

# Fund management fees: the role of industry competition and investor sentiment

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## ABSTRACT

This article analyzes the influence of industry competition and investor sentiment on the likelihood of change in investment fund management fees in Brazil. Due to the wide variety of existing funds, with various characteristics and objectives, there may be significant differences in the fees observed. Thus, it is worth analyzing the factors that influence the amount of fund management fees charged, since the literature highlights that the payment of fees is related to fund performance. Also, it is observed that the Brazilian fund industry, despite having a large number of available funds, is still concentrated in few management firms, which is an indication that there is a low competition level. In practical terms, this investigation may be useful to investors in the fund selection process, since the management fee represents one of the main costs an investor faces when investing in this industry. The results point out the importance of adopting greater transparency in the disclosure of fees by financial institutions, since there are indications that the amounts charged are influenced by the characteristics of funds and investors. The methodology adopted involves Logit/Probit regression models, which had changes in the management fee as an explained variable and, as explanatory variables, the proxies of competition and investor sentiment, in addition to other control variables. It was observed that the investor sentiment proxy was significant in explaining the probability of change in management fees, mainly for setting higher fees. However, no statistical significance was observed for industry competition. This research innovates by analyzing the role of industry competition and investor sentiment on the probability of changing management fees, thus contributing to fill a gap found in the Brazilian national literature.

**Keywords:** mutual funds, management fees, competition, investor sentiment, funds industry.

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## 1. INTRODUCTION

When investing resources in a fund, an investor is faced with various costs, with the management fee being one of the most important. The management fee is generally charged for all funds intended for the final shareholder and “[...] remunerates the manager for the services of administration, portfolio management, and others needed for operating the fund” (Comissão de Valores Mobiliários [CVM], 2014, p. 24). Thus, studies point out that the performance differences obtained by fund investors can also be derived from the difference in the amounts of funds’ management fees (Gil-Bazo & Ruiz-Verdú, 2009; Grinblatt & Titman, 1989; Milani & Ceretta, 2013; Vidal et al., 2015), emphasizing that they may be responsible for negatively affecting the net return obtained by shareholders (Grinblatt & Titman, 1989; Parida & Tang, 2017).

In this way, it becomes worth studying which factors influence the amount of management fee, aiming to adapt investor choices, so that they are able to select those funds that best fit their risk profile and that offer a satisfactory level of return. It is possible that an increase in fees represents a loss for investors, who may be paying excessive fees for the returns they receive (Malkiel, 2013; Parida & Tang, 2017).

Also, despite the large number of existing funds, the high concentration of this industry in Brazil stands out, where it is observed that there is an inclination to centralize resources in a few management firms (Iquiapaza, 2009). Data from the Associação Brasileira das Entidades dos Mercados Financeiro e de Capitais (ANBIMA, 2021) show that around 54% of the general fund equity in Brazil is concentrated in five management firms. Industry concentration is related to the degree of competition verified in it. According to Keswani and Stolin (2006), one of the strategies that funds can use to compete with each other is the price-based strategy, through which funds can vary the amount of fees they charge investors to gain competitive advantage. There is a debate that questions whether competition in the fund industry has the power to limit the charging of fees that are disproportionate to the services provided by management firms (Adams et al., 2012).

In this sense, Coates and Hubbard (2007) pointed out that competition can become a means for investors to protect themselves against paying excessive fees, since, with price-related competition, funds could not set fee levels beyond a certain level without losing a large share of the market. On the other hand, Anufriev et al. (2019) stated that differences between fees charged by funds are apparently not eliminated through competition.

Some studies have highlighted the effect of competition on the amount of fees charged by funds (Coates & Hubbard, 2007; Hoberg et al., 2018; In et al., 2014; Luo, 2002; Parida & Tang, 2017; Wahal & Wang, 2011), whose results differ from each other. On the one hand, Coates and Hubbard (2007) stressed that competition exerts a disciplinary force on funds and the amount of fees, and Hoberg et al. (2018), Wahal and Wang (2011), and Ying Luo (2002) indicated that fees are higher in markets with less competition. On the other hand, In et al. (2014) and Parida and Tang (2017) obtained results showing that funds operating in more competitive markets charge higher fees.

Complementarily, Hu et al. (2016) showed that investor sentiment is negatively associated with the amount of fees charged by funds. Their results showed that, compared to performance sensitivity, investor sentiment was a more relevant variable in predicting the amount of fund fees. Likewise, Massa and Yadav (2015) argued that funds use market sentiment as a strategy to increase performance and, indirectly, increase funding. Other authors have also discussed a possible association between investor sentiment and mutual fund performance (Bu, 2020a, 2020b). Thus, there are indications of the existence of a possible relationship between investor sentiment and the amount of management fee charged by the funds.

Wang et al. (2020) studied the effect of investor sentiment on the risk and performance of funds in China and found that investor sentiment had a negative relationship with performance and the risk taken by funds. The authors argued that this evidence is in favor of the propositions of the ‘dumb money’ effect, since an increased demand for funds leads to inferior performance for shareholders.

In this sense, it is observed that the level of investor sensitivity to fund performance is considered a factor that can influence the amounts of management fees charged. When investors in a fund have a less elastic need for their shares, the fund tends to charge higher fees, because investors who are more sensitive to performance would redeem their shares when noticing that the result obtained is poor (Christoffersen & Musto, 2002). From this perspective, the funds with the best performance compete for investor resources regarded as ‘sophisticated’ and end up setting lower fees than the funds with the worst performance (Gil-Bazo & Ruiz-Verdú, 2008). Thus, the general objective of this study is analyzing the influence of fund industry competition and investor sentiment on changes in management fees for stock investment funds in Brazil.

