AN EMPIRICAL EVALUATION OF THE PROPERTY TYPE DIVERSIFICATION STRATEGY FOR REAL ESTATE INVESTMENT TRUSTS

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ABSTRACT

The goal of this paper is to investigate whether and how it is possible to generate property type diversification benefits in real estate portfolios. For the period 1997-2016, daily log returns of REITs from 5 different segments which are quoted in NYSE are used for this purpose. According to the findings of the study, there are two way Granger causality between Equity Residential and Boston Properties Inc. and Boston Properties Inc. and Federal Realty Investment Trust. Therefore to obtain property type diversification benefits, real estate portfolios should not include office and residential segment and office and retail segment simultaneously.

Keywords: Diversification, Economic location, Property Types, REITs

1. INTRODUCTION

A real estate investment trust (REIT) is a portfolio of real estate that is managed by a professional company. They obtain/develop, operate, and manage their real estate portfolio which often leads to a natural diversification. The company is typically quoted on a stock exchange and its stocks can be traded in the capital market. Due to the increased number of shareholders, the company should be transparent and disclose the necessary information. They are also given some privileges such as tax benefits to avoid double taxation. A typical U.S. REIT distributes vast majority of its income as dividends.

Investors of direct real estate or real estate stocks such as REITs bare systematic and unsystematic risks. Systematic risks are risks that apply to all assets within the same portfolio whereas unsystematic risk is idiosyncratic which applies solely on single group of asset. If you invest in a real estate portfolio of residential and office segments, the less than expected growth of the economy is a systematic risk because it is a risk for both of the segments. But the change in lease cost for offices is a systematic risk that applies solely for office segment assets.

Diversification is an attempt to mitigate unsystematic component of real estate. The best benefits can be obtained when there is less correlation between the assets. For example if you only hold residential property in New York, a sudden decrease in the value of New York residential property would diminish the value of your portfolio. However if you diversify across the segments and location, such volatility is less likely. The objective of diversification is to obtain the highest return for a given level of risk. The risk is reduced by adding assets to the real estate portfolio until reaching a level that is close to the systematic risk. Adding too much real estate to the portfolio after reducing the risk to systematic risk is not beneficial. Because there is no further risk reduction opportunity and added real estate come with more transaction and managerial costs. The practical type of diversification is naïve however it can be quantified through mean-variance optimization.

REITs are exposed to capital market risks. The investors of REITs rely their returns on the performance of stocks. Although, investment portfolios with operating real estate has a pretty predictable cash flow, their returns might be affected by the liquidity in the capital market. In the period of a financial crisis, the risk premium for the stocks increase, which lead to negative returns for the investor. Moreover, REITs which are involved in real estate development are working under more risks and uncertainty. Real estate development, These risks can be partially mitigated through diversification.

Investing in real estate involves taking various risks such as geographical risks and property type risks. Real estate diversification takes place most in the form of geographical diversification. Real estate investors tend to invest all of their properties in the same location. This is because investors get to know the location and opportunities which decreases costs associated with the research and transaction. If you invest abroad, you need to pay more for commissions as you require more research and transaction costs increase. However there are benefits that come with diversification. If these benefits are more than the increased cost of investing in another location, then this will prove to be a good investment strategy.

The research of this paper is about property type diversification. There is less research in the literature in this field. Property type diversification is an attempt to make use of diversification by investing in different segments of real estate. The segments of real estate include residential, office, retail, health, and hotel. Due to diversification opportunities, the diversified portfolio by adding more than 1 real estate segments is superior to the property type focused portfolio given the diversification benefits outweigh the transaction and holding costs of real estate.

The remainder of the paper is organized as follows. In Section 2, some of the relevant papers in the field of real estate diversification is discussed. The methodology and research model is given in Section 3. Information on the data, and empirical analysis are available in Section 4. In

Section 5, some of the important findings of the analysis are described. Finally in Section 6, the academic, practical and policy implications are given.

