Revista de Economía Aplicada EA Número 78 (vol. XXVI), 2018, págs. 43 a 79

ACTIVE MANAGEMENT AND MUTUAL FUND PERFORMANCE*

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This paper analyses the relationship between active management and performance in US equity mutual funds over the period 2001-2011 for both gross and net returns. Active management is measured by time-varying parameters, idiosyncratic risk and turnover. A U-shaped relation is found, thus both the best and the worst mutual funds show a higher level of active management. This behavior is also found in the relationship between expenses and performance. Active management therefore implies selecting different strategies or investment bets with higher expenses and an unequal performance is achieved. However some level of persistence in the success of these bets is only found for the best mutual funds.

Key words: active management, mutual fund, performance.

JEL classification: G23, G11.

Mutual funds have developed significantly over the last decades, and a rich body of literature has emerged that analyzes how they are managed. One of the most relevant issues to attract both scholars' and practitioners' attention is fund performance, namely, managers' ability to provide added value and to achieve better results than when a passive management strategy is followed.

The extensive literature published on the topic has been influenced by the evolution of asset pricing models. Pioneering studies in this field are those of Sharpe (1966), Treynor (1966) and Jensen (1968). The application of conditional models considering the economic information available to managers has also been proposed by Ferson and Schadt (1996) and Christopherson *et al.* (1998), among others. Since the contributions of Sharpe (1992), Fama and French (1993) and Carhart (1997), the use of multifactor models has become widespread. In these models mutual fund returns are adjusted to their style, benchmarks or risk factors, as recently shown by Kosowski *et al*. (2006), Bollen and Busse (2005), Busse *et al.* (2010) and Fama and French (2010), among others.

(*) The authors acknowledge the financial support provided by research projects ECO2017-85746-P (Ministerio de Economía, Industria y Competitividad) and UJI-B2017-14 (Universitat Jaume I). The usual disclaimer applies.

Within this context, some literature has been concerned with the relationship between active management and performance. Sharpe (1991, 1992) showed the relevant role of residual risk in active management. He noted that to provide value added and to beat the market, a mutual fund must differentiate itself from the benchmarks. This difference implies the existence of tracking error, which in turn produces residual risk or idiosyncratic risk. In this line, Chevalier and Ellison (1997), Basak *et al.* (2007), and Chen and Pennacchi (2009) indicate that managers have an incentive to increase idiosyncratic risk if they are evaluated on their performance relative to a benchmark.

However, there is a puzzle in the literature regarding the relationship between active management and performance. On the one hand, Kacperczyk *et al.* (2005) point out that, on average, mutual funds perform better when they deviate from the benchmark and concentrate their holdings in industries where they have informational advantages. Cremers and Petajisto (2009) find that funds outperform benchmarks when they have greater differences in portfolio holdings as compared to the benchmarks. Amihud and Goyenko (2013) point out that lower R^2, that is, higher idiosyncratic risk, indicates greater selectivity and it significantly predicts better performance, whereas Huij and Derwall (2011) find that concentrated funds with higher levels of tracking error perform better than their more broadly diversified counterparts. On the other hand, Huang *et al.* (2011) find that funds' poor performance is driven by the increase in their idiosyncratic risk levels, which occurs when funds increase portfolio concentration. One argument that could reconcile this result with the above is that proposed by Casavecchia and Hulley (2013), who found evidence of a U-shaped relationship between performance and fees, and between performance and idiosyncratic risk.

The main aim of our study is therefore to shed light on this puzzle. In order to do so, we formulate a framework in which managers implement investment strategies with the aim of adding value to the mutual fund. We show how assessing fund performance is equivalent to assessing the performance of the strategies the fund pursues. In order to provide a nonzero abnormal performance, the results of these strategies should differ from those obtained by passive investment in the benchmark or factors of the performance model. As noted above, active fund management adds value when differentiation and idiosyncratic risk are involved. Our hypothesis follows that approach: active management involves differentiation and this, in turn, leads to an abnormal performance different from zero.

We contribute by proposing a more general approach, contrary to what is stated in some of the literature, without directly assuming that differentiation and idiosyncratic risk imply better performance. We actually propose that a U-shaped relationship may exist between active management and performance, which explains the puzzle related to the conflicting evidence found by the literature [Huang *et al.* (2011) and Amihud and Goyenko (2013), among others]. We also attempt to contribute to the literature by considering other variables apart from idiosyncratic risk as proxies to measure the level of active management. Indeed a mutual fund could show idiosyncratic risk even following a passive strategy only because it does not replicate exactly the benchmarks or style factors. Thus, unlike the contributions of Cremers and Petajisto (2009) and Amihud and Goyenko (2013), we also measured active management by analyzing the dynamics of the fund's risk level.

We assess mutual fund performance considering both net and gross returns for several reasons. The first is that the use of mutual fund net returns is of more inter-

est to investors because they match investors' returns (without front-end and back-end fees). In addition, as our objective is to analyze active management, is more appropriate to use gross returns since they are not biased by the relationship between active management and fees. This effect is especially relevant for our objectives, given that previous studies have found a relationship between the two variables [e.g. Casavecchia and Hulley (2013)], so our contribution must be made with gross returns in order to show that the relationship between performance and active management is not driven by fees. Secondly, we also analyze the performance persistence, and in this case there is previous evidence showing how persistence in fees can lead to evidence of persistence in performance. Gottesman and Morey (2007) attribute persistence to the expense ratio and, in the same vein, Fama and French (2010) identify costs as the source of persistence. Although using net returns is of greater interest to investors, we should use gross returns to find out, in an effective manner, if the results of active management are persistent over time.

