

ARE THE BRAZILIAN INVESTORS LOSING RETURN BY CHOOSING LIQUIDITY?

Abstract

The investment industry in Brazil has most of its products endowed with high liquidity. Liquidity is a relevant variable that conducts the choice of investment in Brazil. Several articles debates the possibility to reach out higher returns by choosing investments that require long-term redemption period, allowing investment in illiquid assets. In order to verify if the Brazilian investors are losing return by demanding high liquidity, we analyze different classes of mutual funds, comparing those that provides high and low liquidity. The results led us to a positive effect of redemption period on returns, indicating that the investment funds that require longer periods of redemptions tend to achieve higher returns.

KEYWORDS: Return, liquidity and investment funds.

1. Introduction

The investment industry in Brazil has most of its products endowed with high liquidity. Liquidity is a relevant variable that conducts the choice of investment in Brazil. Several articles debates the possibility to reach out higher returns by choosing investments that require long-term redemption period, allowing investment in illiquid assets. From the investor's perspective, the additional return comes from the demand for a liquidity premium, based on the difficulty to convert assets into cash. On the other hand, additional returns can be justified by transaction costs and lower necessity of maintain cash available to attend customer redemptions order. Several empirical evidence provides support for this arguments (Khandani and Lo (2011), Easley, Hvidkjaer, and O'Hara (2002), Amihud, Mendelson, and Pedersen (2005)).

Among the large number of asset classes available in Brazil, the mutual funds stands out. The mutual fund industry in Brazil is one of the world's largest, managing great part of the individual's investments. In order to provide a perspective of relevance, the mutual fund industry in 2014 reached out more than 2.7 trillion Reais under management, over 14,000 funds within 11.5 million individuals, positioning among the seven largest world mutual funds industries (Annual of Mutual Fund Industry FGV-ANBIMA, 2015).

Investment funds that require long redemption period are the minority part in the Brazilian market. The mutual fund industry is very relevant in the national context and most of it provides daily liquidity or short-term redemption period. Thus, arises the necessity of deeply understand the role of redemption period within this market, seeking evidence of whether the funds that require long redemption period deliver higher returns rates as discussed in the literature, indicating a lack of financial knowledge by investors.

The results accessed by econometric strategy led us to an identification of a positive effect of the redemption period in the performance of investment portfolios, indicating that the investment funds that require longer periods for redemptions tend to access higher rates of returns.

In this sense, we can state that significant part of the investments of Brazilians are achieving less rates of return for having high liquidity. The results likely requires a cultural change or increase the investor's knowledge about the relationship between liquidity and return. The study has greatly contributed to the contemporary discussion about the supply of these products on the Brazilian market.

In the remainder of the study, section I describes the motivation about it. The second section outline the literature over this topic, evidencing the discussion and the major studies. The section III presents the data used into analysis; the fourth part

highlights the method employed. The fifth section detail the results and discussion. The section fifth of the study present the closing remarks, and the last section report the references.

2. Theoretical Discussion

The literature have been debating for decades the relationship between liquidity and asset prices. Generically speaking, when an investor chooses an illiquid asset, he will require an additional return in order to allocate financial resources on it. In this sense, a portfolio that includes lower liquidity assets contain a higher return expectation.

The literature seeks to explain how liquidity affects returns, and discusses deeply that relationship. As long, the liquidity defined as the ease of trading an asset, given a lack of liquidity, exogenous transaction costs appears as brokerage fees, operational tasks, taxes, etc. Each trading of a given asset over the time, the buyers or/and sellers incurs in transaction costs. In addition, the buyer anticipates additional costs in the light of future sales, and the cycle remains throughout the lifetime of the asset.

The impact of a lack of liquidity in asset prices can only be a deterministic characteristic of the asset, such as transaction costs, and, thus, assets that require higher transaction costs should provide a higher expected return, as approach of Eleswarapu Reinganum (1993), Eleswarapu (1997) and Aragon (2004). On the other hand, liquidity can be a systematic risk factor. From this perspective, transaction costs are not enough to capture the liquidity risk. As argued by Chacko (2005), if there are transaction costs that do not vary over time, the buyer or seller of a given asset may incorporate these costs into your decision-making process without affecting the asset prices.