2. LITERATURE REVIEW

Lee investigated the relative importance of property type and geographical diversification in real estate returns. The research period is 1981 and 1995. Retail, office, and industrial properties in 326 locations in United Kingdom are used in this study. Property types are found to be more important than geographical diversification.(Lee S.L., 2001:167)

Young et al. studied real estate return distributions in the UK. The study includes 296.583 return data for the period 1981 to 2003. Returns are appraisal based on asset value changes which take place on December each year. When analyzed, it is observed that real estate is not normally distributed for almost all of the sub sectors. Moreover the skewness and magnitude of real estate asset specific change over time which means real estate risk is heteroskedastic. Therefore some values in MPT real estate risk models are fictitious. (Young et al., 2006: 131)

Olaleye and Aluko investigated diversification of real estate portfolios. They used residential property transactions between 1997 and 2001. Efficient portfolios are found to be superior, when compared with single property portfolio and equal allocation portfolio. Although diversification is absolutely helpful in risk reduction of real estate portfolios, it is not clear if efficient portfolios are superior to the naïve diversification. (Olaleye& Aluko, 2006: 187)

Glascock and Kelly studied the relative effect of property type and country effects in internationally diversified real estate portfolios. The research is for the period 1990-2005. They collected data from GPR 250 Property Securities Index which includes property type indexes in 21 countries. They concluded that property type effects are smaller than country effects. Property type diversification explains only 6% of total variance. Therefore country diversification is more effective in achieving risk reduction. (Glascock & Kelly,2007: 369)

Olaleye et al. investigated diversification strategies for direct property investment in Nigeria. The research focuses on commercial centers of Nigeria for 1998-2003 period. 76 properties investigated in the research include commercial and residential properties. They showed that portfolios with property type diversification is better. However when they further diversify with geographical diversification. Efficient portfolio diversification is also superior to naïve diversification strategies. (Olaleye et al., 2008 : 230)

Shen et al. examined the benefits of international diversification within real estate mutual funds. They collected monthly return, total net asset, expense ratio, and turnover ratio for international and domestic funds. The research covers 59 international and 146 domestic mutual funds based

in United States between 1998 and 2008. Sharpe ratio, Jensen's alpha, and Treynor ratio are calculated for this purpose.

They found that international real estate mutual funds perform better and are less riskier than domestic mutual funds . However structural break in 2007, increased the risk and decreased the returns in international mutual funds due to changed perception of distressed international assets. (Shen et al, 2012: 412)

Ro & Zibrowski studied investor reaction to property type focus changes in acquisitions, dispositions, and joint ventures. They used Dow Jones database to acquire data for the period 1990-2009. There is a sample of 678 portfolio changes. The events occur in the office/industrial, residential and retail REIT sectors. REITs which are focused on investor needs have a strong tendency to invest in one property type while large institutional investors diversify by property type. There is significantly negative abnormal returns for acquisitions that decrease property type focus and geographical focus. However dispositional events which increase property type focus, don't lead to significantly positive abnormal returns. (Ro & Ziobrowski,2012: 197)

Akinsomi et al. studied geographic and property type diversification of real estate in South Africa. The particular emphasis is barriers to entry. They selected 36 listed companies from the Johannesburg stock exchange and obtained data about these companies. The diversification data was available in the annual reports and also questionnaire methodology were applied. According to the results of this study the major concern of investors in South Africa when investing outside of South Africa and into other parts of Africa is property rights and title risks. Financial considerations such as return on investment, taxation, market size and liquidity are less effective. Economic stability and political risk are also relatively less important. (Akinsomi et al., 2015: 292)

Ciochetti et al. investigated benefits of international diversification from the perspective of contagion effect. They applied a test of market integration between public and private real estate investment and international investment opportunities. The research period is 1998 to 2012 They selected companies from Europe, U.S., Pacific Rim, Asia, Middle East, and Africa. Private real estate returns were obtained by indexes such as NCREIF and IPD.

They found that local arbitrage opportunities exist in real estate. Public and private real estate are integrated by local capital flows. Investors of public and private real estate can achieve similar returns. However global market integration for publicly traded companies has little contribution to the explained variance. The low integration also creates diversification opportunities to lower the risk by investing in different countries. (Ciochetti, 2015 : 173)

Huang and Wang examined risk management opportunities to mitigate risks associated with housing bubbles. They use quarterly data for the period 1976- 2010. The home price indices based on selected states of U.S., REIT index, and stock market index are used in this study. They conclude that monetary policies are unable to stabilize housing, REIT and stock market prices during financial crises. Moreover there are more correlations post 1984. The housing industry is more correlated with REIT industry rather than stocks. Therefore to diversify housing portfolios with stocks are superior to portfolios with REITs. (Huang& Wang, 2015: 634)

Anderson et al. examined the effect of property type diversification in REITs from 1995 to 2006. They obtained property type data from NCREIF and used it with other financial data in the analysis. The total sample includes 69 REITs.

