

## PERFORMANCE OF FUNDS OF FUNDS IN BRAZIL

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### ABSTRACT

Among the modalities of existing funds are the Investment Funds in Quotas (FICs), which they are funds that acquire shares from other funds instead of directly investing in market assets. In addition to offering the inherent advantages of traditional funds, the FIC allows the expansion of investment options, since its structure allows access to several other funds with low initial investment. On the other hand, the structure of the FICs presents rates and costs that can negatively affect their performance. However, the objective of this study is to analyze the performance of the Brazilian FICs, with focus on the other funds. From a sample of 1,723 stock funds, with data available for the period from January 2005 to March 2016, the analysis was used to reach the objective of the study. The results indicated better performance indicators (Sharpe Ratio) for FICs, compared to the other funds in the sample.

**Keywords:** Institutional investors. Funds of funds. Funds of equity funds. Investment funds. Performance.

### 1 INTRODUCTION

The fund industry in Brazil has shown growth both in absolute terms and when compared to other regions such as Latin America and the United States, although the US fund industry is approximately 14 times larger than the Brazilian one. This growth made it possible to develop and regulate various types of investment funds. Among the modalities of existing funds are Investment Funds in Quotas (FICs), which, instead of directly investing in stock market assets, acquire holdings from other funds (Varga & Wengert, 2011).

In addition to offering the inherent advantages of traditional funds, FICs allow the expansion of investment options, as their structure allows investors to access various other funds, including closed, and low initial investment. Despite this, they present additional costs and fees compared to traditional direct funds, since in addition to the fees from the underlying funds, the investor also assumes extra expenses related to FIC management (Bertin & Prather, 2009, Ang, Rhodes-Kropf, Zhao, 2008).

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Some studies suggest that the higher costs of FICs are offset by the diversification and management model. Dai and Shawky's work (2010) shows that the more diversified the FIC the better the result and the lower the risk. Turner (2004) points out that the fund manager can add value through the ability to choose the best mix of markets or class of assets to invest in and identify the individual fund managers who are better. Elaborated to achieve the proposed objectives. Despite of this fact, Amenc and Vaissié (2006) observed that only 20% of the FICs analyzed presented value creation, taking into account portfolio and management construction.

In Brazil, few works deal with FICs. Malaquias and Eid (2014) found that, in times of crisis, FICs were able to add more value than other multimarket funds. Accordingly, Malaquias and Mamede (2015) were compared with the other investment funds. Regarding funds flows from fund managers, Cotrim (2012) states that Brazilian FIC managers supervise to generate value to the adversary as strategies that will compose a portfolio of funds, but they destroy value by trying to make good funds within each strategy.

FICs are generally included in Brazilian academic studies as a control variable (Assali, 2008; Malaquias and Eid, 2014; Malaquias and Mamede, 2015). The indicators showed that FICs have a different structure from the other investment funds, which motivated a study with emphasis on the type of institutional investor. Thus, the research summary consists of analyzing the determinants of the return to risk of Brazilian equity investment funds, with a focus on quota funds.

Data from the Investment Company Institute (2014) in 2013, the assets of the Latin American bond mutual recognition industry totaled approximately US \$ 1.2 trillion, almost 25% higher than in 2009, which was US \$ 905 billion. It is worth mentioning that Latin American participation was 85% in 2013, equivalent to almost US \$ 1.02 trillion. Of note is a growth that expresses values, since in 2009 Brazil had US \$ 784 billion of funds of funds.

According to data from the Investment Company Institute (2014), in analyzing the assets of the BRICS vehicle industry (Brazil, Russia, India, China and South Africa) in 2013, the existing value was US \$ 1.75 trillion, almost 26% higher than in 2009, disbursed at US \$ 1.30 trillion. Brazil's participation in relation to the BRICS in 2013 was 58.2% and in 2009, 60.4%. Despite the participation in Brazil, it is not so important in the BRICS in comparison to Latin America, it is still quite significant, and therefore represents a relevant market to be studied.

