**ARTICLE**

# Industry Competition and Performance Persistence in Brazilian Equity Mutual Funds

Sabrina Espinele da Silva[1]
sabrinaespinele@gmail.com | ⓘ 0000-0001-9451-144X

Leticia Fernandes Pereira[1]
leticia.fepereira@gmail.com | ⓘ 0000-0002-6667-1742

Simone Evangelista Fonseca[1]
simone_fonseca16@hotmail.com | ⓘ 0000-0002-1169-8614

Robert Iquiapaza[1]
riquiapaza@gmail.com | ⓘ 0000-0003-1657-2823

## ABSTRACT

The Brazilian mutual fund industry, despite having a high increase in net worth, is concentrated around a few large administrators. Therefore, it is worth questioning the extent to which this level of concentration can affect the performance delivered to the shareholders, as greater concentration implies less competition. In this way, this research aimed to analyze the impact of market competition on the performance persistence of equity mutual funds in Brazil. Using a sample of free portfolio equity investment funds from 2010 to 2019, the main results point to the existence of performance persistence for Brazilian free portfolio equity funds. Furthermore, they pointed out a positive and statistically significant relationship between the level of competition and the performance of funds, as well as in the interaction between competition and performance persistence. Consequently, indicating that, funds with greater performance persistence tend to maintain this persistence even in the face of greater industry competition.

# 1. INTRODUCTION

The importance of the investment fund industry for the development of capital markets is undeniable. Several studies have highlighted the growth of this investment modality, in terms of assets under management (AUM), worldwide and especially in the Brazilian market (Klapper et al., 2004; Maestri & Malaquias, 2017; Parida & Tang, 2017; Silva et al., 2018). However, it is observed that the Brazilian industry, despite having increasingly higher managed assets, is concentrated around few and large administrators (Iquiapaza, 2009). Therefore, it is worth questioning to what extent this level of concentration can impact the performance delivered to the fund shareholder.

It is also noteworthy that the current scenario of falling bond interest rates has implied the reallocation of financial resources to riskier investment assets, which includes equity funds (Anbima & FGV, 2019). Thus, it is necessary to investigate how these changes may impact competition and the performance of funds in this segment. In this context, it becomes even more important to disclose information to fund shareholders, especially retail ones, since in the market there are investors with different levels of knowledge and monitoring capacity, and the latter can affect the performance of funds by reducing the occurrence of activities that are not aimed at their benefit (Paz et al., 2017).

In this sense, the fund industry can be compared to a competitive market, in which funds are distinguished by their characteristics and objectives; investors are similar to consumers, who select funds based on their individual preferences; and, finally, fees that represent the price charged for fund administration and management (In et al., 2014; Kacperczyk et al., 2016). Similar to the industrial organization sector, investment funds compete with each other and use market strategies to attract investors. These strategies may involve pricing – that is the fees charged by funds – or attempting to gain a competitive advantage by delivering superior returns to shareholders (Keswani & Stolin, 2006).

Furthermore, Coates and Hubbard (2007), argue that performance is consistent with competition so that the latter can directly impact fund performance and its persistence over time. In a competitive market, pressures should drive funds to achieve efficiency in portfolio resource allocation by suppressing arbitrage possibilities (In et al., 2014). For this reason, the competitiveness of the fund industry seems to be negatively related with the persistence of fund performance (Ferreira et al., 2019; Keswani & Stolin, 2006; Parida & Tang, 2017).

From this perspective, Hoberg et al. (2018) point out that funds that invest in the same asset class are competitors and that when competition is high it becomes less likely that funds will be able to persistently generate positive alphas. The study by these authors showed that performance, when measured by alpha, tends to be lower as the degree of competition increases. Furthermore, that study showed that performance persistence is significantly stronger in less competitive markets, similarly to that evidenced by Parida and Tang (2017). Following this same line, Ferreira et al. (2019) highlight that the competitiveness of the mutual fund industry is an important determinant of the variation in the level of performance persistence across countries.

Therefore, this research aimed to analyze the impact of market competition on the persistence of equity investment funds' performance in Brazil. It is an interesting study for evaluating the competition and for the importance of the analysis of fund persistence, because the results can bring initial signals about the ability of fund managers, and shows whether past performance

information can be useful in predicting the future fund performance (Borges & Martelanc, 2015; Ferreira et al., 2019; Nerasti & Lucinda, 2016; Riley, 2021). It is noteworthy, however, that the analysis of managers' luck or skill regarding the achievement of positive and persistent alphas needs more specific analyses, such as the use of bootstrap-based simulation techniques. Several works have used Fama and French's (2010) methodology, such as Matos et al. (2015), Borges and Martelanc (2015), and Blake et al. (2017). However, recent criticism (Harvey & Liu, 2020; Riley, 2021) indicates that this type of technique may present low power for differentiating luck and skill, especially when applied in a smaller sample context. Thus, to solve this issue is not part of the main scope of this paper, which aims to analyze the impact of competition on performance and its persistence in the short run.

The analysis of the effect of market competition on fund performance and its persistence is relevant, especially in a highly concentrated market such as the Brazilian one. Thus, the contributions of this study are: (a) present new evidence of the impact of competition on performance and performance persistence, in a developing market such as Brazil, (b) consider the level of fund market competition in the analysis of persistence, something that has not been considered in previous research in Brazil; (c) additionally, the paper analyzes a period of information from the last decade, broader than that used in other Brazilian studies. (d) reinforce the idea that although it is not the only relevant variable, the past performance of funds is an essential variable that should be taken into account by investors when choosing the fund in which to invest.

Hence, using a sample of free portfolio equity mutual funds over the period 2010 to 2019, the main results indicated the existence of performance persistence for Brazilian free portfolio equity funds, with a positive and statistically significant relationship in the coefficient of past performance on present performance. In addition, it pointed out a positive and statistically significant relationship between competition and fund performance, as well as in the interaction between competition and performance persistence. Consequently, it is observed that funds with higher performance persistence tend to maintain this persistence even in the face of greater competition.

## 2. LITERATURE REVIEW

This section presents theoretical and empirical studies that supported the development of this research. In the first subsection, studies on performance and its persistence were presented, and in the second, research on the relationship between competition and performance persistence in the fund industry was reviewed.

### 2.1. PERFORMANCE AND PERSISTENCE OF PERFORMANCE IN FUNDS

The performance of an investment fund represents one of the variables taken into account by an investor in the decision process in relation to the fund for the application of money (Ferreira et al., 2013). In this sense, the persistence of performance is important in the study of funds and is relevant for all agents involved with their management (Jagannathan et al., 2010; Keswani & Stolin, 2006; Kosowski et al., 2007).

In this sense, the work of Jensen (1968) brings a discussion about the predictability power of funds' future returns based on historical returns. The referred author argued that past returns do not ensure the future returns of investment portfolios. The literature regarding the persistence of performance gained prominence from the context of this discussion (Carhart, 1997; Fama & French, 1993; Jegadeesh & Titman, 1993, 2001; Lintner, 1965; Mossin, 1966; Sharpe, 1964). Since then, the verification of outperformance, like the persistence of fund performance, has become the object of several academic types of research in the field (Fung et al., 2008; Jagannathan et al., 2010; Nerasti & Lucinda, 2016; Vayanos & Woolley, 2013).