They found strong positive relationship between property type diversification and return on assets, return on equity and Tobin's Q. Diversification significantly helps to reduce property type specific risk. Moreover, managers can select most highly performing properties in diversified portfolios. Therefore diversified REITs trade at a premium to portfolios including a single type of property. (Anderson et al., 2015: 71)

Gibilaro and Mattarocci studied the home country bias for REITs. Transaction and search costs increase when buying abroad. They selected 361 REITs from 21 countries listed in Standard and Poor's Global REIT index. Daily data is used for the period 2003-2013. The data has an evidence that REITs increasingly invest in more countries and the number of REITs that invest abroad also increases.

According to the results smaller markets such as the Netherlands and New Zealand tend to diversify internationally. The REITs who invest in one country abroad almost always invests in other foreign countries. But when diversified REITs and home biased REITs are compared there exists no premium for the returns. The results indicate that due to high initial costs home biased REITs outperform diversified REITs although the percentage of REITs that outperform decrease when longer time horizon is used. (Gibilaro&Mattarocci, 2016: 29)

3. METHODOLOGY

In the field of finance, returns are often preferred to data in level. This is an attempt to fulfill normality assumptions and avoid auto regression. It is calculated by

$Rs = (P_1 - P_0) / P_0$

However an alternative and a more common way to calculate stock return is log return.

$R_L = \ln (P_1 / P_0)$

There are various advantages for using logarithmic returns. First of all logarithmic returns are continuously compounded. Continuous returns are time additive, which is easier than multiplicative process. When logarithmic returns are used, the security prices can't be negative. If security prices are assumed to follow random walk, then the logarithmic returns of the security are normally distributed which is important for the regression assumptions. For forecasting , continuous compounding of logarithm returns are much better. When simple return isn't too large, logarithmic return is close to simple return. The mathematical relationship between the simple return and logarithmic return is given in the below formula. (Hudson & Gregoriou, 2015:152)

$$R_L = \ln (1 + R_s)$$

In the study, log returns are used as suggested in the literature. Also, unit root tests; Augmented Dickey Fuller - ADF and Philips Perron – PP are also applied as frequently applied in the literature. As the series are stationary in level, Vector Autoregression – VAR is modeled only for analyzing Granger causality.

Vector autoregressions (VARs) are models to grasp interrelationships between multiple variables based on time series. The variables are explained with previous values of them and other variables. The model is linear and frequently used in the literature. Vector autoregression can be formulated in the following form. (Giannone et al., 2015: 436)

$$y_t = C + B_1 y_{t-1} + \ldots + B_p y_{t-p} + \varepsilon_t$$

Granger causality is also investigated a lot in the literature. Following the works of Clive W.J. Granger, the causality between time series can be analyzed. A series can be claimed to be causal on the effect because of its information that is not available in any other series. G-causality claims that the cause provides superior forecast of the effect. The null hypothesis is that some variable X_t Granger causes another variable Y_t which doesn't necessarily mean that Y_t Granger causes X_t which is tested separately. (Granger, 2003: 70)

4. DATA ANALYSIS

The data used in this study is the closing price values for real estate investment trust(REIT) stocks. The research period is between 20. June.1997 and 20.June.2016. The REITs used in the study are Boston Properties Inc. from NYSE (shortly named as "BXP" for this study) , Equity Residential from NYSE (shortly named as "EQR" for this study), Federal Realty Investment Trust from NYSE (shortly named as "FRT" for this study), HCP, Inc. from NYSE (shortly named as "HCP" for this study), and Host Hotels and Resorts, Inc. from NYSE (shortly named as "HST" for this study). The REITs are chosen on purpose each to represent one major segment

of REITs. BXP operates in office segment, EQR operates in residential segment, FRT operates in retail segment, HCP operates in healthcare segment, and HST operates in tourism segment.

The main goal of this research is to investigate whether different segments of real estate is integrated. According to the literature of portfolio theory in finance, less integration brings diversification benefits in real estate portfolios of REITs.

The first step in the research is calculating log returns of the daily stock returns with the formula given in the methodology section of this paper. Once the log returns are obtained, summary statistics for each variable is obtained. These summary statistics are given in Table 1.

Table 1: Summary Statistics

REIT	No. of observations	Mean	Standard Deviation	Minimum	Maximum
BXP	4780	0,0517%	2,00%	-18,25%	21.46%
EQR	4780	0,0433%	2,11%	-24,36%	21,15%
FRT	4780	0,0551%	1,84%	-25,39%	19,60%
HCP	4780	0,0123%	2,73%	-28,32%	23,89%
HST	4780	0,0417%	2,07%	-18,21%	20,52%

Note: Results are provided for daily log returns.

