

**Diversification and property control impact on the performance of Brazilian Real Estate Investment Trusts
(REITs)**

Abstract

We analyse the impact of property-type diversification strategies and property control on the performance of Brazilian REITs. We use a dynamic data panel sample from 110 REITs from 2002 to early 2016. We use a regression model in which the performance of REIT, measured by Jensen's Alpha indicator, is explained according to the diversification and property control. The quantitative analysis suggests that both property-type diversification and full property control positively impact performance of REITs. The paper seeks to analyse management strategies applied to REITs and to motivate further research regarding indirect real estate investment in Brazil.

Keywords: Diversification Strategy, Brazilian Real Estate Investment Trust, Performance.

Track: Financial Markets, Investment and Risk.

1. Introduction

During the last 10 years, indirect real estate investments have greatly evolved in Brazil through Real Estate Investment Trust (REITs); many new trusts have been released on the market as an option for investment, and management strategies have become more important to achieve better and more competitive performance. The structure for REITs in Brazil was first implemented in 1993, it is relatively young compared to the U.S.'s structure, and although the REIT market in Brazil is considered smaller than those in North America, Europe and Asia, it has undergone significant evolution over the last 10 years. According to the Brazilian Security Exchange Commission (SEC) Brazilian Security Exchange Commission (SEC), that is the entity responsible for Brazilian REITs, the Brazilian REITs had a equity growth of almost 2,000% (in US\$ million) from 2005 to 2015, while the US-REITs increase was approximately 180% in the same period.

In February 2015, the Brazilian Stock Exchange (B3) had approximately 130 publicly traded REITs, whereas more than half had initial public offerings (IPOs) between 2010 and 2015. The number of Brazilian REITs quadrupled in the last 10 years and, with this increase, the market volume grew. The equity market value expanded by approximately 1,100% since the subprime crisis.

The way the REITs have become a well-known and popular option for investment in the Brazilian market, many new trusts have arisen, and with them, the quality of Brazilian REIT management has begun to have greater importance to sustain trusts as good investment alternatives. Furthermore, the scenario evolution of REITs has shown that, although Brazil is currently experiencing both a political and an economic crisis, REITs are an important investment alternative, and their economic importance arises from the organization of the sector, similar to a true market in which developers, brokers, managers, wealth and job creation exist. Then the study of Brazilian REITs must continue to evolve because the importance of proper management of their assets increases along with the relevance of REITs in the Brazilian financial market (GUIMARÃES, 2013).

Therefore, this research contributes to the literature expanding Brazilian REIT analysis by contextualizing the importance of two management strategies, i.e., the property-type diversification and the property control, on the performance of REITs. The first strategy examined, that is, the level of diversification of buildings portfolio according to property type, was previously analysed in the international context. There have been many articles examining property-type diversification strategies for REITs (ANDERSON et al., 2015; CHONG et al., 2012, RO and ZIOBROWSKI, 2011; BOER et al., 2005; BYRNE and LEE, 2003; CAPOZZA and LEE, 1995). These articles have drawn different conclusions and have debated the pros and cons of focused and diversified REITs; however, overall, recent results have shown that returns increase with property diversification.

The second management strategy studied is the level of ownership control over the buildings that compose the portfolio of Brazilian REITs. Although the literature has discussed the importance of the corporate structure behind REIT management, such as corporate governance, dividend politics, agency costs and institutional ownership (BROCKMAN et al., 2014; GHOSH and SUN, 2014; DEVOS et al., 2013; CAMPBELL et al., 2011; EROL and TIRTIROGLU, 2011; DOLDE and KNOPF, 2010), not much research exists regarding the level of control over the buildings that composes a REIT's portfolio. However, it is possible to expect that, by having full control over these buildings; trusts could improve performance by avoiding conflicts of interest with third parties and perhaps agency problems inside the REIT's corporate structure. Therefore, this research also intends to comprehend whether Brazilian REITs – REITs – that have total control over/ownership of their properties have a management advantage, reflected in their performance.

To verify how important the diversification strategy and the level of control are for REIT management, this study proposes a regression model using a dynamic panel data regression, using an indicator of performance, Jensen's Alpha, as the dependent variable. The sample is composed by 110 REITs listed on B3, in the period between 2002 and 2016. The results show that, in Brazil, the REITs that adopt diversification strategies should expect a positive impact on their performance and suggests that not having to share the property with third parties generates a positive impact on performance.

The paper is organized as follow. Section 2 presents the main characteristics of Brazilian REITs, the differences between them and the US-REITs and a literature review on REIT diversification and control strategies. In section 3 we introduce the data, the statistical model and the description of the variables. Next section provides the empirical results, and section 5 brings forward the concluding remarks.

2. Brazilian REITs and Literature Review

Real estate investment trusts are broadly known worldwide. However, countries and regions have their peculiarities, and the real estate market is subject to such peculiarities. In this Brazilian REITs are contextualized, and a literature review of previous studies of REITs is presented.

