FEP WORKING PAPERS
Research – Work in Progress – n. 203, February 2006

Are mutual fund investors in jail?

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JEL: G20, G23 and G28

KEYWORDS: Mutual Fund, Performance Reaction, Load Costs, Investor Behaviour

ABSTRACT

The absence of investor reaction to the poor performance of mutual funds is a widely reported phenomenon. This paper investigates the role of load costs as an explanation for the phenomenon and concludes that back-end load fees are an obstacle to reaction. We find that investors with a high likelihood of undergoing a liquidity crisis, preferring liquidity in decision making, act contrary to the reaction hypothesis, and investors with broader investment horizons do not react to poor performances due to the fact that they are "imprisoned" by back-end load fees.

• CEMPRE is supported by CFT through POCTI of the QCAIII, which is financed by FEDER and Portuguese funds.

1. INTRODUCTION

In addition to the costs intrinsic to transactions concerning the sale and purchase of securities, mutual funds are, in general, subject to four types of fees: front-end, back-end, management and custodian. The first two are directly borne by the investor on subscribing to new mutual fund units and when redeeming units, respectively. Management and custodian fees are borne by the fund over time and, therefore, these are reflected in the fund's net asset value (NAV).

The argument, used by the industry and (generally) accepted by regulatory authorities, for the existence of load costs is that the aim of such fees is to prevent investors from investing for a short period of time, which could cause portfolios to suffer liquidity shocks. The underlying idea is that the frequent purchase and sale of units would require a large part of the portfolio to remain liquid, therefore reducing the fund's yield and passing on the resulting loss to all other unit holders. Hence, the purpose of the purchase and redemption fees is to prevent such a scenario.

The lack of mass investor reaction to the poor performance of funds is a puzzle that has still not been solved. The hypothesis that load costs have a significant role to play was accepted a long time ago (Ippolito, 1992). The contingent diversity of investor profile regarding sensitivity to liquidity shocks has also been formulated in theoretical terms (Nanda et al., 2000).

The type of response that investors provide to mutual fund performance has been the subject of significant research. Various studies have reported the phenomenon of asymmetry: the better the past performance of top performing funds the greater the flows attracted, whereas low performances do not encompass the sale of fund shares (Ippolito (1992), Chevalier and Ellison (1997), Goetzmann and Peles (1997), Sirri and Tufano (1998), Lynch and Musto (2000), Christoffersen (2001) and Del Guercio and Tkac (2001)).

In relation to the possible causes of this behaviour asymmetry, Ippolito (1992), assuming no load costs and persistent performance, finds that the investor will tend to choose funds with better recent performances instead of randomly selecting a fund. Similarly, investors will tend to avoid the worst performing funds by, on the one hand, not channelling new capital flows to these funds and, on the other, redeeming investments previously made in the worst performing funds. The load costs are, in this scenario, the (rational) explanation as to why large parts of the market are not transferred from one fund to the other when the performances are reported. In support of this theory, Ippolito (1992) documents that the net flows of funds that do not charge front-end and/or bach-end fees are more sensitive to performance than the net flows of funds that charge these kind of fees[1].

Sirri and Tufano (1992), on the other hand, explain investor behaviour based on the idea that the operating complexity of the industry leads to increased information costs. Investors therefore, in order to avoid these costs, decide based on the information made available to them, either through marketing instruments or through the media.

It is not easy in an extremely complex market, like the US market, to separate out the effect of information costs from the effect of load costs. In such a complex market, exchanging one mutual fund for another always involves, besides the load costs resulting from the outflow from the losing fund to the inflow in the winning fund, costs associated to the search for and processing of information that allows the characteristics and performances of the many funds to be classified. In a smaller-sized market, such as the Portuguese one, information costs are lower, and they can be deemed irrelevant[2]. However, there are relevant front-end fees and, in particular, significant back-end costs that may similarly function as an obstacle to the mass movement of capitals between different funds.

The purpose of this study is to assess whether back-end fees serve as an obstacle to disinvestment from poorly performing funds. Acknowledging the existence of two types of investors (as assumed by Nanda et al., 2000), this study seeks to investigate whether investors with a high likelihood of undergoing liquidity crises, preferring liquidity in decision making, are or are not influenced to act in a manner contrary to the performance reaction hypothesis. If liquidity is the determining factor in selection, investors will tend to prefer funds with lower back-end fees for short investment horizons, subscribing much more to funds of this type, even if they record worse

[1] Sirri and Tufano (1998) also concluded that funds with larger fees tend to have more sluggish growth than funds with lower fees.

[2] Despite the fact that Portugal has had mutual funds since 1986, as of March 2001 there were only 261 mutual funds, managing a total NAV of 21,390 million euros. These mutual funds were managed by a total of 19 management companies. The Portuguese market is, therefore, substantially less complex than the US market, and the respective information costs are, consequently, considerably lower.

performances than funds with higher back-end fees. The other hypothesis under analysis concerns the possibility that investors with longer investment horizons (i.e. less exposed to liquidity shocks) do not react to poor performances given that they find themselves “imprisoned” by back-end fees. The notion is that the high back-end fees for broad investment horizons, associated to poor performance, are a dissuasive factor to the mobilisation of capital flows from poorly performing funds to winning funds.

The importance of performing this study for a small market (such as the Portuguese one) is raised by the fact that the absence of reaction to poor performances is a reality in these types of markets (Alves and Mendes, 2006). Another reason to study the Portuguese case is based on the fact that the information available to the public is unlike that of any other market, given that not only is the value of the portfolios managed by the funds and their composition published monthly, but also the value of each investment unit is published daily[3,4]. Finally, given the lower complexity of the Portuguese mutual fund industry, and the public availability of information, information costs may be assumed irrelevant, and we are able to isolate the effect of load costs on fund flows.

