

*DIVERSIFICATION AND PROPERTY CONTROL IMPACT ON THE PERFORMANCE OF
BRAZILIAN REITS ¹*

*IMPACTO DA DIVERSIDADE E DO CONTROLE DE PROPRIEDADE NA PERFORMANCE
DOS FIIS BRASILEIROS*

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ABSTRACT

Objective: This paper seeks to analyse property-type diversification and property control management strategies in the performance of Brazilian REITs, measured by Jensen's Alpha indicator, using a dynamic regression panel data from 99 REITs in the period between 2006 and early 2016.

Background: The Brazilian Real Estate Investment Trusts (REITs) had a market capitalization of 20.2 billion dollars on July 31, 2018, and is a constantly growing market, according to the Brazilian Association of Financial and Capital Market Entities (ANBIMA).

Method: To achieve the 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 the Bloomberg platform, in the period between January 2006 and February 2016.

Results: The results suggest that a property control strategy positively affects the performance of Brazilian REITs, indicating that trusts could improve performance by avoiding conflicts of interest with third parties, and perhaps agency problems inside the REIT's corporate structure by having full control over its properties.

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Contributions: 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, in the performance of REITs.

Keywords: Diversification Strategy. Property Control Strategy. Brazilian Real Estate Investment Trust. Performance. Jensen's Alpha.

RESUMO

Objetivo: Este estudo procura analisar estratégias de gestão de diversificação e controle de propriedades no desempenho dos FIIs brasileiros, medidos pelo Alfa de Jensen, usando uma regressão dinâmica em dados de painéis de 99 FIIs no período entre 2006 e início de 2016.

Fundamento: Os Fundos de Investimento Imobiliários (FIIs) brasileiros têm uma capitalização de Mercado de 20.2 bilhões de dólares em 31 de julho de 2018 e é um mercado em constante crescimento, de acordo com a Associação Brasileira das Entidades dos Mercados Financeiro e de Capitais (ANBIMA).

Método: Para alcançar os objetivos, coletamos dados sobre o preço de fechamento da ação (em BRL), o número total de ações em circulação (em milhões), o valor do ativo líquido do fundo (BRL / ação) e o retorno bruto total dos REITs brasileiros de a plataforma Bloomberg, no período entre janeiro de 2006 e fevereiro de 2016.

Resultados: Os resultados sugerem que uma estratégia de controle de propriedade afeta o desempenho dos FIIs brasileiros, indicando que trustes poderiam melhorar o desempenho evitando conflitos de interesse com terceiros e, possivelmente, problemas de agência dentro da estrutura corporativa dos FIIs tendo controle total de suas propriedades.

Contribuições: Esta pesquisa contribui para a literatura que está expandindo a análise brasileira do REIT, contextualizando a importância de duas estratégias de gestão, ou seja, a diversificação do tipo de propriedade e o controle da propriedade, no desempenho dos REITs.

Palavras-chave: Estratégia de Diversificação. Estratégia de Controle de Propriedade. Fundos de Investimento Imobiliários Brasileiros. Desempenho. Alfa de Jensen.

1 INTRODUCTION

Over the last decades, 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 investment option, 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, so 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 decades. Brazilian REITs had an equity growth of almost 2,000% (US\$ million) from 2005 to 2015, according to the Brazilian Security Exchange Commission (SEC), which is the entity responsible for Brazilian REITs, while the US-REITs equity growth was approximately 180% in the same period.

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

Because the REITs have become a well-known and a popular investment option in the Brazilian market, many new trusts have been set up, 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, in the performance of REITs. The first strategy examined, that is, the level of diversification of real estate 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, Benefield & Hurst, 2015; Chong, Krystalogianni & Stevenson, 2012; Ro & Ziobrowski, 2011; Boer, Brounen & Op'T Veld, 2005; Byrne & Lee, 2003; Capozza & 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 realties 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 policies, agency costs and institutional ownership (Brockman, French & Tamm, 2014; Ghosh & Sun, 2014; Devos, Ong, Spieler & Tsang, 2013; Campbell, Ghosh, Petrova & Sirmans, 2011; Erol & Tirtiroglu, 2011; Dolde & Knopf, 2010), not much research exists regarding the level of control over the real estate that composes a REIT's portfolio. However, it is possible to expect that, by having full control over these properties, 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 that have total control over/ownership of their properties have a management advantage, reflected on 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, where the dependent variable is an indicator of performance, the Jensen's Alpha. The sample has 99 REITs listed on B3, in the period between 2006 and 2016. The results show that, in Brazil, the REITs that adopt the property control strategy present high performance, indicating that trusts could improve performance by avoiding conflicts of interest with third parties, and perhaps agency problems inside the REIT's corporate structure by having full control over its properties. When excluding mortgage REITs from the sample, the property-type diversification also presents a positive and statistical relevant impact on performance, which suggests that not having to share the property with third parties generates a positive impact on performance. Finally, it is noted that the performance of Brazilian REITs has high persistence, which indicates that managers seek to achieve a target performance and maintain this performance over time.