Our results corroborate the main hypothesis: a U-shaped relationship between active management and performance, i.e., the most actively managed funds do achieve an abnormal performance farther from zero, but with both negative and positive signs. Nevertheless, funds with a low level of active management have an abnormal performance close to zero. Our hypothesis also implies a U-shaped relationship between performance and fund expenses, given that a greater level of active management involves more expenses giving full support to our hypothesis. Our results are in line with Casavecchia and Hulley (2013), who also found a U-shaped relationship. However, our approach differs from that of these authors, who propose a theoretical model that explains what the relationship between performance and fees should be. The underlying economic intuition is quite straightforward: since investing in an index portfolio incurs no cost, investors have no reason to pay fees to a fund manager; but they pay fees for the net alpha they expect to produce, relative to its level of idiosyncratic risk. Unlike this study, we do not rely on the relationship between fees and idiosyncratic risk; rather we propose a broader model that explains the relationship between active management and performance based on market efficiency. In markets with high efficiency, manager strategies will obtain an abnormal performance farther from zero, but for either positive or negative values, which produces the U-shaped relationship. In fact, in our empirical work this evidence is found for the analysis with both gross and net returns, so this relationship is not driven by the specific relationship between fees and active management. Another difference is that not only do we measure active management through idiosyncratic risk, but we also propose alternative measures, which enhances the robustness of our results. Our study contributes to the literature by relating these results with the characteristics of the mutual funds, finding that the best and worst funds are smaller in size[1].

(1) As Indro *et al.* (1999) and Beckers and Vaughan (2001) point out, the active management variable could be related to size and performance, and as such, small funds may be more agile than large funds in moving their investments across markets. On the other hand, the big popular mutual funds with a large number of investors might be more cautious about moving their assets if restricted investment targets are imposed. Thus, small funds may be more active and distant from the market, whereas big funds may follow a strategy more closely linked to the market. Casavecchia and Hulley (2013) also find that small funds show intensive rebalancing, idiosyncratic risk and higher management fees.

Related to the results noted above, we go a step further and analyze the reasons for this finding. Why can active funds achieve both the best and the worst performance? To answer this question, we carry out a fairly typical performance persistence analysis from the financial literature[2]. When considering gross returns our results provide no evidence of performance persistence, except for the best funds, although its economic impact is moderate. Whether among these best funds, we selected those on the top, we find higher level of persistence. It seems therefore that these funds do have greater ability to persistently select strategies that provide positive abnormal performance. This result is consistent with the evidence obtained by Amihud and Goyenko (2013) who found significant positive abnormal performance for mutual funds with best past performance and high active management. Our results for the rest of funds, including those with the worst performance, seem to be driven by unsuccessful bets rather than persistence in poor management ability.

The remainder of the paper is organized as follows: Section 1 proposes the relationship between performance and active management. In section 2, the data is described. Section 3 contains the empirical results, grouped into the following sub-sections: performance; active management; the role of management and expenses; persistence; and finally non-survivor mutual funds. Section 4 highlights the main conclusions of this study.

1. The performance of active management

We express as $V_{p,t-1}$ the value of the assets of mutual fund p at moment t-1, i.e., at the beginning of period t. We propose a model in which mutual fund managers take a number of J investment decisions in their active management during period t. Each decision may be expressed as a strategy $S_{j,t}$ which produces an earning $E_{j,t}$ and involves a management expense $f_{j,t}$ (including management fees). At the end of the period the new value of the assets of the mutual fund may be expressed by [1]:

$$V_{p,t} = V_{p,t-1} + \sum_{j}\left(E_{j,t} - f_{j,t}\right) \qquad [1]$$

The net return of the mutual fund for the t period $R_{p,t}$ can be expressed as [2]. Considering the return of the strategies in relative terms $R_{j,t}$ and the expense ratio $e_{p,t}$, the net return of the mutual fund can be expressed by [3].

(2) From the previous literature, it can be inferred that the funds with the highest level of active management pursue differentiated investment strategies. The results of these strategies are not fully or partially captured by the performance model, which leads to the fund's nonzero abnormal performance. If we consider investment strategies as a bet on the evolution of assets and markets, it is interesting to analyze whether the outcome of these bets is random, or whether it is a consequence of managers' ability. One way to conduct this analysis is to assess the persistence of performance. Several studies have been concerned about the performance persistence of mutual funds, i.e., whether managers consistently outperform (or underperform) the market [see Carhart (1997), Bollen and Busse (2005), Kosowski *et al.* (2006), Busse *et al.* (2010), Fama and French (2010), and Abdelsalam *et al.* (2014), among others]. In this line, another contribution of our study will be to analyze active management and performance persistence. A lower level of persistence would imply that the strategies' performance does not follow a successful pattern over time, but that it is the random outcome of winning or losing a bet. On the other hand, however, a higher level of performance persistence would imply that managers really have the ability to select and develop winning or losing strategies.

$$R_{p,t} = \sum_j E_{j,t} V_{p,t-1}^{-1} - \sum_j f_{j,t} V_{p,t-1}^{-1} \quad [2]$$

$$R_{p,t} = \sum_j R_{j,t} - e_{p,t} \quad [3]$$

Managers may pursue a wide range of strategies. These can be grouped according to the level of active management involved. Thus, a simple, passive strategy would be to invest in a diversified stock portfolio, for instance replicating a stock index. In this case, as a buy and hold strategy, the net return of the fund would be equal to the weighted return of the assets in the portfolio at the beginning of the period less the expense ratio. At the other extreme, an example of active management would be an intraday arbitrage, so that an additional income is obtained that is not necessarily linked to assets included in the portfolio at the beginning of the period.