This study analyses the relationship between back-end load costs and investor reaction relative to equity funds investing in domestic Portuguese shares, over a period of 7 ¼ years, using contingency table analysis. The results obtained strongly support the “entrenchment hypothesis” associated to 12 and 24-month investment horizons. We conclude that when the cost of disinvestment is high it acts as an obstacle to the penalisation of funds with poor performances; when such costs are low, there occurs disinvestment from better performing funds whenever liquidity requirements compel such. Conversely, corroboration of the liquidity hypothesis was established regarding fees for very short term redemptions (one or three months), according to which investors, due to the high likelihood of suffering liquidity shocks, choose funds according to the reduced value of back-end load costs and, therefore, preferentially subscribe to funds with lower back-end fees and worse performances.

[3] As far as we know, Hungary is the only other country in the EU that publishes portfolios (and their value) each month, but not for all mutual fund categories. In the USA, for instance, there is only quarterly portfolio and demand information.

[4] This information is available at the Portuguese Securities Commission website since 2002. Before 2002, daily newspapers published this information in the markets section. Thus, the cost of monitoring a portfolio of risky assets is negligible.

The paper includes a description of the sample and the demand variables in section 2. Section 3 contains a two- and three-dimensional analysis of the relationship between demand, performance and redemption costs. Section 4 contains the main conclusions.

2. DATASET AND MAIN VARIABLES

(i) Sample

The sample includes all 30 Portuguese open-end mutual funds which were classified as "domestic equity funds" by APFIN[5], between 31st December 1993 and 31st March 2001, and is therefore identical to the population.

The sample possesses characteristics that are of great bearing on the purposes of this investigation: (*i*) it refers only to the equity funds of one single country[6]; (*ii*) by including all funds we avoid survivorship bias; (*iii*) investments in bonds are of little significance[7]. These facts contribute to increase the effectiveness of performance measurements.

The total assets (monthly average) under the management of these funds is 635.2 million euros, with a maximum of 1805.6 million euros (April 1998) and a minimum of 90.4 million euros (December 1995). At the end of March 2001 the total NAV was 495.8 million euros.

(ii) Mutual Fund Investment Flow Variables

The absolute capital flows (CF) and the normalized capital flows (NCF) are alternatively used to measure the monthly investment flow of each fund.. The absolute capital flows is given by

$$CF_t = NAV_t + I_t - NAV_{t-1}(1 + R_t) \qquad [1]$$

where: NAV_t is the total net value of the fund's portfolio, at date t, after the distribution of income; I_t is the income distributed by the mutual fund; and R_t is the return achieved by the fund between t-1 and t[8/9].

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[5] APFIN is the Portuguese association of mutual fund management companies.

[6] The inclusion of foreign shares would mean taking into consideration the systematic risk of other countries. The importance of local factors in the calculation of the price of the risk of each one of the return generating factors is documented by Serra (2000).

[7] The mean aggregate percentage of domestic shares in the NAV managed by the samples' funds is 82.0%.

[8] We assume that the income distribution occurs on date *t*. Events, such as fund mergers, are handled using the follow the money approach (Gruber, 1996).

The normalised capital flows is given by[10]:

$$NCF_t = \frac{CF_t}{NAV_{t-1}}. \qquad [2]$$

The first metric favours larger funds that tend to have greater absolute cash flows disassociated from performance, while NCF tends to amplify the results of smaller funds (Gruber, 1996). Therefore, it is important to use both measurement methods. The exclusive use of the former could hide the reaction of the clients of large funds, in much the same way that the exclusive use of the latter metric could lead to the excessive prominence of the reaction of clients of smaller funds.

(iii) Sources of Information

The daily price quotation of each fund, the dates and the sums of the distributed incomes, and the funds monthly portfolios are from Dathis[11]. Market and accounting information for listed companies is also from Dathis, from the annual publications issued by Euronext Lisbon with yearly accounting information on listed companies, and from the daily quotation bulletins of Euronext Lisbon. Information regarding the fees charged by each fund was obtained from the funds' management rules published in the quotation bulletins of Euronext Lisbon. Accounting information relative to the management companies of the funds is from the same quotation bulletins and from CMVM (Portuguese Securities Commission).

3. PERFORMANCE, DEMAND AND REDEMPTION FEES

Mutual funds in Portugal are, in general, subject to four types of fees, in addition to the transaction costs associated to the sale and purchase of securities. These fees are: front-end, back-end, management and custodian. The front-end load fee is wholly borne by the investor at the time of subscription. The back-end load fee is payable by the investor when redeeming investment units. The management and custodian fees are borne by the fund and, therefore, impact on the respective NAV. Front-end and back-end load costs can both be an obstacle to

[9] Purchases (net of sales) made by fund of funds of the same financial group were deducted from the total flow, thereby ensuring that only capital flows originating from clients outside of the fund complex is considered.
[10] NCF is used by Ippolito (1992), Sirri and Tufano (1998) and Zheng (1999), among others.
[11] Financial information disclosure service of Euronext Lisbon.

performance reaction, due not only to the fact that the subscription of funds with a good performance is expensive, but also because the disinvestment from a badly performing fund is excessively costly.

The majority of the funds in our sample did not charge front-end fees. Only about 20% of the funds required the payment of this fee, which reached a maximum of 5% in some years. The analysis of the relationship between front-end fees and demand[12] allows one to conclude that the funds with the highest fees are more often those that occupy the top positions in the demand rankings. This means that investors, in general, more intensively seek out funds with higher front-end load fees.