2 LITERATURE REVIEW

This section 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.

2.1 Brazilian REITs

Within capital markets, many types of investment vehicles/products exist. As Hudson-Wilson, Gordon, Fabozzi, Anson, & Giliberto, (2005) explained, in the case of real estate, there are basically four financial investment structures: 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 U.S., a famous alternative is the REIT, which offers investors an alternative 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 U.S., whereas in Brazil, it is according to Law No. 8668 / 1993 from Rule 205 / 1994 from the Comissão de Valores Mobiliários, which is the Brazilian entity equivalent to the SEC, and responsible for REITs regulation in Brazil (Brazilian SEC henceforward).

Some important characteristics to point out and which are common to both Brazilian REITs (B-REITs) and US-REITs cases is that it is not mandatory that they be publicly traded in 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 B-REITs, a minimum number of 50 stockholders is necessary, and there are tax exemptions for personal investors with less than 10% of shares in each REIT. In terms of mandatory distribution, US-REITs must deliver 90% of the operating profit, they have no specific rules for net capital gain distribution, and the timing is annual, whereas B-REITs must return 95% of the operating profit and 95% of the net capital gain, and they have biannual timing. Both countries present equity REITs, and hybrid REITs.

The economic status of the two countries is different when the issue is the REIT industry. Gabriel, de Sousa Ribeiro & Rogers (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 macroeconomic aspects, have consequences for the contrast between Brazilian REITs and US-REITs in performance analyses. The numbers regarding the size of both markets alone can suggest discrepancies. Taking the North American REITs as an example, according to the National Association of Real Estate Investment Trusts (NAREIT, 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 comprised a total net equity value of US\$ 15.8 billion, with 261 trusts listed at the Brazilian SEC; however, the actual number of trusts publicly traded was lower. At the beginning of 2016, approximately half of the REITs (129) were publicly traded at B3 (abbreviation to Brasil Bolsa Balcão, the Brazilian Stock Exchange).

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 listed entities experience operations and policy restrictions. Pagliari, Scherer & Monopoli (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 investments.

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 U.S., but also abroad. Thus, for each

country, a closer study is important to comprehend market standards, thus facilitating a proper business strategy that could best suit a region or country.

There is not much research in the Brazilian literature. Yokoyama, Neto and Cunha (2016) research uses a sample of REITs listed on the São Paulo Stock Exchange, during the period of 2008-2014. REIT returns is decomposed into three market factors. Their assessment indicates that REIT performance is not primarily driven by any of three underlying markets, named: direct real estate, stocks, and bonds. They suggest REIT would consist of a unique asset class and as such may provide diversification benefits in a mixed portfolio based on Modern Portfolio Theory.

Scolese, Bergmann, Silva and Savoia (2015) uses a quarterly sample of 15 listed REITs from 2011 to 2015 to assess the determining factors for the return of REITs in the Brazilian market. From the historical returns of the fund, they apply a multiple regression to estimate manager allocation in different asset classes over time through Asset Class Factor Model. Their results indicate that returns are influenced by the behavior of market interest rates, inflation and stock market.

Moraes and Serra (2017) use, as a proxy for the diversification of REITs, the R2 of a time series regression, from 2012 to 2015, of the fund's return versus the stock market's return. Then they analyze the factors that influence this diversification in a cross-section regression containing 22 REITs. The authors found evidence that only the size of the fund influences its diversification. No evidence was found of the influence of the number of properties or concentration of assets on the diversification of REITs.

2.2 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 realty concept seeks to reach, such as commercial/office, industrial, retail, hotel/lodging, residential or healthcare. Figure 1 illustrates diversified and focused property portfolios in the context of REITs.