Typically managers' strategies are not observable, so an external analyst cannot know what strategies are pursued and what results they yield. In some cases, part of this problem could be solved using portfolio holdings with appropriate frequency. However portfolio holdings have other problems, the main one being that reported information is a snapshot of the portfolio composition on a specific date, so interim trading bias may be present if observation frequency is low [Elton *et al.* (2010) and Fulkerson (2013)]. On this point, Puckett and Yan (2011) state that "studies that use quarterly data commonly assume that all trades occur at the end of the quarter, but in fact they could occur at any time within the quarter". Additionally, portfolio holding information may not be available and may be incomplete. At best, the available information is the daily net asset value of the fund, which allows the analyst to calculate net returns. This information is crucial since net return is the aggregate of the funds' results from their strategies less their expenses. Consequently this information is very useful because active fund management can be evaluated by comparing the funds' results with those obtained by passive management [Sharpe (1991), (1992)]. In the literature it is frequently the case that passive management is identified with a set of *factors*, or *benchmarks*, in the context of a linear model such as [4],

$$R_{p,t} = \alpha_p + \sum_i \beta_{p,i} F_{i,t} + \varepsilon_{p,t} \quad [4]$$

where $R_{p,t}$ represents the net return of the fund from two consecutive net asset values. On the right, α_p measures abnormal performance by comparing the net return of the fund with the expected return, and defined by a set of slopes $\beta_{p,i}$ with respect to the benchmarks or factors $F_{i,t}$, for $i = 1$ to N. Finally, $\varepsilon_{p,t}$ is the error term of the model and t takes value from 1 to T periods. Given that [4] assesses mutual fund net returns and, as shown in [3], they derive from the fund's strategies and expenses then mutual fund abnormal performance is the result of assessing the net returns of the strategies with the same model. Therefore, returns yielded from strategies may also be assessed individually in [5].

$$R_{j,t} = \alpha_j + \sum_i \beta_{j,i} F_{i,t} + \varepsilon_{j,t} \quad [5]$$

And considering [3] we obtain:

$$R_{p,t} = \sum_j \alpha_j + \sum_j \sum_i \beta_{j,t} F_{i,t} + \sum_j \varepsilon_{j,t} - e_{p,t} \quad [6]$$

Comparing [6] with [4], and assuming that the expenses are uncorrelated with the factors and the error term, we obtain expressions [7]-[9]:

$$\alpha_p = \sum_j \alpha_j - \frac{1}{T} \sum_t e_{p,t} \quad [7]$$

$$\beta_{p,i} = \sum_j \beta_{j,i} \quad [8]$$

$$\varepsilon_{p,t} = \sum_j \varepsilon_{j,t} \quad [9]$$

Expression [7] shows how the fund's abnormal performance is the result of adding the abnormal performance of the strategies less the expenses they incur. Obviously, for a fund the alpha estimated from net returns will be less than that estimated from gross returns, but fundamentally the fund's result depends on the results yielded by its strategies. Indeed, it is interesting to analyze how in [5] the strategies contribute to abnormal performance. For instance, for the sake of simplicity we consider that $e_{p,t}$ is zero and that expression [5] includes the return of the stock market as the only risk factor. In this context let us first consider the case of an index fund and that it therefore pursues an investment strategy that replicates the stock market. In this case, the market correlation is 1, the model [5] fully explains the fund's returns and the alpha is zero. Logically, the fund would only obtain a nonzero alpha when, at some point, it differentiates itself from the market in order to obtain different returns. Sharpe (1991, 1992) shows that to beat the market or benchmark the fund must follow an active management approach involving a differentiation which generally implies an increase in the residual variance of model [4] and consequently, through [9] and supposing independency among residuals, also in [5]. Second, let us consider the extreme example of a hedge fund that follows investment strategies which provide independent returns compared to those from the market. In this case, the beta would be zero, the percentage of residual variance would be 100% and the alpha performance would be the average fund return. In summary, the index fund (hedge fund) represents an extreme case of minimum (maximum) differentiation that involves an abnormal performance equal (possibly different) to (from) zero. The two examples show two opposite sides of management and how differentiation brings about nonzero performance.

As Sharpe (1992) points out, in the context of a linear model the differentiation or active management would possibly be reflected in a higher level of residual variance. However, if this differentiation involves certain dynamism in the management of the portfolio, this could be captured by a model that allows the parameters to be estimated as time-varying. Therefore, if a model is subject to different time periods, for example by a rolling window estimation, the differentiation may also be reflected in an increased variability of these parameters over time. On the other hand, a greater differentiation would imply higher portfolio management costs, in that it involves

active management with higher market analysis costs, higher turnover and higher portfolio managers' fees.

Consequently, to measure the funds' performance we use a linear model [4] with five factors as shown in [10]; the first is the implicitly risk free return since the funds' performance, $r_{p,t}$, is measured in excess of it. The rest are the risk factors from the Fama and French (1993) model: excess market return $r_{m,t}$, the return of small stocks minus the return of big stocks $r_{smb,t}$, and the difference of the return between high and low book-to-market ratio stocks $r_{hml,t}$; and from Carhart (1997): the momentum factor, the return of past winner stocks minus the return of past loser stocks $r_{wml,t}$. The details of how these factors are constructed may be consulted on French's website (2011).

$$r_{p,t} = \alpha_p + \beta_{p,m}\, r_{m,t} + \beta_{p,smb}\, r_{smb,t} + \beta_{p,hml}\, r_{hml,t} + \beta_{p,wml}\, r_{wml,t} + \varepsilon_{p,t} \qquad [10]$$

This model has been widely applied in the recent mutual fund literature by Kacperczyk *et al.* (2005), Kosowski *et al.* (2006), Gallo *et al.* (2007), Huij and Verbeek (2007), Fama and French (2010), Busse *et al.* (2010), Huij and Derwall (2011), Vicente *et al.* (2011) and Hackethal *et al.* (2012), among others.

In sum, fund managers make a series of investment decisions or strategies. As these strategies are being assessed by model [10], the fund's performance under the same model depends on the performance of the strategies. In general, these strategies lead to a nonzero abnormal performance insofar as they provide different results from those of the factors in [10]. The higher the differentiation, the greater the possibilities of obtaining an abnormal performance far from zero. By applying an unconditional model the differentiation is reflected in a higher level of residual risk. However, when a conditional model using a rolling window is applied, this differentiation may cause time-variance in the parameters of the model. The existence of specific risk and/or time-varying parameters provides evidence of differentiation that may be the result of a greater degree of active portfolio management. With respect to the above it is important again to recall that the investment decisions or strategies managers follow are not observable; only their aggregate result can be perceived. Therefore, it must be remembered that the existence of evidence linked to active management, such as residual variance and time-varying parameters, actually indicates the presence of differentiation from passive management, which is represented by the set of betas and factors on the right side of model [10].

