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The Institutional Investor Impact on Stock Prices

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Abstract

Purpose – This study aims to analyze the impact of mutual funds trading shares together for consecutive periods on the price of these shares.

Design/methodology/approach – Fixed-effects panel regression analyses were performed to identify the relationship between persistence, which measures how many consecutive periods a particular share was bought or sold by the pool of funds, and the returns of the same stock in the short and medium term.

Findings – Shares that are purchased by the pool of funds persistently have reduced returns, and stocks sold have increased returns in both the short and medium term. In addition, the sample that gathered small funds with an active strategy, buying and selling small caps, presented the most statistical and economic relevance in all periods.

Originality/value – These results allow us to question the ability of small fund managers to select assets and the timing of their transactions, as well as their contribution as well-informed investors to the equilibrium of capital market prices.

Keywords – investment funds; institutional investor; persistence; herd effect; stocks; stock price

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1 Introdution

The purpose of this study is to analyze the impact of mutual funds trading stocks together for consecutive periods on the price of these stocks. The tendency of the funds to carry out similar buy-sell transactions, as if one copied the other, has been called the institutional herd effect in the literature. This effect has been positively identified in Brazil and in the world by a series of studies such as Klemkosky (1977), Kraus and Stoll (1972), Friend, Blume, and Crockett (1970), and Tariki (2014). The present study investigates the impact of the institutional herd effect of Brazilian funds on stock prices.

There are three possible explanations for the existence of the institutional herd effect. The first is that funds seek to follow the leader, that is, the fund that has managed to achieve the best results. The second is based on the hypothesis that funds receive the same private information and observe the same financial indicators when choosing stocks, so the herd effect would be a natural consequence of this informational equality. Finally, the third is based on the asymmetry of reputational effects: funds prefer to act in a similar way since being a negative highlight in the industry could have very negative consequences and may not be worth the risk, in which case fund managers would not have an incentive to take risks.

One of the consequences of the institutional herd effect that motivates studies focusing on it is the distortions in stock prices caused by supply or demand pressures, resulting from the funds trading. At first, due to them being well-informed investors, funds would be expected to contribute to bringing stock prices to their equilibrium by buying undervalued shares and selling overvalued ones, thus acting as price stabilizers. However, the existence of the institutional herd effect means that funds could be price destabilizing, that is, by trading shares, they could push their prices away from the equilibrium, leading to a price deviation in the short term, followed by a price reversal in the medium term. According to this hypothesis, stocks purchased by a combination of funds would increase in price in the short term, due to the increased demand generated, and in the medium term their prices would suffer a reduction, thus generating an average return. The same would happen with stocks sold by funds: in the short term their prices would suffer a reduction due to increased supply, and in the medium term this reduction would be reversed.

Initially, studies that address the institutional herd effect on stock prices have evaluated its short-term impacts. Wermers (1999) and Sias (2004) studied the impact of American funds trading stocks on the price of these stocks and both found evidence in the short term of price increases for the stocks funds sold and price decreases for those funds bought. However, Bikhchandani, Hirshleifer, and Welch (1992) and Sharfstein and Stein (1990) identified that the institutional herd effect creates persistence of decision over time; that is, when a fund buys a particular stock in multiple periods other funds mimic their choice more broadly, emphasizing the importance of observing the impact of the institutional herd effect in the medium term and in consecutive periods. Dasgupta, Prat, and Verardo (2011) took this feature of the institutional herd effect into account and created a variable called persistence to record the number of consecutively repeated stock purchases and sales by a pool of US funds over time and their impact on both short and medium term prices. In the short term the results remained the same: stocks bought (sold) by funds increase (decrease) in price. However, the authors found evidence that in the medium term the relationship between persistence and prices is reversed; that is, shares persistently bought by the pool of funds present low prices, and shares sold for consecutive periods increased in price in the medium term. This evidence corroborates the price destabilization hypothesis; that is, funds push equity prices away from their equilibrium, at first causing a rise (decrease) in the price of shares

bought (sold), and then a reversal of that trend, thus contradicting the argument that funds know how to choose winning shares.

In 2016, the Brazilian investment funds industry reached 3.1 trillion in equity, making it the seventh largest in the world with more than 12 million quota holders. According to the 2015 Investment Fund Industry Yearbook, compiled by the Getúlio Vargas Foundation (FGV) and the Brazilian Association of Financial and Capital Market Entities (Anbima), the industry almost doubled in size in the previous 5 years, and this expressive growth had been occurring for at least 20 years. In addition, funds have a significant presence on the São Paulo Stock Exchange (B3), being one of the main groups that trade stocks, since Brazilian people does not yet have the culture of investing directly in the stock exchange, which reinforces the importance of investigating the role of funds in adjusting stock prices in Brazil.

In addition to the expressiveness of the size of the fund industry in the country and its important presence in B3, previous studies such as Borges and Martelanc (2015) identified a higher percentage of funds with the ability to generate above-average returns in Brazil compared to the results presented by Fama (2010) in the USA, leading it to be believed that Brazil has greater market inefficiency than developed countries, and that the role of funds in adjusting stock prices in Brazil may be more powerful than was identified in a similar study in the USA. If it is believed that these different scenarios may be an indication that the impact of funds on share prices here in Brazil is different from that identified in the USA, this study becomes relevant.