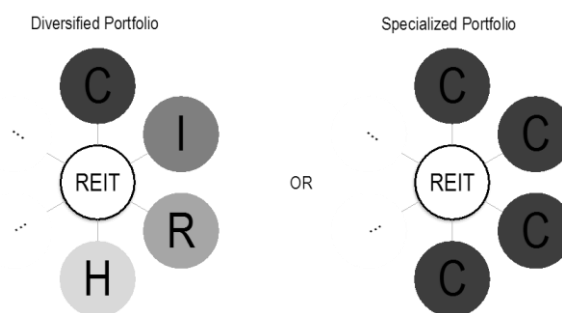


Fig 1. Property-type diversification: Diversified & Specialized Property Portfolios

Note: created by the authors using Microsoft® Power Point.

The individual investor can diversify by himself, picking several focused REITs, so the only appeal of diversification would be because this strategy could generate higher returns. Maybe this is the reason why Chong et al. (2012) reported that, in the U.S., 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. Capozza and Seguin (1999) had a peculiar finding. According to their work, despite diversified REITs have higher cash-flows, the gains were offset by higher management costs. One could argue nowadays these costs could be lower with the advance in managerial skills and productivity.

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 a 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 to be inconsistent with portfolio theory and diversification, it might make sense economically. Anderson et al. (2015) found that there is a positive impact of diversification on return on assets, return on equity, and Tobin's Q, due to shielding against property-type specific risk. Nevertheless, as the market has already incorporated this information in price, they also concluded that 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.

2.3 Property Control

Brazilian REITs have an internal corporate structure that contemplates a relationship between the REIT shareholders and its managers. As Basu, Paeglis & Rahnamaei (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 condominium form of ownership. 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 in one specific landlord. In this sense, REITs sometimes concentrate a small fraction of the units of a building (less than 50%), a majority of the units of a building (more than 50%) and the totality of the units of a building (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. Lozano, Martínez & Pindado (2016) 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, Howton, Lee & Luo (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 U.S., Howton et al. (2012) compared performance between REIT-owned properties and non-REIT-owned properties, concluding that REIT ownership favourably influences 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 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 the Bloomberg platform, in the period between January 2006 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 99 Brazilian REITs with available information in the period.

3.1 Dependent Variable

Jensen's Alpha is used to understand the historical performance of an asset, stock or portfolio (Jensen, 1968). If Jensen's Alpha is greater than zero, then the asset performed better than expected during a period; and if it is less than zero, then the asset performed worse than expected. The method to obtain 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 most important Brazilian stock market index, the Bovespa Index (IBOV) 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 between fixed and floating rate, and for the present paper, the PREDI30 Index was chosen from the Brazilian market (Meirelles & Fernandes, 2018). 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 99 REITs, there are 122 Alphas and Betas, one for each month from January 2006 to February 2016. The first window to calculate Alpha and Beta for January 2006 has data from February 2004 to January 2006. Since some REITs are older than others, 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, on a monthly basis. The equation for this regression model has as a dependent variable (Y), 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 (binary variables) representing whether the REIT is diversified and whether there is 100% control of the properties within its portfolio. The equation for this model is represented by (2):

$$\alpha_{it} = \beta_0 + \beta_1 \ln(\text{Age})_{it} + \beta_2 \ln(\text{NAV})_{it} + \beta_3 \ln(\text{MCap})_{it} + \beta_4 \alpha_{it-1} + \delta_1(D_{DIV})_{it} + \delta_2(D_{CONTROL})_{it} + u_{it} + \varepsilon_{it} \quad (2)$$

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 $\alpha_{i,t-1}$ represents the lagged Jensen's Alpha and is an endogenous variable. Because the CAPM model is associated with a rolling window method, as explained in the following pages, the Jensen'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 Jensen's Alpha lagged twice ($\text{Alpha}_{i,t-2}$).

Finally, by analysing the results of 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 Jensen's Alpha and how relevant they are for REIT managers to improve this measurement of performance. The regression model was estimated using random effects because the Breush-Pagan test indicated that it is better than pooled estimation. We used robust standard errors to take into account the heteroscedasticity.

3.2 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 a dummy variable is a valid way to measure property-type diversification. Property-type Diversification is represented by DDIV, 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 DCONTROL, is set to one if there is 100% control of all of the properties in the real estate portfolio, and zero otherwise. The information was gathered through IPO prospects and reports from the B3 web site.

3.3 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 & Linneman, 1998; Case, Pollakowski & Wachter, 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.

To the best of our knowledge, no article has used all these control variables together.