This paper analyzes the relationship between active management and performance. Our hypothesis is that active management involves differentiation and it leads to a performance different from zero. In a context of markets with a low level of efficiency, theoretically one would expect that better informed professional managers would be able to implement differentiation strategies to achieve a persistently positive abnormal performance over time. In contrast, in a context of markets with a higher level of efficiency, it is less likely that managers would be able to implement strategies that persistently obtain a positive performance. In fact, in this latter case, the strategies could resemble bets on certain assets, asset classes or markets whose result could even be purely random. As a consequence, greater differentiation implies a greater bet and therefore a performance farther from zero, but both positive and negative. If greater differentiation implies more active management, turnover and fees, we would not expect these variables to be linearly related with performance; rather, a U-shaped relationship would be found since both worst and best mutual funds would show higher levels of differentiation.

2. Data

The empirical analysis is applied to a sample of US domestic equity mutual funds. In the US, as in other markets, the number of mutual funds has increased notably in recent decades. The sample period runs from March 1, 2001 to May 3, 2011. Specifically, 2,273 mutual funds from the Morningstar database are considered. Mutual funds are split into two subsamples: the first consists of 1,428 funds with complete data over the sample period, i.e., *survivor* funds; the second contains 845 funds that died in this period, i.e., *non-survivor* funds. If these funds are omitted from the analysis, aggregate performance results may be positively biased because these funds usually achieve, on average, a worse abnormal performance than survivor funds, as pointed out by Brown and Goetzmann (1995), Elton *et al.* (1996) and Deaves (2004). However, presenting aggregate results including both survivor and non-survivor funds may produce additional bias due to the relative robustness of results obtained for a scarce sample in the case of some non-survivors. Rohleder *et al*. (2011) point out that individual fund performance measurement requires a return history of a certain length to generate reliable regression estimates. For this reason, the results are presented separately except for the persistence analysis case, since it is not possible to estimate the ex-post performance of non-survivor funds.

Model (10) was applied with both net and gross mutual fund returns. From the point of view of investors, it is more interesting to estimate the performance with net returns since this is the return they typically obtain. If the aim is to analyze the result of fund management before expenses, it is more appropriate to use gross returns. Moreover, in analyzing persistence in performance it is relevant to consider gross returns because some previous studies, such as Carhart (1997), Gottesman and Morey (2007) and Fama and French (2010), identify expenses as the source of persistence. Daily net returns are computed by comparing the NAV (the net asset value of the fund) for daily dates, and considering any distributed gain. We compute gross returns by adding fund expenses to net returns. On the right of model (10), the daily returns of the three Fama and French factors, the Carhart momentum factor and the risk free asset (the one-month Treasury bill rate) are taken from French's website (2011).

Other mutual fund data from Morningstar used in the analysis are annual expense ratio, annual turnover ratio and size. Expense ratio is the annual fee that the fund charges its shareholders, expressed as the percentage of assets deducted each fiscal year for fund expenses, including management fees, administrative fees, operating costs and other asset-based costs incurred by the fund. Turnover is a measure of the fund's trading activity that, following the Morningstar definition, is computed by taking the lesser of purchases or sales (excluding all securities with maturities of less than one year) and dividing by average monthly net assets. A low turnover figure (0.20 to 0.30) would indicate a buy-and-hold strategy. High turnover (more than 1) would indicate an investment strategy involving considerable buying and selling of securities. In the rest of the paper we sometimes use the variable log (turnover) to facilitate the analysis and representation. Lastly, size is measured at the beginning of the period sample, i.e., March 2001. In this way we avoid introducing a spurious correlation between size and performance, because if the average fund size is used, that size may have increased implicitly due to good fund performance, both because of increasing

assets through the cumulative effect of positive stock returns, and due to the post feedback between performance and net flows of money into the fund [Sirri and Tufano (1998) and Matallín-Sáez (2011)]. In the rest of the paper mutual fund size is expressed in terms relative to the assets of all the mutual funds in the sample.

Panel A of Table 1 presents some descriptive statistics for the mutual funds sample. The average of the gross annualized return of the funds is 8.06%, and after considering expenses the average is 6.85%. The median is lower, showing that the cross-sectional distribution of the mutual funds mean return is positively skewed by good mutual funds. On the right of Panel A non-survivor mutual funds show lower returns than survivor funds. The mean is now lower than the median, i.e., the mean is driven to some extent by the worst mutual funds. In fact, at 10% of the cross-sectional distribution of the mean of the non-survivor funds' returns, they show most negative returns: -14.84% annual and -15.49% annual for gross and net returns, respectively. Non-survivor mutual funds show high levels of expenses, turnover and size. On the other hand, and related with factors of model [10], Panel B of Table 1 shows the annualized mean of daily return and risk (measured by the s.d. of the returns) for these data.

3. Results

The next sections report the results for survivor mutual funds. The last section provides the results for non-survivor mutual funds.

3.1. Performance

Table 2 shows the results for unconditional and conditional performances of the 1,428 US survivor mutual funds. In both cases, model [10] is used to measure performance with daily returns. In the first case, the estimation of the model is for the whole of the sample period and in the second case, the estimation is conditioned to short sample periods by means of a non-overlapping monthly rolling window[3]. The results are displayed with funds grouped by deciles and ranked from worst to best according to conditional performance. The last row represents the average for the entire sample. Panel A (B) shows the results when gross (net) mutual fund returns were used in the performance estimation.

The results are similar to those obtained in the previous literature on mutual fund performance. Thus, for net returns (Panel B) most of the funds have a nonzero performance, although more cases of negative performance appear, and evidence is found of underperformance at the aggregate level. Performance improves for gross returns (Panel A), but on average it is close to zero, although with a small number of funds with performance significantly different from zero.

(3) The monthly window estimation captures the variability of the parameters in model [10] with two objectives: [1] to measure time-varying conditional performance; and [2] to measure the variability of the factor parameters as a proxy of active management. Obviously the selection of a wide (reduced) window decreases (increases) the variability of the parameters. Hence, a monthly window is an intermediate size that, since we use daily returns, allows time-varying parameters while maintaining a certain level of robustness [see e.g. Agarwal *et al*. (2011), Matallín-Sáez (2011) and Engle *et al*. (2013), among others]. When return data are not daily but monthly, the windows must be larger in order to maintain this robustness [see e.g. Andreu *et al.* (2009) and Yin (2016), among others].