Brown and Goetzmann (1995) point out that the risk-adjusted performance of investment funds tends to persist. Size, age, fees charged and the performance of the funds themselves are determinants of this persistence over time. However, such persistence depends on the period studied (Brown & Goetzmann, 1995). In general, studies about performance persistence focus on active portfolio management strategies. Especially, on common aspects among these strategies, such as a search for winning assets, which, despite being a positive alpha strategy, also presents a high level of risk (Brown & Goetzmann, 1995; Carhart, 1997).

In addition to past returns and fund expenses, size and market risk also explain part of the persistence of fund performance (Detzel & Weigand, 1998; Nerasti & Lucinda, 2016; Porter & Trifts, 1998). Size, due to the availability of portfolio capital, and market risk, because it motivates trends in market movements to which funds respond according to the investment style of managers (Detzel & Weigand, 1998). However, in emerging countries, fund manager characteristics and fund style may not be considered major determinants of performance, compared to the impacts exerted by past performance, size, and transaction costs of investment funds (Ramasamy & Yeung, 2003).

The results of studies on the persistence of fund performance are diverse. In general, they depend strongly on the sample of funds under analysis, and persistence usually do not represent luck, and it can be more evident in certain fund categories (Keswani & Stolin, 2006; Kosowski et al., 2007). In the Brazilian investment fund market, studies point out both that, on average, there is not enough evidence for the persistence of fund performance (Castro & Minardi, 2009; Gomes & Cresto, 2010; Nerasti & Lucinda, 2016), and the opposite, i.e., the existence of this persistence (Berggrun & Lizarzaburu, 2015; Mendonça et al., 2017).

According to Castro and Minardi (2009), as well as Gomes and Cresto (2010), few Brazilian investment funds can provide and ensure superior performance to investors. In this sense, past performance and portfolio size represent important aspects for selecting funds with better performance in Brazil (Berggrun & Lizarzaburu, 2015). Moreover, according to Nerasti and Lucinda (2016), one must consider market and momentum risk factors as the main determinants of performance. Thus, it is observed that there are funds with positive and significant alpha, which provide and ensure superior performance for investors; however, these funds represent a small proportion when compared to whole industry (Castro & Minardi, 2009; Mendonça et al., 2017).

Thus, in cases where performance persistence can be observed, the sources attributed to this fact are several: (a) the superior skill of managers; (b) different exposures to risk factors; (c) market timing; (d) scale, turnover, and trading costs and; (e) industry competitiveness (Ferreira et al., 2019; Nerasti & Lucinda, 2016).

## 2.2. INDUSTRY CONCENTRATION AND THE PERSISTENCE OF PERFORMANCE

The fund industry resembles a market with competition, in which funds are differentiated by their characteristics, for example: management style, investment strategies and assets in which they invest, while investors have the power to select or switch between funds based on their individual preferences (In et al., 2014). According to Keswani and Stolin (2006), investment funds can compete with each other based on few strategies. Among them is the competition through performance, which leads to the competitive advantage of the best performing funds over the others.

In the UK, Keswani and Stolin (2006) investigated the impact of competition on the persistence of fund performance. The authors pointed out that industry concentration, as measured by the Herfindahl Index, was statistically significantly related to performance persistence. More specifically, they found evidence that market segments with a higher concentration of assets under management on fund families - lower competition - showed higher performance persistence. The authors explained that in the more competitive sectors, funds tend to be more aggressive in their pursuit of superior returns. Consequently, there is a reduction in the probability that the best funds will repeatedly achieve abnormal returns, because other competing funds will invest more in research, or they may "follow" the best funds' strategies.

Regarding the quality of active fund management, Gil-Bazo and Ruiz-Verdú (2008) defined it as the ability to generate returns above what can be achieved by applying passive investment strategies, as in the case of indexed funds. They proposed a model for the study of equity mutual funds in the United States, which was grounded on three aspects: (1) there is a competition among funds in the market; (2) investors do not know the skill of portfolio management at the time of their decision making, with their best estimate consisting of past returns; and (3) not all investors interpret the available information optimally. The study has shown that funds with the worst past performance charge fees equal to or higher than funds with better performance. This places a greater burden on the worst funds' shareholders, who, in addition to receiving lower returns, pay higher fees, further diminishing their net returns.

Gil-Bazo and Ruiz-Verdú (2009) investigated whether the distinctions between the fees charged by funds implied differences in the value created for shareholders. The authors concluded that, when ranking funds by their risk-adjusted performance, the worst funds were those that charged higher fees. In Brazil, Silva et al. (2018) also observed a negative and significant relationship between management fees and fund performance.

Subsequently, Wahal and Wang (2011) analyzed the effects of competition, characterized by new funds entering the market, on the prices, performance, costs, and survival of mutual funds in the U.S. market, over the period from 1981 to 2005. The authors showed that strong competition tends to cause a reduction in management fees and net fund raising. In addition, they showed that competition is negatively associated with fund performance and relates to their survival rate.

Due to low entry barriers in the fund market, In et al. (2014) made an initial proposition that increased competition would result in increased fund efficiency to mitigate the possibilities of arbitrage and abnormal returns. In addition, increased competition would provide a reduction in fees, as a strategy to raise flows from more investors. However, when analyzing the effect of competition on the performance and fees of socially responsible funds, the results obtained by the authors indicated that this specific segment of funds cannot be considered competitive, because the growth of competition led to superior performances.

In this regard, Parida and Tang (2017) investigated the impact of fund industry concentration on performance and expense ratios, and observed statistically significant relationships between them. More specifically, the higher the industry concentration, the lower the competitiveness, the higher the funds' performance and persistence, and the lower the fees charged by them. They used the strategic fee-setting justification proposed by Christoffersen and Musto (2002), whereby funds with better past performance compete for the resources of fee-sensitive and performance-sensitive investors, while non-sensitive investors keep their resources in funds with worse past performance.

Validating this hypothesis of Christoffersen and Musto (2002), Parida and Tang (2017) found evidence that funds from less competitive market segments showed superior performance and performance persistence compared to more competitive segments. Therefore, they indicated that fee-sensitive and performance-sensitive investors are attracted to the less competitive markets, where performance is better, and funds set lower fees. Meanwhile, funds in markets with lower concentration - therefore more competitive - and worse performance, realizing the relatively inelastic investor demand curve for their shares, charge higher fees.

Hoberg et al. (2018) tested the hypothesis that competition in mutual funds limits the achievement of alpha and the ability to achieve (greater) future alphas. The authors analyzed a sample of open-end and actively managed mutual funds in the United States over the period from 1980 to 2012. The study presented that alpha tends to be lower as the degree of competition increases; furthermore, it showed that persistence of performance is significantly stronger in less competitive markets. Finally, the authors showed that managers operating in less competitive markets generally charge higher management fees, which dynamically increase, as they are able to earn higher returns than their peers in less competitive markets are.

Ferreira et al. (2019) studied the determinants of the persistence of mutual fund performance across the world in 27 countries. The authors observed persistent fund performance in most of the countries contained in the sample and found evidence in favor of competition as a potential determinant of this persistence, indicating that competitive pressures undermine the maintenance of outperformance.

Additionally, Leippold and Rueegg (2020) studied equity funds from different asset classes and regions and could not reject the hypothesis that most alphas achieved by funds are statistically equal to zero. Therefore, they considered that the mutual fund segment is highly competitive and argued for competitive equilibrium given by the absence of persistence. Table 1 presents a summary of the main results found in the literature exposed in this section.