In order to study the impact of institutional investors on stock prices, the monthly database for the composition of Brazilian funds' portfolios maintained by Anbima was used. This database is relatively recent in Brazil and has therefore not yet been studied, since before 2009 funds did not have to disclose their portfolios on specific dates. Fixed-effects panel regression analyses were performed to identify the relationship between persistence, which measures how many consecutive periods a particular share was bought or sold by the pool of funds, and the returns of the same stock in the short and medium term.

The results differ from those presented in the American study, as expected. Stocks that are purchased by the pool of funds persistently have reduced returns, and stocks sold have increased returns in both the short and medium term. In addition, the sample that gathered small funds with an active strategy, trading small caps, presented the most statistical and economic relevance in all periods. These results allow us to question the ability of small fund managers to select assets and the timing of their transactions, as well as their contribution as well-informed investors to the equilibrium of capital market prices.

2 Theoretical references

2.1 International Studies

Some of the earliest published studies with evidence of the institutional herd effect were Klemkosky (1977), Kraus and Stoll (1972), and Friend, Blume, and Crockett (1970). Klemkosky (1977) identified that institutional investors often tended to predominate on one side of the market (buying or selling) for a given stock at any given time, thereby creating an imbalance. The author found evidence of the follow-the-leader strategy among funds. Kraus and Stoll (1972) aimed to identify the contribution of institutional investor block trades to the market efficiency of the stock exchange, and were able to determine the tendency to herd in these institutions.

Following the same line of thought, De Bondt and Thaler (1985) also identified the herd effect in investments. The main objective of the authors was to identify if there was an exaggerated reaction on the part of stock investors, and consistent evidence was found of exaggerated reactions and later reversion to average returns. Lakonishok, Shleifer, and Vishny (1992) found evidence of both positive feedback and herding

in pension funds, particularly those trading small caps. Grinblatt, Titman, and Wermers (1995) and Wermers (1997) documented that the vast majority of funds use packaged strategies or use the positive feedback of other managers from previous periods.

Other studies have sought to explain the institutional herd effect. Scharfstein and Stein (1990) conclude that asset managers may want to avoid the reputational risk that would come from a totally different and original investment strategy. If successful the premium would be great, but if the strategy failed, this manager would be the one to have to explain the poor performance. Froot, Scharfstein, and Stein (1992) and Hirshleifer, Subrahmanyam, and Titman (1994) conclude that fund managers make decisions together because they receive similar private information and refer to the same financial indicators. Bikhchandani, Hirsh-leifer, and Welch (1992) argue that managers can use the same private information obtained by well-informed investors through observing their latest asset purchase and sale transactions, and then negotiating in the same direction as the leaders. Finally, Falkenstein (1996) finds that institutional investors may share the same risk aversion in relation to shares with the same characteristics, e.g. liquidity.

With respect to the relationship between the institutional herd effect and stock prices in the short term, Wermers (1999) shows evidence that shares highly-purchased by funds outperform well-sold shares in up to two quarters. Sias (2004) found evidence that institutional demand is positively correlated to prices in the short term. In the medium term, this relationship is reversed. Dasgupta, Prat, and Verardo (2011) created a variable - called persistence - to measure how many consecutive periods a particular stock is bought or sold by the pool of American funds. They looked at the portfolio of US funds from 1983 to 2004, and found evidence that stocks bought (sold) by the US funds together for consecutive months decreased (increased) in price in the medium term. In addition, the authors observed that the effect is stronger with small caps. The explanations suggested by the authors for this phenomenon are: (i) a behavioral bias leads managers to make decisions based on outdated information; (ii) fund managers have no incentive to take risks, because when they are the only ones to present poor performance they may get fired; (iii) fund managers negotiate stocks against insider investors who have superior knowledge of the cash flows of the companies, and are unaware of this fact; (iv) cash flows entering and leaving the funds can define the relationship between fund trading and stock returns. Some papers such as Coval and Stafford (2007) and Frazzini and Lamont (2008) found evidence of a negative correlation between cash inflows and return on equity. However, Dasgupta, Prat, and Verardo tested this hypothesis in their 2011 article and found no relevant evidence.

Some recent international studies have also examined the impact of the institutional herd effect. Jiao and Ye (2014) studied the institutional herd effect on hedge funds and their impact on US stock prices. The authors found evidence that mutual funds copy hedge funds, moving the stock price away from equilibrium and causing a subsequent price reversion to average, thus providing important evidence of the stock price destabilization hypothesis, arising from the institutional herd effect. Edelen, Ince, and Kadlec (2014) studied the relationship between institutional investors and abnormal stock returns and concluded that shares purchased by funds tend to be overvalued and are accompanied by abnormal returns in the future. The authors understand that the most likely reason is that funds have a preference for certain stock characteristics that have performed poorly in the long run. Huang, Wu, and Lin (2015) investigated the impact of the institutional herd effect on the relationship between risk and return in the USA and concluded that the greater the institutional herd effect, the stronger the explanatory power of the equations that relate risk and return, that is, the more efficient the market is.