Table 1: Summary statistics for the mutual funds in the sample

Panel A

	Survivor mutual funds				Non-survivor mutual funds			
	Mean	Median	10% Perc.	90% Perc.	Mean	Median	10% Perc.	90% Perc.
Gross return	8.06%	7.50%	4.71%	12.29%	-0.79%	1.58%	-14.84%	7.49%
Net return	6.85%	6.31%	3.48%	10.99%	-2.11%	0.21%	-15.49%	6.23%
Expense ratio	1.22%	1.24%	0.60%	1.75%	1.32%	1.35%	0.00%	2.04%
Turnover	78.41	66.51	17.04	160.09	98.81	80.83	21.60	186.20
Initial size	1,566.28	256.32	15.03	2,691.69	1,597.87	359.01	30.44	3,441.75

Panel B

Factors	Annualized mean return	Annualized s.d.
Market	6.74%	21.47%
Smb	7.32%	9.36%
Hml	6.12%	9.82%
Wml	3.47%	17.55%
Risk free asset	2.02%	0.11%

The sample period runs from March 1, 2001 to May 3, 2011, and considers 2,273 US equity mutual funds from Morningstar database. Mutual funds are split into two subsamples, 1,428 survivor funds and 845 non-survivor funds. Returns are annualized from daily data. Initial size is measured as assets in USD millions on March 2001.

Source: Own elaboration.

3.2. Measuring active management

In this section we want to assess the degree of differentiation or active fund management. Our interest focuses on certain variables. The first of these is turnover, as we noted above, data for which is taken directly from the Morningstar database that measures the percentage of the portfolio's holdings that have changed over the past year. We compute the mean of the annual turnover data for each mutual fund. As proxies of active management we use a set of variables derived from the application of model [10]. In the unconditional approach, the percentage of idiosyncratic risk of the mutual fund is used. It is measured as one minus the value of the determination coefficient of the regression. In the conditional approach we estimate the idiosyncratic risk in a similar way, but considering the mean of the determination coefficient of the rolling regressions. Also in this approach we compute the standard deviation of the time-varying parameters of model [10] estimated in the rolling regressions, as proxies of active management. It is feasible to expect that more active managers sometimes change the composition of the portfolio in an attempt to select underpriced

Table 2: PERFORMANCE RESULTS

Panel A (Gross returns)

		Mean of conditional performance (annualized)					Unconditional performance (annualized)				
		Percentage of funds in decile				Average	Percentage of funds in decile				Average
Decile by conditional performance	Number of funds	<0	p-value < = 0.05	>0	p-value < = 0.05		<0	p-value < = 0.05	>0	p-value < = 0.05	
D1	143	100.00%	51.05%	0.00%	0.00%	-4.32%	90.21%	10.49%	9.79%	0.00%	-1.90%
D2	143	100.00%	7.69%	0.00%	0.00%	-2.13%	76.92%	12.59%	23.08%	0.00%	-0.90%
D3	143	100.00%	2.10%	0.00%	0.00%	-1.38%	79.02%	3.50%	20.98%	0.00%	-0.61%
D4	142	100.00%	0.70%	0.00%	0.00%	-0.82%	57.04%	4.23%	42.96%	0.70%	-0.17%
D5	143	100.00%	0.00%	0.00%	0.00%	-0.38%	65.03%	1.40%	34.97%	0.70%	-0.15%
D6	143	60.14%	0.00%	39.86%	0.00%	-0.02%	44.76%	0.70%	55.24%	0.70%	0.26%
D7	142	0.00%	0.00%	100.00%	0.00%	0.47%	21.83%	0.00%	78.17%	2.82%	0.94%
D8	143	0.00%	0.00%	100.00%	0.00%	1.12%	14.69%	0.00%	85.31%	9.09%	1.42%
D9	143	0.00%	0.00%	100.00%	4.90%	1.96%	6.29%	0.00%	93.71%	18.18%	1.88%
D10	143	0.00%	0.00%	100.00%	46.85%	4.22%	4.20%	0.00%	95.80%	34.97%	3.27%
All funds	1428	56.02%	6.16%	43.98%	5.18%	-0.13%	46.01%	3.29%	53.99%	6.72%	0.41%

The table shows a summary of the results of survivor mutual fund performance applying model [10]. Gross daily returns are used in Panel A and net daily returns in Panel B. Alpha is annualized from daily data. Conditional performance is estimated considering time-varying parameters by means of a monthly rolling window. The results are displayed grouping funds by deciles ranked from worst to best according to conditional performance.

Source: Own elaboration.

Table 2: PERFORMANCE RESULTS (continuation)

Panel B (Net returns)