Therefore, the literature review about the relationship between competition and performance (and persistence of performance) in the fund industry suggests that in competitive markets, increased competition makes it difficult to achieve superior and persistent performance over time, with evidence of negative relationships between these variables (Ferreira et al., 2019; Hoberg et al., 2018; Keswani & Stolin, 2006; Leippold & Rueegg, 2020; Parida & Tang, 2017; Wahal & Wang, 2011). In turn, In et al. (2014), when analyzing the U.S. socially responsible fund segment, obtained a positive relationship between competition and fund performance, and argued that such an observation is due to the absence of competition in this segment, possibly due to the recent advance of this type of fund in the market.

**Table 1**

*Summary of Studies on Concentration in the Investment Fund Industry*

| Author | Year | Object of Study | Main Results |
|--------|------|-----------------|--------------|
| Keswani and Stolin | 2006 | Fund Industry | Market segments with higher concentration - less competition - showed greater persistence of performance. |
| Wahal and Wang | 2011 | Fund Industry | They showed that strong competition tends to cause a reduction in management fees and fundraising. In addition, they showed that competition is negatively associated with fund performance and relates to fund survival rates. |
| In et al. | 2014 | Fund Industry | They observed that an increase in competition positively affects the performance of socially responsible funds. In addition, 12b-1 fees, which represent distribution expenditures such as marketing, and expense ratios showed a positive relationship with competition. |
| Parida and Tang | 2017 | Fund Industry | They found evidence that funds in less competitive market segments outperformed compared to segments that are more competitive. Moreover, funds charge higher fees in more competitive market segments, which was justified by the authors based on the strategic fee-setting hypothesis proposed by Christoffessen and Musto (2002). |
| Hoberg et al. | 2018 | Fund Industry | The study showed that alpha tends to be lower as the degree of competition increases; furthermore, it showed that performance persistence is significantly stronger in less competitive markets. |
| Ferreira et al. | 2019 | Fund Industry | They highlighted that competition is a potential determinant of performance persistence, as it affects how funds that are performing better and/or worse will perform in the future. The authors point out that greater competitive pressure make it more difficult for funds to remain top performers. |
| Leippold and Rueegg | 2020 | Fund Industry | They could not reject the hypothesis that the alphas achieved by most funds were statistically equal to zero. They considered that the fund industry is highly competitive and argued for competitive equilibrium. |

*Source:* Elaborated by the authors.

## 3. METHODOLOGY

For this research, the information provided by the SI-AMBIMA 4.3 system was used. The funds included in the sample were those classified as "free portfolio" by ANBIMA, in the period from January 2008 to December 2019, with available monthly data. It is emphasized that the analyses were performed for the period 2010-2019, the three previous years were necessary for the estimation of alpha in 36-month rolling windows, as described later in this section.

The sample delimitation considered the incubation and survival biases, in order to avoid them. The incubation bias occurs when management institutions launch new funds in the market, but only those with the best results remain open. Therefore, to avoid this bias, funds with assets under management (AUM) lower than R$ 5 million were not considered in the study, since it is likely that funds recently launched in the market will not reach this amount (Borges & Martelanc, 2015; Malaquias & Maestri, 2017). As for the survival bias, in order to eliminate it, funds that were closed during the study period were kept in the sample, since disregarding them may imply wrong conclusions (Sanvicente & Sanches, 2002).

Industry competitiveness was estimated using the Herfindahl-Hirschman index (HHI), as was done by Parida and Tang (2017) and Ferreira et al. (2019). It is worth noting here that the Herfindahl-Hirschman index measures industry concentration so that the higher its value, the more concentrated the industry is, and therefore less competitive. Therefore, the HHI index was used with the negative sign, so that higher values for it mean higher competitiveness, similarly to that adopted by Parida and Tang (2017). Equation 1 presents the calculation for estimating the Herfindahl-Hirschman index (HHI), to measure competition/competitiveness:

$$HHI_t = - \sum_{i=1}^{N_t} S_{i,t}^2 \qquad \text{(1)}$$

In which:

$HHI_t$ is the Herfindahl-Hirschman index of the fund class in period $t$, with opposite sign;

$S_{i,t}$ is the ratio between the total net assets of fund family $i$, in period $t$, and the total net assets of all funds belonging to the class, in period $t$.

$N_t$ is the number of fund families belonging to the class in period $t$.

The performance measure used was Alpha, initially proposed by Jensen (1968), which represents the excess of observed return over an expected return, given by the exposure to risk. In its initial proposition, the expected return to obtain Alpha is calculated using the Capital Asset Pricing Model (CAPM), devised by Sharpe (1964) and Lintner (1965) and Mossin (1966). Later, however, Fama and French (1993) and Carhart (1997) added other risk factors to the classic CAPM: book-to-market ratio (book value/market value), size, and momentum (tendency to maintain short-term returns). The four-factor model is considered by the literature as one of the most appropriate for estimating the alpha of funds.

Therefore, the estimation of alpha was carried out by regressing the funds' excess returns, as dependent variable, and, as independent variables, the four risk factors of the Fama-French-Carhart (FFC) specification: market, book-to-market, size, and momentum. The market risk factor was calculated by the difference between Ibovespa returns and Selic returns. The other risk factors were taken from the database of the Center for Research in Financial Economics at the University of São Paulo (NEFIN- https://nefin.com.br/data/risk_factors.html), in a similar way as applied by Nerasti and Lucinda (2016).

Equation 2 represents the regression to obtain the Alpha, which was done in previous 36-month rolling windows (3 years). Thus, for the 2010 alpha, the data from 2008, 2009, and 2010 were considered, for the 2011 alpha, the data from 2009, 2010, and 2011, and so on, thus obtaining alphas for each year (from monthly data) and each fund in the sample.

$$r_{i,t} - r_{f,t} = \alpha_i + b_i \left( r_{m,t} - r_{f,t} \right) + s_i SMB_t + \gamma_i HML_t + p_i WML_t + \varepsilon_{it} \qquad \text{(2)}$$

In which:

$r_{i,t} - r_{f,t}$ is the excess return of fund $i$, in period $t$;

$r_{m,t} - r_{f,t}$ is the excess market return in period $t$;

$\alpha_i$ is the alpha of fund $i$ in the period, given by the regression intercept;

$b_i, s_i, \gamma_i, p_i$ are the beta coefficients of the regression in period;

$SMB_t$ is the size factor;

$HML_t$ is the value factor;

$WML_t$ is the momentum factor;

$\varepsilon_{i,t}$ is the residual term.