The following sub-sections analyse the relationship between back-end load fees, demand and performance.

3.1 TWO-DIMENSIONAL ANALYSIS

<u>(i) Demand vs. Back-end Load Fees</u>

The practice of charging these fees is generalised amongst equity funds in Portugal. The fee usually varies according to the investment period. In order to standardize the analysis, the variables CR1M, CR3M, CR6M, CR12M, CR24M and CR60M were constructed. These variables represent fixed back-end load fees in force for 1-month, 3-month, 6-month, one-year, two-year and five-year investments, respectively. These variables are in Table 1, and we can conclude that back-end load costs decrease as the timeline from purchase increases.

TABLE *1* – EVOLUTION OF VARIABLES CR1M, CR3M, CR6M, CR12M, CR24M and CR60M

	1994	1995	1996	1997	1998	1999	2000	1994	1995	1996	1997	1998	1999	2000
				CR1M							CR12M			
Average	2,03%	1,94%	1,96%	1,93%	1,95%	1,99%	1,92%	0,93%	0,83%	0,91%	0,77%	0,88%	0,91%	0,86%
Median	2,00%	2,00%	2,00%	2,00%	1,56%	2,00%	1,63%	1,00%	1,00%	1,00%	0,75%	1,00%	1,00%	1,00%
Maximum	5,00%	5,00%	5,00%	5,00%	5,00%	5,00%	4,00%	2,00%	2,00%	3,00%	3,00%	3,00%	3,00%	3,00%
Minimum	1,00%	1,00%	1,00%	1,00%	1,00%	0,63%	1,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
				CR3M							CR24M			
Average	1,60%	1,58%	1,62%	1,57%	1,60%	1,63%	1,63%	0,78%	0,67%	0,72%	0,64%	0,57%	0,52%	0,52%
Median	2,00%	1,75%	1,50%	1,50%	1,50%	1,50%	1,50%	0,25%	0,13%	0,25%	0,00%	0,25%	0,25%	0,25%
Maximum	2,50%	2,50%	3,00%	3,00%	3,00%	3,00%	3,00%	2,00%	2,00%	3,00%	3,00%	3,00%	3,00%	3,00%
Minimum	0,00%	0,00%	0,00%	0,00%	0,38%	0,63%	1,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
				CR6M							CR60M			
Average	1,33%	1,26%	1,32%	1,30%	1,41%	1,44%	1,36%	0,75%	0,63%	0,68%	0,57%	0,37%	0,28%	0,30%
Median	1,50%	1,00%	1,00%	1,00%	1,50%	1,50%	1,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
Maximum	2,50%	2,50%	3,00%	3,00%	3,00%	3,00%	3,00%	2,00%	2,00%	3,00%	3,00%	3,00%	3,00%	3,00%
Minimum	0,00%	0,00%	0,00%	0,00%	0,38%	0,50%	0,50%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%

Obs.: CR1M, CR3M, CR6M, CR12M, CR24M and CR60M are, respectively, the redemption fees applicable for investments with the duration of 1 month, 3 months, 6 months, 1 year, 2 years and 5 years.

[12] Not reported in order to save space. The analysis was performed for quarterly, half-yearly and annual flows.

Two-dimensional contingency tables were built to analyse the relationship between demand and back-end fees. The back-end load variable has two mutually exclusive categories: the Big category «B» if, during the period under analysis, the fund charged fees greater than the median and the Small category «S» if, on the contrary, these fees were below the median. The demand variable is divided into two categories as well: W^* (winner) and L^* (loser), according to whether the fund in question achieved net capital flows above or below the median, respectively.

If demand is independent of fees then the observations would be equally distributed between the 4 cells of the contingency table. However, if there is a preference for more expensive funds and the avoidance of cheaper funds, then the observations tend to concentrate in BW^* and SL^*. If the preferred funds are the cheapest ones, then the observations tend to concentrate on BL^* and SW^*.

Table 2 reports our results for the Malkiel (1995) repetition of winners and losers tests[13]. In this table the percentage of repetition of winners (RW) is computed as $RW=BW^*/(BW^*+SW^*)$, and the percentage of repetition of losers (RL) is equal to $RL=SL^*/(BL^*+SL^*)$. For the CR1M and CR3M variables, the RW percentages are below 50%, which means that the winners in terms of demand were not the funds with the highest fees. The RL percentages are also below 50%, indicating that the funds with lower fees are not the least preferred. Thus, both RW and RL suggest that there exists a negative relationship between back-end fees for 1 and 3-month investment horizons and demand.

When the CR12M and CR24M variables are used, the observations tend to concentrate in the BW^* and SL^* cells, at least in terms of normalized flows of capital. In this case, the funds with higher fees are those most sought after and funds with lower fees record lower growth in demand. Finally, no circumstances with statistical significance were found for the CR6M or CR60M variables.

It can thus be concluded that back-end load fees in the short term (1M and 3M) seem to dissuade investors, but do not produce an identical effect in longer investment horizons.

[13] The Chi-square test (with and without the Yates continuity correction), the cross-product ratio (also known as the odds ratio or relative risk test) and the joint repetition test of Pesaran and Timmermann (1992) were also used, but results are not reported.