It is worth mentioning that FICs are inserted in an important segment of the Brazilian financial market: institutional investors. This class of investors is responsible for moving significant amounts of resources in the financial market, characterizing itself as the largest investors in investment funds in Brazil (Institute of Applied Economic Research, 2015).

## 2 REVIEW OF LITERATURE

Investment funds are among the main ways of attracting and allocating existing financial resources. The volume of funds invested in this type of investment grew significantly in Brazil in the early 1990s, with the process of economic liberalization. It provided the creation of several new funds and increased investment in existing funds (Milani, Ceretta, Barba, & Casarin, 2010).

According to Bertin and Prather (2009), the investment fund industry has witnessed a rapid growth in a category of funds called funds of investment funds (FIC). Basically, FICs are funds that invest in traditional funds instead of investing directly in the financial market. Ang et al. (2008) indicate three main reasons for increasing the popularity of these funds: i) the possibility for investors to access investment funds that are closed to individual investors; ii) minimum investment required when compared to other funds; iii) access to diversified portfolio, so that only individual investors with large amounts of capital could replicate this level of diversification.

According to Fothergill and Coke (2001), FICs offer investors a broad range of alternative investment strategies based on the combination of different underlying funds in the FIC portfolio, so such diversification can provide returns with low levels of risk. In addition, because of the structure of the FICs, individual investors tend to obtain greater transparency benefits than they would have if they invested in an investment fund in a direct way, thus minimizing eventual problems with the choice of the fund or the due process. diligence, for

example. Despite these benefits, it is important to highlight that FICs present additional costs and fees compared to traditional funds, which make them more expensive. According to Ang et al. (2008), FICs pass on to investors all the fees charged by the underlying funds in the quota fund portfolio. In addition, there are extra fees to compensate the fund manager, which are also relevant and may corrode a possible performance above the expected return.

When comparing the performance of traditional hedge funds and FICs of hedge funds, Ammann and Moerth (2008) observed that the average annual return of hedge funds was 8.42% in the period from January 1994 to April 2005, while FICs presented a 6.53% average annual return for the same period. The authors attributed this difference in performance precisely to the FIC rate structure, so the results suggested an additional incidence rate of 1.84% per year compared to the direct hedge funds, very close to the difference from the average performance (1.89% per annum).

Regarding the profitability, it is worth mentioning some studies on private equity FICs, such as Aggarwal, Sharma and Prashar (2012), which, when listing three private equity FIC indexes with five market indices (AORD, SSE Composite, N225, FTSE 100 and S & P500), showed that two of the three FIC indexes showed higher annual returns than four of the market indexes in four of the five years analyzed. Gresch and Wyss (2011), in analyzing 1,641 private equity funds, indicated that FICs are more attractive in terms of risk and return than direct investment funds.

On the other hand, Denvir and Hutson (2006), when analyzing data from 332 FICs, from January 1990 to May 2003, performed worse than individual hedge funds, due to the high rates inherent to the structure of FICs. Nevertheless, the authors have also shown valuable features of FICs that compensate for this problem, it is mentioned, that their returns do not suffer from the same negative asymmetry that characterizes the return of hedge funds.

In the case of the Brazilian FICs, the results of the study by Malaquias and Mamede (2015) suggested better performance indicators in comparison to the other investment funds, even with the structure that involves higher rates.

Similarly, Rocco (2009) studied the profitability, volatility, equity and risk-adjusted return of Brazilian multimarket funds, comparing the results of direct funds and FICs in the period from 2002 to 2007. Among the results, Rocco (2009) found evidence of Sharpe's highest index for investment funds in quotas of other funds in relation to funds that invest directly in assets of the market.

In addition, Malaquias and Eid (2014), when analyzing Brazilian multimarket funds, found that FICs, even with the structure with higher rates of interest than traditional funds, can add more value than the other multimarket funds analyzed. The justification for this is that FICs are able to find forecasted trading opportunities in a segment that does not conform to the Market Efficiency Hypothesis. It is worth mentioning that, according to the authors, the size of funds, regardless of the period analyzed, presented a positive relation with performance, that is, the higher the fund the better its performance.