It is worth noticing that the growth of the investment fund industry in recent decades and its representativeness in the financial market justify the need for further studies on its characteristics (Parida & Tang, 2017). In the Brazilian economic scenario of considerable increased net funding, especially of multimarket funds and stock funds (Associação Brasileira das Entidades dos Mercados Financeiro e de Capitais [ANBIMA] & Fundação Getulio Vargas [FGV], 2020), it becomes interesting to try to provide investors with more information about which factors can influence the amount of management fee charged by funds (Cooper et al., 2020; Ying Luo, 2002).

Furthermore, given the high degree of concentration within the investment fund industry in Brazil, competition is an important variable to be studied herein. Several studies have investigated the role of competition in the mutual fund market (Feldman et al., 2020; Ferreira et al., 2019; Hoberg et al., 2018; Leippold & Rueegg, 2020; Parida & Tang, 2017), but few have

analyzed the role of competition in determining fees (Parida & Tang, 2017), especially in Brazil. Similarly, this article also aims to enrich the discussions on investor sentiment, mainly regarding its role in the determination of fees by funds.

Finally, the results of this research may be used to support the decisions of managers and administrators to adapt their fees to investor and market behaviors. They may also be used by investors, providing information to assist them in the selection and monitoring of funds, avoiding the payment of excessive fees; and by regulators, such as the Brazilian Association of Financial and Capital Market Entities (Associação Brasileira das Entidades dos Mercados Financeiro e de Capitais [ANBIMA]) and the Brazilian Securities and Exchange Commission (Comissão de Valores Mobiliários [CVM]), to avoid unwanted behavior on the part of management firms, by setting high fees on small investors or those with less ability to monitor funds, such as retail investors.

## 2. LITERATURE REVIEW

As previously mentioned, the management fee is the main amount charged by the fund manager as remuneration for the provision of its services (CVM, 2014). It must be included in the fund's regulations and be expressed as an annual percentage of fund net assets (CVM, 2014).

Cooper et al. (2021) assessed whether the amounts of management fees are important for investors, found dispersions in the amounts charged, even after controlling for variables related to fund characteristics, and highlighted that they may indicate some degree of inefficient pricing, as funds with similar characteristics set different fees. The authors highlight the economic impact for investors, documenting that percentage fees are relevant, as the fund industry in the United States of America (USA) generated a negative net aggregate value of 125 billion dollars in 37 years, which were mainly due to the high fees charged.

In Brazil, Silva et al. (2018) studied active equity investment funds classified as BOVESPA Index (Índice Bovespa [Ibovespa]), between 2009 and 2015. They concluded that the funds setting higher fees are those that provide shareholders with worst performances, so that differences in fees imply divergences in the amount generated for investors. On the other hand, Dalmácio et al. (2007) when analyzing stock funds within the period from May 2001 to December 2003, did not observe a relationship between management fee and performance of active Ibovespa funds and observed a low correlation when verifying active IBRX funds.

### 2.1 Studies on Competition in the Mutual Fund Industry

The investment fund industry may be understood as a market with competition, where funds are distinguished by their characteristics, such as size, purpose, and types of assets in which resources are invested. Investors, on the other hand, resemble consumers, as they can choose and switch between funds, according to their individual preferences (In et al., 2014). Keswani and Stolin (2006) highlighted two strategies through which funds can compete with each other, namely price competition - in which funds set the value of their fees in order to obtain a competitive advantage - and performance competition.

It is worth noticing that a restricted number of managing firms responsible for a large part of the equity invested in a fund market reveals a low degree of competition, or competition, indicating high concentration. On the other hand, an industry with little concentration of managed resources has a higher competition level. Regarding Brazil, Iquiapaza (2009) pointed out that the fund industry is concentrated in a few managing firms, which suggests that it has little competition. Although there is a national and international tendency for competition to grow in this industry, favored by factors such as digitalization, which has enabled the entry of new participants (ANBIMA & FGV, 2020), more than half of the total net assets of Brazilian funds is concentrated under five managing firms (ANBIMA, 2021).

Ying Luo (2002) showed that market competition significantly impacted fees. In the United Kingdom's (UK) mutual fund industry, Keswani and Stolin (2006) studied the influence of competition on fund performance persistence and showed that the industry concentration index was significantly and positively related to performance persistence.

Similarly, analyzing the US market, Wahal and Wang (2011) concluded that strong competition tends to motivate a decrease in management fees and lower flows to funds. Later, In et al. (2014) studied the impact of competition on socially responsible funds, especially on performance. The results suggest that the specific segment of socially responsible funds may not resemble a competitive market, since increased competition has positively impacted the performance of this type of fund. As for the impact of competition on fees, In et al. (2014) obtained results showing that the fees used to cover the funds' marketing costs become higher with increased competition, probably due to additional costs deployed in an attempt to attract more investors.

Parida and Tang (2017) analyzed the impact of market competition on fund fees and argued that, as fees are set by the managing institutions themselves, they should decrease with competition. However, the results showed that funds operating in segments with greater competition set higher fees. The authors observed that larger funds showed a stronger positive relationship between fees and competition than smaller funds.

On the other hand, Hoberg et al. (2018) showed that, when operating in markets with less competition, managers, in general, charge higher management fees, which increase dynamically, as they manage to obtain higher returns than their peers. It is worth noticing that these authors analyzed, within the period from 1980 to 2012, a sample of open-ended and actively managed mutual funds in the USA.

