

Why are Storage REITS Outperforming Other REITS?

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Recent developments in the REIT stocks have seen a critical divergence. Most REITs have outperformed S&P 500 index over the sample period that covers about twenty years. However, within different sectors of this industry, storage REITs are the outperformers. In this paper, we examine different forces that are impacting Storage REITs. Also, there are some structural trends that are having a significant effect on this sector of real estate. Using structural breakpoint methodology, we can identify changes that are occurring in this industry, in particular storage REITs and identify factors that affect the performance of this real estate sector.

JEL Classification: G10, G11, G12, G14

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INTRODUCTION

One of the important sectors of the economy relates to the importance of real estate industry and its compounding effect on the national or the global economy. Both residential and commercial real estate is a useful barometer to estimate future economic conditions. For example, Benjamin et al. (2004) found a positive relationship between US economy and the real estate prices. However, as pointed out by Chan et al. (1990) real estate market goes through booms and busts thus creating significant risks that are unique to this industry. Due to extensive use of leverage in this industry, REITs (Real Estate Investment Trusts) are directly and indirectly affected by changes in the interest rates.

As suggested by various authors, equity REITs tend to have stronger relationship with small stocks but have a weaker correlation with the bond market. Furthermore, there are specific factors not reflected in the equity and the bond markets, that have a significant effect on this sector. For instance, real estate investment can also be local in nature where local factors may dominate this industry. Since we cannot move the real estate property to another location or another geographical area if a particular city witnesses decline, this sector's performance needs to be investigated keeping in mind both the broader economic factors as well as the local conditions.

Nevertheless, real estate investment is sensitive to many factors that merits careful study. Within the different sectors of the real estate investment trusts (REITs) self-storage facility became a very useful and lucrative investment from being an unattractive proposition with location that prohibited customers from being able to use the facility due to safety concerns. In addition, there was a possibility of spoilage of the storage as these facilities were not climate controlled. But, with the demographic changes, more individuals are storing their goods due to downsizing or other reasons, these self-storage facilities are climate controlled and has desirable locations.

To study the performance of these self-storage REITs we employ a multiple structural break methodology to gain insight into changing risk-return attributes of REITs. In this methodology, a trimming value is used which enables endogenous breakpoint estimation. It is important to note that the time-period for the data should be long enough for infrequent structural breaks to occur.

The remainder of the paper is organized as follows. The next section presents a review of the relevant literature. This is followed by sections that describe the methodology and results. The final section concludes the paper.



LITERATURE REVIEW

There are many research papers that have examined relationship between equity returns and economic/financial variables. For example, Chen, Roll, and Ross (1986) followed by Fama and French (1989) and Campbell and Diebold (2009) find that factors such as market premium, size premium and value premium are closely linked equity returns. Furthermore, these factors namely, size, value and momentum can also be

related to short-term rates, default spreads, term spreads and dividend yields.

Hoskins et al. (2004) point-out that the relationship between real estate and economic variables is constantly changing. Hence, understanding of this time variability of real estate returns can be useful in decision making by investors for portfolio formation and diversification. Also, the debt structure of REITs plays a role in terms of its performance. Increases in leverage or debt are negatively associated with REIT returns. Lee (2010) finds that REITs provides diversification benefits until 1999 but in the post 1999 period REITs become return enhancers. Thus, any study of long-term performance of REITs must incorporate structural changes in the industry in relation to the underlying characteristics of the sectors and sub-sectors of REITs as the responses of these assets vary.



DATA AND METHODOLOGY

Monthly data for storage REITs spanning from January 1995 to April 2020 aggregating 304 months are downloaded from National Association of Real Estate Investment Trusts (NAREIT) website and represent the FTSE, NAREIT real-estate index series. Economic data for term premium (ten-year Treasury Bonds minus three months Treasury Bills), default premium (Moody's Baa Bonds minus Treasury Bonds), monetary policy variable (change in Federal Funds rate), unexpected inflation (percentage inflation minus lagged three-month treasury bill) is downloaded from Federal Reserve Bank, St. Louis website. The data for Fama-French (FF) and Carhart four factor model that includes momentum are downloaded from Ken French's website. All data are monthly and cover the identical timespan.