According to Geranio and Zanotti (2005), FICs have the highest management rate compared to other categories of funds. This rate reflects the costs with how the funds are managed. FICs that invest in systems by their same asset management company charge only a commission, while those who buy funds in another management company add extra management fee to compensate for asset allocation services. The authors also indicated two explanations for the higher FICs rates: i) a premium price because of the benefit provided by the diversification; ii) the predominance of quota funds investing in systems not managed by the same promoter. These arguments lead one to think that the relationship between performance and the FICs management rate may behave differently from that presented in traditional funds.

Some studies suggest that while FICs are more expensive, this can be offset by the benefits provided by diversification. Compared to traditional investment funds, the Bertin and Prather (2009) survey showed a favorable performance during the period from 1996 to 2003, mainly due to the diversification of fund managers.

The study also pointed out that the identification of the management team and the management knowledge influence the FICs performance. Dai and Shawky (2010) have found evidence of better results when comparing performance among specialized stock funds (diversify only among managers but are within a single fund strategy) and diversified (diversify

both among managers and fund strategies) and the lower the risk the greater the diversification. Amo, Harasty and Hillion (2007) also studied the benefits of FIC diversification. Their results indicated that by adding only a small number of hedge funds, no more than six, hedge fund risk falls by half compared to individual hedge funds.

In contrast to earlier work on diversification, according to Brown, Gregoriou and Pascalau (2012), the risk reduction provided by FICs tends to end when it reaches between 10 and 20 underlying hedge funds. In addition, the diversification of over 25 underlying funds leads, in most cases, to a significant reduction in performance. In this way, it is perceived that there are relevant limits regarding the diversification provided by the FICs.

Brands and Gallagher (2005) also argue that regardless of the portfolio selection strategy, most FIC diversification gains are obtained with a portfolio comprising only six funds. After this point, the incremental increases in the number of funds held in the portfolio do not show significant gains from the risk and return point of view.

Besides with regard to the fund portfolio, Milan and Eid (2014) analyzed the turnover of Brazilian investment funds portfolios from 2007 to 2011, in order to identify possible effects on performance. The main results presented by the authors indicated that high levels of monthly portfolio turnover exert a negative effect on performance. In addition, the FICs showed significantly lower monthly turnover rates than stock funds, therefore, it was suggested that FICs tend to maintain their stable portfolios.

Another factor that may represent an important advantage for FICs is the choice of the manager. Borges and Martelanc (2015), from ten thousand data simulations, from Brazilian stock investment funds from 2000 to 2013, have found consistent evidence of the ability of fund managers to produce positive abnormal returns, that is to say, higher than those that would be obtained by pure luck, especially in managers of large funds.

In this context, Reddy, Brady and Patel (2007) affirm that FICs can choose managers from a large universe of funds, whereas a multi-strategy manager, for example, is limited to her/his ability to hire teams according to each strategy that participates. Thus, in a sense, it is possible to state that an FIC has access to the best managers for a wide range of investment strategy. This can have a positive impact on fund performance if you can build a portfolio with high-average managers.

Turner (2004) points out that by investing in an FIC, unlike in a common fund, the fund manager can add value through the ability to choose the best mix of markets or class of assets to invest. It identifies individual fund managers who are best Elaborated to deliver value in these markets in order to achieve the fund's investment objectives.

In this sense, Aiken, Clifford, and Ellis (2015) examined the portfolios of hedge fund of funds to identify the channels through which FICs add value to their clients. Although the mentioned authors identify portfolios maintained by FICs composed of several funds, which would be expensive and infeasible for individual investors to manage on their own, the evidence suggests that FICs do not have extraordinary ability in choosing their underlying hedge funds. In other words, FICs can apply funds to funds with poor future performance. On the other hand,

Aiken et al. (2015) have shown that FICs are good at making investment decisions, ei, after an FIC liquidates its position in a hedge fund, it is later a poorer performance (more frequently). Thus, Aiken et al. (2015) understand that FICs play a key role as intermediaries in the markets where Transaction cost are significant.