TABLE *2* – REDEMPTION FEES VERSUS CAPITAL FLOWS

	CR1M		CR3M		CR6M		CR12M		CR24M		CR60M	
	Repeat Winners Test RW	Repeat Losers Test RL	Repeat Winners Test RW	Repeat Losers Test RL	Repeat Winners Test RW	Repeat Losers Test RL	Repeat Winners Test RW	Repeat Losers Test RL	Repeat Winners Test RW	Repeat Losers Test RL	Repeat Winners Test RW	Repeat Losers Test RL
	Panel A: Quarterly Analysis											
CF	0.43 ***	0.43 ***	0.43 **	0.44 **	0.48	0.48	0.52	0.51	0.54	0.53	0.51	0.50
NFC	0.43 **	0.46 *	0.44 **	0.46	0.49	0.51	0.53	0.56 **	0.55 *	0.56 **	0.51	0.52
	Panel B: Half-Year Analysis											
CF	0.37 ***	0.40 ***	0.44 *	0.43 **	0.48	0.46	0.53	0.52	0.51	0.49	0.47	0.47
NFC	0.43 *	0.44 *	0.46	0.44 *	0.52	0.50	0.58 **	0.58 **	0.59 **	0.56 *	0.55	0.51
	Panel C: Annual Analysis											
CF	0.43	0.44	0.46	0.47	0.46	0.47	0.51	0.52	0.48	0.49	0.46	0.48
NFC	0.40 **	0.44	0.38 **	0.43	0.43	0.47	0.55	0.60 *	0.52	0.55	0.50	0.53

Obs.: (*i*) RW are RL, respectively, the percentage of repeated winners [$RW = BW^*/(BW^*+SW^*)$] and the percentage of repeated losers [$RL = SL^*/(BL^*+SL^*)$]; (*ii*) the null hypothesis are, respectively, RW=0,5 and RL = 0,5 (independency hypothesis); (*iii*) the symbols ***, ** and * show statistical significance at 1%, 5% and 10%, respectively.

To sum up, investors, in general, more intensively channel investment flows to funds with lower back-end load fees for short term investments (one and three months) and to funds with more costly redemption conditions for one-year and two-year investments. This can be interpreted as evidence that investors fear liquidity shocks in the short term and trust in the prospect of recuperating costs in the longer term. This interpretation is compatible with the model of Nanda et al. (2000), according to which the expected returns for funds with load costs exceed – due to the lower impact of liquidity shocks – the expected returns for funds without load costs.

(ii) Performance vs. Back-end Load Fees

If a fund possesses a better performance but demands prohibitive back-end fees, investors do not intensively favour this fund for new subscriptions, despite the yield achieved. In the same manner, very high fees in funds with poorer performances can deter investors from redeeming their investments. In such a case, the fund would be "entrenched" in the redemption costs. An immediate conclusion that can be drawn is that funds with higher fees for 12 and 24-month investment horizons are demand-preferred. Thus, it may be the case that back-end fees (when high) are hindering investor reaction to poor performance, in the same way that these fees (when low) are the basis for sacrificing good performances (whenever investors possess liquidity requirements).

It is evident that in the world envisaged by Nanda et al. (2000) – based on a model in which the load costs are endogenously set in a competitive market composed of investors with different liquidity requirements – the "entrenchment" hypothesis would not be pertinent, considering that the funds with higher back-end fees would be those providing greater return. In this model, investors exposed to liquidity shocks prefer funds without back-end fees whereas investors with longer investment horizons prefer funds with load costs considering that they offer (expected) higher returns[14]. Nevertheless, such a world does not only lack empirical foundation, particularly in relation to the ex-post existence of a positive relationship between returns and back-end fees, but it also behaves as a temporal space of adjustment in which investors find themselves "entrenched". To all intents and purposes, a minimum period of time is necessary so that the greater performance of funds not subject to liquidity shocks – if these exist – can compensate the higher back-end fee[15].

Table 3 relates performance to CR1M, CR3M, CR6M, CR12M, CR24M and CR60M. Fund performance rankings are divided into winners (W) and losers (L), and back-end load fees into large (B) and small (S). The χ^2 and the repetition of losers tests[16] refer to tables comparing the performance of a period to the fees of the subsequent period.

The mutual funds' performance was calculated in two distinct ways: (*i*) the continuous raw returns; and (*ii*) the alpha coefficient of Carhart's (1997) model (based on a 4 factor APT model, which, besides the excess of market return gauged by the return differential of the PSIG Index[17] and the return of the LISBOR[18], also includes the HML, SMB and WML factors[19]).

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[14] This view does not only result from the fact that this type of fund does not invest in areas possessing as high a financial value as the others, but also due to them not having to bear sales costs triggered by liquidity shocks. In addition, the more able management companies possess a comparative advantage in the attraction of investors with lower liquidity requirements. Also, given the scarcity of investors without liquidity requirements, the management company shares out some of its income by offering lower fees.

[15] Gruber (1996) reports evidence that funds with load costs and positive capital flows surpass the performance of funds without load costs and positive capital flows for the investment horizon of one year, and that the reverse occurs when the investment horizon is three months. However, in the one-year timeframe, the performance difference is not sufficient to compensate for the load costs.

[16] A fund is repeatedly a loser if it is a loser in terms of performance (L) and it has low costs (S).

[17] We use the PSIG Index (the Euronext general Index for Euronext Lisbon) as the market returns proxy.

[18] We use the Lisbor 3-month rate (an inter-bank monetary rate) as a proxy of risk-free interest rate.

[19] The HML variable attempts to quantify the book-to-market effect and corresponds to the return of a portfolio that is long in high book-to-market stocks and short in low book-to-market stocks; SMB measures the size effect, and corresponds to the return of a portfolio that is long in small caps and short in big caps; WML measures the momentum effect, and is the return of a portfolio long in stock winners and short in recent losers. Due to the reduced size of the Portuguese stock market, the small markets methodology of Alves and Mendes (2004) is used in the calculation of the HML, SMB and WML factors.