It is well known in both economic and financial time series analysis and forecasting that data may be non-stationary implying non-constancy of parameters such as mean and variance over time. This non-stationarity of data may cause random walk behavior by the time series. Consequently, the application of linear models such as regression analysis may lead to spurious results. Furthermore, as pointed out by Nelsen and Plosser (1982), random walk behavior could be caused by changes in the trend arising from a random shock to the time series followed by another disturbance. Initially, it was assumed that the time series would revert over a business cycle and become stationary. However, in several instances this mean-reversion need not occur

Detection of multiple structural breaks when the break-date is unknown (or it is endogenous), Bai and Perron (1998, 2003) develop a sequential structural break method where the sample is divided around each break-date and parameters are estimated using ordinary least squares and the sum of squared errors are calculated and stored. The correct break-date is identified as the date when the residual variances are minimized.

$$Y_t = x_t\beta + z_t\lambda_j + \varepsilon_t \text{ Where } t = T_{j-1} + 1, \dots, t_j$$

and $j=1, \dots, m+1$. y_t or REITs returns (excess returns) is the dependent variable at time t , x_t and z_t are vectors of covariates

and β and λ_j ($j=1, \dots, m+1$) are vectors of coefficients, ε_t is the error term at time t . Furthermore, the indices (T_1, \dots, T_m) are the unknown breakpoints. The method of estimation is based on the least square principle and for each m -divisions with break-dates (T_1, \dots, T_m) , corresponding least square estimates of β and λ_j are computed by minimizing the sum of squared residuals.



EMPIRICAL RESULTS

Table 1 outlines the preliminary statistics for monthly storage REIT returns. The median values for storage REITs are higher than the mean, indicating a negatively skewed distribution that may signify frequent small gains followed by infrequent large losses. In turn, this indicates that negatively skewed distributions have a much smaller maximum and a

much larger minimum value. The sizable negative or positive skewness in conjunction with high excess kurtosis may also reflect nonlinearities in REIT returns. When these nonlinearities become more extreme, there are catastrophic gains and losses.