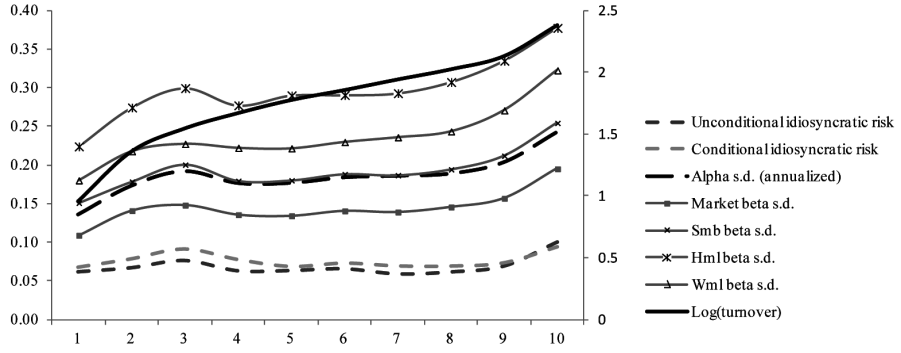
		Mean of conditional performance (annualized)					Unconditional performance (annualized)				
		Percentage of funds in decile				Average	Percentage of funds in decile				Average
Decile by conditional performance	Number of funds	<0	p-value < = 0.05	>0	p-value < = 0.05		<0	p-value < = 0.05	>0	p-value < = 0.05	
D1	143	100.00%	83.22%	0.00%	0.00%	-5.79%	97.20%	39.16%	2.80%	0.00%	-3.48%
D2	143	100.00%	53.15%	0.00%	0.00%	-3.42%	91.61%	25.17%	8.39%	0.00%	-2.00%
D3	143	100.00%	35.66%	0.00%	0.00%	-2.60%	93.71%	30.77%	6.29%	0.00%	-1.84%
D4	142	100.00%	18.31%	0.00%	0.00%	-2.05%	89.44%	21.13%	10.56%	0.00%	-1.43%
D5	143	100.00%	9.09%	0.00%	0.00%	-1.48%	85.31%	16.78%	14.69%	0.00%	-1.09%
D6	143	100.00%	14.69%	0.00%	0.00%	-1.01%	74.13%	20.28%	25.87%	0.00%	-0.75%
D7	142	100.00%	2.11%	0.00%	0.00%	-0.59%	59.86%	9.86%	40.14%	0.70%	-0.21%
D8	143	63.64%	0.00%	36.36%	0.00%	-0.06%	48.25%	0.70%	51.75%	1.40%	0.13%
D9	143	0.00%	0.00%	100.00%	0.00%	0.69%	34.97%	0.70%	65.03%	2.80%	0.61%
D10	143	0.00%	0.00%	100.00%	10.49%	2.88%	11.19%	0.00%	88.81%	13.99%	1.95%
All funds	1428	76.33%	21.64%	23.67%	1.05%	-1.34%	68.56%	16.46%	31.44%	1.89%	-0.81%

The table shows a summary of the results of survivor mutual fund performance applying model [10]. Gross daily returns are used in Panel A and net daily returns in Panel B. Alpha is annualized from daily data. Conditional performance is estimated considering time-varying parameters by means of a monthly rolling window. The results are displayed grouping funds by deciles ranked from worst to best according to conditional performance.

Source: Own elaboration.

stocks and time the market. Therefore, more actively managed portfolios will tend to show higher levels of turnover, idiosyncratic risk and variability of the parameters in model [10]. To analyze this, first we rank mutual funds in deciles according to turnover from low to high values. Then we compute the average of the values of the variables defined above across each decile and construct Figure 1. As the figure shows, there is a common behavior across the variables: the first decile shows lower values than the last decile for all the variables. As turnover increases, the values of these variables, i.e., the active management of the mutual funds, also increase.

Figure 1: MEASURING ACTIVE MANAGEMENT



Funds are grouped in deciles from low to high turnover. In the plot, turnover is showed as log (turnover). Estimates are from results of applying model [10] with gross returns.

Source: Own elaboration.

Table 3 shows the correlations from the data presented in Figure 1. Note that the correlation between variables is high, especially for the standard deviation of the parameters estimated from the conditional estimation by means of a monthly rolling window. For this reason, Table 4 reports the results of the univariate regressions between the variables that proxy active management. In all of them, the dependent variable is the log of the turnover. In the regressions the *p-values* of the slope are especially significant for the case of the alpha s.d. and the market, smb, hml, wml betas s.d. When the unconditional model is applied, the active management is captured by the tracking error (or error term), i.e., the idiosyncratic risk. However if the conditional model is applied, the possibility of incorporating time-varying parameters captures the active management, and then the idiosyncratic risk is less relevant (the R^2 is reduced from 0.222 to 0.069). In Table 4, the highest explanatory power is for the case of the alpha and betas s.d., i.e., a higher proportion of the differences in turnover across deciles is explained by the time-varying parameters in model [10]. With regard to the alpha s.d. variable, it implies that higher (lower) turnover entails higher (lower) variability of the alpha, i.e., the abnormal performance achieved by the fund, and probably less (more) persistence in performance. Regarding the time-varying betas, these results indicate that the application of model [10] provides an accurate read-

Table 3: Correlation between active management measures

	Uncon. idioync. risk	Cond. idioync. risk	Alpha s.d.	Market beta s.d.	Smb beta s.d.	Hml beta s.d.	Wml beta s.d.	Log (T.)
Unconditional idiosyncratic risk	1							
Conditional idiosyncratic risk	0.869	1						
Alpha s.d.	0.791	0.660	1					
Market beta s.d.	0.865	0.721	0.983	1				
Smb beta s.d.	0.860	0.703	0.987	0.990	1			
Hml beta s.d.	0.749	0.573	0.988	0.966	0.978	1		
Wml beta s.d.	0.788	0.569	0.974	0.973	0.978	0.980	1	
Log(Turnover)	0.471	0.263	0.889	0.815	0.836	0.916	0.892	1

Correlation matrix between the decile mean of the variables that measure active management. Funds are grouped in deciles from low to high turnover. Estimates are from results of applying model [10] with gross returns.

Source: Own elaboration.

Table 4: Turnover and active management

	Constant	Slope	R^2
Unconditional idiosyncratic risk	0.680	15.651	0.222
	(0.377)	(0.170)	
Conditional idiosyncratic risk	0.928	10.963	0.069
	(0.418)	(0.462)	
Alpha s.d.	-0.721	13.344	0.791
	(0.152)	(0.001)	
Market beta s.d.	-0.445	15.278	0.664
	(0.450)	(0.004)	
Smb beta s.d.	-0.656	12.566	0.700
	(0.279)	(0.003)	
Hml beta s.d.	-1.003	9.316	0.839
	(0.049)	(0.000)	
Wml beta s.d.	-0.524	9.645	0.796
	(0.241)	(0.001)	

Univariate regressions between log(turnover) as dependent variable. Values for regressions are decile mean from results of applying model [10] with gross returns. Funds were grouped in deciles from low to high turnover.

Source: Own elaboration.

ing of the level of active portfolio management. Therefore, the funds with a higher level of rotation carry out more active management, which involves incorporating higher time-varying betas in the conditional approach.