TABLE *3* – PERFORMANCE VERSUS REDEMPTION FEES

Performance Measure	Test of X^2 χ^2	Repeat Losers Test RL	Test of X^2 χ^2	Repeat Losers Test RL	Test of X^2 χ^2	Repeat Losers Test RL
	Panel A: Quarterly Analysis					
	CR1M		CR3M		CR6M	
Raw Returns	14.80 ***	0.59 ***	12.79 ***	0.57 **	0.31	0.50
Carhart Alpha	4.56 **	0.59 ***	4.14 **	0.57 **	0.52	0.50
	CR12M		CR24M		CR60M	
Raw Returns	1.38	0.46 *	0.15	0.53	0.16	0.68 ***
Carhart Alpha	0.50	0.46 *	0.14	0.53	0.05	0.68 ***
	Panel B: Half-Year Analysis					
	CR1M		CR3M		CR6M	
Raw Returns	2.66 *	0.70 ***	12.58 ***	0.62 ***	0.00	0.54
Carhart Alpha	12.18 ***	0.70 ***	7.84 ***	0.62 ***	0.26	0.54
	CR12M		CR24M		CR60M	
Raw Returns	0.05	0.48	0.55	0.52	0.52	0.65 ***
Carhart Alpha	1.05	0.48	1.04	0.52	0.29	0.65 ***
	Panel C: Annual Analysis					
	CR1M		CR3M		CR6M	
Raw Returns	1.71 *	0.51	1.99 *	0.54	0.09	0.53
Carhart Alpha	1.21	0.51	0.21	0.54	0.08	0.53
	CR12M		CR24M		CR60M	
Raw Returns	0.17	0.46	1.28	0.47	0.01	0.63 **
Carhart Alpha	0.02	0.46	2.85 **	0.47	0.21	0.63 **

Obs: (i) χ^2 is the χ^2 statistic; (*ii*) RL is the percentage of repeated losers [RL = SL/(BL+SL)]; (*iii*) the symbols ***, ** and * show statistical significance at 1%, 5% and 10%, respectively.

There exists (for all quarterly, half-yearly and annual analysis) a positive relationship between performance and back-end fees for investments made more than two and less than five years previously (CR60M). Similarly, there is a positive relationship for short investment periods (CR1M and CR3M).

The results obtained can be read from the perspective of either new subscriptions (inflows) or redemptions (outflows) to performance reaction. In terms of inflows, an economic agent with high liquidity requirements chooses, according to Nanda et al. (2000), a fund with low short-term back-end costs. According to Table 3, if a fund is chosen as a function of CR1M or CR3M, a poorly performing fund will probably be chosen. Subscriptions from this type of investor will be contributing to an inverse reaction, instead of contributing to the penalisation of poorly performing funds. On the other hand, if new subscribers are economic agents with a reduced probability of experiencing liquidity shocks, they will select funds with higher back-end fees. Consequently, if those investors have an investment horizon that is greater than two years but less than five they shall choose based on CR60M, which – according to Table 3 – leads to the selection of better performing funds. In this case, these subscriptions shall contribute to supporting the performance reaction hypothesis.

In relation to outflows, Table 3 permits conclusions to be drawn that support both hypotheses. Lets assume that an investor verifies that the fund held in its portfolio performed badly (L) and, furthermore, that the investment in the fund was made less than three months previously. Very probably, a fund with a reduced value (S) for CR1M and CR3M is held. In this event, the back-end fee is not, in theory, an obstacle to the performance reaction sale. If the investment was made more than two and less than five years previously, then, in much the same way, it is very probable that the investor possesses an «S» fund. In this situation, back-end fees do not seem to hinder performance reaction. However, if the timeframe is one year, the probability that the fund held is a «B» type is greater than 50%[20]. The same can be said, in the annual analysis, for investments that are more than one and less than two years old (CR24). If the circumstances refer to a Nanda et al. (2000) agent, who is certain that not enough time has elapsed for the positive impact of the absence of liquidity shocks to generate greater returns, then no reaction is registered. If, on the contrary, the investor is convinced that the fund has not been managed as well as other funds, then, nonetheless, the agent may prefer not to react since this would imply the payment of heavy back-end fees[21]. In such a case, it may be preferable to wait for sufficient time to elapse so that no or lower fees are payable, even if subject to management that is not as good as that exhibited by other funds. Investors feel that they are "prisoners" to the back-end fees in force. Consequently, in relation to outflows, the investor profile, investment horizon and back-end load fee can all interact with performance, generating behaviour that does not comply with the reaction hypothesis.

3.2 THREE-DIMENSIONAL ANALYSIS

The previous paragraphs clearly show that the joint study of the performance rankings of a given period, the rankings of net flows of capital and the back-end fee rankings of the subsequent period is essential. Three-dimensional contingency tables with performance – high (W) and low (L) -, demand - increased (W*) or decreased (L*) -, and fees – big (B) or small (S) -, are suitable for the purpose.

These tables allow four different hypotheses to be tested. The first is the hypothesis of independence of the three variables: $H_0 : p_{ijk} = p_{i..}p_{.j.}p_{..k}$, [3]

[20] Even though statistical significance is only observed with the quarterly analysis.
[21] Added to which would be the possible payment of front-end fees for a new fund.

where p_{ijk} represents the probability that a result will "fall" into cell i (i = W, L), j (j = W^*, L^*) and k (k = B, S), $p_{i..}$ denotes the probability of category i, $p_{.j.}$ denotes the probability of category j and $p_{..k}$ is the probability of category k.