Brazilian REITs versus US-REITs

Within capital markets, many types of investment vehicles/products exist. As Hudson-Wilson et al. (2005) explained, in the case of real estate, there are basically four financial structures of investments: i) private commercial real estate equity; ii) private commercial real estate debt; iii) public real estate equity – REITs or real estate operating companies (REOCs); and iv) public commercial real estate debt. In the USA, a famous alternative is the REIT, which

offers investors an indirect form to invest in real estate. In Brazil, REITs are the equivalent to US-REITs, and although they have some specific differences, both markets have laws and legislation qualifying and regulating their operability. In the North American case, the legislation is in accordance with the Real Estate Investment Trust Act of 1960, which prevails in the USA, whereas in Brazil, it is according to Law No. 8668 / 1993 from Rule 205 / 1994 from Brazilian Security Exchange Commission (SEC).

Some important characteristics to emphasize and that are common to both cases, REITs and US-REITs, it is not mandatory that they be publicly traded on the stock exchange, and there are no legal restrictions regarding the use of leverage. Differences between the two cases are that US-REITs cannot have fewer than 100 stockholders and that 5 or fewer stockholders cannot hold more than 50% of the shares, whereas for Brazilian REITs (B-REITs), there is the need for a minimum of 50 stockholders, and there is tax exemptions for every stockholder with less than 10% of shares on each REIT. In terms of mandatory distribution, US-REITs must deliver 90% of the operational profit, they have no specific rules for net capital gain distribution, and the timing is annual, whereas B-REITs must return 95% of the operational profit and 95% of the net capital gain, and they have biannual timing. In both countries there are equity REITs, and hybrid REITs..

The economic status of the two countries is different when the issue is the REIT industry. Gabriel et al. (2015) emphasized that the variances between the Brazilian and American markets in terms of financial systems, capital markets, structure, market size, and maturity, as well as regulations and macroeconomics aspects, have consequences for the contrast between Brazilian REITs and US-REITs in performance analysis. The numbers regarding the size of both markets alone can suggest discrepancies. Taking the North American REITs as an example, according to NAREIT¹ (2016), these REITs registered a market capitalization of US\$ 938.8 billion in 2015, with 233 REITs publicly listed and negotiated, whereas in the same year, the Brazilian REIT market composed a total net equity value of R\$ 61.7 billion, with 261 trusts listed at SEC²; however, the actual number of trusts publicly traded was lower. In the beginning of 2016, approximately half of the REITs (129) were publicly traded at B3³.

According to Brounen and Koning (2012), REITs provide investors a liquid way of investing in diversified portfolios of commercial real estate, and they create an attractive legal structure for real estate companies, although the

1 National Association of Real Estate Investment Trusts (NAREIT)

2 Comissão de Valores Mobiliários is the Brazilian entity equivalent to SEC, and responsible for REITs regulation

3 B3 – Brasil Bolsa Balcão, is the Brazilian Stock Exchange

listed entities experience operations and policy restrictions. Pagliari et al. (2005) compared indirect and direct real estate investments and found that, historically; REITs exceeded the returns on private real estate equities and were favoured by individual/small investors, while large institutional players still preferred private real estate investment.

Similar to other industries, real estate investments are highly conditioned to regional and legal restrictions. Each country has its own peculiarities. Brounen and Koning (2012), through their REIT history review, showed the importance of establishing the correct conditions to develop a sizeable REIT industry. According to them, lobbying organizations and coinciding financial deregulations are essential to REIT market growth, not only in the USA, but also abroad. Thus, for each country, closer study is important for comprehending market standards, facilitating a proper business strategy that could best suits a region or country.

Property-Type Diversification

Diversification strategy is a topic that is broadly discussed in the literature. A diversified firm is active in multiple businesses or markets. Consequently, a firm’s level of diversification is one of the main concepts characterizing its corporate level strategy (FURRER, 2011). Deciding the level of diversification in a firm is not a straightforward process. As Furrer (2011) explained, there are three dimensions to represent the diversification strategy: geography, product market and vertical integration. Therefore, the overall diversification level of a firm derives from the extent of its diversification in these dimensions.

In this study, the diversification analysis targets the product market dimension of REITs. In this sense, what is meant by property-type diversification is that a REIT can target multiple types of properties to compose its portfolio, or it can focus on only one type or one property. The property type is classified according to the real estate market segment that the building concept seeks to reach, such as commercial/office, industrial, retail, hotel/lodging, residential or healthcare. Figure 3 illustrates diversified and focused property portfolios in the context of REITs.

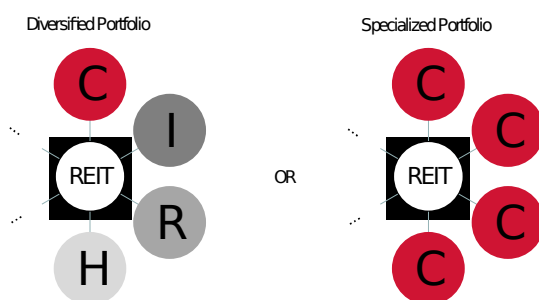


Figure 1 - Property-type diversification: Diversified & Specialized Property Portfolios

Note: Property type examples are commercial/office (C), industrial (I), retail (R) and hotel/lodging (H).