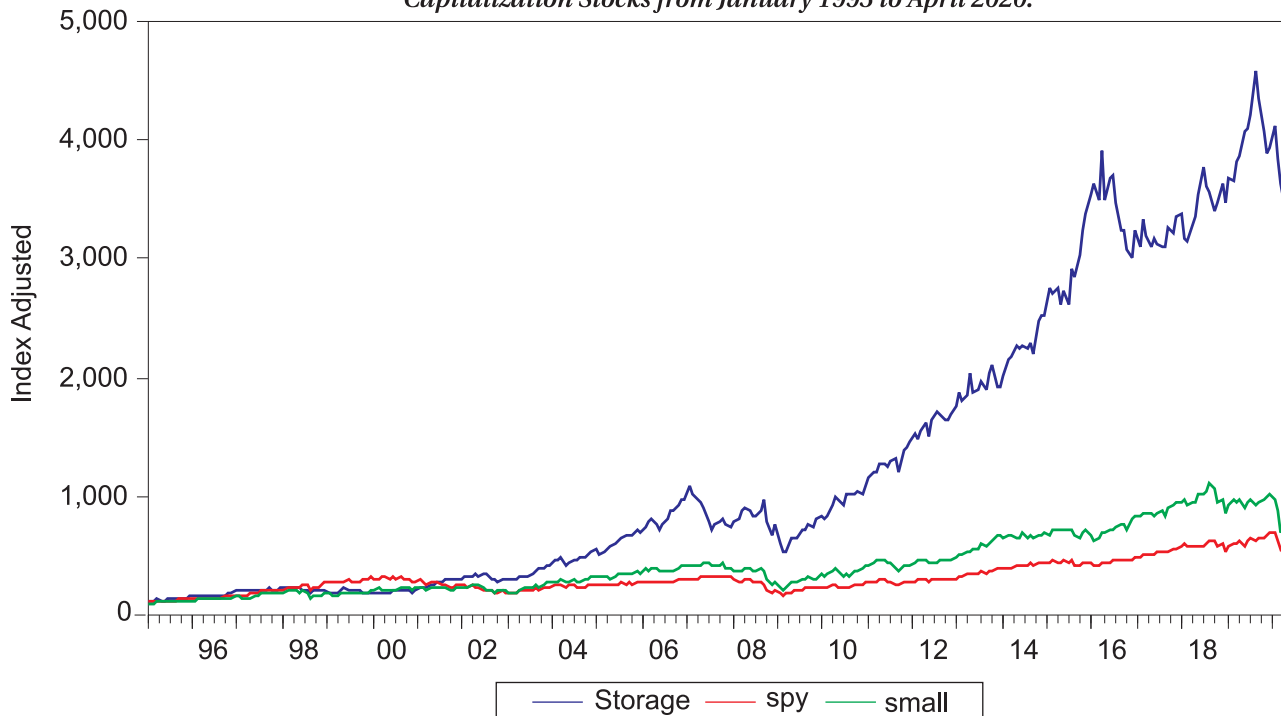
The highest mean returns are found for storage REITs, which stood at 1.298 percent per month well above the mid-capitalization, small and S&P 500 average returns of 0.751, 0.704 and 0.608 percent respectively with similar standard deviation or risk for the full sample. Furthermore, Storage REITs have a much higher monthly Sharpe-Ratio (SR) of 0.196 when compared against Sharpe-Ratio of 0.109 for Mid-Cap stocks followed by 0.096 for S&P 500 index. Hence, even after adjustment for risk, storage REITs have a much better performance than other major equity indices over the sample period.

Table 1. Descriptive Statistics for REITs, Economic and Financial Variables

SR	Mean	Median	Max.	Min.	St.Dev.	Skew	Kurt	Jarque-Bera
Storage	1.298	1.597	21.928	-22.244	5.656	-0.36	4.70	
Mid	0.751	1.176	16.03	-28.72	5.44	-1.19	7.51	331.7***
Small	0.704	1.282	17.36	-33.07	5.88	-1.25	7.73	364.7***
SPY	0.608	1.037	13.60	-18.14	4.54	-0.92	5.07	98.20***
		0.096						

*Note: Monthly time series for Storage REITs covers about twenty five years period from January 1995 to April 2020. SR is the Sharpe Ratio and *, **, *** represent significance at 10%, 5%, and 1% levels, respectively. All REITs and financial returns are calculated by $\ln(p_t/p_{t-1})$ where p is the stock index.*

Figure 1a. Plot of the index for REITs, S&P 500 and Small Capitalization Stocks from January 1995 to April 2020.



As Figure 1a reflects, storage REITs outperformed both the S&P 500 and small stocks but with higher volatility. There are several periods when storage REITs generated outsized returns followed by large losses signifying potential profit opportunities contingent upon the correct identification of sensitivities to changing market conditions.

A standard multi-factor pricing model in which typical macro-economic variables are included to explain real estate return predictability. Additionally, dynamic evolution of these economic risk factors is considered as storage REIT exposure to risk variables changes over time due to business cycle expansion or contraction. Thus, the following equation

was a structural break point around M7 of 2001 implying that the storage real estate market was less important before this period. Only in the recent time-period after the financial crisis that these real estate companies returns went up significantly above small, mid-cap and large company stocks. As pointed out by Correll (2003), Americans are purchasing and consuming goods far more than most countries and that has created a substantial demand for self-storage facilities. Further, the storage REITs have withstood the changes in economic cycles better than the other REIT investments.