In Zeng (2016), data from the American funds portfolio from 1980 to 2010 are analyzed and the author concludes that institutional investors overvalue already overvalued stocks and undervalue stocks already undervalued by the market. In addition, the funds have more overvalued shares in the portfolio than undervalued ones, without making a profit from it. Zeng states that his results contradict the general notion that individual investors generate price noise and suggest that institutional investors play an important role in the poor valuation of stocks in the capital market; his conclusions are consistent with the price destabilization hypothesis. These recent international studies present evidence that is in line with the results presented in this study.

Lobão and Serra (2002) tested the herd effect on mutual funds in Portugal between 1998 and 2000 and measured an impact four to five times higher than that found in mature markets. In addition, the authors identified that the herd effect is stronger among funds with lower stock diversity and among mid-market capitalization firms.

Cai, Han, Li, and Li (2017) investigated the institutional herd effect on US government debt securities, and found evidence that the effect in this market is significantly greater than in the stock market. In addition, they identified that the herd effect causes price distortions when the funds sell the bonds, but not when they buy them.

2.2 Empirical Results in Brazil

Tariki (2014) studied the existence of the herd effect in equity funds in Brazil, and strong evidence of it was found in the sample. In addition, Tariki identified that this effect is stronger among stocks with a lower market capitalization and in large funds.

Sanches (2013) studied the existence of the herd effect using the measure proposed by Hwang and Salmon (2001), which consists of measuring the stock's beta cross-dispersion according to the Fama and French (1993) three factors model. The author found similar results to those in the international literature - the evidence suggests the existence of the herd effect in Brazil - but found no evidence of an increased herd effect in periods of crisis, as would be expected.

Borges (2007) studied the anchoring of stock prices in Brazil from 2000 to 2006 and found evidence of the use of the minimum price of the last 52 weeks by investors when deciding to buy and sell, and that this anchoring may be related with the herd effect. Kutchukian (2010) studied price anchoring as one of the drivers of the herd effect on fund growth in Brazil, and found strong evidence of an institutional herd effect that is homogeneous between asset and liability funds.

3 Methodology

3.1 Data

In order to study the relationship between stock trading by the set of Brazilian funds and the price of these stocks, the monthly Anbima database of fund portfolio compositions was used through Economática®. The sample included all open-ended Brazilian mutual funds that have stocks traded on the B3 in their portfolios, in the period between September 2009 and February 2016, resulting in 78 months being included in the sample. For this study there was no need to observe funds individually. What matters is the total financial value of each stock in the portfolio of all Brazilian funds in each month.

In order to avoid survival bias, all Brazilian mutual funds, including those that had already been canceled during the period analyzed, were included in the sample. The same treatment was given to all stocks included in the sample. As the data were collected by adding up the market value of each share in the portfolio of all Brazilian funds in each month, it is not possible to know how many funds actually had shares in the portfolio in each period, but according to Economática a total of 39,715 funds were considered (most of the funds were already canceled and most had zero stocks in the portfolio), run by more than

1,000 different managers, as well as 413 stocks (many already canceled and not present in the funds' portfolios).

In addition to the main sample that considers all Brazilian funds, the model was also tested in more restricted samples according to certain fund and stock characteristics. Funds with an active investment strategy seek to achieve above market average returns through their ability to select stocks, so it is expected that this group of funds will have a more pronounced effect on price persistence, since their stock trading is more varied and independent. The size of funds, in terms of assets under management, may also interfere with the quality of their management. In Borges and Martelanc (2015), the performance of Brazilian funds was tested according to the methodology developed by Fama (2010), and evidence was found that small funds have less ability than larger ones. Therefore, the expectation is that small funds will have a greater impact on stock prices. The size of the stock market capitalization is also a feature known to generate abnormal returns (Fama and French, 1993). In the case of persistence, the hypothesis is that small stocks would have a greater impact on institutional investor herding, since they are generally less liquid shares and therefore have less efficient prices, which could create greater opportunities for gains. The active funds were selected according to their Anbima classification. Large funds were considered as those with net assets above 100 million reais on the date of their last trade, and small funds were all others. The criterion for classifying the small caps was a company market value of less than 200 million reais.

3.2 Persistence

Persistence is the number of consecutive months in which the pool of funds buys or sells a specific stock. The percentage variation in the quantity of a stock $\Delta Q_{i,t}$ in the all funds portfolio will be calculated as the percentage change in the stock's market value in the all funds portfolio, adjusted by the percentage change in the stock's price (adjusted for proceeds): $\Delta Q_{i,t} = \frac{P_{i,t}Q_{i,t}}{P_{i,t-1}Q_{i,t-1}} / \frac{P_{i,t}}{P_{i,t-1}}$. As in Dasgupta, Prat, and Verardo (2011), a stock is considered bought (sold) when the percentage variation in the quantity of the share is higher (lower) than the median of that variation considering all stocks in the all funds portfolio, to control for market growth: $\Delta Q_{i,t} > \mu_{\frac{1}{2}} \Delta Q_{j,t}$. Persistence is the number of consecutive months in which a stock is bought (sold) and takes integer values from +1 to +4 when the stock is bought and from -1 to -4 when it is sold. The maximum persistence value is +4 (-4), i.e. if a stock is bought (sold) for more than 4 consecutive months it will have +4 (-4) persistence. Shares that have not changed or have not been in the funds portfolio receive a value of 0. For example, a stock that has a percentage change in its quantity greater than the median in March, April, and May 2015 will have a persistence of +3 in May 2015.