Chong et al. (2012) explained that, in the USA, less than 10% of equity REITs are classified as diversified, and there is a predominance of specializing REITs in a single property type. The same is observed in Brazilian REITs, that most of them seek to focus on a single property type.

There is a debate regarding what concerns the efficiency of specialization or the diversification strategy. According to Berger and Ofek (1995), theoretical arguments have suggested that diversification has both value-enhancing and value-reducing effects. However, in their research, they analysed the effects of diversification on firm value, and the results showed a negative relationship. In contrast, Lang and Stulz (1994) studied whether the market evaluation of a firm correlates with its diversification degree; however, they found no evidence that diversification benefits firms on average.

Ro and Ziobrowski (2009) examined how property focus or diversification influenced the value of U.S equity REITs from 1997 to 2006. According to them, REITs present a strong tendency to seek one particular property type. Through their analysis, by adopting CAPM and a Fama-French three-factor model with momentum, they concluded that there was no evidence of superior performance associated with specialized REITs. The authors concluded that specialized REITs presented higher market risk than diversified REITs. Chong et al. (2012), in contrast, reported that the arguments in favour of a focused strategy are that the REIT managers should have better understanding and knowledge of specialist markets and sectors, and lower costs in monitoring and analysing more markets could be attained. Hence, although the idea of focus can appear inconsistent with portfolio theory and diversification, economically, it might make sense. Anderson et al. (2015) found that there is a positive impact of diversification on returns due to shielding against property-type specific risk. Nevertheless, they also concluded that, despite superior performance, buying diversified REITs instead of specialized REITs is not a profitable strategy.

Therefore, it is possible to consider that diversification has a positive impact on REITs by achieving better performance (ANDERSON et al., 2015), and a similar result should be expected for the case of Brazilian REITs; thus, the first hypothesis (H1) is:

H1: REITs that apply a diversification strategy outperform REITs that are specialized.

Property Control

Brazilian REITs have an internal corporate structure that basically contemplates a relationship between the REIT shareholders and its managers. As Basu et al. (2016) noted, there has been a great focus on studying the separation of ownership from control/power and the conflicts of interest between shareholders and managers in the context of the firm. Brockman et al. (2014) explained that REIT structure usually relies on a management team and an

advisory team. According to these authors, third parties hired to execute the job sometimes compose these teams, and this situation can occasionally lead to agency problems, self-dealing and conflicts of interest.

Because REITs that own properties must address building management and operation, there could be a third “organizational structure” that affects the overall REIT administration. This third structure consists of the relationship between the REIT management team and the building’s condominium. Like in a firm, when a shareholder has the majority of shares, the landlord of a building can have the majority of the condominium, controlling the decisions of the building management and operation. The control of the condominium is a reflection of the number of units that are concentrated with one specific landlord. In this sense, REITs sometimes concentrate a small fraction of a building’s units (less than 50%), a majority of building’s units (more than 50%) and the totality of building’s units (100%).

As Boukouras (2011) commented, in a firm owned by shareholders that have professional managers controlling their operations, the associated agency costs and the corporate mechanisms to decrease them are popular topics involving ownership and control discussions. Lazano et al. (2015) explored the problem between minority and majority shareholders, leading to a U-shaped relationship between ownership concentration and firm value. Basu et al. (2016) explored blockholder-level measures of power and their consequences for firm value, as well as how multiple blockholders could demonstrate significant differences between ownership and power. According to Howton et al. (2012), the long horizon of REITs might lead them to focus more intensively on operations as a source of value creation. The idea of REITs becoming more efficient in terms of performance because of their management operations enhances the importance of understanding whether the degree of control that REITs have over their properties is relevant. Although limited to a specific niche of the real estate industry, i.e., the hotel business in the USA, Howton et al. (2012) compared performance between REIT-owned properties and non-REIT-owned properties, concluding that REIT ownership favourably impacts the performance of the properties.

The second hypothesis of the present research considers the importance of having 100% control of the building(s) composing the REIT portfolio. Because research about this topic is scarce, to approach the subject and formulate a coherent hypothesis, an alternative approach is to verify the problems that managers can avoid by having 100% control of a building. Because 100% control of properties basically means not having a partner sharing some decisions and interfering in the property, it is possible to assume that full control/ownership helps the REIT manager to prevent conflicts of interests with potential partners and to prevent potential agency problems in the corporate structure of the REIT. Therefore, the second hypothesis (H2) formulated is:

H2: REITs with 100% ownership of their buildings outperform other REITs.