On the other hand, Cotrim (2012), when studying funds from hedge funds in Brazil, classified as multi-manager funds, found that the managers of these funds manage to generate value by selecting the strategies that will compose the portfolio of the respective multi-manager fund, but destroy value by trying to anticipate market movements and, in addition, can not choose the best funds within each strategy.

The results of Kat and Helder's research, presented in Gregoriou (2006), indicated that most FICs in terms of return to investors did not show value added, which does not mean that these funds are not useful, since to the advantages described above, as low investment required, allow small investors to have access to diversified fund portfolio. The study by Amenc and Vaissié (2006) showed that approximately 89% of FICs demonstrated value creation in terms of portfolio construction and 31% had added value through active management. However,

when considering both portfolio construction and management, only 20% presented value creation.

Edelman, Fung, Hsieh and Naik (2012) used a database of 1,591 hedge FICs to verify the performance of diversified hedge fund portfolios during the period from January 2005 to December 2010. Their results demonstrated that the returns of FICs analyzed are, to a large extent, driven by exposure to systematic risk factors. In addition, FICs presented a positive cumulative mean return, when exposed to different sources of systematic risk, only in the first period analyzed (from January 2005 to June 2007).

According to Leusin (2006), although the FICs present many advantages for the investor, such as diversification, choice of professionals who will manage the funds, small investors access to restricted funds, among others, the effect of the incident rates generates a cost very high for the quota holders, in order to restrict the attractiveness of these investments. The results of Leusin's work (2006) indicated that, although managers can add value to the investor, the excess of fees greatly compromises the return, absorbing much of the advantage of this type of investment.

According to Füss, Kaiser and Strittmatter (2009), characteristics such as size and age can also influence the risk / return performance of funds. The results showed that the return decreases for small FICs and increases for large FICs, as the experience (age) of funds grows. The explanation for this point is that new FICs tend to be more cautious in taking risk, more diversified and having lower return volatility than the older ones. Shawky and Wang (2014) also found that larger ones tend to outperform smaller funds, because FICs do not generate direct asset portfolios, they are less subject to the liquidity costs associated with high portfolios of assets in other types of investments.

Another aspect that we should pay attention is the crisis periods. There is evidence in the literature that periods of crisis may have some effect on the performance of investment funds. In their study of Brazilian multimarket funds, Malaquias and Eid (2014) established a variable to verify the possible influence of crisis periods on the performance of the funds, so that the period from January 2005 to May 2008 was considered a market moment in high and from June 2008 to August 2011 a period of crisis. The results of the research by Malaquias and Eid (2014), in this context, demonstrated statistically significant differences between the average performance of the funds in periods of crisis and in periods of stability. In periods of crisis the average performance of the funds was worse.

Similarly, Joaquim and Moura (2011) analyzed performance and indicators of persistence of Brazilian multimarket funds in the period from 2007 to 2011, noting the effects that the crisis of 2008 could exert on performance. Among the results, the authors identified even during the crisis period, the existence of abnormal returns and persistence for a significant amount of funds at the aggregate level, but few funds showed persistence of performance at the individual level, so that performance decreased as the increase as time passes by.

Garay, Hernández and Rivillo (2017) analyzed the behavior of microeconomic variables of multimarket funds during the period prior to the crisis of 2008, in order to identify if such elements could predict the probability of FIC survival in the crisis period. Among the results of the study, it was observed that the probability of FIC survival during the global financial crisis of 2008 can be explained by the behavior of the average return estimate, the standard deviation of the monthly returns, the administration rate, the performance rate and the coefficient of kurtosis of the monthly returns.

In general, it is possible to perceive that it seems to be a consensus among the studies that FICs tend to be less profitable when compared to the profitability of traditional investment funds, mainly due to their structure, which presents additional rates. Despite, some studies indicate the fact can be offset by other benefits provided, mainly by the diversification and management of these funds. Moreover, it cannot be said that such factors are indisputable benefits, since, as seen, diversification has limits and there is controversy about the value created by managers, which motivates and shows the opportunity to carry out a new study on the subject matter.