3.3 Econometric Model

The statistical method applied in this study was panel regression analysis with fixed effects. Fixed effects were chosen, since they control the model for omitted variables that differ between the units (companies), but that are constant over time. In addition, two statistical tests were performed with the data, the Chow Test and the Hausman Test, which indicated fixed effects as being more adequate for the data treatment compared to pooled ordinary least squares (POLS) and random effects. The applied econometric model is as follows:

$$R_{i,t+1} = \alpha_i + \beta_1 Pers_{i,t} + \beta_2 R_{i,t-48} + \beta_3 Cap_{i,t} + \beta_4 MtB_{i,t} + \beta_5 Vll_{i,t} + \beta_6 PE_{i,t} + \beta_7 TnO_{i,t-1} + Dm_t + \varepsilon_{i,t} \quad (1)$$

In the model (1), the dependent variable $R_{i,t+1}$ measures the stock return i in month t + 1, that is, in the following month: $R_{i,t+1} = (P_{i,t+1} - P_{i,t}) / P_{i,t}$. This model was tested with six different specifications for the dependent variable. In addition to the return of the stock in the following month, the model was also applied to the returns of the next three, six, twelve, eighteen, and twenty four months, in order to observe the explanatory power of the persistence variable in the stock's return in both the short and medium term. The return $R_{i,t+3}$ refers to the cumulative return of the following three months: $R_{i,t+3} = (P_{i,t+3} - P_{i,t}) / P_{i,t}$, the return $R_{i,t+6}$ refers to the cumulative return of the following six months: $R_{i,t+6} = (P_{i,t+6} - P_{i,t}) / P_{i,t}$, , and so on. $Pers_{i,t}$ is the explanatory variable of interest, which represents the persistence of stock i in the sum of all Brazilian funds in month t.

The other explanatory variables of the model are control variables, which are included due to being important variables indicated in the literature as stock price determinants, in order to avoid omitted variable bias. The first was the cumulative stock return for the last 4 years, $R_{i,t-48}$, since past returns include much of the effects not captured by other variables. The choice of a four-year period to measure past stock returns, following Dasgupta, Prat, and Verardo (2011), was made to facilitate comparisons between results, and also a shorter time period could omit relevant information about the stock, besides giving too much weight to recent events, and the moment effect, which occurs in the stock's performance in the past 3 to 12 months, could bias the analyses. The market capitalization $Cap_{i,t}$ controls for the size of the company, and the market-to-book ratio *market-to-book* $MtB_{i,t}$, defined by the ratio between the market value and book value of the company, was included to capture the growth potential of the company. Both factors were indicated by Fama and French (1993) as determinants of stock prices. The percentage change in the company's net income for the last quarter, $Vll_{i,t}$, identifies the profitability of the company, a factor that directly interferes with its market value, and thus the share price. The P/E ratio of the stock, $PE_{i,t}$, defined by the ratio between the share price and the company's net earnings per share, indicates the relative position of the company in its sector of activity, which may affect its price. Finally, the stock turnover in the last month, $TnO_{i,t-1}$, a liquidity indicator defined by the ratio between the number of days on which there was at least one trade with the stock, the number of trades with the stock within the period, and the cash volume transacted with the stock in the same period, captures the liquidity of the stock in the stock exchange, a factor that interferes with its price. In addition, Falkenstein (1996) finds that institutional investors may share the same risk aversion in relation to shares with the same characteristics, e.g. liquidity. The Dm_t vector corresponds to the 77 dummy variables for month that were included in the model to guarantee the robustness of the results.

4 Results

Table 1 below compares the explanatory variable persistence coefficients in all 42 tested specifications of the model. The different specifications consider as a dependent variable the returns of one, three, six, twelve, eighteen, and twenty four subsequent months, in order to identify the impact of persistence on the stock price in both the short and medium term. The

model was also tested for different samples. First the set of all funds together was tested, then only large funds were selected, then small funds, active funds, all funds trading only small caps, and finally a combination of some of these restrictions was used. The purpose in this case was to verify whether these fund and stock characteristics influence the impact of persistence on prices.