On subsequent pages, the information gathered to compose the data in this study is discussed, and the methodology adopted is formulated and explained to verify hypotheses 1 and 2 empirically.

3. Methodology

The main objectives of this paper are to analyse the influence of diversification and control on the performance of B-REITs. To achieve these objectives, we collected data on the closing price of the share (in BRL), the total number of outstanding shares (in millions), the fund net asset value (BRL/share) and the total gross return of Brazilian REITs from Bloomberg platform, in the period between January 2002 and February 2016. To analyse and classify the property-type diversification and the level of property control for each Brazilian REIT, Initial Public Offering (IPO) prospects were gathered from the B3's web page. Then, data were consolidated in 110 Brazilian REITs with available information in the period.

Dependent Variable

The Jensen's Alpha is used to understand the historical performance of an asset, stock or portfolio (BERK & DEMARZO, 2014). If Jensen's Alpha is greater than zero, then the asset performed better than expected during period; and if it is less than zero, then the asset performed worse than expected. The method for obtaining this variable is a cross-section regression analysis according to the CAPM (SHARPE, 1964; LINTNER, 1965):

$$r_{it} - r_{ft} = \alpha_i + \beta_i (r_{mt} - r_{ft}) + e_{it} \quad (1)$$

Where $r_{it} - r_{ft}$ is the excess return of the REIT stock relative to the risk free rate, $r_{mt} - r_{ft}$ is the excess return of the market relative to the risk free rate, e_{it} is the random error, i represents the REIT and t represents the time (month). From this model, for each REIT, α_i is the Jensen's Alpha and β_i is the Beta (JENSEN, 1968).

The CAPM requires benchmarks for market returns and risk-free assets. We use the IBOV monthly index as the benchmark, which is supposed to gauge the average performance of the Brazilian stock market. To represent a risk-free asset, the reference interest rates are applied from swaps PreXDI, and for the present paper, the PREDI30 Index was chosen from the Brazilian market. These indices were obtained from the Bloomberg platform.

Additionally, because the data from B-REITs do not have the same historical amount as the US-REIT data and to take full advantage of it, the regression represented by equation (1) contemplates a period of 24 months associated with a rolling window method, which is applied to obtain a historical set of Alphas and Betas for each REIT. The result is a panel data sample in which, for the 110 REITs, there will be "x" number of Alphas and Betas registered for as many months as the data allow. Since some REITs are older than others are, an unbalanced panel data set is expected. This

criterion, although it might present some biases, is adopted to maintain a relevant statistical sample for the regression model.

After a primary overview of the portfolio analysis, the methodology consists of a regression model with panel data sample, which is grouped by REITs, and the time period is monthly. The equation for this regression model has as a dependent variable (Y), the Jensen's Alpha, while the independent variables (X) are the age, fund net asset value and market capitalization of the REITs, as well as two dummies (binomial variables) representing whether the REIT is diversified and whether there is 100% control of the buildings within its portfolio. The equation for this model is represented by equation (2):

$$\mathbf{Alpha}_{it} = \beta_0 + \beta_1 \ln(\mathbf{Age})_{it} + \beta_2 \ln(\mathbf{NAV})_{it} + \beta_3 \ln(\mathbf{MCAp})_{it} + \beta_4 \mathbf{Alpha}_{i,t-1} + \delta_1(\mathbf{D}_{\mathbf{DIV}})_{it} + \delta_2(\mathbf{D}_{\mathbf{CONTROL}})_{it} + \mathbf{u}_{it} + \epsilon_{it} \quad (2)$$

The regression was estimated using instrumental variables (IVs) and two-stage least squares (2SLS) for panel-data models. A random effects estimator was adopted for time and entities. As shown in Equation (2), the variable $\mathbf{Alpha}_{i,t-1}$ represents the lagged Jensen's Alpha and is an endogenous variable. Because of the CAPM model being associated with a rolling window method, as explained in the following pages, the Jansen's Alpha obtained for period "t" had a strong correlation with the Jensen's Alpha of period "t-1". This characteristic configured the data set as a dynamic panel and justified a regression using an instrumental variable (IVs), which in this case was the Jensen's Alpha lagged twice ($\mathbf{Alpha}_{i,t-2}$).

Finally, by analysing the results from the regression model with a dynamic panel data sample represented by equation (2), it is possible to understand how property-type diversification and property control affect the Jensen's Alpha and how relevant they are for REIT managers to improve this measurement of performance.

Explanatory Variables

The explanatory variables are two dummy variables selected to compose the main regression. Each of these variables seeks to describe how property-type diversification and property control affects Jensen's Alpha, in other words, the performance of Brazilian REITs. According to Anderson et al. (2015) the use of dummy variables is a valid way to measure property-type diversification. Property-type Diversification is represented by $\mathbf{D}_{\mathbf{DIV}}$, and is set to one if the existence of more than one type is identified from commercial, logistics/industrial, residential, retail and hotel properties and zero otherwise. Property Control, represented by $\mathbf{D}_{\mathbf{CONTROL}}$, is set to one if there is 100% control of all of the buildings in the property portfolio and 0 otherwise. The information was gathered through IPO prospects and reports from B3 web site.