### 3 METHODOLOGICAL PROCEDURES

For this study, all the stock funds with monthly data available in the *Economática* database for the period from January 2005 to March 2016 were considered. The year 2005 was chosen due to the use of the period after the harmonization of the content disclosed by investment funds (CVM Instruction 409, No. 411, No. 413, 2004). The end date was selected because it is the month with the most recent data available during the collection period (which ended in July 2016), which provided 1,723 funds available. It is important to highlight that the sample includes active funds, as well as funds that were closed during the period.

Four factors were included in the study, as previous work has already shown a significant relationship with performance. Here come:

i) administration rate: considered in the studies of Dai and Shawky (2010), Sialm, Sun and Zheng (2013) and Malaquias and Eid (2014). It is expected to find in this work a negative relationship between the management fee and the profitability, since the incidence of these rates is not necessarily linked to the good performance of a particular fund and, therefore, tend to worn out the gains. Measurement form: maximum rate of administration charged annually by the funds;

ii) performance rate: considered in the studies of Brown, Goetzmann and Liang (2003), Dai and Shawky (2010) and Malaquias and Eid (2014). Unlike management fees, performance fees represent an incentive for fund managers to achieve good results. Thus, we expect to find in this study a positive relationship between the performance rate and the performance. Measurement form: dummy variable, receiving "one" for funds that charge performance fee and "zero" for the others;

iii) background size: considered in the studies of Füss et al. (2009), Shawky and Wang (2014), Malaquias and Eid (2014) and Malaquias and Mamede (2015). We expect to find in this work a positive relationship between fund size and performance, given that larger funds tend to have lower operating costs due to economies of scale.

Measurement form: Naperian logarithm of the fund's average Net Equity. during the observation period;

iv) background age: considered in the studies of Agarwal and Kale (2007), Füss et al. (2009), Li, Zhang and Zhao (2011) and Malaquias and Mamede (2015). Based on these studies, there is evidence for both a positive relationship between age and performance, since new funds present initial costs with portfolio construction and greater caution in investments, as well as a negative relation, since they may present performance because they are more likely to use innovative investment strategies in order to establish themselves in the market. Measurement form: age, in years, based on the last observation available for each fund.

Table 1 presents a summary of study variables:

Table 1  
**Study variables**

Variable	Description	Literature
Sharpe_Ratio	Sharpe Ratio	Joaquim and Moura (2011), Milan and Eid (2014) and Malaquias and Eid (2014).
FIC	<i>Dummy</i> for quota fund (fic), receiving 1 for quota funds and 0 for traditional funds.	Assali (2008), Malaquias and Eid (2014) and Malaquias and Mamede (2015)
Adm_fee	Maximum rate of administration charged annually	Dai and Shawky (2010), Sialm, Sun and Zheng (2013) e Malaquias and Eid (2014).
Perf_fee	<i>Dummy</i> variable, receiving 1 for funds that charge performance and zero for others.	Brown, Goetzmann and Liang (2003), Dai and Shawky (2010) and Malaquias and Eid (2014).
Size	Naperian logarithm of the fund's average net equity during the observation period.	Füss <i>et al.</i> (2009), Shawky and Wang (2014), Malaquias and Eid (2014) and

		Malaquias and Mamede (2015)
Age	Age, in years, based on the last observation available for each fund.	Agarwal and Kale (2007), Füss <i>et al.</i> (2009), Li <i>et al.</i> (2011) and Malaquias and Mamede (2015)

Source: Elaborated by the authors.

To adjust for performance by risk, we used the Sharpe Ratio, which indicates the average return above the risk free rate, weighted by the volatility of the returns. The estimate for the risk-free rate used in this study was the SELIC monthly profitability. Thus, the dependent variable of the quantitative model is the output of the Sharpe Ratio for each fund. The main independent variable is the dummy for quota fund (FIC), receiving 1 for quota funds and 0 for the others. The other independent variables are those already presented: size, age, administration rate and performance rate. The quantitative model elaborated is indicated below:

$$sharpe\_ratio_i = \beta_0 + \beta_1 fic_i + \beta_2 size_i + \beta_3 adm\_fee + \beta_4 perf\_fee_i + \beta_5 age_i + \varepsilon_i$$

in which, Sharpe\_Ratio represents the Sharpe Ratio in the period; FIC a dummy variable for quotas background, receiving 1 for quota funds and 0 for others; size represents the Naperian logarithm of the fund's average net equity; adm\_fee represents the maximum rate of administration charged by the funds; perf\_fee represents a dummy variable, receiving 1 for funds that charge performance and zero for others; age represents the age of the funds in years.