As a complement to previous studies, Ferreira et al. (2019) pointed out that a hypothesis that could justify the relationship between competition and fund performance is that, in markets with less competition, managers have the power to get more money from shareholders by charging higher fees. Indeed, the authors found evidence of a negative correlation between average fees and measures of industry competition, but highlighted that this effect is not strong enough. More recently, Leippold and Rueegg (2020) analyzed equity investment funds from various classes and regions, and assume that the fund segment studied has high competition and were in favor of the existence of competitive balance, due to lack of performance persistence.

Therefore, it appears that some authors have found indications that funds from markets with less competition have higher fees (Hoberg et al., 2018; Luo, 2002; Wahal & Wang, 2011), while others have shown that fees are higher in more competitive markets (In et al., 2014; Parida & Tang, 2017). When considering the hypothesis of strategic setting of management fees by Christoffersen and Musto (2002), according to the argument proposed by Parida and Tang (2017), it is expected that increased competition leads to an increase in fund management fees, which constitutes the hypothesis 1 of this study.

## 2.2 Studies on Investor Sentiment in the Fund Industry

Yoshinaga and Castro (2012, p. 191) defined investor sentiment as “[...] a belief about future cash flows and investment risks that are not rationally justifiable based on the informational content that the investor has.” In this sense, Baker and Wurgler (2006) argued that classic finance studies leave no room for analysis of investor sentiment. Behavioral finance assumes that individuals are subject to the effects of cognitive biases in the decision-making process, especially in situations involving uncertainty and risk (Kahneman & Tversky, 1979). Therefore, it becomes interesting to analyze the effects of investor sentiment in the fund industry, where uncertainty is inherent to the decision-making process of administrators, managers, and investors.

From this perspective, several studies have analyzed the effects of investor sentiment, especially in the stock market (Baker & Wurgler, 2006, 2007; Pan, 2020; Yoshinaga & Castro, 2012). In the fund industry, some studies have highlighted the effects of investor sentiment on fund performance (Bu, 2020a, 2020b; Wang et al., 2020), management strategies (Massa & Yadav, 2015), and on the amount of management fees (Hu et al., 2016). Wang et al. (2020) studied the effect of investor sentiment on risk and fund performance in China. As a result, they found that investor sentiment was negatively related to performance and the risk taken by funds. The authors argued that this evidence are in favor of the propositions of the ‘dumb money’ effect, since an increased demand for funds leads to inferior performance obtained by shareholders; and that managers tend to reduce risks in periods of high levels of investor sentiment, thus contributing to controlling overall market risk. Bu (2020a, 2020b), on the other hand, found divergent results. The author found that the alpha of funds is higher and more likely to be obtained in periods of high investor sentiment.

Massa and Yadav (2015) addressed the management strategies used by equity investment funds in the USA. Their results showed strong evidence in favor of using the opposite strategy, so that funds whose portfolios are less sensitive to investor sentiment outperformed those with higher beta, controlling for risk factors and those related to fund characteristics.

Hu et al. (2016) conducted a study on management fees, using a behavioral perspective based on investor sentiment. The authors' argument was that, due to the expectation of good results in the short term, investors who are more strongly driven by sentiment seek to invest in assets relying on qualified management. This increases the demand for shares in investment funds and, therefore, their assets. As a significant portion of the operating costs of financial managers corresponds to a fixed amount, in periods when investors are strongly influenced by sentiment, such amount can be covered by a smaller percentage of the assets in their portfolio (Hu et al., 2016).

In contrast, where investors are less driven by sentiment, they are more likely to accept share prices and consider management fees to be fair. In this case, due to the informational asymmetry in the market and the managers' quest to maximize their utility, higher fees may be set, which leads to worse future net profitability for shareholders. Therefore, as investors are rather driven by sentiment, the greater the demand for funds with better management skills and the lower the fees (Hu et al., 2016). Thus, based on the results of Hu et al. (2016), it is expected, in periods of low sentiment, that management fees are higher, evidencing a negative relationship between these variables.

In this context, it is observed that the level of investors' sensitivity to fund performance is considered a factor that can influence the amounts of management fees charged.

### 3. METHODOLOGY

#### 3.1 Sample Delimitation and Data Source

The sample consists of actively managed Brazilian equity investment funds. This approach is justified because they are funds that tend to charge higher fees than passive funds (Castro & Minardi, 2009), and in active funds, performance is affected by several factors, resulting from active strategies (Milani & Ceretta, 2013), but indexed funds do not aim at performance, but at replicating pre-established benchmarks. The following were also excluded from the study: (i) specific funds, due to lack of diversification; and (ii) foreign investment

When investors in a fund have a less elastic demand for their shares, the fund tends to charge higher fees, because investors who are more sensitive to performance would redeem their shares when they notice a bad result (Christoffersen & Musto, 2002). From this perspective, the funds with better performance compete for the resources of investors considered 'sophisticated' and end up setting lower fees than the funds with worse performance (Gil-Bazo & Ruiz-Verdú, 2008).

Thus, Gil-Bazo and Ruiz-Verdú (2008) found evidence that funds with worse past performance set lower or equal fees to funds with better performance. Top-performing funds charge lower fees by competing for the resources of investors who are considered 'sophisticated' (i.e. sensitive to fees and performance). The authors also pointed out that the charging of higher fees by funds with worse performance expectations - and worse management quality - overwhelms investors, who, in addition to obtaining a worse result, incur higher costs, further reducing their net income.

It is worth noticing that investor sentiment is not directly observable and that, for this reason, there are numerous proxies for it, there is no perfect or incontestable proxy for measuring it, as highlighted by Baker and Wurgler (2006). Thus, there are several proxies in the literature that seek to capture investor sentiment, and several authors use the Baker and Wurgler's (2006) index, or adaptations based on this index. In addition, in Brazil, there is the Consumer Confidence Index (CCI), which some authors used as a proxy for sentiment (Lemmon, 2006; Marschner & Ceretta, 2021; Schmeling, 2009).