Control Variables

The control variables were chosen to better characterize Brazilian REITs: the variables Age, Net Asset Value and Market Capitalization were selected to have their effects separated from the effects that property-type diversification and property control might have on performance. Following we present the description of each control variable:

i) Age (AMBROSE AND LINNEMAN, 1998; CASE et al. 1991): this variable represents the age of the Brazilian REIT and is reported in months. It was considered as the time that the fund presented gross returns computed on Bloomberg.

ii) Net Asset Value (NAV) (BARKHAM & WARD, 1999): is a number that represents the trust value per share. It is the ratio between the total value of the assets (minus the liabilities) and the total number of outstanding shares, expressed in BRL per share.

iii) REIT size (CLAYTON & MACKINNON, 2003): Measured as the Market Capitalization (MCap), is the product of the last price of the share multiplied by the number of outstanding shares and is reported in millions of BRL.

iv) Lagged Jensen's Alpha ($\text{Alpha}_{i,t-1}$): Is the first lag of the Jensen's Alpha. It controls for the persistence of performance through time.

Assumptions and Limitations

The real estate information arrangement in Brazil is not as accessible as that in the USA, which limits the coverage of the survey. During the development of this research, it was necessary to make some assumptions to facilitate the application of the methodology. Although the assumptions were driven by limitations in obtaining information, they are points for improvement that further research could explore.

To analyse the diversification and control characteristics of Brazilian REITs and their influence on performance, it was necessary to assume that these variables did not change with time. For example, after analysing the documentation that led to classifying a Brazilian REIT as diversified or not and has having full control of its properties, it was assumed that this condition was the same for all periods of analysis. This simplification excluded the capacity that Brazilian REITs have to change their portfolio characteristics from the study. It was an assumption that was needed because the disposal of information did not allow for monitoring all of the changes that each B-REIT portfolio underwent with time.

Another assumption was that Brazilian mortgages REITs were classified as diversified according to property type and were classified as trusts without control over buildings in which that indirectly invested. These specific B-REITs could be taken apart from the regression model; however, because they are a relevant number, we decide to

maintain them in the analysis. Nevertheless, in the Results section, scenarios are presented in which these Brazilian were excluded from the main regression as well.

Due to the limitations of the information, one important variable for REIT performance was not considered in the analysis. The Brazilian REIT management costs could not be part of the main regression as a control variable because it was not possible to access a sample that would provide these values for each trust and for each period of time.

The next section contemplates the results obtained by the described methodology and assumptions.

4. Results

In this section, a summary of the descriptive statistics is presented, regarding the panel data and the results obtained after categorizing the Brazilian REITs according to diversification and control of properties. Thereafter, an analysis of the values that encompass the Jensen's Alpha obtained through the CAPM methodology is presented.

As previously mentioned, together, all of the information for the regression analysis composes a panel data with 5,858 observations, which is grouped by 110 REITs. The number of periods for each Brazilian REIT can range from 8 to 140 months, according the available information, thus is an unbalanced panel data. Table 1 shows a summary of descriptive statistics for the panel data. Among the control variables (age, fund net asset value, and market capitalization) the correlation does not exceed 0.15, which indicate that they can be considered independent variables.

Table 1 - Descriptive Statistics – Period between July 2004 and February 2016

Variable	Mean	Std. Dev.	Minimum	Maximum	Observations
price	484.45	829.23	0.11	11810.00	N= 5858
shares	6.71	20.34	0	323.01	
grossret	869.95	1580.44	0.52	13828.78	
nav	498.11	857.66	0.33	11631.75	
mcap	222.34	661.66	0	29241.45	
age	45.24	34.69	2	170.00	

Panel Variable: REITs (i= 1, 2, ..., 110)
Time Variable: month (t= 1, 2, ..., 140)
Obs: Unbalanced Data Panel
Analysed Period: July 2004 to February 2016

Notes: The data set is panel data in which the panel ID variable (groups) is the REITs ($i = 1, 2, \dots, 110$), and the time variable is the monthly date ($t = 1, 2, \dots, 140$). The variable “price” is the closing price of the share; “share” is the total number of outstanding shares (in millions); “grossret” is the total gross return index; “nav” is the fund net asset value (BRL/share); “mcap” is the market capitalization (millions of BRL); and “age” is the age of the REIT (in months); For each REIT, the variables “price”, “shares”, “grossret”, “nav”, “mcap” and “age” have monthly observations.

Of 110 funds, 43 were diversified, and 38 had 100% control of their buildings. Since approximately 60% (67 trusts) of the analysed REIT were not diversified, this first number suggests that, in Brazil, there is a preference to seek specialization strategies. Regarding the level of control, nearly 35% (38 trusts) of the analysed REITs own 100% of the properties that compose their portfolios. In addition, 87% (33 trusts) of these REITs specialize in one type of property. One might conclude that, although 100% control could be desired, it is not the predominant strategy, and if it is adopted, then it probably adheres to a specialization scheme.