In sum, the estimated values from model [10] are consistent with the directly observable turnover data. Therefore, our results show how certain variables from the application and interpretation of the model can be used as proxies of the degree of active fund management. In this section the results are only reported for gross returns since the results for the net returns case are practically the same.

3.3. Performance, active management and expenses

3.3.1. Performance estimated with gross returns

In this section we analyze the relation between active management, mutual fund expenses and performance. For this purpose, first the sample mutual funds are ranked according to performance from the conditional approach with gross returns and then grouped in deciles. Decile 1 (D1) is formed with the worst mutual funds and decile 10 (D10), with the best. Panel A of Table 5 shows the average of the deciles for some mutual fund characteristics such as performance, size, idiosyncratic risk, turnover, management fee and other expenses, and for the case of the conditional approach, alpha skewness and the standard deviation of the parameters of [10]. Figures 2a to 2f show the values of the variables in Table 5; recall that deciles are ranked according to conditional performance.

In Figure 2a the conditional and unconditional performance increases across the deciles, and practically all the performance is distributed equally between deciles with negative and positive values. It is also notable that the unconditional performance is greater than the conditional performance except for the last decile. As conditional performance allows the parameter to be time-varying, the alpha captures the ability for stock selection more precisely; it is perverse except for the best mutual funds of D10. Nonetheless the figure shows how both unconditional and conditional performances display a similar evolution; indeed the correlation between the mean values in deciles of both variables is 98.78%; and 70.62% for the single funds levels[4]. Figure 2a also displays the average value of the skewness of the conditional alpha. As noted, skewness increases with the performance: the worst funds exhibit negative skewness; in D5 and D6 with abnormal performance close to zero the skewness is practically zero and for the best funds, the skewness is positive. Since the skewness is estimated on the distribution of conditional alphas obtained over the sample period in each mutual fund, a negative skewness indicates that the worst funds obtain a lower mean, due to the influence of certain moments in time in which those funds pursued active strategies that yielded a result that was too negative than that expected for a normal distribution of these alphas. Skewness is positive for funds with better performance, but a growing relationship between the two variables is not clearly perceived; in fact, in D9 skewness is practically zero, while it is similar in D10 and D8, and in absolute terms its value is approximately half that in D1 for the worst funds.

(4) When funds are ranked according to conditional performance the results of this section are very similar to those when funds are ranked according to unconditional performance; for this reason the latter are omitted to save space.

Table 5: PERFORMANCE, ACTIVE MANAGEMENT AND EXPENSES

Panel A (Gross returns)

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
Conditional Alpha	-1.90%	-0.90%	-0.61%	-0.17%	-0.15%	0.27%	0.93%	1.42%	1.88%	3.27%
Unconditional alpha	-4.32%	-2.13%	-1.38%	-0.82%	-0.38%	-0.02%	0.47%	1.12%	1.96%	4.22%
Relative initial size	0.0511%	0.0855%	0.0572%	0.1043%	0.1330%	0.0597%	0.0755%	0.0750%	0.0353%	0.0241%
Conditional idiosyncratic risk	10.20%	7.04%	5.29%	5.48%	4.18%	4.59%	5.85%	6.68%	8.11%	11.70%
Unconditional idiosyncratic risk	9.32%	6.92%	5.72%	6.12%	4.84%	5.14%	6.66%	7.74%	9.38%	14.15%
Alpha skewness	-0.550	-0.178	-0.209	0.010	-0.009	-0.006	0.218	0.202	0.024	0.230
Alpha s.d.	0.240	0.185	0.165	0.166	0.133	0.143	0.172	0.188	0.215	0.252
Market beta s.d.	0.190	0.149	0.126	0.129	0.106	0.115	0.131	0.141	0.164	0.192
Smb beta s.d.	0.242	0.195	0.173	0.168	0.143	0.156	0.184	0.193	0.219	0.250
Hml beta s.d.	0.371	0.316	0.265	0.270	0.224	0.233	0.276	0.304	0.333	0.373
Wml beta s.d.	0.304	0.251	0.211	0.213	0.181	0.189	0.218	0.244	0.268	0.290
Turnover	0.209	0.183	0.183	0.181	0.151	0.159	0.165	0.167	0.173	0.179
Expense ratio	1.43%	1.15%	1.21%	1.18%	1.03%	1.02%	1.14%	1.25%	1.33%	1.43%
Management Fee	0.81%	0.66%	0.63%	0.64%	0.51%	0.57%	0.66%	0.72%	0.75%	0.83%
Other expenses	0.63%	0.48%	0.58%	0.54%	0.52%	0.45%	0.49%	0.53%	0.58%	0.60%

The table shows the average of the deciles for some characteristics of the mutual funds. Deciles are formed according to conditional performance from worst (D1) to best (D10) mutual funds. Performance is annualized.

Source: Own elaboration.

Table 5: PERFORMANCE, ACTIVE MANAGEMENT AND EXPENSES (continuation)

Panel B (Net returns)