As for investor sentiment, a negative relationship with fees is expected, as argued by Hu et al. (2016), due to the increased demand for qualified management in periods when investors are more strongly driven by sentiment, which constitutes the hypothesis 2 of this study.

funds, as they are associated with risk factors in the foreign market.

The sample is also restricted to all funds in the subcategories "Free Stocks," "Active Index," "Value/Growth," and "Dividends," which together manage the largest portion of the total net assets invested in the category "Actively Managed Equity Funds" (98% of the total net assets invested in active equity funds is allocated to these subcategories). The sampling period was from December 2009 to December 2019, every 6 months, totaling 20 semesters, due to availability and data collection period.

The information used in the work was taken from the databases made available by ANBIMA, by Economática, by the Brazilian Center for Research in Financial Economics of the University of São Paulo (Núcleo de Pesquisa em Economia Financeira da Universidade de São Paulo [NEFIN-USP]), by the Institute of Applied Economic Research (Instituto de Pesquisa Econômica Aplicada [IPEADATA]), the CVM, and the Brazil Stock Exchange and Over-the-Counter Market (Brasil, Bolsa, Balcão [B3]). Due to data availability, monthly data were collected to estimate the proxies and obtain the research variables. Subsequently, they received the value of the last information available in the semester concerned, to obtain half-yearly data.

Incubation and survival biases were considered. According to Sanvicente and Sanches (2002), disregarding the survival bias can lead to wrong conclusions; to avoid

this, the funds that were closed during the analysis period of this study were kept in the sample. Funds with less than 12 months duration were also excluded. As for the incubation bias, it happens because, when launching new funds on the market, managing institutions close part of them, remaining open only those with better results. According to Borges and Martelanc (2015), it is likely that funds recently launched on the market will not reach net assets of R\$ 5 million. For this reason, funds with assets below this amount were excluded from the sample.

### 3.2 Variables Used in the Research

Table 1 displays the variables that were used in this study and their estimation method, when needed, along with the bibliographic references on which they were based.

**Table 1**  
General information about model variables

Variable	Calculation	Bibliographic source	Database
Management fee ( $TxAdm$ )	Expressed as a percentage per semester (126 days) of shareholders' net assets.	CVM (2014) Silva et al. (2018)	SI-ANBIMA 4.3.
Concentration Index ( $HHI$ )	$HHI_{j,t} = -\sum_{i=1}^{N_{j,t}} S_{i,j,t}^2$ where: $S_{i,j,t}$ is the total net assets of the fund family $i$ in the class $j$ , in the period $t$ , divided by the total net assets of all funds operating in the class $j$ ; $N_{j,t}$ is the number of fund families in the class $j$ in the period $t$ .	Feldman et al. (2020) Ferreira et al. (2019) Parida e Tang (2017)	Own estimation. Information on family size and fund classes taken from the system SI-ANBIMA 4.3.
Investor sentiment ( $SENT$ )	Building a proxy to capture investor sentiment, by performing an ACP of the following variables: NIPO, AD, PDIV, and PINDIV. The calculation methodology for each of them is shown in Section 3.3.2. Alternatively, investor sentiment was captured using the Consumer Confidence Index (CCI), as follows: $SENT_{i,t} = \ln(CCI_{i,t})$ where: CCI is the Consumer Confidence Index.	Lemmon (2006) Marschner and Ceretta (2021) Miranda and Machado (2018) Schmeling (2009)	Own estimation. Estimation information was collected from the databases Economática, CVM, B3, and IPEADATA.
Performance ( $Alfa$ )	$r_{i,t} - r_{f,t} = \alpha + b(r_{m,t} - r_{f,t}) + sSMB_t + yHML_t + pWML_t + \varepsilon_{it}$ where: $r_{i,t} - r_{f,t}$ is the excess return on the fund $i$ , in the period $t$ ; $r_{m,t} - r_{f,t}$ is the excess market return in the period $t$ ; $\alpha$ is the performance of the fund $i$ in the period, given by the intercept of the regression; $b, s, y, p$ are the beta coefficients of the regression over the period; $SMB_t$ is the size factor; $HML_t$ is the book-to-market factor; $WML_t$ is the momentum factor; $\varepsilon_{it}$ is the error term.	Bu (2020a) Fernandes et al. (2018) Gil-Bazo and Ruiz-Verdú (2009) Silva et al. (2020) Vidal et al. (2015)	Own estimation.
Age ( $Ida$ )	Time, in semesters, since the opening of the fund.	–	SI-ANBIMA 4.3.
Size ( $Size$ )	$Size_{i,t} = \ln(NA_{i,t})$ where: $Size_{i,t}$ is the size of the fund $i$ , in the period $t$ ; $NA_{i,t}$ is the net assets of the fund $i$ , in the period $t$ .	–	SI-ANBIMA 4.3.
Type ( $Type$ )	Dummy variable that takes the value 1, if the fund is open, and 0, otherwise.	–	SI-ANBIMA 4.3.

**Table 1**  
Cont.

Variable	Calculation	Bibliographic source	Database
Manager ( <i>Man</i> )	Dummy variable that takes the value 1, if there is a coincidence between the manager and the fund administrator, and 0, otherwise.	–	SI-ANBIMA 4.3.
Market Segmentation ( <i>MS</i> )	Dummy variable that takes the value 1, if the fund is exclusive, and 0, otherwise.	–	SI-ANBIMA 4.3.
Risk Free ( <i>Rf</i> )	Risk-free rate of return in Brazil, estimated by IDC returns.	–	Economática.