Hypotheses of partial independence can also be tested, allowing the assessment of whether one of the variables is conditionally independent of the other two:

$$H_0(1): p_{ijk} = p_{i..}p_{.jk}, \qquad [4]$$

$$H_0(2): p_{ijk} = p_{.j.}p_{i.k}, \qquad [5]$$

$$H_0(3): p_{ijk} = p_{..k}p_{ij.}, \qquad [6]$$

where $H_0(1)$ corresponds to the hypothesis of performance independence relative to the other two variables, $H_0(2)$ is the hypothesis that demand is independent of performance and back-end fees, and $H_0(3)$ is the hypothesis that the back-end fee is independent of demand and performance. The $H_0(2)$ hypothesis is particularly useful for our purposes.

TABLE *4* –$H_0(2)$ TEST, FOR QUARTERLY ANALYSIS

$H_0(2)$	n_{ijk}	E_{ijk}	n_{ijk}	E_{ijk}	n_{ijk}	E_{ijk}	n_{ijk}	E_{ijk}	n_{ijk}	E_{ijk}	n_{ijk}	E_{ijk}
	Alpha-CF-CR1M		Alpha-CF-CR3M		Alpha-CF-CR6M		Alpha-CF-CR12M		Alpha-CF-CR24M		Alpha-CF-CR60M	
WW^*B	52	68.1	53	70.6	50	63.6	72	78.6	62	62.1	41	44.6
WW^*S	77	68.6	76	66.1	79	73.1	57	58.1	67	74.6	88	92.2
WL^*B	84	67.9	88	70.4	77	63.4	85	78.4	62	61.9	48	44.4
WL^*S	60	68.4	56	65.9	67	72.9	59	57.9	82	74.4	96	91.8
LW^*B	51	54.6	56	57.6	74	66.6	84	73.1	74	63.1	49	42.6
LW^*S	91	79.6	86	76.6	68	67.6	58	61.1	68	71.1	93	91.7
LL^*B	58	54.4	59	57.4	59	66.4	62	72.9	52	62.9	36	42.4
LL^*S	68	79.4	67	76.4	67	67.4	64	60.9	74	70.9	90	91.3
χ^2	13.41		14.15		8.42		4.72		5.60		2.93	
p	0.00 ***		0.00 ***		0.02 **		0.10 *		0.07 *		0.20	
	Alpha-NCF-CR1M		Alpha-NCF-CR3M		Alpha-NCF-CR6M		Alpha-NCF-CR12M		Alpha-NCF-CR24M		Alpha-NCF-CR60M	
WW^*B	58	67.6	55	70.1	58	63.1	82	78.1	68	61.7	45	44.3
WW^*S	76	68.1	79	65.6	76	72.6	52	57.7	66	74.1	89	91.5
WL^*B	78	68.4	86	70.9	69	63.9	75	78.9	56	62.3	44	44.7
WL^*S	61	68.9	53	66.4	70	73.4	64	58.3	83	74.9	95	92.5
LW^*B	51	54.2	57	57.2	71	66.1	81	72.6	71	62.7	46	42.3
LW^*S	84	79.1	78	76.1	64	67.1	54	60.7	64	70.6	89	91.0
LL^*B	58	54.8	58	57.8	62	66.9	65	73.4	55	63.3	39	42.7
LL^*S	75	79.9	75	76.9	71	67.9	68	61.3	78	71.4	94	92.0
χ^2	5.53		11.99		2.15		4.90		6.50		0.90	
p	0.07 *		0.00 ***		0.27		0.09 *		0.04 **		0.41	

(i) W (L) represents the winners (losers) in the performance rankings; W^* (L^*) represents the winners (losers) in the capital flow (CF or NCF) rankings; and B (S) represents the funds with big (small) redemption fees (CR) for the different time investing horizons (1, 3, 6, 24 and 60 months); (*ii*) the symbols ***, ** and * show statistical significance at 1%, 5% and 10%, respectively.

The χ^2 test is used in this study. In Table 4, referring to a quarterly analysis, the alphas of the Carhart model are used, demand is assessed via CF and NCF, and various investment time horizons are considered for the purpose of back-end fees. The number of observations for each cell (n_{ijk}), the respective expected values (E_{ijk}), χ^2 statistics and the unilateral p-value are reported for each case. The significance levels are also stated, and the null hypothesis is described by [5][22]. At the 10% significance level, the hypothesis that demand is independent of both performance and back-end load fees is rejected in 9 of the 12 reported situations.

The "entrenchment" hypothesis requires that, given the performance and redemption costs, the demand rankings favour funds with heavier back-end load. Thus, it is expected that WW^*B surpasses its expected value and that WL^*B is lower than its expected value. This is the case with Alpha/NCF/CR12M: the value observed for WW*B (82) exceeds the expected value (78.1) and the value observed for WL*B (75) is lower than the respective expected value (78.9). However, Alpha/NCF/CR1M records the opposite. The "entrenchment" hypothesis likewise states that WL^*S surpasses the expected value and WW^*S is below the expected value. This means that winning funds relative to performance are more likely to be *converted* into losing funds relative to demand when they possess lower back-end fees. In contrast, funds with winning performances are much less likely to be transformed into losing funds if they are protected by high fees[23]. Similarly, where "entrenchment" exists, it is expected that LW^*B surpasses its expected value and the opposite occurs with LL^*B. Moreover, it is expected that funds with poor performances and low back-end fees would more likely be penalised, which means that it can be forecasted that LL^*S *surpasses* LW^*S. In other words, LL^*S can be expected to overtake the expected value and the opposite will occur vis-à-vis LW^*S[24].