Amihud and Mendelson (1986, 1988), and Biais (1993). Duffie, Garleanu and Pedersen (2005, 2007) argues that some characteristics of the assets impact their prices, thus, assets more restricted in terms of trading should provide differentiation in their prices.

The excess return obtained by low liquidity assets also find arguments in insider trading theory. Private information can also be another source of risk for illiquid assets. If one party are trading with less information regarding the counterparty, so, the buy and sell orders over the asset will receive influences from adverse selection. Assets traded less often will face a slower process of discovery information. This view finds support in Glosten and Milgrom (1985), Easley O'Hara (1987), Easley, Hvidkjaer, and O'Hara (2002).

Theoretical models such as Vayanos (1998), Vayanos and Vila (1999) have shown that the lack of liquidity related to transaction costs can only be a determinant of the second order of asset prices, given the ratio between buy and sell prices are typically small when compared to the risk premium. Alternatively, some models predict that the lack of liquidity should not matter in a portfolio position, because the agents simply reduce the impact of these costs by adjusting their portfolios less frequently. Also, if trading costs varies in time and it is known ex-ante, their impact on the portfolio can be substantial due to the additional risks they impose on investors not diversified or that face any difficulty regarding managing his own portfolio.

Hasbrouck (2005) state that the perspective developed by literature are not mutually exclusive, the deterministic function of liquidity may be fixed to price and a simple characteristic, while stochastic and systematic variation over time can give an additional risk factor. It turns out when we consider different perspectives, empirical implications arise demanding models that explore such relationships.

Liquidity has broad effects on financial markets. Thus, liquidity can explain the variations in the prices of different types of assets, even controlling for characteristics such as risk, and the time series relationship between different assets. Liquidity support explanation about why certain assets of difficult negotiations are relatively inexpensive. Liquidity may help explain a series of puzzles, such as significant increases in prices of certain stocks, bonds price changes in corporate bonds, among others.

Given the academic discussion regarding the effect of liquidity and higher expected returns, the large number of investment funds available on the Brazilian market that provide high liquidity and the few studies on this topic in Brazil, emerges the need for further analysis of this market. As bright point, understand if the Brazilian investor is ceasing to access higher return on their investments by relying on high liquidity.

3. Data

All analyses are restricted on the mutual fund industry in Brazil. The empirical investigation seeks the effects of liquidity on returns accessed by investors. The sample includes fixed income mutual funds, equity mutual funds and hedge mutual funds, consisting of 2,335 investment funds in monthly observations.

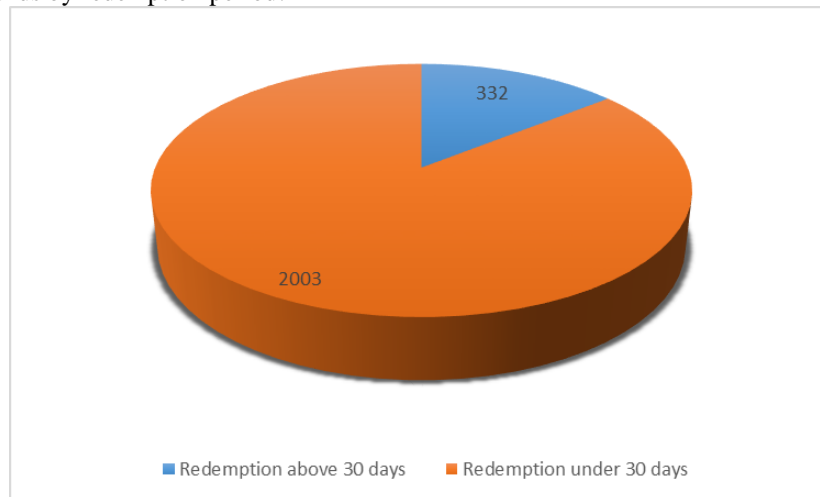
The analysis includes 9 years, from 2006 to 2014, aiming to capture the effect in different economic period on the financial market. The databases used are Economática, Bloomberg and the Yearbook of the investment mutual fund industry (Yearbook of the Mutual Funds Industry – FGV). The sample also counts with all the information about the fund and its return records.

The sample contains heterogeneous mutual funds, displaying different characteristics in terms of size, number of investors, management fees and lifetime. In Brazil, all mutual funds are required to release data about the constitution, benchmarks, portfolio composition and financial track record.