Outcomes provided by the application of the CAPM

As previously explained, the Jensen’s Alphas were obtained through the application of a CAPM model for a time period of 24 months and by executing a rolling window approach to create a historical sample of Alphas for each REIT. Since some REITs are not sufficiently old to provide a CAPM regression for 24 months, the number of REITs for the following results decreased from 110 to 99 trusts. Table 2 presents the average monthly Jensen’s Alphas obtained for these 99 trusts. The IBOV index represents the broad market on the stock exchange and contemplates a time period analysis between July 2006 and February 2016.

Table 2 – CAPM Results – Monthly Average Values

SCENARIO 1 Benchmarked with IBOV		
Variable	Mean	Std. Dev.
r_i (per month)	0.42%	6.36%
REITs Excess Return (per month)	-0.46%	7.24%
Market Excess Return (per month)	-1.38%	6.55%
Beta	0.3789	0.2709
Alpha	0.0067	0.0377
Age (months)	62.5	31.6
Time Period	July 2006 to February 2016	
Total Observations	3783	
Number of REITs	99	

Note: Results shows the monthly average values of REIT return (r_i), REIT excess return and market's excess return. The Alpha variable represents Jensen's Alpha.

As can be observed in Table 2, the monthly average alpha was 0.67. As Berk and Demarzo (2014) explained, the alpha from the CAPM model can be interpreted as a risk-adjusted measurement of the stock historical performance, and it is the distance at which the security is placed, above or below, the Security Market Line (SML). Additionally, the beta of a stock/security is the expected percentage variation in its return given a one percent change in the market's return. Therefore, the average beta of approximately 0.38 shows that in a given month, for a 1% return (shortfall) of the market, the average REIT would present a return of 0,38% (-0,38%) plus a 0,67% alpha, totalling a return of 1,05% (0,29%) on that month. So, B_REITs are, in general, less volatile than the benchmark (IBOV indice).

However, these conclusions are limited to formal CAPM assumptions, which, according to Sharpe (1964), are that i) investors are fully rational; ii) there is symmetry of information and homogenous expectations; iii) there are no market imperfections; and iv) the sale and purchase of securities at competitive market prices and borrowing and lending at the risk-free interest rate are possible.

Regression Results

Table 3 presents the set of results for the regression model proposed in this paper, plus three alternative models of regression, combining the Control Variables and the Explanatory Variables. The standard errors were estimated according to bootstrap methods.

Table 3 – Regression Outcomes – 99 REITs

VARIABLES	MODEL 0	MODEL 1	MODEL 2	MODEL 3
Alpha (t-1)	0.957444*** (158.17)	0.957591*** (180.56)	0.957255*** (197.33)	0.957459*** (143.54)
ln(NAV)	-0.000075 (-1.53)	-0.000074 (-1.45)	-0.000106* (-1.81)	-0.000110** (-2.00)
ln(Mcap)	0.000145* (1.68)	0.000150* (1.65)	0.000169* (1.82)	0.000182* (1.91)
ln(Age)	-0.000107 (-0.42)	-0.000093 (-0.33)	-0.000186 (-0.81)	-0.000179 (-0.60)
Ddiv		0.000190 (0.89)		0.000308 (1.45)
Dcontrol			0.000396** (2.04)	0.000471** (2.02)
Constant	-0.000169 (-0.16)	-0.000315 (-0.27)	0.000016 (0.02)	-0.000186 (-0.16)
Observations	3,585	3,585	3,585	3,585
R-Square	0,953	0,953	0,953	0,953
Number of REITs	99	99	99	99

z-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: Regression results of Jensen's Alpha (Alpha) for the measurements of age, fund net asset value (NAV), market capitalization (Mcap), diversification strategy (D_{DIV}) and control level (D_{CONTROL}). The variable D_{DIV} has a value of 1 if it is a diversified strategy and a value of 0 if it is not.

Similarly, D_{CONTROL} has a value of 1 if there is full control of property and 0 if there is not.

MODEL 0: $\text{Alpha}_{i,t} = \beta_0 + \beta_1 \ln(\text{Age})_{i,t} + \beta_2 \ln(\text{NAV})_{i,t} + \beta_3 \ln(\text{MCap})_{i,t} + \beta_4 \text{Alpha}_{i,t-1} + u_{i,t} + \varepsilon_{i,t}$

MODEL 1: $\text{Alpha}_{i,t} = \beta_0 + \beta_1 \ln(\text{Age})_{i,t} + \beta_2 \ln(\text{NAV})_{i,t} + \beta_3 \ln(\text{MCap})_{i,t} + \beta_4 \text{Alpha}_{i,t-1} + \delta_1(\text{D}_{\text{DIV}})_{i,t} + u_{i,t} + \varepsilon_{i,t}$