**Source:** Prepared by the authors.

As a proxy for risk-free asset returns (*Rf*), the Interbank Deposit Certificate (IDC) (Fernandes et al., 2018; Paz et al., 2017) was used. On the other hand, for market returns ( $r_M$ ), Ibovespa returns were used. Management fees were collected in annual amounts and their corresponding effective dates. They were turned into semesters, following a procedure similar to Silva et al. (2018) and reconstituted as a historical series.

### 3.2.1 Estimation of industry concentration measure

As a measure of industry concentration/competition, the Herfindahl-Hirschman index (HHI) was used, similarly to that used by other authors (Feldman et al., 2020; Ferreira et al., 2019; Parida & Tang, 2017). The calculation of the index is shown in Table 1. It was carried out annually and a higher HHI value means greater concentration and less competition.

### 3.2.2 Investor sentiment estimation

Investor sentiment has been measured in two ways: the first based on a proxy built with variables inherent to the capital market and the second based on opinion polls. The sentiment proxy created by Baker and Wurgler (2006) is one of the most used in previous studies, and other adaptations for the Brazilian market emerged from it. Based on adaptations proposed by Miranda and Machado (2018), Yoshinaga and Castro (2012), and Xavier and Machado (2017), the first sentiment proxy was estimated from four variables:

- **NIPO:** represents the number of initial public offerings (IPOs) and subsequent issues, being calculated by the moving average of the last twelve months of the number of IPOs + Follow on;
- **AD:** represents the proportion of rises and falls of stocks (Advancing and Declining) and is calculated using the moving average of the last twelve months of the proportions;

- **PDIV:** represents the dividend premium, calculated by the difference between the market-to-book ratios of companies that do and do not pay dividends;
- **PINVIND:** represents the share of individual investors in B3's financial trading volume, calculated monthly as a percentage.

The information for calculations was taken from databases provided by Economática, the CVM, and B3. Monthly data were collected and estimated and, in the end, the proxy was converted to half-yearly periodicity, using the last available information for the semester concerned.

Such variables were reduced to the sentiment indicator using the principal component analysis technique. The first proxy for sentiment was estimated monthly and subsequently converted into half-yearly values. It is worth noticing that, in order to reduce macroeconomic effects capable of generating noise in the sentiment index, the individual variables were orthogonalized by macroeconomic factors, before formulating the indicator by the ACP, as conducted by Baker and Wurgler (2006) and Miranda and Machado (2018). Macroeconomic variables consist of: Gross Domestic Product (GDP) growth; the Overall Consumer Price Index (Índice de Preços ao Consumidor Amplo [IPCA]); growth in the consumption of durable and non-durable goods and services; job growth; and the recession indicator. These variables were collected from the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatísticas [IBGE]), the Institute of Applied Economic Research (Instituto de Pesquisa Econômica Aplicada [IPEA]), and the National Bureau of Economic Research (NBER).

The second way of measuring sentiment, based on opinion polls, was an alternative to the first estimated proxy. It consists of the logarithm of the CCI, provided by IPEADATA, which is in line with previous studies (Marschner & Ceretta, 2021; Schmeling, 2009).

### 3.3 Performance Estimation

The methodology for estimating the performance of funds followed Carhart's (1997) procedures, which consist of two stages. In the first, a regression of the funds' excess return was performed with the four risk factors, according to Equation 1.

$$r_{i,t} - r_{f,t} = \alpha_i + b_i(r_{m,t} - r_{f,t}) + s_iSMB_t + h_iHML_t + p_iPRIYR_t + \varepsilon_{i,t} \quad \boxed{1}$$

where:

$r_{i,t} - r_{f,t}$ : market risk premium, equal to the fund's excess return  $i$  on the risk-free asset return in the period  $t$ ;

$SMB_t$ : premium for the size-related risk factor in the period  $t$ ;

$HML_t$ : premium for the risk factor related to the book-to-market ratio (book value/market value) in the period  $t$ ;

$PRIYR_t$ : time-related risk factor premium in the period  $t$ ;

$\varepsilon_{i,t}$ : error term.

The market risk factor was measured by the difference between the Ibovespa and CDI returns. The other risk factors were collected from the database made available by the NEFIN-USP, similarly to what was done by Nerasti and Lucinda (2016).

The second step consisted of calculating the difference between the funds' excess gross returns and the risk premium, which is equivalent to the sum of the products between the Beta coefficients obtained in the regression of Equation 1 and the risk factors. Due to data availability, Alpha values were estimated with monthly data, using

$$TxAdm_{i,t} = \beta_0 + \beta_1 * HHI_{i,t-1} + \beta_2 * SENT_{t-1} + \beta_3 * Alfa_{i,t-1} + \beta_4 * Age_{i,t-1} + \beta_5 * Size_{i,t-1} + \beta_6 * Type_{i,t-1} + \beta_7 * Man_{i,t-1} + \beta_8 * SM_{i,t-1} + \beta_9 * Rf_{t-1} + \varepsilon_{it} \quad \boxed{2}$$

where:

$TxAdm_{i,t}$ : change in the management fee, for the Logit/Probit model, which receives the value 1 for funds that have changed their fees in the period concerned, and 0, otherwise.