It is appropriate to indicate that an additional analysis was carried out, including the segregation of the model in two different economic periods. For the choice of periods, the monthly risk premium for all sample funds was initially calculated. Then, the average risk premium was calculated per year. It was observed that the years 2008, 2011, 2013, 2014 and 2015 presented average premium for the negative risk, while in the other periods the average risk premium was positive. Accordingly, the information of the referred periods (2008, 2011, 2013, 2014 and 2015) was considered as periods of crisis.

The quantitative model was estimated based on the multivariate regression analysis with standard errors robust to heteroscedasticity (since the White test was statistically significant in the models estimated in this study - Tables 3, 4 and 5). According to Hair, Black, Babin, Anderson and Tatham (2009), multivariate regression analysis consists of a statistical technique used to examine the relationship between a single dependent variable and a set of independent variables with wide applicability in research problems forecasting and explanation.

#### 4 RESULTS

Table 2, presents the descriptive statistics for the study variables. The average Sharpe Ratio points out that the value added by the funds, on average, does not exceed the risk-free rate of each period (since its average is equal to -0.093). Approximately 40% of the sample is made up of quota funds (39.6%) and 47% of them charge their quotaholders' performance fees.

Table 2

##### Descriptive statistics

Variable	N#	Average	SD.	Min.	Max.
size	1.723	16.933	1.503	12.204	22.299
Fic	1.723	0.396	a	0.000	1.000
adm_fee	1.723	1.601	1.237	0.000	10.000
perf_fee	1.723	0.470	a	0.000	1.000
age	1.723	6.916	5.913	1.017	49.456
Sharpe Ratio	1.723	- 0.093	0.156	- 0.945	0.801

Source: Elaborated by the authors. a = values suppressed because the variables are dummies.

Table 3 contains the results for the regression analysis, in order to test the hypothesis of the study. This analysis involves all the funds in the sample (ie, it has not got the survival bias, as it does not disregard closed funds in the period). The results indicated that all the variables used were important to understand the Sharpe Ratio variations of the funds, since they were statistically significant up to the 5% level. The results also indicated the absence of problems due to multicollinearity, since the VIF (Variance Inflation Factor) test was below 5.

Table 3

**Results for regression analysis (all funds)**

Variable	beta	Stand_error (robust)	t	sig.
size	0.033	0.003	12.320	0.000
adm_fee	- 0.012	0.003	- 4.020	0.000
perf_fee	- 0.017	0.007	- 2.420	0.016
age	0.004	0.001	6.470	0.000
FIC	0.034	0.007	4.640	0.000
constant	- 0.658	0.045	-14.500	0.000

**Note.** Adjusted R-squared = 17.02%. Maximum value for the FIV statistic: 1.29. The extreme values for the dependent variable (in this case, 5% of the database) were excluded and the model was estimated again; the coefficients, in terms of signal and level of significance, were equivalent. They indicated that the results do not appear to be influenced by potential extreme value effects.

Source: Elaborated by the authors.

In general, the results indicated better performance indicators for Investment Funds in Quotas (FICs) compared to the other funds in the sample. Such evidence is in disagreement with some works observed in the literature on the subject, such as Denvir and Hutson (2006), Gregoriou (2006), Leusin (2006), Ang et al. (2008) and Edelman et al. (2012), which showed worse performance of FICs. However, it is important to note that the results verified in this research are in line with the recent studies of these funds in the Brazilian market, such as those presented by Malaquias and Eid (2014) and Malaquias and Mamede (2015). Bertin and Prather (2009) also found a better performance of FICs than traditional funds.