The series are checked for stationarity with unit root tests. The tests applied are Augmented Dickey Fuller(ADF) and Phillips Perron (PP). The results of the tests are given in Table 2. According to the both tests, all of the variables are stationary at 1% level of significance. This is because the test results are more than critical values.

Table 2: Unit Root Tests

REIT	ADF Test Results
BXP	-79,782*
EQR	-55,647*
FRT	-80,545*
HCP	-77,374*
HST	-54,273*

ADF critical values for the series BXP and FRT are %1 = -3,431, %5 = -2,862.

ADF critical values for the series EQR, HCP, and HST are %1 = -2,565, %5 = -1,941.

*: Stationary at 1% level of significance

REIT	PP Test Results
BXP	-81,859*
EQR	-85,846*
FRT	-82,615*
HCP	-77,448*
HST	-79,639*

PP critical vaues for the series BXP and FRT are %1 = -3,431, and%5 = -2,862.

PP critical vaues for the series EQR, HCP, and HST are %1 = -2,565, and%5 = -1,941.

*: Stationary at 1% level of significance

The variables are stationary in level. They are analyzed for Vector Auto Regression (VAR) model. For the optimum number of lag, various criteria are analyzed. The results are presented in Table 3. Accordingly, 1 lag and 7 lags are suggested with the criterion. 1 lag – Model 1 is chosen because of the principle of parsimony.

Table 3: Lag Order Selection Criterion

Order Selection	Selection Order	Selection Criteria
Model 1	1	SC, HQ
Model 2	7	LR, FPE, AIC

SC: Schwarz Information Criterion, HQ: Hannan-Quinn Information Criterion, LR: Sequential Modified LR Test Statistics, FPE: Final Prediction Error, AIC: Akaike Information Criterion.

VAR(1) model is developed for this study. The variables are modeled with their and other variables' first lags. The coefficients regarding this model are given in Table 4. The development of Vector autoregression model is enough for the Granger causality due to the fact that the variables are stationary at the same degree. (in level)

Table 4: VAR Model Coefficients

	BXP	EQR	HCP	FRT	HST
BXP(-1)	-0,112	-0,081	-0,145	-0,061	-0,094
EQR(-1)	0,055	0,007	0,011	0,034	-0,011
HCP(-1)	-0,026	-0,042	-0,011	-0,023	-0,037
FRT(-1)	-0,098	-0,082	-0,065	-0,115	-0,0434
HST(-1)	0,026	-0,039	0,001	0,009	0,008
C	0,0006	0,0005	0,0002	0,0006	0,0005

The VAR model is checked for stability. If the roots are within the unit circle, then the model is reliable. The results for this test are given in Table 5. Accordingly, all the roots are within the unit circle. Also the modulus is less than one. This indicates that the VAR model can be used for further analysis.

Table 5: Roots Table in the Unit Circle

Root	Modulus
-0,117 - 0,042i	0,125
-0,117 + 0,042i	0,125
-0,048	0,048
0,030 - 0,003i	0,030
0.030 + 0.003i	0.030

Finally the variables are tested for Granger causality. The results of this analysis are available in Table 5. The results indicate that there is two way Granger causality between EQR and BXP, BXP and FRT. There is also one way Granger causality between FRT and EQR, HCP and EQR, BXP and HCP, BXP and HST, HCP and HST.

Table 6: Granger Causality Results

Null Hypothesis	X2
EQR doesn't Granger cause BXP	3,93**
FRT doesn't Granger cause BXP	11,35*
HCP doesn't Granger cause BXP	2,47
HST doesn't Granger cause BXP	1,18
BXP doesn't Granger cause EQR	7,47*
FRT doesn't Granger cause EQR	7,37*
HCP doesn't Granger cause EQR	6,00**
HST doesn' tGranger cause EQR	2,41
BXP doesn't Granger cause FRT	5,44**
EQR doesn't Granger cause FRT	1,75
HCP doesn't Granger cause FRT	2,21
HST doesn't Granger cause FRT	0,18
BXP doesn't Granger cause HCP	14,15*

EQR doesn't Granger cause HCP	0,08
FRT doesn't Granger cause HCP	2,63
HST doesn't Granger cause HCP	0,00
BXP doesn't Granger cause HST	10,36*
EQR doesn't Granger cause HST	0,15
FRT doesn't Granger cause HST	2,12
HCP doesn't Granger cause HST	4,62**

*:1% level of significance, **: 5% level of significance

5. DISCUSSION

The research is based on 5 Real estate investment trust stocks from New York Stock Exchange, each operating different segments. The goal of the research is to find out whether these segments are statistically integrated for the research period 1997-2016. If they are integrated, the diversification benefits would be limited.