3.4 Assumptions and Limitations

The real estate information arrangement in Brazil is not as accessible as that in the U.S., which limits the coverage of the survey. During the development of this research, we 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, we assume that these variables did not change with time. For example, after analysing the documentation that led to the classification of a Brazilian REIT as diversified or not and as 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 in 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 mortgage REITs were classified as diversified according to property type and were classified as trusts without control over the properties in which they invest indirectly. These specific B-REITs could be taken apart from the regression model; however, because they are a relevant number, we have decided to maintain them in the analysis.

Nevertheless, in the Results section, scenarios are presented in which they were excluded from the main regression as well.

Due to limitations of 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.

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

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 Jensen's Alpha obtained through the CAPM methodology is presented.

As previously mentioned, together, all of the information for the regression analysis comprises a panel data with 3,585 observations, which is grouped by 99 REITs. The number of periods for each Brazilian REIT can range from 8 to 122 months, according to information available so far, thus it is an unbalanced panel data.

Table 1 shows the diversification and control for 99 BREITs. Out of 99 funds, 43 were diversified, and 38 had 100% control of their real estate. Since approximately 57% (56 trusts) of the analysed REIT was not diversified, this first number suggests that, in Brazil, there is a preference to seek specialization strategies. Regarding the level of control, nearly 38% of the analysed REITs own 100% of the properties that compose their portfolios. In addition, 87% of these REITs specialize in one type of property. One might conclude that, although a 100% control could be desired, it is not the predominant strategy, and if it is adopted, then it probably adheres to a specialization scheme.

Table 1 – Number of funds by Diversification and Control

Variable	Control		
	Yes	No	Total
Diversification			
Yes	8	35	43
No	30	26	56
Total	38	61	99

Source: Research Data (2019).

As previously explained, Jensen's Alphas were obtained through the application of a CAPM model for a period of 24 months and by executing a rolling window approach to create a historical sample of Alphas for each REIT (first window from February 2004 to January 2006).

Table 2 shows a summary of descriptive statistics for numeric variables used in panel data for these 99 trusts. The IBOV index represents the broad market in the stock exchange.

As can be observed in Table 2, the monthly average alpha was 0.67%. As Jensen (1968) explained, the alpha from the CAPM model can be interpreted as a higher return than those we would expect given the level of risk of each of the portfolios, or 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%) in that month. So, for a diversified portfolio, B_REITs are, in general, less risky than the benchmark (IBOV index).

However, these conclusions are limited to formal CAPM assumptions, which, according to Sharpe (1964), are that i) investors are fully rational; ii) Investors prefer a higher expected future wealth to a lower value and exhibit risk-aversion; iii) there is symmetry of information and homogenous expectations; iv) there are no market imperfections; and v) there is a common pure rate of interest, with all investors able to borrow or lend funds on equal terms.

Table 2 – Descriptive Statistics – Period between January 2006 and February 2016

Variable	Mean	Std. Dev.	Minimum	Maximum
r_i (per month)	0.42%	6.36%	-63.08%	100.58%
REITs Excess Return (per month)	-0.46%	7.24%	-66.24%	97.28%
Market Excess Return (per month)	-1.38%	6.55%	-25.17%	24.04%
Beta	0.38	0.27	-2.52	2.80
Jensen's Alpha	0.01	0.04	-0.06	0.44
Age (months)	62.5	31.6	2	170
nav per share	498.11	857.66	0.33	11631.75

Notes. The data set is panel data in which the panel ID variable (groups) is the REITs ($i = 1, 2, \dots, 99$), and the time variable is the monthly date ($t = 1, 2, \dots, 122$), $n=3,585$. The variable "nav per share" is the fund net asset value per share (BRL/share) and "age" is the age of the REIT (in months).

Source: Research Data (2019).

Table 3 presents the Pearson correlation for numeric variables present in the regression model. Among the control variables (age, fund net asset value per share, and market capitalization) the correlation does not exceed 0.20, which indicate a weak degree of multicollinearity in the model.

Table 3 – Pearson Correlation for numeric variables – Period between January 2006 and February 2016

Variable	r_i (per month)	REITs Excess Return (per month)	Market Excess Return (per month)	Beta	Jensen's Alpha	Age (months)	nav per share
r_i (per month)	1						
REITs Excess Return (per month)	0.9310	1					
Market Excess Return (per month)	0.1916	0.3464	1				
Beta	0.0172	-0.0263	0.0461	1			
Jensen's Alpha	0.0240	0.0338	0.0507	-0.1651	1		
Age (months)	-0.0145	-0.0134	-0.0068	0.0990	0.0308	1	
nav per share	-0.0051	-0.1203	-0.0177	0.0867	0.0115	0.1888	1
mcap	0.0880	-0.1115	-0.0208	-0.0260	0.0440	0.0683	0.2007

Source: Research Data (2019).

