but the cause of the inflation may be very different.

Comparing the regression during the recession years of 1990-1992 and 2007-2009, one common factor is discovered. The REITs reaction to inflation is just the opposite as it was during the years leading up to the recessions. There is a negative correlation shown by the coefficients of the industrial production variables on both regressions. The main difference between the two recessions is the strong correlation between unemployment and the REIT returns from 2007-2009. This suggests that the poor economy is the main cause for the commercial real estate recession. This follows the hypothesis stated earlier and follows the reasoning set forth in the article written by Garner (2008) which clearly states overbuilding as the main cause for the early 1990s recession.¹

There are some more conclusions to be made from the variables that did not turn out to be significant. First is the return on the S&P 500 index, which was only significant during the current recession. The fact that it was negatively correlated for that regression and not

¹ Garner, "Is Commercial Real Estate Reliving the 1980s and Early 1990s?"

significant for the others supports the study done by Glascock, Michayluk and Neuhauser (2004), which finds that REITs provide good diversity for stock portfolios because they have low correlation to stock returns.² It is also supported by Clayton and Mackinnon (2003) who reveal the increasing correlation between REITs and private real estate.³

The absence of any significance to either short term or long-term interest rates is also supported by the literature. Mueller and Pauley (1995) find that the relationship between REITs and interest rates is not very strong.⁴ In support of future study in this area, Allen, Madura and Springer (2000) suggest that interest rates may affect different categories of REITs in different ways.⁵ The data on REITs would have to be more specific to examine that point. Instead of using an Equity REIT index, breaking down the specific investments each REIT invests in and then categorizing them may result in a stronger relationship with interest rates.

This study set out to examine the possibility that we are in a similar recession to the one in early 1990. The data presented supports the hypothesis that these two recessions have fundamental differences. As suggested earlier, there could be changes to the methodology that may perhaps improve the results. This may give a better idea if the hypothesis is truly

² Glascock, and Michayluk, and Neuhauser. "The Riskiness of REITs Surrounding the October 1997 Stock Market Decline."

³ Clayton, and Mackinnon, "The Relative Importance of Stock, Bond and Real Estate Factors in Explaining REIT Returns."

⁴ Mueller, and Pauley. "The Effect of Interest-Rate Movements on Real Estate Investment Trusts."

⁵ Allen, and Madura, and Springer. "REIT Characteristics and the Sensitivity of REIT Returns."

correct or not. While there is much more to be researched on this topic, this study provides a starting point and basis for further research.

Bibliography

- Allen, Marcus, and Jeff Madura, and Thomas M. Springer. "REIT Characteristics and the Sensitivity of REIT Returns." *Journal of Real Estate Finance and Economics* 21, no. 2 (2000): 141-152.
- Avramov, Doron. "Stock Return Predictability and Asset Pricing Models." *The Review of Financial Studies* 17, no. 3 (2004): 699-738
- Bharati, Rakesh, and Manoj Gupta. "Asset Allocation and Predictability of Real Estate Returns." *The Journal of Real Estate Research* 7, no. 4 (1992): 469-484.
- Brown, David T.. "Liquidity and Liquidation: Evidence from Real Estate Investment Trusts." *The Journal of Finance* 55, no. 1 (2000): 469-485
- Browne, Lynn, and Karl E. Case. "How the Commercial Real Estate Boom Undid the Banks." In *Real Estate and the Credit Crunch*, edited by Lynn E. Browne and Eric S. Rosengren, 57-97. New Hampshire: 1992.
- Chen, Jun, and Jon Southard. "Commercial Real Estate Loss Expectation and CMBS/CMBX Prices." *TWR Viewpoint* 7, no. 2 (2008)
- Chen, K.C., and Daniel Tzang. "Interest-Rate Sensitivity of Real Estate Investment Trusts." *The Journal of Real Estate Research* 3, no. 3 (1988): 13-22.
- Clayton, Jim, and Greg Mackinnon. "The Relative Importance of Stock, Bond and Real Estate Factors in Explaining REIT Returns." *Journal of Real Estate Finance and Economics* 27, no. 1 (2003): 39-60.
- Fama, E.F., and K.R. French. "Common Risk Factors in the Returns on Stocks and Bonds." *Journal of Financial Economics* 33, no. 1 (1993): 3-56
- Garner, C. Alan. "Is Commercial Real Estate Reliving the 1980s and Early 1990s?" *Economic Review* 93, no. 3 (2008): 89-115.
- Glascok, John, and David Michayluk, and Karyn Neuhauser. "The Riskiness of REITs Surrounding the October 1997 Stock Market Decline." *Journal of Real Estate Finance and Economics* 28, no. 4 (2004): 339-354.
- Gyourko, Joseph, and Edward Nelling. "Systematic Risk and Diversification in the Equity REIT Market." *Real Estate Economics* 24, no. 4 (1996): 493-515
- Karolyi, G. Andrew, and Anthony B. Sanders. "The Variation of Economic Risk Premiums in Real Estate Returns." *Journal of Real Estate Finance and*

Economics 17, no. 3 (1998): 245-262

- Ling, David, and Andy Naranjo, and Michael Ryngaert. "The Predictability of Equity REIT Returns: Time Variation and Economic Significance." *Journal of Real Estate Finance and Economics* 20, no. 2 (2000): 117-136.
- Lizieri, Colin, and Stephen Satchell, and Qi Zhang. "The Underlying Return-Generating Factors for REIT Returns: An Application of Independent Component Analysis." *Real Estate Economics* 35, no. 4 (2007): 569-598
- Mueller, Glenn, and Keith Pauley. "The Effect of Interest-Rate Movements on Real Estate Investment Trusts." *The Journal of Real Estate Research* 10, no. 3 (1995): 319-325.
- Paladino, Mike, and Herbert Mayo. "REIT Stocks do not Diversify Stock Portfolios: an update." *Real Estate Review* 27, no. 4 (1998): 39-40.
- Pesaran, M. Hashem, and Allan Timmermann. "Predictability of Stock Returns: Robustness and Economic Significance." *The Journal of Finance* 1, no. 4 (1995): 1201-1228
- Peterson, James D., and Cheng-Ho Hsieh. "Do Common Risk Factors in the Returns on Stocks and Bonds Explain Returns on REITs?" *Real Estate Economics* 25, no. 2 (1997): 321-345
- Qi, Min. "Nonlinear Predictability of Stock Returns Using Financial and Economic Variables." *Journal of Business & Economic Statistics* 17, no. 4 (1999): 419-429
- Seck, Diery. "The Substitutability of Real Estate Assets." *Real Estate Economics* 24 (1996): 75-95.
- Serrano, Camilo, and Martin Hoesli. "Forecasting EREIT Returns." *Journal of Real Estate Portfolio Management* 13, no.4 (2007): 293-309
- Wang, Ko, and John Erickson, and Su Han Chan. "Does the REIT Stock Market Resemble the General Stock Market?" *The Journal of Real Estate Research* 10, no. 4 (1995): 445-460.