MODEL 2: $\text{Alpha}_{i,t} = \beta_0 + \beta_1 \ln(\text{Age})_{i,t} + \beta_2 \ln(\text{NAV})_{i,t} + \beta_3 \ln(\text{MCap})_{i,t} + \beta_4 \text{Alpha}_{i,t-1} + \delta_2(\text{D}_{\text{CONTROL}})_{i,t} + u_{i,t} + \varepsilon_{i,t}$

MODEL 3: $\text{Alpha}_{i,t} = \beta_0 + \beta_1 \ln(\text{Age})_{i,t} + \beta_2 \ln(\text{NAV})_{i,t} + \beta_3 \ln(\text{MCap})_{i,t} + \beta_4 \text{Alpha}_{i,t-1} + \delta_1(\text{D}_{\text{DIV}})_{i,t} + \delta_2(\text{D}_{\text{CONTROL}})_{i,t} + u_{i,t} + \varepsilon_{i,t}$

The information shown in Table 3 suggests that diversification strategy has positive effects on the Jensen's Alpha value; in other words, it improves performance. The constant δ_1 associated with the diversification strategy in the regression model has a positive value for the two models in which it is included, although not statistically significant. In the Brazilian case, considering all REITs types (equity, mortgage and hybrid), the outcomes from the regression model are not sufficient to ignore that the factors mentioned by Chong et al. (2012) could have a large impact on the performance of REITs to an extent that specializing in one type of property could positively impact performance. Summarizing, although the signs of the coefficients are in line with Anderson et al. (2015) and confirms the first hypothesis (**H1**) that REITs with diversification strategy outperform specialized REITs, this result is not statistically significant.

When analysing the results from the impact of property control on performance, the numbers suggest the expected outcome. The hypothesis (**H2**) that full control over the buildings that integrate the property portfolio of REITs positively impacts its performance could be verified for both models at a statistical relevance of more than 95%. This outcome justifies having the totality of a building, i.e., full control, to increase the REIT performance.

Up to this point, the analysed REITs included the mortgage REITs. These REITs were assumed to be as property-type diversified and as not having full control of their properties, however, these assumptions due to data limitation and because mortgage REITs are significant in the market. As an alternative to this assumption, Table 4 presents the results of the regression model excluding the mortgage REITs. Previously, 99 trusts were analysed, and now, the number decreased to 80 REITs.

The results from Table 4 lead to almost the same conclusion as that from Table 3's results. The difference was that the property-type diversification presents a positive impact on performance when excluding mortgage REITs from the analysis, surpassing the impacts from a focused strategy and showing statistical relevance (in Model 3, which includes all variables). This change is important because it shows that, property-type diversification impacts REIT performance more positively than specialization.

Regarding the methodology adopted, an important fact to consider is that the model presents a high R-squared value. For the three scenarios examined and for the conditions in Tables 3 and 4, the R-squared is greater than 0.90, indicating that the dependent variable, Jensen's Alpha, has more than 90% of its value explained by the proposed model, in which the explanatory variables are the lagged Jensen's Alpha ($\text{Alpha}_{i,t-1}$), age, the fund net asset value, market capitalization and the dummies for property-type diversification and property control. Lemmon et al. (2008) indicated that corporate capital structures can be unexpectedly persistent and explained how important it is to account for lagged effects in empirical specifications. For the present study, the lagged effect within the Jensen's Alpha value enlightens its importance, as indicated by its p-values in Tables 3 and 4.

The market capitalization variable ("Mcap") also shows relevant explanatory conditions, presenting a positive effect on Jensen's Alpha, while the net asset value ("Nav") has a relevant negative impact on Jensen's Alpha. This valuation might suggest a review of the methodology to render it more accurate to the subject of analysis since the explanatory side of the regression equation seems to be highly concentrated on the lagged Jensen's Alpha ($\text{Alpha}_{i,t-1}$).

The overall analysis of the present research explores the REIT market in Brazil in greater detail, providing the literature with more information and motivating additional research around this topic.

Table 4 - Models for Regression Outcomes excluding "REITs de Papel" - 80 REITs

VARIABLES	MODEL 0	MODEL 1	MODEL 2	MODEL 3
Alpha (t-1)	0.957125*** (101.07)	0.957213*** (173.04)	0.957035*** (139.01)	0.957125*** (169.60)
ln(NAV)	-0.000097 (-1.33)	-0.000097* (-1.80)	-0.000132** (-2.08)	-0.000134** (-2.36)
ln(Mcap)	0.000172** (2.40)	0.000184* (1.76)	0.000203** (2.36)	0.000218** (2.35)
ln(Age)	-0.000124 (-0.44)	-0.000150 (-0.56)	-0.000181 (-0.77)	-0.000214 (-0.67)
Ddiv		0.000424 (1.55)		0.000471* (1.71)
Dcontrol			0.000415 (1.38)	0.000451* (1.73)
Constant	-0.000090 (-0.08)	-0.000133 (-0.13)	-0.000041 (-0.04)	-0.000085 (-0.06)
Observations	3,135	3,135	3,135	3,135
R-Square	0,9527	0,9527	0,9527	0,9527
Number of REITs	80	80	80	80

z-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: Regression results of the Jensen's Alpha (Alpha) of measurements of age, fund net asset value (NAV), market capitalization (Mcap), diversification strategy (D_{DIV}) and level of control (D_{CONTROL}). The variable D_{DIV} has a value of 1 if it is a diversified strategy and a value of 0 if it is a focused strategy. Similarly, D_{CONTROL} has a value of 1 if there is full control of the property and 0 if there is not.