After the fund performance estimates were made, a new database was then built with the performance measure, level of competition or industry competitiveness and control variables for each fund, with annual frequency. The analysis of the effect of competition on performance and its persistence was performed using a multiple regression model with panel data, in which Jensen's Alpha (α) was explained by the following independent variables: persistence of performance $(\alpha_{t-1})$, (competitiveness (HHI), age of fund (AGE), fund size (SIZE) – given by the natural logarithm of the fund's average AUM over the last 3 years –, family size – given by the natural logarithm of the AUM of the institution managing the fund (SIZEFAM) –, and the fund management fee (FEE), according to equation 3, where j represents the fund and t represents time.

$$\alpha_{j,t} = a(\alpha_{j,t-1}) + b(HHI_t) + c(AGE_{j,t-1}) + d(SIZE_{j,t-1})$$
$$+ e(SIZEFAM_{j,t-1}) + f(FEE_{j,t-1}) + g(\alpha_{j,t-1} * HHI_t) + \varepsilon \tag{3}$$

The estimation of equation 3 was performed from panel data, and the coefficient "$a$" represents the persistence of the performance, according to the procedure performed by Ferreira et al. (2019) and Miguel (2020), who discuss that, if this coefficient is positive we have evidence that the performance persists, but if it results in negative we have evidence that the performance tends to reverse. Like the authors, we first estimated a model without the interaction variable, to test the existence of performance persistence, and then with its inclusion, which aims to test whether persistence is directly affected by the level of industry competition (coefficient "$g$").

It should be noted that some values of returns were identified that were extremely distant from the rest of the sample, which may be due to possible errors in the database. Thus, to deal with the effects of possible outliers in the funds' returns, the returns data were winsorized at 0.5%. To reduce possible multicollinearity effects, the interaction variables were mean-centered according to the procedures proposed by Iacobucci et al. (2017). In addition, to reduce possible heteroscedasticity effects White's standard errors were used.

# 4. RESULTS

## 4.1. DESCRIPTIVE STATISTICS OF THE DATA

Table 2 presents the descriptive statistics of the performance and characteristics of the sample funds. It can be seen from Table 2 that the sample funds achieved a minimum return of -16.25 % p.m. while a maximum return of 17.66 % p.m., with an average value of 1.03 % p.m. The performance of the funds, measured by the alpha of the four-factor model, varied from -16.26% to 11.8% p.m., with an average value of 0.10%. It is worth mentioning that at the 5% significance level, 19.78% of the sample funds, in the analyzed period, obtained positive and significant alphas and 15.53% negative and significant alphas. The average AUM of the managing institutions is more than R$ 88 billion (SIZEFAM), while the average size of the funds is more than R$ 45 million (SIZE), with a minimum of R$ 5 million.

**Table 2**
*Descriptive statistics of the data in the period 2010 to 2019*

|  |  | Minimum | 1º quartile | Median | Mean | 3º quartile | Maximum |
|---|---|---|---|---|---|---|---|
| Fund return | a.m. | -16,25% | -1,69% | 1,05% | 1,03% | 3,79% | 17,66% |
| Ibovespa | a.m. | -24,80% | -3,39% | 0,71% | 0,81% | 4,84% | 16,97% |
| Selic | a.m. | 0,29% | 0,57% | 0,80% | 0,77% | 0,95% | 1,213% |
| α | a.m. | -16,26% | -0,53% | 0,11% | 0,10% | 0,75% | 11,80% |
| FEE | a.a. | 0,00% | 0,49% | 1,50% | 1,44% | 2,05% | 8,50% |
| SIZE | ln | 15,4300 | 16,6300 | 17,5500 | 17,6400 | 18,5100 | 22,1600 |
| SIZEFAM | ln | 15,5100 | 24,3300 | 25,6000 | 25,2100 | 26,5000 | 27,5400 |
| AGE | years | 0,0000 | 3,0000 | 5,0000 | 5,6250 | 7,0000 | 39,0000 |
| HHI | monthly | -0,2143 | -0,2000 | -0,1898 | -0,1865 | -0,1782 | -0,1378 |
| HHI | yearly | -0,2070 | -0,2026 | -0,1906 | -0,1901 | -0,1882 | -0,1436 |
| N° funds in the sample |  |  |  |  |  |  | 1082 |
| N° of families |  |  |  |  |  |  | 46 |

*Source:* Elaborated by the authors.

In addition, Table 2 shows that for the 1082 funds in the sample there are only 46 families (management institutions), suggesting that the Brazilian fund market is really quite concentrated. Furthermore, it is observed that the industry's average annual competition index (HHI) is -0.1901, with a minimum value of -0.2070 and a maximum of -0.1436. It is worth noting that, as described in the methodology, the negative index expresses that the higher its value, the greater the competition in this market, the findings for the Brazilian funds market show that it is not a very competitive market, further evidencing the concentration of the industry. Additionally, from Table 2 we can see that the funds have an average age of 5.6 years and charge an average management fee of 1.44% for a year.

Table 3 presents the Person Correlations among the variables studied. One notices that the highest correlation is observed between alpha and its lag, this correlation being equal to 0.240. It is also possible to observe that all variables presented a positive correlation with performance, except for the management fee (-0.059) and age (-0.129). In relation to the alpha and the HHI index, the correlation observed was 0.086, suggesting a positive relationship between performance and segment competition.

**Table 3**
*Pearson's Correlation*

|  | α | FEE | AGE | SIZEFAM | SIZE | HHI |
|---|---|---|---|---|---|---|
| α | **1,000** | | | | | |
| FEE | **-0,059** | | | | | |
| AGE | **-0,129** | **0,208** | | | | |
| SIZEFAM | **0,096** | -0,009 | -0,013 | | | |
| SIZE | **0,097** | **-0,177** | **0,071** | **0,223** | | |
| HHI | **0,086** | 0,000 | **-0,056** | **-0,044** | 0,014 | |
| $\alpha_{t-1}$ | **0,240** | **-0,050** | **-0,144** | **0,082** | **0,133** | **0,060** |

**Note:** Values in bold are statistically significant at 5%.
**Source:** Elaborated by the authors.

The significance and values of the correlations bring initial indications that corroborate the evidence brought by the literature, of a significant effect of competition (HHI index) on fund performance (Ferreira et al., 2019; In et al., 2014; Parida & Tang, 2017) and, of the existence of a negative effect of management fees and fund age on performance (Gil-Bazo & Ruiz-Verdú, 2008, 2009) and a positive effect of size (Castro & Minardi, 2009).

## 4.2. EMPIRICAL RESULTS

Table 4 presents the results of the regressions performed to estimate equation 3. The first regression (1) used the independent variables highlighted in the methodology, without considering any interaction between them. The second model (2) considered, in addition to the explanatory variables of the first regression, the interaction between lagged alpha from a previous period with the HHI index, following the methodology of Ferreira et al. (2019). It should be noted that, in this model, we sought to correct possible multicollinearity problems arising from the interaction, through the centralization in the mean of the variables.

Table 4 shows that all independent variables were statistically significant for determining performance (α), considering the 5% significance level. For the sample used, the persistence of performance was verified, since the coefficients of the lagged alphas were positive and significant, which is in line with other works in the literature (Berggrun & Lizarzaburu, 2015; Brown & Goetzmann, 1995; Mendonça et al., 2017).

As for the competition of the fund industry, the coefficients of the Herfindahl-Hirschman index (HHI) were also positive and significant, which indicates that the performance of the funds is directly related to this variable, that is, the greater the competition of the industry, the greater the performance achieved by the funds. This result differs from that observed by Keswani and Stolin (2006), Wahal and Wang (2011), Parida and Tang (2017), Hoberg et al. (2018), Ferreira et al. (2019), and Leippold and Rueegg (2020). However, it is in agreement with the results found by In et al. (2014).