Since REITs enjoy both stock and bond like features these real estate companies may be impacted by stock market factors

Table 2. Storage REITs returns against Economic Variables Using Sequential Structural Break Analysis

	c	Term	Default	GDP	c	Fed	UINF	GDP
2 vs 3	3.26	13.02	18.93					
Storage REITs:	Break Date 1995M01 – 2009(M03)				Break _____ Date			
1995M(01) – 2001(M06)	1.399	0.509*	-0.483	1.786***		3.946**	-2.141	2.579-
7.446***	(0.87)	(1.86)	(-0.66)	(5.13)	(3.24)	(-0.75)	(0.84)	(-2.73)
					Break Date 2001M(07) – 2020(M04)			
2.564***					1.085***		1.746	-0.599
Adj. R²		0.021			(2.54)	(0.66)	(-0.45)	(2.59)
F	3.14**				Adj. R²			0.034
				Trimming=0.15	F	2.53**		
0 vs 1					F Scaled	F Critical Values(5%)		
1 vs 2					4.06	16.24	16.19	
					1.85	7.40	18.11	

represents the time series behavior of cross-sectional storage REIT returns against standard economic variables:

$$R_t = \beta_0 + \beta_1 \text{Term}_t + \beta_2 \text{Default}_t + \beta_3 \text{GDPT}_t + \epsilon_t \quad (3)$$

Where the dependent variable, R_t represents storage REIT returns. The first independent variable in the model, term spread, the second variable in the model, default or credit spread and the third variable, is directly related to real estate values as higher GDP is associated with lower vacancy rates and increased rental income.

Notes: Method is from Bai and Perron (1997) where tests of L+1 vs L sequentially determined breaks are tested for multiple breakpoints. The economic variables are term spread (10-year Treasury Bonds minus 3-month Treasury Bills), default or credit spread (Moddy's Baa minus Treasury Bond), Gross Domestic Product (GDP), unanticipated inflation UINF (CPI minus Risk Free), change in federal funds rate (monetary policy variable). The trimming value is defined as the shortest time that a break needs to be eligible to be included as structural. *, **, *** represent significance at 10%, 5%, and 1% levels, respectively. Critical values are from Bai and Perron.

From this table it is evident that the storage REITs had minimal structural changes against economic variables. Both term spread and GDP had a significant effect on the return characteristics of these real estate companies returns. However, when other economic variables are included, there

while retaining distinct features embedded in idiosyncratic risk.

The regression equation for the Fama-French and Carhart four-factor model with momentum is:

$$r_{it} - r_{ft} = \alpha_i + \beta_i (r_{mt} - r_{ft}) + \omega_i \text{SMB}_t + \theta_i \text{HML}_t + \lambda_i \text{PRIYR}_t + \epsilon_{it} \quad (5)$$

where $r_{it} - r_{ft}$ is the excess return for different REITs, r_{ft} is the risk-free rate, r_{mt} is the return on value weighted market portfolio, SMB_t is the return on diversified portfolios of small stocks minus large stocks, HML_t is the difference between diversified portfolio of high and low Book/Market-Value stocks and PRIYR_t are the returns on value weighted zero investment factor showing similarity with the portfolio for size, book to market equity and one-year momentum in stock returns and ϵ_{it} is a zero-mean residual.