The hypothesis that demand is steered by liquidity concerns implies a relationship between the observed values and the expected values which is the opposite of the "entrenchment" hypothesis. In these circumstances it would be expected that funds with lower fees are favoured (in terms of demand) in each performance category. It can be concluded that there is evidence of "entrenchment" in Alpha/NCF/CR12M, and evidence of demand dominated by liquidity concerns in Alpha/CF/CR1M. In all the other cases of rejection of the null hypothesis, situations that are wholly in agreement with the "entrenchment" hypothesis for Alpha /NCF/CR24M are verified. Conversely, Alpha/NCF/CR1M, Alpha/CF/CR3M and Alpha/NCF/CR3M are totally contrary to this hypothesis. The results of Alpha/CF/CR12M and Alpha/CF/CR24M are

[22] In order to save space identical tables drafted for the different time horizons and different null hypotheses are not reproduced herein.
[23] This is the case of Alpha/CF/CR12M, but not Alpha /CF/CR1M.
[24] Alpha/NCF/CR12M, once again, behaves according to the "entrenchment" hypothesis. The reverse is true of Alpha /CF/CR1M.

consistent with the “entrenchment” hypothesis in 6 of the 8 cells, whereas with Alpha/CF/CR12M this is true for only two cells.

Table 5 summarises the results of the analysis of all the 4 hypotheses [3] to [6]. There is (strong) evidence of the “entrenchment” hypothesis associated to the CR12M and CR24M fees, both on a quarterly and half-yearly basis. Accordingly, in terms of normalized flows relative to both raw returns and to the alphas of the Carhart model, $H_0(2)$ is rejected in favour of the hypothesis that demand is not independent of the performance/ back-end fee variables. In addition, in any one of the cases, the eight cells of the tables of contingency record values consistent with such a hypothesis[25]. If one uses CF, however, $H_0(2)$ is only rejected for quarterly data. Thus, the only situation in which all of the cells develop according to the “entrenchment” hypothesis is that of Raw Returns/CR24M. Nevertheless, both CR12M and CR24M Carhart alphas provide evidence consistent with this hypothesis for 6 of the 8 cells.

TABLE 5–TESTS OF H_0, $H_0(1)$, $H_0(2)$, $H_0(3)$

	H_0	$H_0(1)$	$H_0(2)$		$H_0(3)$		H_0	$H_0(1)$	$H_0(2)$		$H_0(3)$
	χ^2	χ^2	χ^2	NC	χ^2		χ^2	χ^2	χ^2	NC	χ^2
Panel A: Quarterly Analysis											
Raw Returns vs CF						Alpha Cahrart's vs CF					
CR1M	28.2 ***	15.4 ***	12.2 ***	0	25.0 ***	CR1M	18.8 ***	6.4 **	13.4 ***	0	16.2 ***
CR3M	25.6 ***	13.6 ***	11.8 ***	0	22.5 ***	CR3M	19.0 ***	7.4 **	14.2 ***	0	16.6 ***
CR6M	7.2 *	6.1 *	7.0 **	2	5.5 *	CR6M	8.8 *	7.8 **	8.4 **	2	7.2 **
CR12M	4.4	3.8	2.9	6	2.5	CR12M	5.2	4.7 *	4.7 *	6	3.5
CR24M	5.4	1.9	5.2 *	8	3.5	CR24M	5.8	2.3	5.6 *	6	4.0
CR60M	2.2	1.9	2.1	4	0.4	CR60M	3.0	2.7	2.9	4	1.2
Raw Returns vs NCF						Alpha Cahrart's vs NCF					
CR1M	21.1 ***	15.5 ***	5.6 *	0	18.9 ***	CR1M	10.2 **	5.2 *	5.5 *	0	10.0 ***
CR3M	21.1 ***	13.4 ***	7.5 **	0	18.8 ***	CR3M	16.3 ***	9.2 **	12.0 ***	0	16.1 ***
CR6M	2.0	79.8	1.7	4	0.7	CR6M	2.7	75.2	2.2	4	2.6
CR12M	8.0 **	3.2	6.4 **	8	6.5 **	CR12M	5.4	0.8	4.9 *	8	5.3 *
CR24M	8.7 **	2.2	8.5 **	8	7.3 **	CR24M	6.7 *	0.2	6.5 **	8	6.5 **
CR60M	2.6	1.9	2.4	6	1.2	CR60M	0.9	0.3	0.9	8	0.9
Panel B: Half-Year Analysis											
Raw Returns vs CF						Alpha Cahrart's vs CF					
CR1M	17.1 ***	3.1	14.2 ***	0	16.0 ***	CR1M	29.1 ***	13.2 ***	14.7 ***	0	23.3 ***
CR3M	19.1 ***	13.6 ***	6.2 *	0	17.8 ***	CR3M	16.6 ***	10.2 ***	7.5 **	2	12.2 ***
CR6M	2.7	1.7	2.7	2	2.2	CR6M	6.3 *	5.2 *	5.9 *	2	3.0
CR12M	1.3	0.8	1.3	6	0.8	CR12M	4.8	4.4	3.9	4	1.8
CR24M	4.7	4.6 *	4.2	4	4.1	CR24M	4.5	4.3	3.4	4	1.2
CR60M	2.3	1.7	1.7	2	1.7	CR60M	5.3	5.0 *	5.2 *	4	2.3
Raw Returns vs NCF						Alpha Cahrart's vs NCF					
CR1M	7.0 *	2.7	4.3	0	6.7 **	CR1M	17.3 ***	12.7 ***	4.7 *	0	16.8 ***
CR3M	15.7 ***	13.0 ***	3.1	0	15.3 ***	CR3M	11.6 **	8.7 **	3.6	0	11.2 ***
CR6M	0.3	0.3	0.3	6	0.2	CR6M	0.9	0.8	0.6	4	0.7
CR12M	6.1 *	0.2	6.0 *	8	5.9 *	CR12M	7.5 *	1.9	6.6 **	8	7.5 **
CR24M	7.0 *	1.3	6.6 **	8	7.0 **	CR24M	7.1 *	1.1	6.0 *	8	6.9 **
CR60M	2.9	1.3	2.4	6	2.8	CR60M	2.1	0.5	1.8	8	1.9