MODEL 0: $\text{Alpha}_{i,t} = \beta_0 + \beta_1 \ln(\text{Age})_{i,t} + \beta_2 \ln(\text{NAV})_{i,t} + \beta_3 \ln(\text{MCap})_{i,t} + \beta_4 \text{Alpha}_{i,t-1} + u_{i,t} + \varepsilon_{i,t}$

MODEL 1: $\text{Alpha}_{i,t} = \beta_0 + \beta_1 \ln(\text{Age})_{i,t} + \beta_2 \ln(\text{NAV})_{i,t} + \beta_3 \ln(\text{MCap})_{i,t} + \beta_4 \text{Alpha}_{i,t-1} + \delta_1(\text{D}_{\text{DIV}})_{i,t} + u_{i,t} + \varepsilon_{i,t}$

MODEL 2: $\text{Alpha}_{i,t} = \beta_0 + \beta_1 \ln(\text{Age})_{i,t} + \beta_2 \ln(\text{NAV})_{i,t} + \beta_3 \ln(\text{MCap})_{i,t} + \beta_4 \text{Alpha}_{i,t-1} + \delta_2(\text{D}_{\text{CONTROL}})_{i,t} + u_{i,t} + \varepsilon_{i,t}$

MODEL 3: $\text{Alpha}_{i,t} = \beta_0 + \beta_1 \ln(\text{Age})_{i,t} + \beta_2 \ln(\text{NAV})_{i,t} + \beta_3 \ln(\text{MCap})_{i,t} + \beta_4 \text{Alpha}_{i,t-1} + \delta_1(\text{D}_{\text{DIV}})_{i,t} + \delta_2(\text{D}_{\text{CONTROL}})_{i,t} + u_{i,t} + \varepsilon_{i,t}$

5. Final Remarks and Future Studies

As proposed in the introduction, the present research examined the impact of (1) property-type diversification and (2) property control on an REIT performance. In line with Anderson et al. (2015), our analysis suggested that, in Brazil, the REITs that adopt diversification strategies should expect a positive impact on their performance. Additionally, the analysis of the level of property control shows relevance when correlated with REIT performance, while there has been very little literature focused on this subject. The results obtained through the methodology adopted in this paper demonstrated positive impacts of total property control on REIT performance, suggesting that not having to share the property with third parties is more beneficial.

The overall research also suggests that the study of REIT property-type diversification and property control deserves a more accurate model/methodology to provide better outcomes. Due to data limitations, some assumptions were considered and restricted the methodology. Future studies should consider these limitations. For example, adding REIT management costs as an explanatory variable to performance, which was not possible to include in the present research because of difficulties in accessing it, could improve the analysis and it is an opportunity for further research.

We also suggests that further studies should exclude mortgages REITs from the examined data and focus on only equity REITs, when the topics of study are property-type diversification and property control, as doing it would better suit their market context, and in the present research showed different results for the regression models. Further research could also analyse diversification according to the region and could be added to the explanatory variables that affect REIT performance.

A major limitation of this paper was the condition of classifying and quantifying the property-type diversification and property control. The analysis relied on dummy variables as measurements of diversification and control, and it is important to more deeply examine the quantification of these two variables. One recommendation is to apply the Herfindahl-Hirschman Index as an alternative to quantify diversification and property control. This change could enable interpretations of U-shaped relationships between property-type diversification and REIT performance, as well as property control and performance.

Another extension of the work could be qualitative studies of Brazilian REITs. Management mechanisms and their impacts can be very sensitive and can differ according to each specific case scenario, and qualitative studies could examine real cases to emphasize the advantages of property-type diversification or property specialization. Each strategy ends up presenting pros and cons, and each REIT can present different solutions to manage these factors.

Qualitative studies could also be very important for analysing property control issues as well. This topic could apply to very specific situations if intensively analysed. The interaction between a REIT's corporate structure and a building's condominium can present specific issues and conflicts that a qualitative study could explore better.

Finally, this research approaches the Brazilian REITs market and provides intriguing results. Further research could improve the analysis and explore property-type diversification and property control in greater detail. The Brazilian REITs market is relatively young; however, with its development, it is important to understand Brazilian market conditions better and how indirect real estate investments can be improved.

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