$HHI_{i,t-1}$ : indicator variable of the fund's Herfindahl-Hirschman index  $i$  in the period  $t$ ;

$SENT_{t-1}$ : indicator variable of the proxy for investor sentiment, in the period  $t$ ;

$Alfa_{i,t-1}$ : performance indicator, given by the Alpha value of Carhart's (1997) model, of the fund  $i$  in the period  $t-1$ ;

$Age_{i,t-1}$ : age of the fund  $i$  in the period  $t-1$ ;

$Size_{i,t-1}$ : size of the fund  $i$  in the period  $t-1$ ;

$Type_{i,t-1}$ : a dummy variable for the fund  $i$  in the period  $t-1$ , which takes the value 1, if the fund is open, and the value 0, otherwise;

$Man_{i,t-1}$ : a dummy variable for the fund  $i$  in the period  $t-1$ , which takes the value 1, if the manager and the

moving windows of three previous years (36 months). Subsequently, the last measure of the semester was used to obtain the semester variable.

### 3.4 Econometric Model Estimation: Probability of Changing Management Fees

In this study, the management fee, explained variable, was analyzed in fee changes (dichotomous nature). The dichotomous nature refers to verifying, or not, changes in them in relation to the previous period. Thus, the results of this study pointed out the marginal effects of the explanatory variables on the probability of changing fees. To create the dummies, for each fund, the fee in  $t$  was subtracted from the fee in  $t-1$ , so if this amount results in a positive value, it is verified that there was an increase in the management fee, when the opposite occurs, i.e. a negative value is obtained, there is a reduced management fee, finally, if this result is null, it is verified that there was no change in the management fee. Thus, two dummies can be created for the management fee: one representing increased fees and one representing decreased fees.

For this, a Logit/Probit model was used, which had the management fee as a dependent variable and, as independent variables: concentration index, investor sentiment proxy, performance, age, size, type of fund, detachment from the person responsible for management and administration, and market segmentation. Equation 2 describes the procedure.

administrator are the same person, and the value 0, otherwise;

$SM_{i,t-1}$ : a dummy variable indicative of the market segmentation of the fund  $i$  in the period  $t-1$ , which takes the value 1, if it is exclusive, and the value 0, otherwise;

$Rf_{t-1}$ : risk-free interest rate in the period  $t-1$ ;

$\varepsilon_{i,t}$ : the error term.

Therefore, we chose to estimate a Logit/Probit model for panel data, in order to investigate the possible marginal effects of competition and investor sentiment on the probability that the fund changes the amount of the management fee.

Regarding the extreme observations, the outliers, they were identified and processed through the Winsorization process at 0.5%. As for the Probit and Logit models, Chi-Square and Log Likelihood tests were performed to assess significance. To test whether there was any null coefficient, the Wald Test (Chi-Square test) was performed.



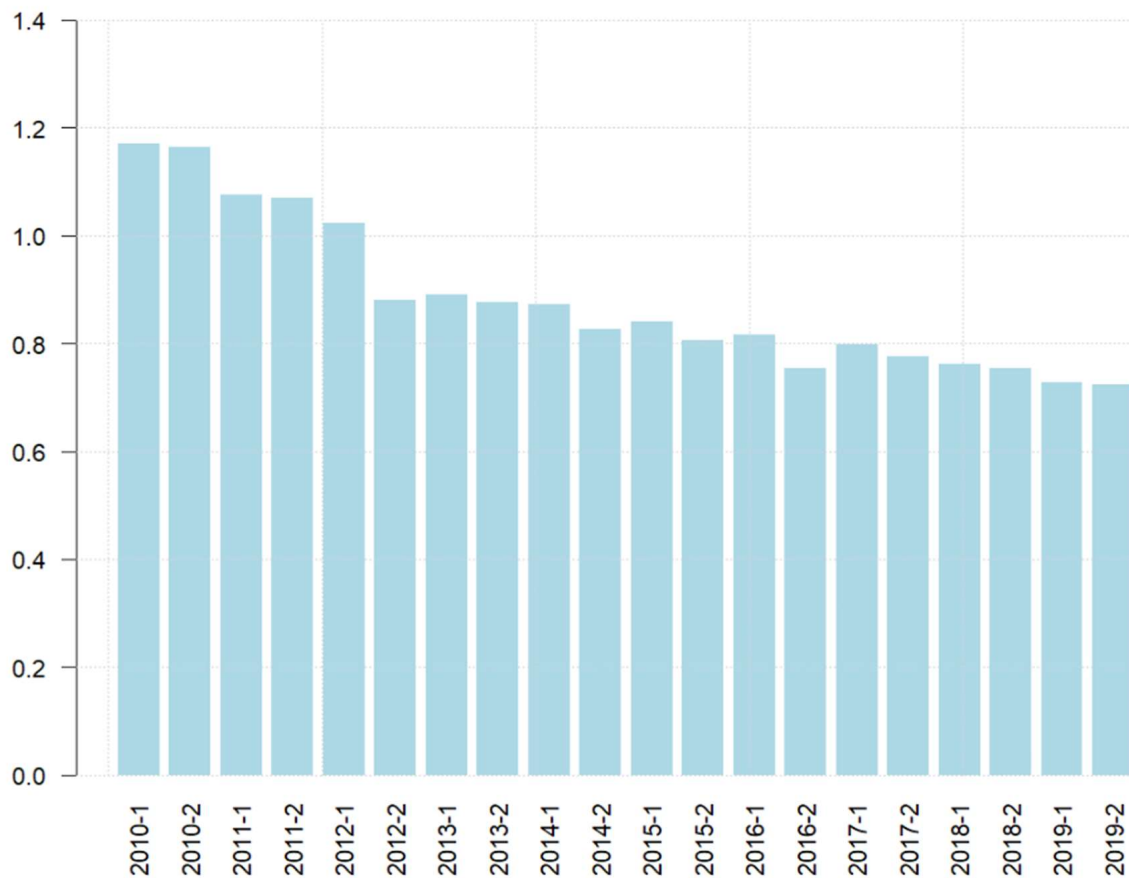
## 4. PRESENTATION AND ANALYSIS OF RESULTS

### 4.1 Descriptive Statistics

Figure 1 shows the evolution of average management fees, from June 2010 to December 2019. It is possible to observe a reduction in average management fees during the sample period. Also, it can be seen that the average values of the fees did not undergo large fluctuations over time.