The sample does not contain the mutual funds that closed over time analyzed and, although we understand that perhaps it can lead for a selection bias, we are confident that the impact is minimized by the size of the sample, the heterogeneity of the funds and the differences in their investment portfolios, mitigating the bias problem. In Brazilian market, an investment mutual fund does not cease under poor performance, the funds are merged, or cease to operate based on strategic decisions of institutions.

The sample contains 332 investment mutual funds that require more than 30 days to refund the financial capital invested by investors, while 2003 funds refund the capital in less than 30 days, as shown in Graph 1.

Graph 1: Investment funds by redemption period.



Source: Economática. Prepared by the authors.

The database has endowed funds with at least 117 million Reais and up to 88 billion Reais, allocating in different assets, and providing particular characteristics of the funds. The variable of size used in this study is in natural logarithm in order to capture the variation between investment portfolios without distorting the results by outliers.

The average lifetime of funds, presented in Table 1, is approximately eight years, with a minimum of 1 year and a maximum of 45 years. These investment funds have at least 10 investors and a maximum number of 791,000 investors, and does not consider exclusive funds. Table 1 present the statistical details about the characteristics of the mutual funds analyzed.

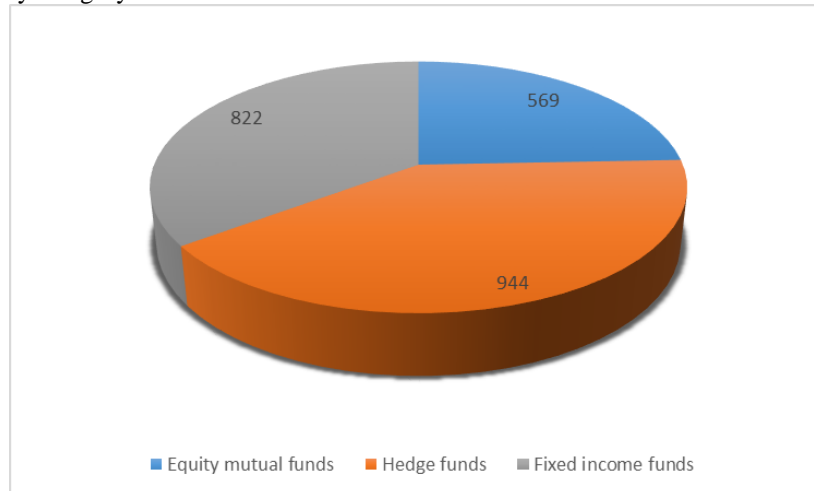
Table 1: Statistical details of the mutual funds analyzed.

All sample	Mean	Median	Std deviation	Max	Min
Sharpe	-0.1179	-0.0733	0.3771	1.3533	-4.5608
Return	-0.1839	0.1744	1.2988	5.2798	-8.8652
Redemption period	14.10	3.00	56.02	1,473.00	0.00
N Investors	2,518.17	80.00	24,031.29	791,730.00	10.00
Net asset	449,249.67	58,665.00	2,384,835.99	88,623,323.00	117.00
Management fee	1.37	1.08	1.11	8.50	0.01
Lifetime	7.55	6.64	4.67	45.54	0.89

Source: Economática. Prepared by the authors.

Considering the mutual funds by category, the database displays 944 hedge funds, 822 fixed income funds and 569 equity funds, as shown in Graph 2.

Graph 2: Mutual funds by category.



Source: Economática. Prepared by the authors.

In order to present the breakdown of data by category of funds used in the sample, Table 2 shows the statistical details of equity funds.

Equity mutual funds have at least 370 million Reais of net assets and a maximum of 1.7 billion Reais, allocating in different assets available and traded on the stock exchanges of São Paulo, BM&FBovespa. The average lifetime shown in Table 2, is about 7 years, counting a minimum of 2 year and a maximum of 45 years. These investment funds have at least 10 investors and a maximum of 26.000, and does not consider exclusive funds.

Table 2: Statistical details of the equity mutual funds analyzed.