The regression result for the above model is provided in Table 3 given below. From the structural break point model, it can be observed that the storage REITs have at least one break point around M(07) of 2012. That implies, the economic crisis did not have a significant effect on these companies confirming the results from the previous table. The date of M(07) 2012 is meaningful in the sense that the significant change in the modernization of the storage facilities occurred after this time-period. Also, digitization and other technological changes made a big impact in the use of storage facilities by the

Table 3 Regression Results for Excess Returns of Storage REITs Sectors Carhart-Fama-French Four Factor Model with Momentum

REITs Sub-Sector	4-Factors					
	α	Mkt	SMB	HML	Mom	
Storage	1995(M01) – 2004(M03)					
	1995(M01) – 2012(M06)	0.959*** (2.83)	0.506*** (6.57)	0.746*** (6.88)	0.490*** (4.94)	-0.066 (-1.04)
Storage	2012(M07) – 2020(M04)	0.502 (0.95)	0.301** (2.05)	0.149 (0.70)	-0.008 (-0.04)	0.578*** (3.04)
	Adj R ²		0.282			
F		14.24***				
Break Test:	F	Scaled F	Critical Values (5%)	Trimming=0.15		
0 vs 1	10.18		50.89	18.23		
1 vs 2	2.24		11.21	19.91		

Regression equation for Carhart four factor model with momentum is $r_{it} - r_{ft} = \alpha_i + \beta_i (r_{mt} - r_{ft}) + \theta_i \text{SMB}_t + \phi_i \text{HML}_t + \lambda_i \text{PRIYR}_t + \varepsilon_{it}$ where $r_{it} - r_{ft}$ is the excess return for the hedge fund index, r_{ft} is the risk-free rate, r_{mt} is the return on value weighted market portfolio, SMB_t is the return on a diversified portfolios of small stocks minus large stocks, HML_t is the difference between diversified portfolio of high and low Book/Market-Value stocks, PRIYR_t or are returns on value weighted zero investment factor showing similarity with portfolio for size, book to market equity and one year momentum in stock returns and ε_{it} is a zero-mean residual. Fama-French factors and momentum data are downloaded from French’s website, t-values are in parentheses and *, **, *** represent significance at 10%, 5%, and 1% levels, respectively.

As expected, the adjusted R-square of 0.282 is quite significant when using Fama-French model. Also, the F-statistics are significant at one percentage implying that this model has a good fit. Furthermore, for the second breakpoint, the momentum effect is significant displaying that both market and momentum is playing a significant role in the storage REIT returns. On the other hand, size and the growth which is significant in the first period does not play a major role for the second period.



CONCLUSIONS

In this study we examine the impact of variability in economic and financial variables on storage REIT returns with the goal of understanding how these relationships have changed over

time. The empirical results generated have important implications for portfolio managers who are interested in portfolio diversification or exploiting investment opportunities and regulators concerned with stability in the real estate markets. A multi-factor methodology is applied to various fundamental economic variables against storage REITs to better understand their changing risk-return attributes.

Consistent with several studies, standard multi-factor models in which typical economic variables are included to explain return predictability are analyzed. Furthermore, dynamic evolution of these changing economic factor is considered using endogenous breakpoint methodology.

To gain additional insights into performance characteristics of REITs, the Fama-French-Carhart four factor regression model is employed to decompose and capture risk-adjusted performance attributes such as ‘alpha’ and factor exposure components to obtain corresponding risk-premium variability over time and detected breakpoints. For the second breakpoint, the momentum effect is significant displaying that both market and momentum is playing a significant role in the storage REIT returns. On the other hand, size and the growth which is significant in the first period does not play a major role for the second period.

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CORRIGENDUM

The readers are hereby informed that the Doctoral Abstract 'A Study of Engagement, Protean Career Orientation and turnover Intentions of Faculty Teaching in Professional and Technical Institutions' submitted by Dr. Khushboo Raina should be read as-

Doctoral Abstract "A Study of Engagement, Protean Career Orientation and Turnover Intentions of Faculty Teaching in Professional and Technical Institutions" published in 33rd Issue of DTR (Vol. 17 No.1) has been submitted by Dr. Khushboo Raina for the award of Ph. D. degree from GGSIP University Delhi. The supervisor was Prof. Puja Khatri, Professor, University School of Management studies, Guru Gobind Singh Indraprastha University, Delhi, India. The university awarded the Doctorate to the research scholar in 2019