Table 2 displays the descriptive statistics of the research's continuous variables, considering all stock funds existing

in the sample. It is observed that the management fees had an average value of 0.80% per semester, being 3.44% per semester the highest value found in the sample. These values are consistent with those reported by Silva et al. (2018) for 2014 and 2015. Also, it was observed that 119 funds increased management fees (9.23% of the funds), while 156 funds decreased them (12.09% of the funds), out of which 21 both increased and decreased fees in the analyzed period.



**Figure 1** Evolution of average management fees (% per semester), from Jun./2010 to Dec./2019

**Note:** Management fees in % a.s.

**Source:** Prepared by the authors.

Regarding the HHI index, the average corresponded to 0.16, with 0.17 being the maximum observed. The standard deviation of this variable was 0.01, which suggests that competition in the study sample did not show a wide range of observed values. The values found are not similar to those reported by Parida and Tang (2018) for the US market, indicating that the two markets have

different competition levels in the fund industry. As for investor sentiment, the proxy, estimated according to adaptations for the Brazilian market, showed negative mean and median values. On the other hand, the proxy for sentiment, which consists of the natural logarithm of the CCI, obtained a mean value of 4.73 and a standard deviation of 0.16.

**Table 2**

Descriptive statistics of variables: Dec./2009 to Dec./2019

	Manag. Fee (% per semester)	HHI	SENT <sub>1</sub>	SENT <sub>2</sub>	Alpha (% per semester)	Age (sem)	NA (R\$ million)	Net Ret. (% per semester)
<b>Stock Funds</b>								
Nr. obs.	7844	7844	7844	7844	7844	7844	7844	7844
Minimum	0.00	0.13	-2.76	4.47	-4.13	0.66	0.00	-32.31
Maximum	3.44	0.17	3.47	5.10	2.44	106.36	9542.12	18.85
1st Quartile	0.25	0.15	-1.01	4.61	-0.45	10.49	20.39	-2.32
3rd Quartile	1.14	0.16	0.23	4.85	0.73	19.81	190.53	4.17
Mean	0.80	0.16	-0.12	4.73	0.06	17.09	204.90	0.60
Median	0.80	0.16	-0.23	4.70	0.18	14.21	65.64	0.59
Stand. Dev.	0.62	0.01	1.45	0.16	1.06	10.92	465.10	6.75
Asymmetry	0.84	-0.61	1.04	0.69	-0.97	2.83	7.25	-1.31
Kurtosis	1.26	0.45	1.26	-0.14	1.98	11.43	80.73	5.81

**Note:** The proxy  $SENT_1$  corresponds to the indicator built according to the adaptations of Miranda and Machado (2018), Yoshinaga and Castro (2012), and Xavier and Machado (2017); and  $SENT_2$  consists of the CCI logarithm. Net Ret. is the net return of the risk-free rate. The Alpha and the Net Ret. were calculated monthly and the last information of the semester concerned was used to obtain these semester variables. The total number of sample stock fund funds is 1,290.

**Source:** Prepared by the authors.

By analyzing Table 2, it is observed that, on average, the funds in the sample obtained a small return in excess of the expected, considering the exposure to risk – the average performance (Alpha) of the stock funds studied was equal to 0.06 % per semester. Furthermore, the average age of the funds was 17.09 semesters, i.e. less than 9 years; the minimum age was 0.66 semesters; and the maximum age, 106.36 semesters – over 53 years. Finally, the average fund size corresponded to almost R\$ 205 million.

#### 4.2 Results of Probit/Logit Regression Models: Probability of Changing Management Fees

Table 3 shows the results of determinants of the probability of changing the funds' management fees.

Although the literature argues that, in theoretical terms, there is no superiority between Logit and Probit models, both of which produce similar results (Correia et al., 2018; Pesaran, 2016), both models were also chosen as a way of increasing robustness.

In order to better investigate the sign of changes in the fees provided by the explanatory variables, two models were created: a Logit/Probit model whose explained variable was a dummy variable that received the value 1, when an increased management fee was found in relation to the previous period, and 0 otherwise; and a Logit/Probit model in which the explained variable was a dummy that received the value 1, when there was a decreased management fee in relation to the previous period, and 0 otherwise. The results are shown in Table 3.

**Table 3**

Probit and Logit models for analyzing the probability of increasing and decreasing management fees, after corrections for robust standard errors: stock funds, from Jun./2010 to Dec./2019

	Increase				Decrease			
	Probit		Logit		Probit		Logit	
	Coef.	Sig	Coef.	Sig	Coef.	Sig	Coef.	Sig
Intercept	-5.9175	***	-12.3665	***	-4.4743	***	-9.2610	***
HHI	-0.2374		-0.9399		3.4090		7.6249	
$SENT_1$	0.0394		0.0798		0.0399		0.0918	
$SENT_2$	0.8252	***	1.8435	***	0.5232	**	1.1604	***
Alpha	0.0082		0.0218		0.0642		0.1501	
Age	-0.0062		-0.0148		-0.0014		-0.0029	
Size	0.0117		0.0246		-0.0322	**	-0.0704	**