Equity mutual funds	Mean	Median	Std deviation	Max	Min
Sharpe	-0.0969	-0.1058	0.0663	0.1950	-0.2400
Return	-1.4273	-1.5669	1.3418	4.7665	-8.8652
Redemption period	15.51	4.00	23.76	184.00	0.00
N Investors	4,093.81	61.00	42,661.37	26,152.00	10.00
Net asset	71,564.03	19,571.00	165,904.96	1,766,612.00	370.00
Management fee	2.13	2.00	1.10	8.50	0.01
Lifetime	7.66	6.58	5.67	45.54	1.76

Source: Economática. Prepared by the authors.

The hedge funds have at least 282 million Reais in net assets and maximum of 14.4 billion Reais, allocating in different assets available and traded on the stock exchanges of São Paulo, BM&FBovespa, in the fixed income market and currency as well. The average lifetime of the sample, presented in Table 3, is approximately six years, with a minimum of 1 year and a maximum of 21 years. These investment funds have at least 10 investors and a maximum of 289,000, and does not consider exclusive funds. Statistical details of the hedge funds can be find in Table 3.

Table 3: Statistical details of the hedge mutual funds analyzed.

Hedge funds	Mean	Median	Std deviation	Max	Min
Sharpe	0.0051	0.0013	0.2562	1.3533	-4.5608
Return	0.3399	0.2806	1.1797	5.2798	-8.1135
Redemption period	17.72	4.00	40.09	363.00	0.00
N Investors	353.85	61.00	1,182.65	289,855.00	10.00
Net asset	193,829.96	50,945.50	663,958.44	14,484,359.00	282.00
Management fee	1.43	1.50	1.01	5.00	0.01
Lifetime	6.75	5.72	3.95	21.96	0.89

Source: Economática. Prepared by the authors.

The last category analyzed, fixed income funds, have at least 359 million Reais of net assets and a maximum of 88 billion Reais, being the category of greatest attraction of investor funds. The fixed income funds allocation focuses on government bonds and corporate bond, besides a small portion on derivatives.

The average lifetime of the sample, presented in Table 4, is approximately eight years, with a minimum of two years and maximum of 23 years. These investment funds have at least 10 investors and a maximum of 791,000, and similarly other categories, does not consider exclusive mutual funds.

Table 4: Statistical details of the fixed income mutual funds analyzed.

Fixed income funds	Mean	Median	Std deviation	Max	Min
Sharpe	-0.2792	-0.1333	0.5380	0.5492	-4.2350
Return	0.1446	0.2231	0.2601	0.6231	-2.8702
Redemption period	9.48	0.00	82.60	1,473.00	0.00
N Investors	3,889.74	134.50	19,698.33	791,730.00	10.00
Net asset	1,026,805.08	177,245.50	3,932,610.36	88,623,323.00	359.00
Management fee	0.76	0.50	0.83	5.00	0.01
Lifetime	8.34	7.70	4.56	23.21	1.76

Source: Economática. Prepared by the authors.

All mutual funds information, manually collected, came from secondary databases, validating by funds and following methodological parameters in order to avoid biased analysis.

With all characteristics and historical information of the funds, we can move forward and apply the methodological strategy in order to achieve the proposed by the study.

4. Methods

To achieve the objective and identify the effect of liquidity on returns, the study departs estimating the returns of each fund in each reporting period, and applies an econometric identification strategy to observe the effect of the redemption period demanded by funds, and all additional variables of interest and control.

Thus, the performance estimative of any investment mutual fund uses metrics wide applied by academic studies.

Equation 1 estimates the simple return:

$$R_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}} \quad (1)$$

Where,

$R_{i,t}$ represents the return of the fund i on month t .

$P_{i,t}$ is the share price of the fund i on month t .

$P_{i,t-1}$ is the share price of the fund i on month previous t .

Sharpe (1966) developed a measure based on the variability of the portfolio given the fact that an inefficient diversification penalizes the performance of a given portfolio, relying on the overall risk of the portfolio to measure performance. Sharpe ratio evidences the difference between the portfolio return and the return of risk-free asset, divided by the total risk of the portfolio, calculated by the standard deviation of portfolio returns.

According to the Sharpe ratio, higher values means better performance of the fund. Thus, Sharpe ratio is more suitable for measuring the relative performance from ex-post performance, given the virtual impossibility of accurately estimating the expected return and its variability. Equation 2 measures the Sharpe rate.

$$Sharpe = \frac{R_p - R_f}{\sigma_p} \quad (2)$$

Where,

Sharpe in the Sharpe ratio of the mutual fund.