As mentioned before, all control variables had got a significant relationship with the dependent variable. As well as the results of the works by Füss et al. (2009), Malaquias and Eid (2014), Shawky and Wang (2014) and Malaquias and Mamede (2015), a positive relationship between the size of the fund as measured by its Net Equity and performance were verified in this study, risk adjusted return is lower for small funds and larger for large funds. Larger funds tend to achieve economies of scale which can impact on better performance. In addition, the better performance of large funds may also be a reflection of the benefits of greater diversification, according to studies by Amo et al. (2007), Bertin and Prather (2009) and Dai and Shawky (2010).

Concerning the age of the funds, the results were convergent to those had been found by Füss et al. (2009) and Malaquias and Mamede (2015), since a positive relationship was found between age and return, so that the new funds did not perform better than the old funds. The reasoning that new funds are more likely to seek bold investment alternatives in an attempt to achieve better results than established funds in order to gain market share does not seem to be consistent with the fund characteristics of this study sample. The quantitative analysis also showed indications that management fees and performance rates are related to the lower performance achieved by the funds.

As the objective of analyzing whether the results would be equivalent considering only the funds in activity, funds closed during the period were excluded from the sample and the model was estimated again (total funds in activity: 1,370). Table 4 contains the results and indicates that the model with all the funds has better explanation power (the adjusted r-squared of the first model is superior).

Table 4  
**Results for regression analysis (surviving funds only)**

Variable	Beta	Stand_error (robust)	t	sig.
size	0.027	0.003	10.470	0.000
adm_fee	-0.012	0.003	- 3.920	0.000
perf_fee	-0.012	0.007	- 1.710	0.088
age	0.003	0.001	5.380	0.000
FIC	0.027	0.007	3.680	0.000
constant	-0.560	0.045	-12.490	0.000

Note. Adjusted R-squared = 24.23%. Maximum value for the FIV statistic: 1.31. Crisis = dummy variable that receives 1 for the Sharpe Ratio in the period of 2008, 2011, 2013, 2014 and 2015, receiving 0 for the Sharpe Ratio obtained in the other periods. The extreme values for the dependent variable (in this case, 5% of the database) were excluded and the model was estimated again; the coefficients, in terms of signal and level of significance, were equivalent, indicating that the results do not seem to be influenced by potential extreme value effects.

Source: Elaborated by the authors.

The results presented in Table 4 are equivalent to those presented in Table 4, except for the Performance Rate variable, which is no longer significant at the 5% level but remains significant at the 10% level. The analysis of the main hypothesis of the study remains the same: quota funds registered a better risk-adjusted return indicator. In view of the results presented, it can be seen that, even with a structure with higher rates of interest rates, FICs can excel in their performance in relation to other types of funds. Thus, they may represent a timely alternative for investors, since in addition to their superior performance, observed in this work, they have unusual benefits in other types of investment, such as access to closed funds, low initial investment, access to diversified portfolio, among others. In order to verify the potential effects of periods of crisis in the results of this study, a new regression analysis was performed, the results of which are available in Table 5.

Table 5  
**Results for regression analysis (surviving funds only, considering the control for different periods)**

Variable	beta	Stand_error (robust)	t	sig.
crisis	-0.615	0.022	- 27.700	0.000
size	0.024	0.008	2.920	0.004
adm_fee	-0.021	0.009	- 2.270	0.023
perf_fee	0.030	0.022	1.320	0.186
age	-0.005	0.002	- 3.090	0.002
FIC	0.138	0.027	5.130	0.000
constant	-0.066	0.135	- 0.490	0.624

Note. Adjusted R-squared = 24.23%. Maximum value for the FIV statistic: 1.31. Crisis = dummy variable that receives 1 for the Sharpe Indices in the period of 2008, 2011, 2013, 2014 and 2015, receiving 0 for the Sharpe Indices obtained in the other periods. The extreme values for the dependent variable (in this case, 5% of the database) were excluded and the model was estimated again; the coefficients, in terms of signal and level of significance, were equivalent, indicating that the results do not seem to be influenced by potential extreme value effects. Source: Elaborated by the authors.