**Table 3**  
Cont.

	Increase				Decrease			
	Probit		Logit		Probit		Logit	
	Coef.	Sig	Coef.	Sig	Coef.	Sig	Coef.	Sig
Type	0.2230		0.4816		0.2354		0.5082	
Manager	-0.2688	***	-0.5991	***	-0.2178	***	-0.4894	***
SM	0.1425	**	0.2795	**	0.1551	**	0.3440	***
Rf	3.5495		7.7321		19.0401		45.1944	

**Note:** \*\* and \*\*\* denote a statistically significant result at 5%, 1% of significance, respectively. *HHI* is the concentration index; *SENT<sub>1</sub>* corresponds to the indicator built according to the adaptations of Miranda and Machado (2019), Yoshinaga and Castro (2012), and Xavier and Machado (2017); and *SENT<sub>2</sub>* consists of the natural logarithm of the Consumer Confidence Index (CCI); *Alpha* is the measure of performance; *Age* is the number of semesters since the funds were opened; *Size* is the natural logarithm of net assets; *Type* is the dummy variable that takes the value 1 for open funds and 0 for closed funds; *Manager* is the dummy variable that receives 1, when there is a coincidence between fund management and administration, and 0, otherwise; *SM* is the dummy variable that takes the value 1 for exclusive funds and 0 for non-exclusive ones; and *Rf* is the risk-free interest rate. It is worth noticing that the correlation between the measures *SENT<sub>1</sub>* and *SENT<sub>2</sub>* is 0.0115.

**Source:** Prepared by the authors.

In general, in Table 3, it is observed that industry competition (HHI) was not a significant variable at 5% in predicting the probability of change in management fees, either to increase or decrease. No evidence was found to support hypothesis 1, i.e. changes in competition in the fund industry under study do not significantly affect the probability of change (increase or decrease) in fund management fees. This may indicate that the competition level is low, or that management fees are not strategically set, as proposed by Christoffersen and Musto (2002) and Parida and Tang (2017).

On the other hand, regarding investor sentiment, the results in Table 3 show that investor sentiment (*SENT<sub>2</sub>*) was significant at 5% to explain both the increased and decreased management fees. The result partially supports the hypothesis 2, since increases in sentiment promote a decrease in fees, due to the demand for qualified management in these periods, as discussed by Hu et al. (2016). However, the coefficients obtained for changes in the increase were higher than those obtained for

decreasing fees, and from this it can be inferred that the increase in sentiment provided a greater probability of an increase in fees than a decrease. This result may be signaling that managers have an opportunistic behavior of setting higher fees when realizing the growth of investor sentiment and, consequently, the demand for fund shares.

As for the coincidence between fund management and administration, it was observed that it reduced the probability of changing management fees; and that this decrease was greater in relation to changes to increase fees than to decrease them. This may indicate that, in these cases, management fees undergo little change, consistent with the lower agency cost in managing the funds. Regarding market segmentation, the coefficients obtained reveal that the exclusive funds were more likely to decrease their management fees than to increase them, which may be reflecting a greater monitoring capacity of shareholders in these funds (Paz et al., 2017). The other control variables were not significant.

## 5. FINAL REMARKS

This article analyzed the influence of fund industry competition and investor sentiment on the likelihood of changes in management fees for stock investment funds in Brazil. The sample consisted of stock funds, with active management, from December 2009 to December 2019. To meet the goal, a Logit/Probit regression model was used, in which the management fee was dichotomous, indicating whether or not it had a change in its amount in relation to the last period.

The results showed that there is no evidence that the fund management fee responds to changes in the competition level for the sample under analysis. This result may be due to the characteristics of the fund market in Brazil, where, although there is a wide range of funds available to investors, most of them are managed by a few firms (Iquiapaza, 2009). Data provided by the ANBIMA (2021) reveal that more than half of the accumulated net assets of investment funds is concentrated under

the management of only five firms. As highlighted by Luo (2002), the lack of competition in the fund industry is also the result of barriers to the entry of new funds, such as economies of scale and learning gains achieved by larger and older funds, respectively; and barriers to investor exit, such as redemption fees.

However, further studies could analyze other measures of industry concentration/competition, such as the entry of new funds in the market or even extend the analyses to other fund categories, so that it is possible to verify whether these results are maintained.

As for investor sentiment, the proxy that was estimated from the CCI was significant and positive, suggesting that management fees tend to be higher and more likely to change after periods in which consumer confidence (proxy for investor sentiment) is higher. Such changes are more likely to take place for setting higher fees, when they occur as a result of increased sentiment. It is possible that an increase in investor sentiment leads them to be more interested in investing in assets with qualified management, because of the expectation of good results in the short term, leading to increased demand for investment fund shares (Hu et al., 2016); and managers with an opportunistic behavior, when

realizing this phenomenon, set higher fees. This result differs from that obtained by Hu et al. (2016) for the US market.

This research contributes to academia by bringing new empirical evidence with regard to the variables that influence management fees in investment funds. In practical terms, this research may be useful to investors in the process of selecting funds to invest in, since the management fee represents one of the main costs an investor faces when investing in this industry. Therefore, he can pay attention to the characteristics that may influence the probability of change in management fees in stock funds of interest.

As a limitation, it is observed that over the sample period, the management fees did not show many changes. In this way, analyzing other periods will allow us to confirm, or not, these results, especially during periods of great uncertainty such as the coronavirus disease 2019 (COVID-19) pandemic. In addition, it is necessary to investigate other control variables, those considered in this study, such as performance, size, and age, did not prove to be significant. One can also investigate the issue using other econometric models, to explain the level and not the variations of management fees.

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