Regarding the control variables, the age of the funds negatively influenced performance, evidencing that older funds achieved lower alphas, similarly to what was discussed by Ferreira et al. (2013), Silva and Iquiapaza (2017) and Borges and Malaquias (2019); while the size of the funds and the size of their fund families positively impacted performance, meaning that increasing the AUM by the funds and their fund families contributes to higher alphas, corroborating what

was discussed by Gervais et al. (2005), Castro and Minardi (2009), and Milani and Ceretta (2013), who ponder that increases in assets can bring gains of scale, which decrease costs for the administrator. The management fee, on the other hand, presented negative and significant coefficients, indicating that funds with higher fees had lower performance, similarly to what was argued by Gil-Bazo and Ruiz-Verdú (2008; 2009) and Vidal et al. (2015), for the American market and Silva et al. (2018), for the Brazilian market.

**Table 4**
*Empirical results of the effect of competition on performance persistence over the period 2010 to 2019*

| | Variável Dependente - α | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) [a] | (4) [a] |
| $\alpha_{t-1}$ | 0,201*** | 0,218*** | 0,188*** | 0,154*** |
| | (0,013) | (0,013) | (0,022) | (0,024) |
| HHI | 0,065*** | 0,062*** | 0,101*** | 0,099*** |
| | (0,014) | (0,014) | (0,022) | (0,021) |
| AGE | -0,0002*** | -0,0002*** | -0,0002*** | -0,0002*** |
| | (0,00004) | (0,00004) | (0,0001) | (0,0001) |
| SIZE | 0,0003** | 0,0003** | 0,0005** | 0,0005** |
| | (0,0001) | (0,0001) | (0,0002) | (0,0002) |
| SIZEFAM | 0,001*** | 0,001*** | 0,0005*** | 0,0004*** |
| | (0,0001) | (0,0001) | (0,0002) | (0,0002) |
| FEE | -0,0003** | -0,0003** | 0,00002 | -0,000002 |
| | (0,0001) | (0,0001) | (0,0003) | (0,0003) |
| HHI * $\alpha_{t-1}$ [b] | | 5,753*** | | -5,400*** |
| | | (1,002) | | (1,652) |
| Constante | -0,005 | -0,006 | 0,002 | 0,002 |
| | (0,004) | (0,004) | (0,008) | (0,008) |
| Observations | 5.277 | 5.277 | 1.832 | 1.832 |
| $R^2$ adjusted | 0,075 | 0,080 | 0,075 | 0,080 |
| F-statistic | 72,201*** | 66,975*** | 24,595*** | 22,720*** |

*Note:* [a] Considers information from 2010, 2013, 2016 and 2019 to control auto-correlation; [b] Reduction of multicollinearity effects with interaction variables centered on the mean.

*Statistically* significant at *$p<0.1$; **$p<0.05$; ***$p<0.01$; Standard errors in parentheses.
*Source:* Elaborated by the authors.

Finally, for the interactions between the variables, in the second model, positive and significant coefficients were observed. The interaction between the HHI index and the alphas obtained in the previous period points to the competitiveness of the fund industry, not only in relation to the concentration of assets managed by institutions but also in relation to the performance achieved by competing funds. This result is in line with that discussed by In et al. (2014), who pointed out that, the positive relationship brings indications that this market is uncompetitive and, therefore, allows the achievement of higher alphas.

To circumvent a possible autocorrelation effect in the construction of the dependent variable, equation 3 was estimated considering only the periods, 2010, 2013, 2016, and 2019, this way there is no overlap of returns information in the estimation of alpha. The results, columns (3) and (4) of Table 4, show that the significance and signs of the results hold, with the only exception of the management fee not being significant in this restricted sample.

Therefore, the results of this paper evidence that there is persistence of performance for the sample analyzed. Furthermore, it suggests that competition in the fund industry provides pressures for managers to seek to allocate resources in order to achieve better returns, reflecting superior and persistent alphas.

### 4.3. ROBUSTNESS TESTS

Considering the data analysis period that extends from 2010 to 2019, it was decided to perform the estimations considering two sample subperiods, being period 1 from 2010 to 2014 and period 2 from 2015 to 2019, the first period tries to capture possible effects of the 2008-2009 economic crisis that affected the global economy and caused negative returns on the Ibovespa index, and the second period marks a period of sharp drops in the basic interest rate of the Brazilian economy (Selic rate), which possibly created an incentive to invest in equity funds, according to Figure 1 that shows the growth of the funds' AUM, which despite showing a slight drop between 2010-2014, grew significantly again after 2016.
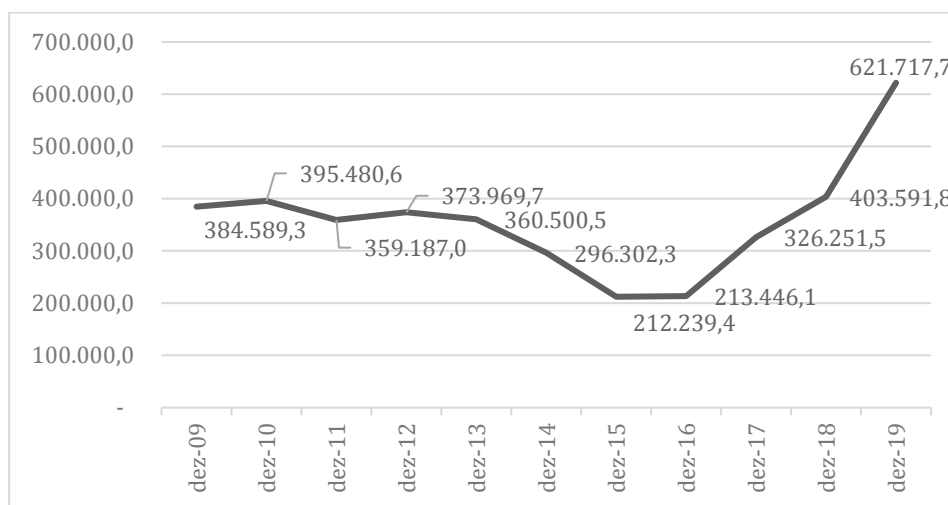


*Figure 1.* ANBIMA Free Portfolio Funds' AUM in *R$ Million*
*Source:* Anbima (2020).

Thus, Table 5 presents the estimation results for the two sample sub-periods. It can be seen that the coefficients of the lagged alpha were positive and statistically significant for both sample sub-periods, showing the persistence of performance in both periods and corroborating the results presented previously.