The results available in Table 5 are consistent with the literature (Malaquias & Eid, 2014), that periods of crisis can significantly affect fund performance. However, even with the control for periods of crisis, the variables Size and Quota Funds continued to present a positive and statistically significant effect. On the other hand, it should be noted that, in both Table 3 and Table 4, the coefficients found, although statistically significant, may not present economic significance. Therefore, the Cohen D for the analyzed variables was estimated considering the difference between groups of traditional investment funds (non-FICs) and FICs, as indicated in Table 6.

Table 6  
**Effect size per group (non-FICs and FICs)**

Variable	D de Cohen	Interval (95%)	
Sharpe_Ratio	-0,172	-0,269	- 0,754
size	-0,016	-0,113	0,080
adm_fee	-0,535	-0,633	- 0,437
perf_fee	-0,143	-0,239	- 0,046
age	-0,054	-0,151	0,042

**Note.** Observations of non-FICs = 1,040; observations of FICs = 683.

Source: Elaborated by the authors

According to the results presented in Table 6, it is observed that, on average, FICs showed higher Sharpe Ratio compared to the other sample bottoms, so that the effect size estimated by Cohen's D can be classified as medium (-0.172). This means that, in practical terms, there is some economic significance of superior performance of the FICs, eliminating the possibility of any misleading results indicated in the regression analysis from the large sample size.

It should be mentioned that, even with regard to the analysis of effect size, FICs presented, on average, higher rates than the other funds. The effect size estimated by Cohen's D was classified as large for the administration rate (-0.535) and small for the performance rate (-0.143). These results corroborate previous studies that have already empirically demonstrated the incidence of higher rates in FICs due to their structure, such as Geranio and Zanotti (2005), Denvir and Hutson (2006), Ang et al. (2008), Ammann and Moerth (2008). The effect size observed for the variables age (-0.054) and size (-0.016) seems not to have been economically significant.

## 5 CONCLUSION

This work was developed with the general objective of analyzing the performance of the funds of investments in quotas, considering a scenario with favorable arguments and contrary to the extraordinary value of these funds, especially due to a structure that may involve double collection of fees. The database comprised 1,723 stock funds and the results found were tested in the complete sample, as well as in a sub-sample, with only the remaining funds in the period. The results in these two samples were equivalent for the main hypothesis test of the study. Remarkable previous studies, four control variables were also added to the study, namely: size and age, which presented a positive relation with the risk-adjusted return, and administration and performance rates, which presented a negative relation with the performance.

The main result indicated that the FICs belonging to the study sample presented better risk-adjusted return indexes, which is in line with arguments already available in the literature, such as studies by Turner (2004), Dai and Shawky (2010) and Malaquias and Mamede (2015). The evidence obtained in this study also suggests the possible advantage of FICs in the management of funds. Many criticisms are made because of the high cost of management, since, in addition to the fees for administering the underlying funds, there may be extra fees to compensate the fund manager. The fact that this research indicates a better risk-adjusted return of FICs, compared to traditional funds, points to evidence that management strategies by quota fund managers can favor the identification of assets with the potential to overcoming the benchmark, strategies which may work well in the investment fund segment (where quota funds operate).

When assessing whether this difference in performance between FICs and other sample funds was economically significant, the results of the effect size tests indicated that, with respect to the difference between the averages of the Sharpe Ratio., the size of the effect found was classified as *median*, that is, corroborated the findings of the regression analysis. Likewise, effect size tests have indicated that FICs charge higher rates than traditional funds, especially tax administration.

This work progresses in relation to the others which have already been developed on the subject, above all, by proposing an analysis that focuses specifically on the FICs, which are usually deprecated from the samples of studies of investment funds in Brazil. In addition, it contributes to the literature of the area by indicating results that may support future discussions about the potential of these funds as an investment alternative, even if it was compared to traditional funds.

The main limitation related to this study is found in the database, which considers only the class of stock funds, when there are other types of active management funds in Brazil, for instance, the multimarket funds. In the multimarket funds, there is also the possibility of operation of the FICs, and new studies on the subject can be developed to verify if the results are favorable or not to those one found in this research.

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