Table 1
The impact of persistence on stock return

$Pers_{i,t}$	$R_{i,t+1}$	$R_{i,t+3}$	$R_{i,t+6}$	$R_{i,t+12}$	$R_{i,t+18}$	$R_{i,t+24}$
All Funds	-0.00068**	-0.00173**	-0.00250**	-0.00225	-0.00154	-0.00072
Active Funds	-0.00096***	-0.00196***	-0.00357***	-0.00238*	-0.00290	0.00193
Large Funds	0.00163	-0.00016	-0.000091	0.00024	-0.000026	0.00167
Small Funds	-0.00104***	-0.00178***	-0.00207**	-0.00404***	-0.00352*	-0.00044
Small Caps	-0.00158**	-0.00289**	-0.00314*	0.00038	-0.00253	0.00016
Small and Active Funds	-0.00093***	-0.00198***	-0.00354***	-0.00251*	-0.00305	0.00142
Small and Active Funds trading Small Caps	-0.00382***	-0.00792***	-0.01212***	-0.01130**	-0.02852***	-0.00238

* at 10% statistical significance

** at 5% statistical significance

*** at 1% statistical significance

The results show that persistence presents statistical significance in the short term (from one to six months) in all samples, with the only exception being large funds. In the medium term (from twelve to twenty four months) some samples lose statistical significance. Active funds continue to present statistical evidence of the impact of persistence in the returns up to 12 months, small funds extend this influence to 18 months, and the sample restricted to small funds with an active strategy trading small caps shows the highest statistical and economic significance for all periods up to 18 months. For the twenty-four month period no persistence effect on the stock price was identified.

In addition, it is possible to observe that the sign of the persistence coefficient is negative in all cases; that is, shares purchased by the pool of funds for consecutive periods have their returns reduced, and shares sold have their returns increased. The coefficients are larger for the sample that pools small active funds trading small caps.

These results differ from the American studies in the short term. In the US there is evidence that persistence has a positive effect on returns up to 6 months, i.e. shares bought (sold) by the pool of US funds for consecutive periods show increased (decreased) returns in the short term. In the medium term, the American studies show a reversal of this trend: the returns of bought stocks fall and those of sold ones rise. In Brazil, this inverse effect occurs from the very first month: the stocks bought by Brazilian funds for consecutive periods have reduced returns, and the ones sold have increased returns, both in the short and medium term.

In Table 2 it is possible to observe the coefficients and statistics of persistence as well as all the other variables, except for the 77 time dummies, for the sample that gathers all Brazilian funds and all stocks.

Table 2
The impact of persistence on stock returns considering all Brazilian funds.

	$R_{i,t+1}$	$R_{i,t+3}$	$R_{i,t+6}$	$R_{i,t+12}$	$R_{i,t+18}$	$R_{i,t+24}$
$Pers_{i,t}$	-0.00068**	-0.00173**	-0.00250**	-0.00225	-0.00154	-0.00072
$R_{i,t-48:t}$	0.02263***	0.02320***	0.01202**	-0.03985***	-0.05958***	-0.16553***
$Cap_{i,t}$	-0.00000***	-0.00000***	-0.00000**	-0.00000**	-0.00000***	-0.00000*
$MtB_{i,t}$	-0.00000***	-0.00000***	0.00000***	0.00002***	0.00002***	0.00003***
$Vll_{i,t}$	0.00000	0.00002	0.00002**	0.00000	0.00007***	-0.00002
$Pe_{i,t}$	0.00000	0.00000	0.00000	-0.00000	0.00000	0.00000
$TnO_{i,t}$	0.01057**	0.01263	0.01503	0.02810	-0.00518	0.09676**
R^2	0.4659	0.3771	0.1760	0.2669	0.1829	0.5117
Prob > F	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

* at 10% statistical significance

** at 5% statistical significance

*** at 1% statistical significance

It can be seen from Table 2 that, considering the set of all funds trading shares together for consecutive periods, the persistence presents statistical and economic relevance in the short term, from one to six months, but not in the medium term, from twelve to twenty four months. All persistence coefficients are negative, indicating that since the first month the stocks bought by funds have reduced returns and the ones sold have increased returns. A stock that in a specific month has a persistence of 2, indicating that it has been bought by all Brazilian funds in the last two months, will, on average, have a reduction in its next month's return of 0.136%.

It is worth noting that the difference between the coefficients of the model that uses the subsequent three-month return and the model using the subsequent six-month return is small, at 0.08%, which shows that after the first three months the impact of funds trading shares continues, but loses strength.

Table 3 shows the coefficients and statistics of all the explanatory variables of the model specification with the most relevant results for the study, which brings together small funds with an active strategy trading small caps.

Table 3
The impact of persistence on the stock returns of small active funds trading small caps.

	$R_{i,t+1}$	$R_{i,t+3}$	$R_{i,t+6}$	$R_{i,t+12}$	$R_{i,t+18}$	$R_{i,t+24}$
$Pers_{i,t}$	-0.00382***	-0.00792***	-0.01212***	-0.01130**	-0.02852***	-0.00238
$R_{i,t-48:t}$	0.03552***	0.03417***	0.01696*	-0.04638**	-0.03400*	-0.15745***
$Cap_{i,t}$	0.00023***	0.00053***	0.00077***	0.00115***	0.00044*	0.00188***
$MtB_{i,t}$	-0.00024	0.00062	0.00052	0.00162	0.00124	0.00157
$Vll_{i,t}$	-0.00000*	-0.00000*	0.00000	0.00001***	0.00009***	-0.00000
$Pe_{i,t}$	0.00000**	0.00000	-0.00000	-0.00000	0.00000	0.00000
$TnO_{i,t}$	0.44683***	0.46771	-0.15741	1.69249**	0.67501	2.09684*
R^2	0.4156	0.4017	0.2896	0.1349	0.1083	0.2373
Prob > F	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