R_p is the mutual fund return.

R_f is the return of risk-free asset.

σ_p is the standard deviation of portfolio returns.

The risk free rate rely on the Brazilian DI rate (Interbank Deposit Rate). This is the intermediation rate of the entire Brazilian financial system and, theoretically, the risk-free rate. The DI rate is widely used in academic studies and by different institutions in Brazil.

To estimate the effect of liquidity on the performance of the fund, the methodology employs a multiple regression model in order to verify the impact of several variables, including the redemption period demanded on performance of the funds.

The independent variable applied in the model is the time required for redemption and add the squared redemption in order to capture the effect of the variable in high levels. That is, identify whether the result obtained remains as the redemption period increases more sharply. The control variables are lifetime, net asset (size), management fees, performance fees and number of investors. The introduction of the redemption period in the regression model is to determine whether the time required by the fund to return the capital to investors is crucial to obtaining positive performance in investments.

The model applied to explain the impact of liquidity on the performance of funds follows Equation 3:

$$Performance_{i,t} = \beta_0 + \beta_1 P.Redemp_{i,t} + \beta_1 P.Redempe^2_{i,t} + \gamma' X_{i,t} + \varepsilon_i \quad (3)$$

Where,

Performance_{i,t} correspond to the performance of the fund i on month t.

P.Redemp_{i,t} is the redemption period required by fund i on period t.

P.Redemp²_{i,t} is the square of redemption period required by fund i on period t.

X_i is the vector of control variables including net asset, fund age, management fee, performance fee and number of investors.

The β_0 is the intercept of the model, β_1 and γ' are the regression coefficients of the variables of interest and control, and ε_i is the model error term. The study assumes that the error term ε_i has normal distribution and random, with mean 0, $E(u)=0$, and the unexplained part of the performance of the fund does not depend on the variables of interest and control, $E(u|x)=E(u)$.

The variable that represents the performance fee is a dummy variable that segments the sample in funds that charge performance fee and funds that does not charge. The decision rely on the similarity of performance fees charged by funds.

5. Results

First, the empirical analysis presents the correlation between all variables used in the regression model. The correlation analysis between the redemption variable and the other study variables, presented in Table 5, demonstrates the low correlation between the variables of return, net assets, age, management fee, performance fee and number of investors.

Table 5: Correlation table between the variables.

	<i>Return</i>	<i>Sharpe</i>	<i>Redemption</i>	<i>Net asset</i>	<i>Lifetime</i>	<i>Manag.fee</i>	<i>Perform.fee</i>	<i>Investors</i>
Return	1							
Sharpe	0.766211703	1						
Redemption	0.179462491	0.304050092	1					
Net asset	0.323555481	0.323058968	0.012680757	1				
Lifetime	0.130459005	0.106314967	-0.152231685	0.275739823	1			
Management fee	-0.143341819	-0.175029041	-0.107529626	-0.096164378	0.069401958	1		
Performance fee	0.172452512	0.089014092	0.209028976	-0.064097031	-0.254563427	-0.130644974	1	
N Investors	-0.083403956	-0.061609867	-0.04610398	0.154416449	0.070281936	0.125518181	-0.109247716	1

Source: Prepared by the authors.

Going through the specification of the regression model defined by Equation 3, Table 6 shows the results of regression by ordinary least squares (OLS), whose redemption period explains the portfolio return. The results achieved by econometric strategy led to the identification of a positive effect of the redemption period in the performance of investment portfolios.

Table 6: Regression table - redemption on return: entire sample

Variables	(1)	(2)
	All OLS Sharpe	All OLS Return
Redemption	0.002*** (4.79)	0.001*** (5.66)
Redemption^2	-0.000 (-0.37)	-0.000*** (-3.82)
Net asset	0.003*** (10.84)	0.001*** (11.08)
Lifetime	0.000*** (3.36)	0.000*** (4.59)
Management fee	-0.001*** (-3.87)	-0.000** (-2.16)
Performance fee	0.002* (1.67)	0.002*** (5.43)
N Investors	-0.000*** (-3.08)	-0.000*** (-3.87)
Obs	2335	2335
Adj R-Square	0.2173	0.1964

Source: Prepared by the author. The table shows the results for the redemption on returns of the funds. The dependent variables are: simple return, Sharpe ratio. The variable of interest is the period of redemption required by the mutual fund and as control variables: net asset, the lifetime in years, management fee, performance fee and number of investors. All regressions adds the application of the White Robust Matrix. *** Sig 1%; **Sig 5%; * 10% Sig. Values outside the parentheses represent the coefficients of each variable models. Values in parentheses represent the t statistic (t-stat) of each test. The model included the application of the VIF-Variance Inflation Factor test, with a total average score of less than 3.0 for all models.