**Table 5**

*Empirical results of the effect of competition on performance persistence across sample subperiods (subperiod 1: 2010-2014; subperiod 2: 2015-2019)*

| | Variável Dependente - α | | | |
|---|---|---|---|---|
| | Subperíodo 1 | | Subperíodo 2 | |
| | (1) | (2) | (1) | (2) |
| $\alpha_{t-1}$ | 0,255*** | 0,263*** | 0,170*** | 0,157*** |
| | (0,018) | (0,018) | (0,019) | (0,017) |
| HHI | -0,023 | -0,002 | 0,106*** | 0,104*** |
| | (0,022) | (0,022) | (0,019) | (0,019) |
| AGE | -0,0004*** | -0,0004*** | -0,0001** | -0,0001** |
| | (0,0001) | (0,0001) | (0,00005) | (0,00005) |
| SIZE | 0,0004** | 0,0004* | 0,0003 | 0,0003 |
| | (0,0002) | (0,0002) | (0,0002) | (0,0002) |
| SIZEFAM | 0,001*** | 0,001*** | 0,0003** | 0,0003** |
| | (0,0001) | (0,0001) | (0,0001) | (0,0001) |
| FEE | -0,001** | -0,001** | -0,0001 | -0,0001 |
| | (0,0002) | (0,0002) | (0,0002) | (0,0002) |
| HHI * $\alpha_{t-1}$ | 9,271*** | | 2,355 | |
| | (1,426) | | (1,440) | |
| Constante | -0,029*** | -0,025*** | 0,009 | 0,009 |
| | (0,006) | (0,006) | (0,006) | (0,006) |
| Observations | 1.920 | 1.920 | 3.357 | 3.357 |
| R2 | 0,185 | 0,167 | 0,046 | 0,045 |
| Adjusted R2 | 0,182 | 0,165 | 0,044 | 0,043 |
| F Statistic | 62,115*** | 64,037*** | 22,888*** | 26,244*** |

*Note:* Reduction of multicollinearity effects with interaction variables centered on the mean.
*Statistically* significant at *p<0.1; **p<0.05; ***p<0.01; Standard errors in parentheses.
*Source:* Elaborated by the authors.

With regard to the variable representing the industry competition (HHI), Table 5 shows that this variable was not statistically significant for subperiod 1, while it was positive and statistically significant for subperiod 2. This result implies that it is not possible to state that there was a direct effect of the industry competition on the performance delivered by the funds during the period in which the country suffered the effects of the economic crisis, but during the period of a sharp fall in the interest rate and of greater demand for this type of investments, we see a positive effect of the competition on the performance delivered to the fund quota holders. Thus, it can be said that in the existence of greater demand by investors for equity fund shares there is an incentive for funds to strive to achieve a higher performance in the face of greater competition in the industry, since managers have incentives to increase the AUM of a fund because in general, they receive, as compensation, a fixed percentage of the assets under management (Chevalier & Ellison, 1997).

On the other hand, from Table 5, it is possible to notice a positive and statistically significant coefficient for the interaction HHI and persistence of performance for subperiod 1 and positive, although not statistically significant, for subperiod 2. This result shows that in periods of market decline (subperiod 1), in general, funds with higher persistence of performance in face of greater competition deliver higher performance, which cannot be stated for the period of greater demand for fund shares (subperiod 2). With respect to the control variables, the signs and statistical significance corroborate the results discussed above.

In a complementary way, we analyze the results by dividing the sample in quantiles of AUM (funds with assets below quartile 1 (25%), funds with assets between quartile 1 (25%) and quartile 3 (75%), and funds with assets above quartile 3 (75%)). These results are shown in Table 6. From this table, it is possible to verify the existence of performance persistence in all assets quartiles, given the positive and statistically significant signs of the lagged alpha variable. Similarly, the positive effect of competition (HHI) on the performance delivered by the funds is verified, corroborating the previous results.

**Table 6**
*Empirical results of the effect of competition on performance persistence dividing the sample by quartile of equity.*

| | Variável Dependente - $\alpha$ | | | | | |
|---|---|---|---|---|---|---|
| | EQ < Q(25%) | | Q(25%) < EQ < Q(75%) | | EQ > Q(75%) | |
| $\alpha_{t-1}$ | 0,155*** | 0,119*** | 0,257*** | 0,249*** | 0,181*** | 0,164*** |
| | (0,029) | (0,028) | (0,017) | (0,017) | (0,024) | (0,023) |
| HHI | 0,085** | 0,064* | 0,052*** | 0,053*** | 0,058** | 0,071*** |
| | (0,036) | (0,036) | (0,019) | (0,019) | (0,024) | (0,024) |
| AGE | -0,0002** | -0,0002** | -0,0002*** | -0,0002*** | -0,0001 | -0,0001 |
| | (0,0001) | (0,0001) | (0,0001) | (0,0001) | (0,0001) | (0,0001) |
| SIZE | -0,002** | -0,002** | -0,002*** | -0,002*** | -0,001*** | -0,001*** |
| | (0,001) | (0,001) | (0,0004) | (0,0004) | (0,0004) | (0,0004) |
| SIZEFAM | 0,0004** | 0,0004** | 0,001*** | 0,001*** | 0,001** | 0,001** |
| | (0,0002) | (0,0002) | (0,0001) | (0,0001) | (0,0002) | (0,0002) |
| FEE | -0,0001 | -0,0001 | -0,001** | -0,001** | -0,0002 | -0,0003 |
| | (0,0003) | (0,0004) | (0,0002) | (0,0002) | (0,0003) | (0,0003) |
| HHI * $\alpha_{t-1}$ | 11,182*** | | 3,629*** | | 4,227** | |
| | (2,394) | | (1,341) | | (1,826) | |
| Constant | 0,042** | 0,038** | 0,024*** | 0,025*** | 0,020* | 0,023** |
| | (0,019) | (0,019) | (0,008) | (0,008) | (0,010) | (0,010) |
| Observations | 1.219 | 1.219 | 2.621 | 2.621 | 1.437 | 1.437 |
| R2 | 0,054 | 0,037 | 0,117 | 0,114 | 0,060 | 0,056 |
| Adjusted R2 | 0,048 | 0,032 | 0,114 | 0,112 | 0,055 | 0,052 |
| F Statistic | 9,799*** | 7,663*** | 49,329*** | 56,194*** | 13,000*** | 14,230*** |

**Note:** Reduction of multicollinearity effects with interaction variables centered on the mean.
**Statistically** significant at *p<0.1; **p<0.05; ***p<0.01; Standard errors in parentheses.
**Source:** Elaborated by the authors.

In what concerns the interaction performance persistence and competition, it can be observed that the coefficients were positive and statistically significant for all quartiles, but the magnitude of this coefficient was higher for funds with lower assets value, showing that the effect of the competition x performance persistence interaction on the funds' performance is higher for the smaller funds, possibly because the smaller funds make more efforts to survive and increase the assets under management, thus needing to differentiate themselves to attract investors' attention in the face of greater competition.

## 5. CONCLUSIONS

Investment funds represent a type of investment that has shown significant growth in Brazil. Within this context, a remarkable characteristic of this industry is the fact that there is a high concentration in the hands of a few large managers (Iquiapaza, 2009) and, therefore, it is worth questioning to what extent this level of concentration can impact the performance and the persistence of the performance delivered to the fund shareholder.

Thus, the objective of this study was to analyze the impact of market competition on the performance persistence of mutual funds in Brazil. To this end, a sample of free portfolio equity funds was used for the period from 2010 to 2019, applying panel data regressions with the performance measure being the alpha from the four-factor model of Fama and French (1993), and Carhart (1997).

The main results indicated the existence of performance persistence from 2010 to 2019 for Brazilian equity funds, with a positive and statistically significant relationship in the coefficient of past performance on present performance, a result robust to division by sub-periods and by quartiles of assets. In addition, they pointed out a positive and statistically significant relationship between competition and fund performance, as well as in the interaction competition and persistence of performance. Consequently, it is concluded that funds with greater persistence of performance tend to maintain this persistence even in the face of greater competition.