* at 10% statistical significance

** at 5% statistical significance

*** at 1% statistical significance

It is possible to observe in Table 3 that in the model specification that has as a dependent variable the stock return for the next month, stocks with persistence equal to 1, that is, small caps that were bought by the set of small and active funds in that month, present a coefficient of the explanatory variable persistence of -0.382%, at 1% statistical significance. This means that, on average, small caps bought by small active funds in a given month will show an average reduction in their next-month's return of -0.382%. In the same scenario, small caps that have persistence equal to 4, that is, that have been bought by the pool of small active funds in the past four consecutive months or more, will have this effect multiplied by 4. Thus, on average, their return from the next month will decrease by 1.528%, an important result in just one month, given the interest rates practiced in our market. In Graph 1, presented below, we can observe the average effect of the persistence variable assuming values of -4 to 4 on the stock's returns for subsequent periods:

The following are Tables 4 to 7 with the coefficients and statistics of all the variables included in the other specifications of the model.

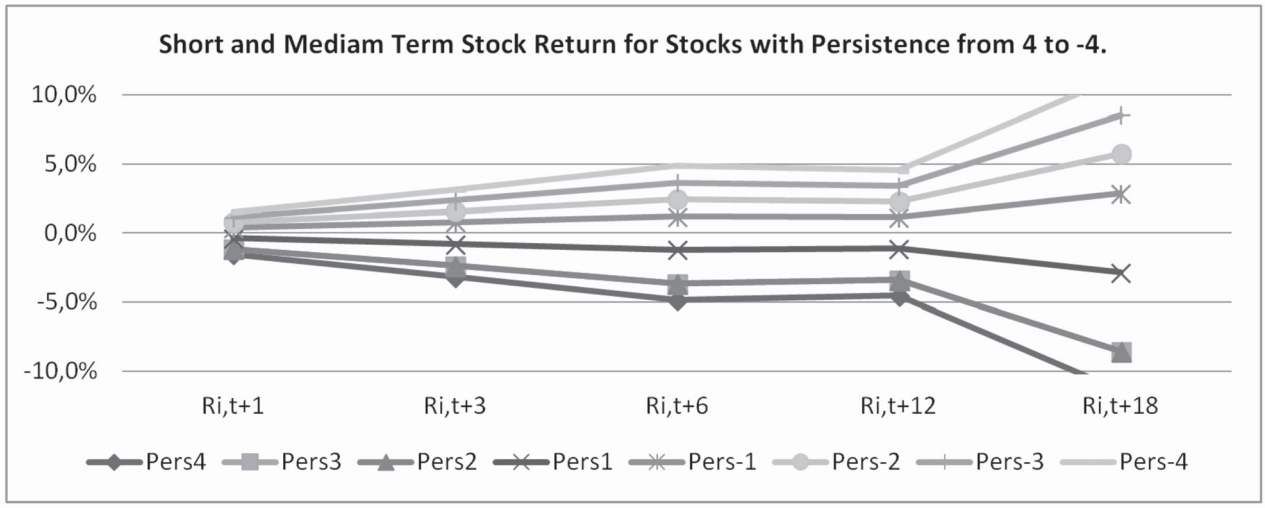

Table 4
Impact of persistence on stock returns of active funds

	$R_{i,t+1}$	$R_{i,t+3}$	$R_{i,t+6}$	$R_{i,t+12}$	$R_{i,t+18}$	$R_{i,t+24}$
$Pers_{i,t}$	-0.00096***	-0.00196***	-0.00357***	-0.00238*	-0.00290	0.00193
$R_{i,t-48:t}$	0.02264***	0.02332***	0.01207**	-0.03981***	-0.05954***	-0.16553***
$Cap_{i,t}$	-0.00000***	-0.00000***	-0.00000**	-0.00000**	-0.00000***	-0.00000*
$MtB_{i,t}$	-0.00000***	-0.00000***	0.00000***	0.00001***	0.00002***	0.00003***
$Vll_{i,t}$	0.00000	0.00002	0.00002**	0.00003	0.00007***	-0.00002
$Pe_{i,t}$	0.00000	0.00000	0.00000	-0.00000	0.00000	0.00000
$TnO_{i,t}$	0.01059**	0.01265	0.01511	0.02812	-0.00509	0.09661**

* at 10% statistical significance

** at 5% statistical significance

*** at 1% statistical significance

Table 5
Impact of persistence on stock returns of small funds

	$R_{i,t+1}$	$R_{i,t+3}$	$R_{i,t+6}$	$R_{i,t+12}$	$R_{i,t+18}$	$R_{i,t+24}$
$Pers_{i,t}$	-0.00104***	-0.00178***	-0.00207**	-0.00404***	-0.00352*	-0.00044
$R_{i,t-48:t}$	0.02266***	0.02327***	0.01210**	-0.03972***	-0.05947***	-0.16551***
$Cap_{i,t}$	-0.00000***	-0.00000***	-0.00000**	-0.00000**	-0.00000***	-0.00000*
$MtB_{i,t}$	-0.00000***	-0.00000***	0.00000***	0.00001***	0.00002***	0.00003***
$Vll_{i,t}$	0.00000	0.00002	0.00002**	0.00003	0.00007***	-0.00002
$Pe_{i,t}$	0.00000	0.00000	0.00000	-0.00000	0.00000	0.00000
$TnO_{i,t}$	0.01059**	0.01262	0.01500	0.02818	-0.00510	0.09675**