The results accessed of the entire sample demonstrate that the redemption period is important to achieve higher return. The results are positive and statistically significant to produce simple returns and to produce higher Sharpe ratios. The variable redemption period when squared has a negative coefficient, indicating that very high period, however, does not lead to higher returns for investors.

Additionally, the fund size, estimated by net asset, and the variable mutual fund lifetime, defined as the age of the fund, positively affect the performance of the funds. The results are expected and in line with traditional studies on this topic.

As negative effect are administration fee and the number of investors. The results indicate that higher administration fee and number of investors tends to reduce the return of the portfolios.

Considering that the period of the study displays variations in the local and international macroeconomic conditions, we deepens the analysis by segmenting the sample into three distinct periods. Thus, the strategy sought the effect of the redemption period from 2006 to 2010, 2008 to 2012 and from 2010 to 2014.

The strategy aims to capture the effects of the moments of variations on macroeconomic variables, such as the period of crisis. It is worth to mention that this study does not aims to set the global crisis period to test the effects, intends only add robustness on analysis. Table 7 presents the results of applying the regression equation segmenting by period.

Table 7: Regression table - redemption on return by period.

	(3)	(4)	(5)	(6)	(7)	(8)
	2006-2010	2006-2010	2008-2012	2008-2012	2010-2014	2010-2014
	OLS	OLS	OLS	OLS	OLS	OLS
Variables	Return	Sharpe	Return	Sharpe	Return	Sharpe
Redemption	0.002** (2.42)	0.000 (1.50)	6.699*** (13.76)	0.003*** (3.27)	-0.341 (-1.20)	0.002*** (3.20)
Redemption^2	-0.000 (-1.38)	0.000 (1.32)	-0.033*** (-9.22)	-0.000 (-1.00)	0.001 (0.63)	-0.000 (-0.59)
Net asset	0.001*** (4.27)	0.003*** (4.41)	5.064* (1.91)	0.003*** (5.65)	5.682*** (3.33)	0.004*** (8.04)
Lifetime	0.000*** (2.67)	0.000 (0.94)	10.174*** (10.37)	0.000 (1.30)	28.402*** (47.39)	0.000*** (2.80)
Management fee	-0.001** (-2.09)	-0.002*** (-3.00)	-9.845*** (-2.89)	-0.002** (-2.39)	1.773 (0.80)	-0.001* (-1.69)
Performance fee	0.002*** (2.68)	0.000 (0.05)	7.000 (0.81)	0.002 (1.07)	-10.020* (-1.90)	0.002 (1.56)
N Investors	-0.000** (-2.15)	-0.000 (-1.57)	-0.000 (-0.37)	-0.000 (-1.64)	-0.000 (-0.61)	-0.000** (-2.00)
Obs	2335	2335	2335	2335	2335	2335
Adj R-Square	0.1719	0.2219	0.5223	0.1982	0.8559	0.2218

Source: Prepared by the author. The table shows the results for the redemption on returns of the funds. The dependent variables are: simple return, Sharpe ratio. The variable of interest is the period of redemption required by the mutual fund and as control variables: net asset, the lifetime in years, management fee, performance fee and number of investors. All regressions adds the application of the White Robust Matrix. *** Sig 1%; **Sig 5%; * 10% Sig. Values outside the parentheses represent the coefficients of each variable models. Values in parentheses represent the t statistic (t-stat) of each test. The model included the application of the VIF-Variance Inflation Factor test, with a total average score of less than 3.0 for all models.