Table 4 presents the set of results for the panel data regression model with random effects proposed in this paper. We present five models using $n = 99$ REITs, the first model (Model 1) has only the control variables, Model 2 has the control variables plus Diversification, Model 3 has the control variables plus Control and Model 4 has all the variables. The last model, Model 5, has all

the variables, but excluding the mortgage REITs (n = 80 REITs). The standard errors are robust and were estimated according to bootstrap methods.

Table 4 – Regression Outcomes

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Alpha (t-1)	0.957444*** (158.17)	0.957591*** (180.56)	0.957255*** (197.33)	0.957459*** (143.54)	0.957125*** (169.60)
ln(Nav)	-0.000075 (-1.53)	-0.000074 (-1.45)	-0.000106* (-1.81)	-0.000110** (-2.00)	-0.000134** (-2.36)
ln(Mcap)	0.000145* (1.68)	0.000150* (1.65)	0.000169* (1.82)	0.000182* (1.91)	0.000182* (1.91)
ln(Age)	-0.000107 (-0.42)	-0.000093 (-0.33)	-0.000186 (-0.81)	-0.000179 (-0.60)	-0.000214 (-0.67)
Ddiv		0.000190 (0.89)		0.000308 (1.45)	0.000471* (1.71)
Dcontrol			0.000396** (2.04)	0.000471** (2.02)	0.000451** (1.73)
Constant	-0.000169 (-0.16)	-0.000315 (-0.27)	0.000016 (0.02)	-0.000186 (-0.16)	-0.000085 (-0.06)
Observations	3,585	3,585	3,585	3,585	3,135
R ²	0.819	0.810	0.875	0.911	0.953
Adjusted R ²	0.818	0.805	0.874	0.911	0.923
# of REITs	99	99	99	99	80

Notes. z-statistics in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1. Regression results of Jensen's Alpha (Alpha), fund net asset value (NAV), market capitalization (Mcap), age (Age), 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.

Source: Research Data (2019).

The information shown in Table 4 suggests that a diversification strategy has positive effects on the Jensen's Alpha value; in other words, it improves performance. The coefficient 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 of the regression model are not sufficient to ignore that the factors mentioned by Chong et al. (2012) could have an 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), this result is statically significant only when we exclude the mortgage REITs from the sample.

When analysing the results of the impact of property control on performance, the numbers suggest the expected outcome. The hypothesis (H2) that full control over the realties that integrate the property portfolio of REITs positively affects its performance could be verified for both models at a confidence level of 95%. This outcome justifies having the totality of a property, 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, Model 5 on Table 4 presents the results of the regression model excluding the mortgage REITs, and what differs Model 5 from Model 4 is this change in the sample. The results of Model 5 show that the property-type diversification (D_{Div}) presents a positive impact on performance when excluding mortgage REITs from the sample, surpassing the impacts from a focused strategy and showing statistical relevance.

Regarding the methodology adopted, an important fact to consider is that the model presents a high R-squared value, greater than 0.80, indicating that the dependent variable, Jensen's Alpha, has more than 80% of its variation 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, Roberts & Zender (2008) indicated that corporate capital structures can be 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 Table 4, which indicates that managers seek to achieve a target performance and maintain this performance over time.

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 last result is different from expected since NAV represents the intrinsic value of the REIT. 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 ($\text{Alpha}_{i,t-1}$).

5 CONCLUSION

We examined the impact of (1) property-type diversification and (2) property control on an REIT performance. 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. There has been very little literature focused on this subject. Additionally, when we exclude the mortgage REITs from the sample, our analysis suggests that the REITs that adopt diversification strategies should expect a positive impact on their performance, in line with Anderson et al. (2015).

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. Although REIT returns are already net of costs, we emphasize that cost variables, such as the management fee, were not included in our analysis due to lack of data. We strongly recommend using these variables as control variables in future studies, if data are available.

We also suggest that further studies should exclude mortgage 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.

Another extension of the work could be qualitative studies on 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 to analyse 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 the condominium form of ownership 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 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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