* at 10% statistical significance

** at 5% statistical significance

*** at 1% statistical significance

Table 6
Impact of persistence on stock returns of all funds trading small caps

	$R_{i,t+1}$	$R_{i,t+3}$	$R_{i,t+6}$	$R_{i,t+12}$	$R_{i,t+18}$	$R_{i,t+24}$
$Pers_{i,t}$	-0.00158**	-0.00289**	-0.00314*	0.00038	-0.00253	0.00016
$R_{i,t-48:t}$	0.03074***	0.02794***	0.01177	-0.04388***	-0.04183***	-0.14491***
$Cap_{i,t}$	0.00003**	0.00011***	0.00022***	0.00031***	0.00003	0.00047***
$MtB_{i,t}$	0.00029	0.00132**	0.00146*	0.00225*	0.00166	0.00412**
$Vll_{i,t}$	0.00000	0.00002	0.00001**	0.00003	0.00008***	0.00000
$Pe_{i,t}$	0.00000**	0.00000	-0.00000	-0.00000	0.00000	-0.00000
$TnO_{i,t}$	0.20458***	0.36828***	0.24798	0.61838	0.91777**	1.22742***

* at 10% statistical significance

** at 5% statistical significance

*** at 1% statistical significance

Table 7
Impact of persistence on stock returns of small active funds

	$R_{i,t+1}$	$R_{i,t+3}$	$R_{i,t+6}$	$R_{i,t+12}$	$R_{i,t+18}$	$R_{i,t+24}$
$Pers_{i,t}$	-0.00093***	-0.00198***	-0.00354***	-0.00251*	-0.00305	0.00142
$R_{i,t-48:t}$	0.02264***	0.02323***	0.01207**	-0.03981***	-0.05954***	-0.16553***
$Cap_{i,t}$	-0.00000***	-0.00000***	-0.00000**	-0.00000**	-0.00000***	-0.00000*
$MtB_{i,t}$	-0.00000***	-0.00000***	0.00000***	0.00001***	0.00002***	0.00003***
$Vll_{i,t}$	0.00000	0.00002	0.00002**	0.00003	0.00007***	-0.00003
$Pe_{i,t}$	0.00000	0.00000	0.00000	-0.00000	0.00000	0.00000
$TnO_{i,t}$	0.01060**	0.01266	0.01512	0.02814	-0.00507	0.09664**

* at 10% statistical significance

** at 5% statistical significance

*** at 1% statistical significance

4.1 Momentum Effect Robustness Test with Adjusted Past Returns

The momentum effect, identified by Jegadeesh and Titman (1993) and demonstrated in Carhart (1997), is an important factor that explains stock returns. According to this phenomenon, buying stocks with a good performance in the last 3 to 12 months and selling stocks with a poor performance in the last 3 to 12 months generates abnormal positive returns in the following year. However, these abnormal returns dissipate over the next two years. Based on Dasgupta, Prat, and Verardo (2011), the last 12 months of the control variable that measures the past four years' cumulative return is removed, to avoid the momentum effect biasing the persistence results, so if the relevant persistence results continue the momentum effect can be discarded.

Table 8 shows the coefficients of the explanatory variable persistence for the same 42 model specifications estimated in Table 1, the difference being that for the control variable that measures the cumulative return from the last four years, the last twelve months were removed, corresponding to the period in which the momentum effect occurs.

It can be seen in Table 8 that the results have not undergone almost any change with the replacement of the past returns control variable. The explanatory variable of interest, persistence, maintained its statistical and economic strength and the coefficients are very close to the previous ones, demonstrating that the identified effect does not concern the momentum effect.

Table 8
Impact of persistence on stock return with four-year past return adjusted to remove the momentum effect.

$Pers_{i,t}$	$R_{i,t+1}$	$R_{i,t+3}$	$R_{i,t+6}$	$R_{i,t+12}$	$R_{i,t+18}$	$R_{i,t+24}$
All Funds	-0.00077**	-0.00185**	-0.00256**	-0.00186	-0.00067	0.00090
Active Funds	-0.00096***	-0.00207***	-0.00378***	-0.00242*	-0.00223	0.00305
Large Funds	-0.00008	-0.00047	-0.00116	0.00039	0.00078	0.00383
Small Funds	-0.00103***	-0.00182***	-0.00212**	-0.00409**	-0.00303	0.00031
Small Caps	-0.00151**	-0.00262*	-0.00227	0.00001	-0.00426	-0.00307
Small and Active	-0.00093***	-0.00207***	-0.00372***	-0.00251*	-0.00248	0.00239
Small and Active Funds trading Small Caps	-0.00350***	-0.00731***	-0.01198***	-0.01258**	-0.03198***	-0.00642

* at 10% statistical significance

** at 5% statistical significance

*** at 1% statistical significance

5 Conclusions

The fund industry in Brazil has been booming for over twenty years and is the seventh largest in the world. Given its relevance, it is important to more deeply understand the effects of funds on the capital market.