The results accessed by segmented sample shows that the results remain as previous. Similarly, the redemption period is an important variable to achieve higher return. The results are positive to produce single returns and higher Sharpe ratios. Contrary, the variable redemption when squared does not present a significant factor in statistical terms, indicating that very long periods of redemption does not lead to higher returns for investors.

In addition, the mutual fund size, estimated by net assets, and the variable lifetime, defined as the age of the fund, present a positively impact on the performance of the funds. The negative effect about the number of investors is less evident. In the period 2008 to 2012, the number of investors does not negatively affect the return of the funds.

Going forward over the different effects among categories of funds, the study applies the econometric strategy for each category, such as equity funds, hedge funds and fixed income funds. Table 8 shows the results obtained with regression using only the equity mutual funds.

Table 8: Regression table - redemption on return: equity mutual funds.

Variables	(9)	(10)
	Equity funds OLS Sharpe	Equity funds OLS Return
Redemption	0.000 (0.75)	0.011** (2.19)
Redemption^2	-0.000 (-0.85)	-0.000** (-2.26)
Net asset	0.011*** (7.19)	0.264*** (8.39)
Lifetime	-0.002*** (-4.73)	-0.057*** (-5.52)
Management fee	-0.000 (-0.12)	-0.000 (-0.31)
Performance fee	-0.022*** (-4.20)	-0.333*** (-3.16)
N Investors	0.000 (0.96)	0.000 (0.67)
Obs	569	569
Adj R-Square	0.1303	0.1703

Source: Prepared by the author. The table shows the results for the redemption on returns of the funds. The dependent variables are: simple return, Sharpe ratio. The variable of interest is the period of redemption required by the mutual fund and as control variables: net asset, the lifetime in years, management fee, performance fee and number of investors. All regressions adds the application of the White Robust Matrix. *** Sig 1%; **Sig 5%; * 10% Sig. Values outside the parentheses represent the coefficients of each variable models. Values in parentheses represent the t statistic (t-stat) of each test. The model included the application of the VIF-Variance Inflation Factor test, with a total average score of less than 3.0 for all models.

The results obtained on equity mutual funds shows that the results are statistical significant only to produce higher Sharpe ratios. The model does not identify similar effect on simply return. The analysis by the Sharpe ratio, the redemption period is an important variable to achieve higher return, and the variable redemption period when squared presents statistical significance, indicating that very long periods of redemption does not lead to higher returns for investors.

It is necessary to highlight the particular behavior of the variables lifetime and performance fee on the return of equity funds. The two variables have a negative impact on returns of portfolios. The result is unexpected, since most of the equity funds have performance fee based on the ability of managers to select and allocate capital in certain individual assets and classes.

Table 9: Regression table - redemption on return: hedge mutual funds

Variables	(11)	(12)
	Hedge funds OLS Sharpe	Hedge funds OLS Return
Redemption	0.003*** (7.79)	0.007*** (3.45)
Redemption^2	-0.000*** (-6.32)	-0.000*** (-3.23)
Net asset	0.027*** (5.08)	0.211*** (8.74)
Lifetime	-0.002 (-1.04)	-0.018* (-1.87)
Management fee	0.000 (0.20)	0.000 (0.33)
Performance fee	-0.006 (-0.40)	-0.088 (-1.19)
N Investors	-0.000** (-2.15)	-0.000** (-2.01)
Obs	944	944
Adj R-Square	0.0944	0.0948

Source: Prepared by the author. The table shows the results for the redemption on returns of the funds. The dependent variables are: simple return, Sharpe ratio. The variable of interest is the period of redemption required by the mutual fund and as control variables: net asset, the lifetime in years, management fee, performance fee and number of investors. All regressions adds the application of the White Robust Matrix. *** Sig 1%; **Sig 5%; * 10% Sig. Values outside the parentheses represent the coefficients of each variable models. Values in parentheses represent the t statistic (t-stat) of each test. The model included the application of the VIF-Variance Inflation Factor test, with a total average score of less than 3.0 for all models.

The results shown in Table 9 point out that these funds are the ones that respond to the redemption date. The hedge funds that require longer redemption period tend to deliver higher returns to investors. The result is consistent because the category of hedge funds have greater flexibility in the allocation and selection of assets. The decision to demand greater redemption period facilitates the financial allocation in less liquid assets.