With respect to the analysis by subperiods, it was found that the effect of competition on fund performance was statistically significant only for subperiod 2 (2015-2019), indicating that in the existence of higher investor demand for funds there is an incentive for funds to strive for the achievement of higher performance in the face of greater industry competition. Furthermore, the results of the competition and performance persistence interaction were positive for both subperiods, although statistically significant only for subperiod 1 (2010-2014), such a result indicates that in periods of market decline (subperiod 1), in general, funds with higher performance persistence in the face of greater competition deliver higher performance.

These results suggest the existence of little competition in the Brazilian fund market, which can be evidenced in the high concentration of the industry around a few managers. As highlighted by In et al. (2014), there are indications that the "free portfolio" category of equity funds segment in Brazil is not competitive and therefore are more concentrated, as it is possible to obtain consistent abnormal returns over time, and increased competition does not seem to mitigate arbitrage opportunities, as would be expected in a competitive equilibrium scenario. Miguel (2020), in his study funds in 32 countries, also reports a statistically significant persistence coefficient for Brazil.

The main contributions brought by this paper are: (a) present new evidence of the impact of competition on performance and performance persistence, in a developing market, such as Brazil, (b) enable new theoretical insights about the variables that impact fund performance, (c) reinforce the idea that although it is not the only relevant variable, the past performance of funds, is indeed an essential variable and should be taken into account by investors when choosing the

fund in which to invest. It should also be pointed out that this study is not without limitations since other competition indicators or other classes of funds could have been tested, and these are suggestions for future studies. Furthermore, one can also test whether the winning funds are able to maintain performance persistence due to better technological structures and/or intellectual capabilities, as in studies that aim to verify whether the educational quality of the manager is related to performance (Chevalier & Ellison, 1999).

## REFERENCES

Anbima. (2020). Consolidado histórico de fundos de investimentos - Dezembro/2019. Retrieved February 15, 2020, from https://www.anbima.com.br/pt_br/informar/estatisticas/fundos-de-investimento/fi-consolidado-historico.htm

Anbima, & FGV. (2019). Anuário da Indústria de Fundos de Investimento / Brazilian Mutual Fund Industry Yearbook. https://cef.fgv.br/sites/cef.fgv.br/files/arquivos/anuario_assets_fgv_2019_final.pdf

Berggrun, L., & Lizarzaburu, E. (2015). Fund flows and performance in Brazil. *Journal of Business Research*, *68*(2), 199-207. https://doi.org/10.1016/j.jbusres.2014.09.028

Blake, D., Caulfield, T., Ioannidis, C., & Tonks, I. (2017). New Evidence on Mutual Fund Performance: A Comparison of Alternative Bootstrap Methods. *Journal of Financial and Quantitative Analysis*, *52*(3), 1279-1299. doi:10.1017/S0022109017000229

Borges, E. C., & Martelanc, R. (2015). Sorte ou habilidade: uma avaliação dos fundos de investimento no Brasil. *Revista de Administração*, *50*(2), 196-207. https://doi.org/10.5700/rausp1194

Borges, D. M., Jr., & Malaquias, R. F. (2019). Restrições de resgate em fundos de ações, liquidez dos ativos e desempenho. *RAE-Revista de Administração de Empresas*, *59*(1). https://doi.org/10.1590/s0034-759020190105

Brown, S. J., & Goetzmann, W. N. (1995). Performance Persistence. *The Journal of Finance*, *50*(2), 679-698. https://doi.org/10.1111/j.1540-6261.1995.tb04800.x

Carhart, M. M. (1997). On Persistence in Mutual Fund Performance. *The Journal of Finance*, *LII*(1), 57-82.

Castro, B. R., & Minardi, A. M. A. F. (2009). Comparacao do desempenho dos fundos de ações ativos e passivos. *Revista Brasileira de Financas*, *7*(2), 143-161.

Chevalier, J., & Ellison, G. (1997). Risk taking by mutual funds as a response to incentives. *Journal of Political Economy*, *105*(6), 1167-1200. https://doi.org/10.1086/516389

Chevalier, J., & Ellison, G. (1999). Are some mutual fund manager better than others? Cross-sectional patterns in behavior and performance. *The Journal of Finance*, *54*(3), 875-899.

Christoffersen, S. E. K., & Musto, D. K. (2002). Demand Curves and the Pricing of Money Management. *Review of Financial Studies*, *15*(5), 1499-1524. https://doi.org/10.1093/rfs/15.5.1499

Coates, J. C. I., & Hubbard, R. G. (2007). Competition in the mutual fund industry: Evidence and implications for policy. *The Journal of Corporation Law*, *33*(1). https://doi.org/10.2139/ssrn.1005426

Detzel, F. L., & Weigand, R. A. (1998). Explaining persistence in mutual fund performance. *Financial Services Review*, *7*(1), 45-55. https://doi.org/10.1016/s1057-0810(99)80012-2

Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, *33*(1), 3-56. https://doi.org/10.1016/0304-405X(93)90023-5

Fama, E. F., & French, K. R. (2010). Luck versus Skill in the cross-section of mutual fund returns. *Journal of Finance*, *65*(5), 1915-1947. https://doi.org/10.1111/j.1540-6261.2010.01598.x

Ferreira, M. A., Keswani, A., Miguel, A. F., & Ramos, S. B. (2013). The Determinants of mutual fund performance: A cross-country study. *Review of Finance*, *17*(2), 483-525. https://doi.org/10.1093/rof/rfs013

Ferreira, M. A., Keswani, A., Miguel, A. F., & Ramos, S. B. (2019). What determines fund performance persistence? International evidence. *Financial Review*, *54*(4), 679-708. https://doi.org/10.1111/fire.12202

Fung, W., Hsieh, D. A., Naik, N. Y., & Ramadorai, T. (2008). Hedge funds: Performance, risk, and capital formation. *Journal of Finance*, *63*(4), 1777-1803. https://doi.org/10.1111/j.1540-6261.2008.01374.x

Gervais, S., Lynch, A. W., & Musto, D. K. (2005). Fund families as delegated monitors of money managers. *The Review of Financial Studies*, *18*(4), 1139-1169.

Gil-Bazo, J., & Ruiz-Verdú, P. (2008). When cheaper is better: Fee determination in the market for equity mutual funds. *Journal of Economic Behavior and Organization*, *67*(3-4), 871-885. https://doi.org/10.1016/j.jebo.2007.04.003

Gil-Bazo, J., & Ruiz-Verdú, P. (2009). The relation between price and performance in the mutual fund industry. *Journal of Finance*, *64*(5), 2153-2183. https://doi.org/10.1111/j.1540-6261.2009.01497.x

Gomes, F. A. R., & Cresto, V. (2010). Avaliação do desempenho dos fundos long-short no Brasil. *Revista Brasileira de Finanças*, *8*(4), 505-529.