This study sought to investigate the relationship between the stock trades that occur jointly among investment funds, a phenomenon called the institutional herd effect, and the prices of these stocks, in the short and medium term.

Some authors, such as Wermers (1999) and Sias (2004), investigated this question and, in the short term, a directly proportional effect between persistence and stock price was identified; that is, the stocks purchased by funds increased in price in the short term, and the ones sold reduced in price. One of the possible explanations for this effect occurring would be increasing demand raising prices.

Other authors have confirmed these results for the short term, and by analyzing the impact of persistence for longer maturities, have identified a price reversal. Dasgupta, Prat, and Verardo (2011) conclude that shares purchased by funds in consecutive periods present negative excess returns in the long run, and the opposite is true for shares sold. Jiao and Ye (2014), Edelen, Ince, and Kadlec (2014), and Zeng (2016) studied different samples of funds and periods in the US market, and all found evidence that funds move stock prices away from their equilibrium, generating a long-term price reversal. Zeng (2016) concludes that its results contradict the general notion that individual investors generate price noise and asserts that institutional investors play an important role in the inaccuracy of stock market valuations.

One of the possible consequences of this phenomenon is the destabilizing effect funds have on equity prices on the capital market; according to this hypothesis, funds make non-rational decisions that would, in the first instance, move stock prices away from their equilibrium, generating a posterior return to mean.

In this study, we analyzed all the open-ended Brazilian funds that have stocks traded on the B3 in their portfolios between September 2009 and February 2016. The results obtained were different from those presented in the international literature for the short term, and

the same for the medium term. In Brazil, shares purchased by funds for consecutive periods show a fall in returns in the following month, and this effect lasts up to eighteen months. Also, shares sold by funds present increased returns in the short and medium term.

It is also possible to observe that when the sample was selected by taking into account fund and stock characteristics known for their effect on prices, the persistence coefficients become economically and statistically stronger. When only active funds, i.e. those funds that intend to exceed average market performance, were considered in the sample, the effect becomes more significant. The same occurs when considering only small funds.

The decision to consider the size of the fund for the analysis originated from a previous study on the ability of fund managers to generate abnormal returns. In Borges and Martelanc (2015), it was concluded that a percentage of large funds had some degree of skill. In line with these results, large funds did not present any evidence of an impact on the prices of stocks traded by them. On the other hand, as expected, small funds showed strong evidence of an impact on stock prices. Lastly, considering the size of the stock market capitalization, stocks with a low market capitalization, i.e. small caps, are known to generate abnormal returns. Therefore, panel models with fixed effects were re-estimated considering only small caps, and, according to expectations, the results showed that the impact of institutional persistence on stock prices is larger and stronger.

Then, in order to investigate the importance of these selected characteristics of funds and stocks, the active and small funds were grouped together, and then the active and small funds trading only small caps. In both cases the results presented were also stronger, with special emphasis on the last group. When small funds with an active strategy trading small caps were considered, the most economically and statistically relevant results were obtained. Small caps bought by small active funds for consecutive periods had a statistically significant effect on the stocks prices in almost all the analyzed periods. In addition to that, the strength of the impact in the case of persistence equal to +3 was -2.852% in eighteen months, i.e. a small cap bought by small active funds for the last three consecutive months showed an average reduction of 2.852% in its return in eighteen months, which is a relevant impact.

This means that there is evidence that investment funds in Brazil cause, with their herd behavior, a drop in the returns of stocks that they choose to buy together for consecutive periods, both in the short and medium term. One of the possible explanations for this, according to the international literature, is that funds are copied in their decisions to buy or sell stocks, either to follow the leader, or because they take the same indicators into account, or to avoid the risk of negative performance when all others perform positively, i.e. in this case the fund manager would have no incentive to take risks.

This behavior can generate a price destabilizing effect, causing the stock price to fall from the first month, and the price of sold stocks to rise, an effect that can be extended for up to eighteen months. It should be recalled that the marginal effect decreases, that is, the impact is stronger in the first month, and increases less and less over the period. Another possible explanation is fund managers' poor stock-picking abilities or badly timed trading, especially among small funds, since on average the stocks purchased had reduced returns in the short and medium term.

One of the limitations of this study concerns the fact that the fund portfolio composition database is monthly, so stock purchases and sales made during the month by the funds are not identified in the sample. In addition, there are a number of issues in the evidence found in this study that warrant investigating. The first one is which hypothesis would explain the institutional herd effect in the Brazilian context: following the leader or avoiding the risk of being

outside the pack. Next, it would be interesting to investigate whether the decisions of fund managers are rational and whether they contribute to asset prices being in equilibrium since they are well-informed investors. Finally, it would be interesting to understand the reasons why the results of international studies are different from the Brazilian one in the short term.

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Contribution of each author

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1. Definition of research problem	√	√
2.Development of hypotheses or research questions (empirical studies)	√	√
3. Development of theoretical propositions (theoretical work)	√	√
4. Theoretical foundation/Literature review	√	
5. Definition of methodological procedures	√	√
6. Data collection	√	
7. Statistical analysis	√	
8. Analysis and interpretation of data	√	√
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