According to the stationarity tests, the log returns of the daily data are stationary in level. This leads to an important statistical conclusion that a Vector Autoregression model can be developed which can be used for Granger causality.

The results of the analysis reveal that the variables EQR and BXP and BXP and FRT Granger cause each other. This means that their co-presence in the portfolios would not have diversification benefits.

CONCLUSION

The importance of diversification in real estate portfolios increase as many investors prefer to hold real estate securities. One of the most institutional vehicles of managing real estate portfolios is Real Estate Investment Trusts (REITs). Scientifically proper allocation of real estate within the portfolio leads to superior returns than portfolios using no diversification or naïve diversification.

The research in this field focuses on property type diversification and location based transaction. The topic of this paper is related to property type diversification which is an area with less research. There is already research in the field who claim the importance of property type diversification. (Lee S.L., 2001:167) This paper has a rather unique goal of investigating

whether and if so how it is possible to generate diversification benefits within the REIT portfolios.

According to the findings of the study, there are important real estate segments that are not integrated which do create diversification benefits by property type diversification. However, once REITs from the office and residential segment and office and retail segment co-exist in portfolios, there will not be diversification benefits due to the two way Granger causality between the segments.

This paper has important academic, practical and policy implications. It has a unique approach to research several segments within the real estate industry which is not available in the literature. Practitioners in this field can also benefit greatly by not adding the two pre-mentioned pairs of segments to the real estate portfolios. Policy makers should also take into account when there is less liquidity in the market, these segments will lose their value simultaneously.

REFERENCES

Akinsomi O., Pahad R., Nape L., Margolis J. (2015) , Geographic Diversification Issues in Real Estate Markets in Africa, *Journal of Real Estate Literature 23:2*, 261-295.

Anderson R.I., Benefield J.D., Hurst M.E.(2015), Property type diversification and REIT performance: an analysis of operating performance and abnormal returns, *Journal of Economics and Finance 39*, 48-74

Ciochetti B.A., Lai R.N. (2015), Shilling J.D. (2015), The Role of Public Markets in International Real Estate Diversification, *International Real Estate Review 18:2,* 155-173.

Gibilaro L., Mattarocci G. (2016), Are Home-biased REITs Worthwhile?, *Journal of Real Estate Portfolio Management 22:1*, 19-30.

Giannone D., Lenza M., Primiceri G.E. (2015), Prior Selection for Vector Autoregressions, *The Review of Economics and Statistics 97:2, 436-452.*

Glascock J.L., Kelly L.J. (2007), Wealth effects of REIT property type focus changes: evidence from property type transactions and joint ventures, *Journal of Property Research 29:3,* 369-384.

Granger, C.W.J. (2003), Some aspects of causal relationships, *Journal of Econemetrics 112*, 69-71.

Huang M.H., Wang T.C. (2015), Housing bubble vulnerability and diversification opportunities during housing boom-bust cycles: evidence from decomposition of asset price returns, *Ann Reg Sci 54,* 605-637.

Hudson R.S. , Gregoriou A. (2015), Calculating and Comparing Security Returns is harder than you think: A Comparison between Logarithmic and Simple Returns, *International Review of Financial Analysis 38, 151-162.*

Lee S.L. (2001), The Relative Importance of Property Type and Regional Factors in Real Estate Returns, *Journal of Real Estate Portfolio Management 7:2*, 159-167.

Olaleye A., Aluko B.T., Oloyede S.A. (2008), Evaluating Diversification Strategies for Direct Property Investment Portfolios, *Journal of Real Estate Portfolio Management 14:3,* 223-231.

Olaleye A., Aluko B.T. (2007), Evaluating Managers Diversification of Real Estate Portfolios: Evidence from Nigeria, *International Journal of Strategic Property Management 11* , 179-189.

Ro S.H., Ziobrowski A.J., Wealth effects of REIT property-type focus changes: evidence from property transactions and joint ventures, *Journal of Property Research 29:3*, 177-199.

Shen Y., Lu C., Lin Z.H. (2012), International Real Estate Mutual Fund Performance: Diversification or Costly Information?, *Journal of Real Estate Finance and Economics 44*, 394-413.

Young M.S., Lee S.L., Devaney S.P., Non-Normal Real Estate Return Distributions by Property Type in UK, *Journal of Property Research 23:2*, 109-133.