Obs.: (*i*) H_0, $H_0(1)$, $H_0(2)$, $H_0(3)$ are, respectively, the null hypothesis of equations [3], [4], [5], and [6]; (*ii*) χ^2 is the χ^2 statistic; (*iii*) NC is the number of the 8 contingency tables cells that are compatible with the hypothesis of “entrenchment”; and (*iv*) the symbols *, ** and *** show statistical significance at 1%, 5% and 10%, respectively.

[25] The number of cells with values that are compatible with the “entrenchment” hypothesis is recorded in the NC column.

The hypothesis that demand is independent of the performance/ back-end fee variables for 12 and 24-month timeframes is rejected in terms of both absolute flows and, above all, normalized flows. The "entrenchment" hypothesis is accepted, and it can be concluded that when disinvestment costs are high they are an obstacle to the penalisation of poor performances, and when they are low, the reduced costs allow the mobilisation of better performing funds due to liquidity shocks.

Simultaneously, for the NCF variable and for the 12 and 24-month investment horizons, the i) three-variable independence hypothesis (H_0) is rejected, and ii) the hypothesis that back-end fees are independent of the performance/demand binomial ($H_0(3)$) is also rejected. These results support the "entrenchment" hypothesis. Lastly, performance is conditionally independent of the demand/ back-end fees pair ($H_0(1)$).

In relation to other investment horizons, the independence hypothesis is never rejected in CR60M, and the same is true of CR6M in terms of NCF. In all other cases, multiple rejections of the tested hypotheses are recorded, but never on a scale comparable with that of the "entrenchment" hypothesis. As it happens, CR1M and CR3M have zero cells compatible with the "entrenchment" hypothesis. This means that all the cells contain values that are consistent with the liquidity hypothesis.

To summarise, our results are compatible with the hypothesis that medium-term investors (1 and 2 years) do not react to poor performances given the fact that they feel "imprisoned" by back-end load fees, in the same way that the results are in line with the hypothesis that investors likely to suffer liquidity shocks shall act in exactly the opposite manner to that indicated by the reaction hypothesis.

4. CONCLUSIONS

The relationship between back-end load fees, mutual fund net capital flows and the performance of mutual funds in a small market was studied in this paper. The conclusions drawn from the two-dimensional analysis of demand /load costs are that investors more intensively channel investment flows to funds with higher back-end fees. Furthermore, investors penalise funds with the highest redemption costs for investment horizons of one and three-months, favouring funds with heavier redemption conditions for one or two-year investment horizons.

These results corroborate the theory that investors are concerned with possible liquidity shocks and, on the other hand, they trust in the capacity – predicted by the model of Nanda et al. (2000) and (only partially) confirmed by Gruber (1996) – that over (sufficiently) long investment horizons the skills of the more expensive management entities shall allow them to recover the increased costs borne.

The comparison of performance with redemption costs produced results that provide an explanation for the absence of reaction to poor performances. It was observed that investors making choices that are restricted by the existence of liquidity shocks and are sensitive to the 1 and 3 month back-end fees, prefer funds with lower fees and tend to invest in funds with worse performances. It was also concluded that the fees charged by funds can be an obstacle to the reaction of investors with 6-to-24 month investment horizons, precisely because of the (high) back-end fees payable.

The three-dimensional analysis of demand, performance and redemption costs corroborated the thesis that, over specific investment horizons, back-end fees are – as established by Ippolito (1992) – an obstacle to performance reaction. We conclude that there is (strong) evidence of the "entrenchment" hypothesis associated to the fees for 12 and 24-month timeframes. Thus, when disinvestment costs are high they are an obstacle to the penalization of poor performances and when they are low, such costs induce disinvestment from better performing funds whenever liquidity requirements compel the mobilisation of resources. Conversely, in relation to short-term (one and three months) back-end load fees, evidence supporting the liquidity hypothesis was found: investors likely to undergo liquidity shocks preferentially invest in funds with lower fees (and worse past performances). In summary, the existence of two types of investors hypothesized by Nanda et al. (2000) provides an explanation for the lack of performance reaction. Investors with a high likelihood of undergoing a liquidity crisis, preferring liquidity in decision making, act contrary to the reaction hypothesis, and investors with broader investment horizons do not react to poor performances due to the fact that they are "imprisoned" by back-end fees.

Our results do have important policy implications. From a regulatory standpoint, the implementation of measures that seek to permit the transfer of capital between funds without cost would be capable of freeing those investors that feel ‘trapped’ in poorly performing funds, thereby making the punitive effect provided by the said movement of capital effective. Otherwise, poorly performing funds shall continue to benefit from the protective umbrella provided by the imposition of high back-end fees. Such a measure would lead to an increase in competition between the different mutual fund management companies.

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