The results are positive to produce single returns and to produce higher Sharpe ratios. The variable redemption when squared presents a significant statistical outcome, indicating that very long periods of redemption does not lead to higher returns for investors.

The fund size, presented by net assets, positively affect the return of the funds. Larger funds tends to drive the performance of hedge funds. Conversely, a large number of investors tends to a negative effect on the performance of portfolios.

Table 10: Regression table - redemption on return: fixed income mutual funds

Variables	(13)	(14)
	Fixed income OLS Sharpe	Fixed income OLS Return
Redemption	0.001 (1.11)	-0.000 (-0.39)
Redemption^2	-0.000 (-0.97)	-0.000** (-2.21)
Net asset	0.087*** (10.05)	0.032*** (6.93)
Lifetime	-0.035*** (-9.97)	-0.002 (-1.10)
Management fee	0.000 (0.51)	0.000 (0.61)
Performance fee	0.178*** (3.21)	-0.004 (-0.13)
N Investors	-0.000*** (-11.53)	-0.000*** (-2.97)
Obs	822	822
Adj R-Square	0.2791	0.1422

Source: Prepared by the author. The table shows the results for the redemption on returns of the funds. The dependent variables are: simple return, Sharpe ratio. The variable of interest is the period of redemption required by the mutual fund and as control variables: net asset, the lifetime in years, management fee, performance fee and number of investors. All regressions adds the application of the White Robust Matrix. *** Sig 1%; **Sig 5%; * 10% Sig. Values outside the parentheses represent the coefficients of each variable models. Values in parentheses represent the t statistic (t-stat) of each test. The model included the application of the VIF-Variance Inflation Factor test, with a total average score of less than 3.0 for all models.

The sample of fixed income funds shown in Table 10 evidence that the results are not statistical significant. This means that the redemption period is not relevant to achieving higher return to investors. The decision of fund managers explains the results because they tend to keep most of the capital allocated in liquid assets such as government bonds and financial certificates. The share of non-liquid assets cannot affect the decision in allocation and capacity of returning cash to the investor.

Other variables have similar behavior to the model contained the entire sample, by which the fund size has a positive impact and the number of investors negatively affects the performance of portfolios.

6. Conclusion

The investment industry in Brazil has most of its products endowed with high liquidity. Liquidity is a relevant variable that conducts the choice of investment in Brazil. Several articles debates the possibility to reach out higher returns by choosing investments that require long-term redemption period, allowing investment in illiquid assets.

From the investor's perspective, the additional return comes from the demand for a premium based on the difficulty to convert assets into cash, since the perspective of the manager, additional returns can be justified by transaction costs and lower necessity of keeping cash available in order to attend customer redemptions order.

Investment funds that require long redemption period are the minority part in the Brazilian market. The mutual fund industry is very relevant in the national context and most of it provides daily liquidity or short-term redemption period. Thus, arises the necessity of deeply understand the role of redemption period within this market, seeking evidence of whether the funds that require long redemption period deliver higher returns rates as discussed in the literature, indicating a lack of financial knowledge by investors.

The results achieved by econometric strategy led to an identification of a positive effect of the redemption period in the performance of investment portfolios, indicating that the investment funds that require longer periods for redemptions tend to access higher rates of returns.

The results obtained on equity mutual funds shows that the results are statistical significant to produce higher Sharpe ratios. Hedge mutual funds are the ones that respond to the redemption date. The hedge funds that require longer redemption period tend to deliver higher returns to investors. The result is consistent because the category of hedge funds have greater flexibility in the allocation and selection of assets. The decision to demand greater redemption period facilitates the financial allocation in less liquid assets.

The results observed over the fixed income funds, redemption period is not relevant to achieving higher return to investors. The decision of fund managers explains the results because they tend to keep most of the capital allocated in liquid assets such as government bonds and financial certificates. The share of non-liquid assets cannot affect the decision in allocation and capacity of returning cash to the investor.

The main contribution of the study rely on the investigation if the Brazilian investors are losing return by the dominant supply of mutual funds investment providing high liquidity. The results highlight the need to understanding the factors that lead the

market to have a small number of funds with long redemption periods, and deepen the understanding of the reasons why the funds mainly offer high liquidity to investors.

It is noteworthy that the topic is unexplored in Brazil by academic studies and on the relevance of investment funds in the national context requires the development of new studies and research.

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