Harvey, C. R., & Liu, Y. (2020). False (and Missed) Discoveries in Financial Economics. *Journal of Finance*, *75*(5), 2503-2553. https://doi.org/10.1111/jofi.12951

Hoberg, G., Kumar, N., & Prabhala, N. (2018). Mutual fund competition, managerial skill, and alpha persistence. *Review of Financial Studies*, *31*(5), 1896-1929. https://doi.org/10.1093/rfs/hhx127

Iacobucci, D., Schneider, M. J., Popovich, D. L., & Bakamitsos, G. A. (2017). Mean centering, multicollinearity, and moderators in multiple regression: The reconciliation redux. *Behavior Research Methods*, *49*(1), 403-404. https://doi.org/10.3758/s13428-016-0827-9

In, F., Kim, M., Park, R. J., Kim, S., & Kim, T. S. (2014). Competition of socially responsible and conventional mutual funds and its impact on fund performance. *Journal of Banking and Finance*, *44*(1), 160-176. https://doi.org/10.1016/j.jbankfin.2014.03.030

Iquiapaza, R. A. (2009). *Performance, captação e foco das famílias de fundos de investimento.* [Tese de doutorado]. Universidade Federal de Minas Gerais. https://repositorio.ufmg.br/handle/1843/BUBD-9BGJA8

Jagannathan, R., Malakhov, A., & Novikov, D. (2010). Do hot hands exist among hedge fund managers? An empirical evaluation. *Journal of Finance*, *65*(1), 217-255. https://doi.org/10.1111/j.1540-6261.2009.01528.x

Jegadeesh, N., & Titman, S. (1993). Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency. *The Journal of Finance*, *48*(1), 65-91. https://doi.org/10.1111/j.1540-6261.1993.tb04702.x

Jegadeesh, N., & Titman, S. (2001). Profitability of momentum strategies: An evaluation of alternative explanations. *Journal of Finance*, *56*(2), 699-720. https://doi.org/10.1111/0022-1082.00342

Jensen, M. C. (1968). Problems in selection of security portfolios: The performance of mutual funds in the period 1945-1964. *The Journal of Finance*, *23*(2), 389-416.

Kacperczyk, M., Van Nieuwerburgh, S., & Veldkamp, L. (2016). A Rational Theory of Mutual Funds' Attention Allocation. *The Econometric Society*, *84*(2), 571-626. https://doi.org/10.3982/ecta11412

Keswani, A., & Stolin, D. (2006). Mutual fund performance persistence and competition: A cross-sector analysis. *Journal of Financial Research*, *29*(3), 349-366. https://doi.org/10.1111/j.1475-6803.2006.00182.x

Klapper, L., Sulla, V., & Vittas, D. (2004). The development of mutual funds around the world. *Emerging Markets Review*, *5*(1), 1-38. https://doi.org/10.1016/j.ememar.2003.12.001

Kosowski, R., Naik, N. Y., & Teo, M. (2007). Do hedge funds deliver alpha? A Bayesian and bootstrap analysis. *Journal of Financial Economics*, *84*(1), 229-264. https://doi.org/10.1016/j.jfineco.2005.12.009

Leippold, M., & Rueegg, R. (2020). How Rational and Competitive Is the Market for Mutual Funds? *Review of Finance*, *24*(3), 579-613. https://doi.org/10.1093/rof/rfz011

Lintner, J. (1965). The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. *The Review of Economics and Statistics*, *47*(1), 131-155. https://doi.org/10.1016/B978-0-12-780850-5.50018-6

Maestri, C. O. N. M., & Malaquias, R. F. (2017). Exposição a fatores de mercado de fundos de investimentos no Brasil. *Revista Contabilidade e Financas*, *28*(73), 61-76. https://doi.org/10.1590/1808-057x201702940

Malaquias, R., & Maestri, C. (2017). Effects of Manager Characteristics on Portfolio Composition of Multimarket Funds. *Revista Universo Contábil*, *13*(2), 89-108. https://doi.org/10.4270/ruc.2017210

Matos, P. R. F., Silva, W., & Silva, F. (2015). Há bons gestores de fundos de investimento em ações no Brasil? *Brazilian Review of Finance*, *13*(2), 325-364. https://doi.org/10.12660/rbfin.v13n2.2015.47820

Mendonça, J. A. de, Jr., Campani, C. H., & Leal, R. P. C. (2017). A Escolha de Fundos de Ações e o Investidor Individual. *Revista de Administração Contemporânea*, *21*, 41-62. https://doi.org/10.1590/1982-7849rac2017160037

Miguel, A. F. (2020). Do fund flows moderate persistence ? Evidence from a global study. *The European Journal of Finance*, *27*(7), 1-20. https://doi.org/10.1080/1351847X.2020.1830820

Milani, B., & Ceretta, P. S. (2013). Efeito tamanho nos fundos de investimento brasileiros. *Revista de Administração Da UFSM*, *6*(1), 119-138. https://doi.org/10.5902/198346593607

Mossin, J. (1966). Equilibrium in a Capital Asset Market. *Econometrica*, *34*(4), 768-783.

Nerasti, J. N., & Lucinda, C. R. (2016). Persistência de Desempenho em Fundos de Ações no Brasil. *Brazilian Review of Finance*, *14*(2), 269. https://doi.org/10.12660/rbfin.v14n2.2016.57958

Parida, S., & Tang, Z. (2017). Price competition in the mutual fund industry. *Economic Modelling*, *70*, 29-39. https://doi.org/10.1016/j.econmod.2017.10.005

Paz, R. L., Iquiapaza, R. A., & Bressan, A. A. (2017). Influence of investors' monitoring on equity mutual funds' performance. *Gestão, Finanças e Contabilidade*, *53*(9), 1689-1699. https://doi.org/10.1017/CBO9781107415324.004

Porter, G. E., & Trifts, J. W. (1998). Performance persistence of experienced mutual fund managers. *Financial Services Review*, *7*(1), 57-68. https://doi.org/10.1016/s1057-0810(99)80013-4

Ramasamy, B., & Yeung, M. C. H. (2003). Evaluating mutual funds in an emerging market: Factors that matter to financial advisors. *International Journal of Bank Marketing*, *21*(3), 122-136. https://doi.org/10.1108/02652320310469502

Riley, T. B. (2021). Portfolios of actively managed mutual funds. *The Financial Review*, *56*(2), 205-230. https://doi.org/10.1111/fire.12257

Sanvicente, A. Z., & Sanches, F. A. M. (2002). Viés de seleção na análise de desempenho de ações no mercado brasileiro. *Revista de Administração*, *37*(2), 38-45.

Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *The Journal of Finance*, *XIX*(3), 425-442.

Silva, S. E. da, Roma, C. M. da S., & Iquiapaza, R. A. (2018). A Taxa de Administração Sinaliza o Desempenho dos Fundos de Investimento em Ações no Brasil ? *REPEC - Revista de Educação e Pesquisa Em Contabilidade*, *12*(3), 286-302. https://doi.org/10.17524/repec.v12i3.1717

Silva, S. E., & Iquiapaza, R. A. (2017). Fundos de investimentos socialmente responsáveis e fundos convencionais: Existem diferenças de desempenho? *Revista Evidenciação Contábil & Finanças*, *5*(3), 4-21. https://doi.org/10.18405/recfin20170301

Vayanos, D., & Woolley, P. (2013). An institutional theory of momentum and reversal. *Review of Financial Studies*, *26*(5), 1087-1145. https://doi.org/10.1093/rfs/hht014

Vidal, M., Vidal-García, J., Lean, H. H., & Uddin, G. S. (2015). The relation between fees and return predictability in the mutual fund industry. *Economic Modelling*, *47*, 260-270. https://doi.org/10.1016/j.econmod.2015.02.036

Wahal, S., & Wang, A. Y. (2011). Competition among mutual funds. *Journal of Financial Economics*, *99*(1), 40-59. https://doi.org/10.1016/j.jfineco.2010.08.012