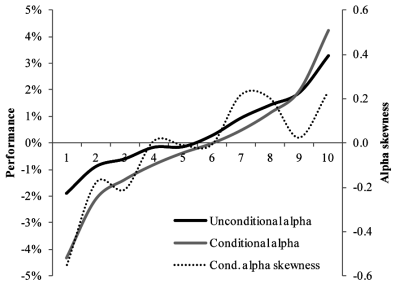
	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
Conditional Alpha	-3.48%	-2.00%	-1.84%	-1.43%	-1.08%	-0.74%	-0.22%	0.13%	0.61%	1.95%
Unconditional alpha	-5.79%	-3.42%	-2.60%	-2.05%	-1.48%	-1.02%	-0.59%	-0.06%	0.69%	2.88%
Relative initial size	0.0236%	0.0799%	0.0858%	0.0828%	0.0846%	0.0618%	0.1163%	0.0844%	0.0542%	0.0269%
Conditional idiosyncratic risk	10.12%	7.85%	5.87%	5.52%	5.34%	5.02%	5.03%	5.94%	7.25%	11.17%
Unconditional idiosyncratic risk	9.10%	7.80%	6.34%	6.10%	6.04%	5.81%	5.69%	6.85%	8.46%	13.82%
Alpha skewness	-0.491	-0.226	-0.173	-0.039	-0.083	0.038	0.128	0.240	0.094	0.236
Alpha s.d.	0.241	0.201	0.169	0.169	0.160	0.154	0.150	0.172	0.198	0.245
Market beta s.d.	0.195	0.157	0.128	0.133	0.124	0.118	0.117	0.134	0.152	0.187
Smb beta s.d.	0.245	0.212	0.172	0.174	0.168	0.159	0.165	0.182	0.203	0.243
Hml beta s.d.	0.377	0.334	0.278	0.277	0.257	0.243	0.244	0.286	0.307	0.364
Wml beta s.d.	0.308	0.270	0.217	0.215	0.206	0.199	0.197	0.227	0.246	0.283
Turnover	0.210	0.191	0.181	0.180	0.174	0.159	0.150	0.161	0.170	0.176
Expense ratio	1.53%	1.40%	1.28%	1.23%	1.11%	1.13%	0.96%	1.07%	1.16%	1.31%
Management Fee	0.82%	0.75%	0.65%	0.65%	0.62%	0.61%	0.53%	0.64%	0.70%	0.81%
Other expenses	0.71%	0.65%	0.63%	0.58%	0.48%	0.52%	0.43%	0.43%	0.47%	0.49%

The table shows the average of the deciles for some characteristics of the mutual funds. Deciles are formed according to conditional performance from worst (D1) to best (D10) mutual funds. Performance is annualized.

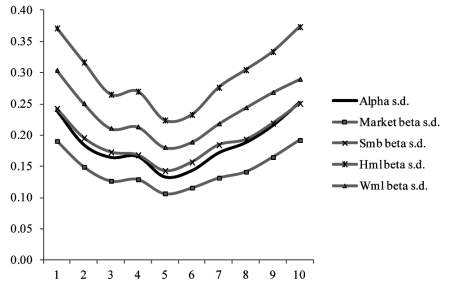
Source: Own elaboration.

Figure 2: PERFORMANCE (ESTIMATED WITH GROSS RETURNS) AND ACTIVE MANAGEMENT

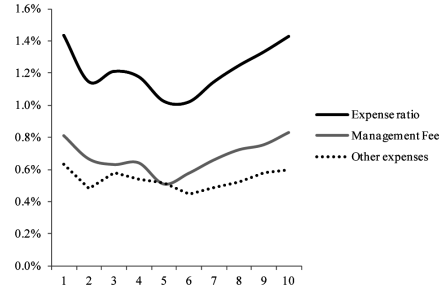
2a. Performance and skewness performance



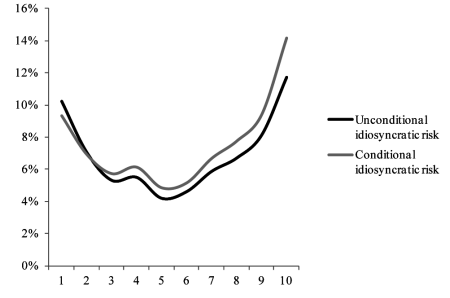
2b. S.d. time-varying parameters model (10)



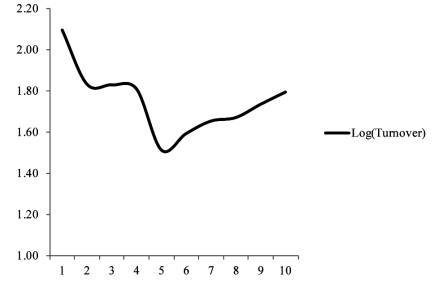
2c. Expenses



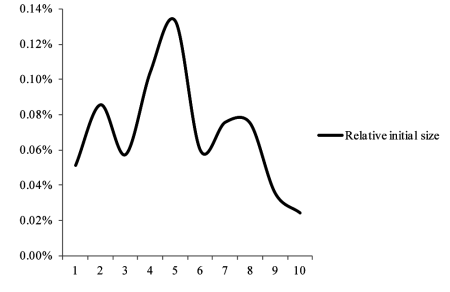
2d. Idiosyncratic risk



2e. Turnover



2f. Size



Funds are grouped in deciles from low to high conditional performance. Estimates are from results of performance from applying model [10] with gross returns. Performance is annualized.

Source: Own elaboration.

Figure 2b shows the variability of the parameters of model [10] when the conditional approach is applied. This variability is measured as the standard deviation of the parameter estimates from the monthly-window rolling regression. All the parameters display similar behavior, showing U-shaped lines in Figure 2b. This means that both the worst and the best abnormal performances are achieved by mutual funds with greater variability in the parameters which, as we noted in the previous section, can be interpreted as a higher level of active management. On the other hand, funds with intermediate values of abnormal performance entail a lower parameter variation, which could imply less active management. This U-shaped relation is also corroborated by the behavior of idiosyncratic risk as Figure 2d shows. Thus, funds with more extreme performance are those with higher levels of idiosyncratic risk. However, the levels of idiosyncratic risk are higher for the case of D10, i.e., the best mutual funds. Perhaps based on the latter, some studies in the literature, including Kacperczyk *et al.* (2005), Huij and Derwall (2011) and Amihud and Goyenko (2013) among others, point out that high idiosyncratic risk implies better performance. However, we show how the relation with respect to performance is U-shaped, which also coincides with the results of Casavecchia and Hulley (2013). On the other hand, funds in the valley, with lower idiosyncratic risk, are those with performance close to zero. So, for both Figures 2b and 2d the valley area matches D5 and D6, just when the abnormal performance changes from negative to positive values. The fact that even when time-varying parameters are considered there is idiosyncratic risk implies that the differences between active and passive management are not mainly driven by strategies based on changes in systematic risk levels but by differentiation strategies based on stock selection that produce returns showing little correlation to the factors included in the model.

Figure 2c reports the average expenses of the mutual fund deciles, ranked by conditional performance. The figure shows the expense ratio, namely, management expenses as a percentage of assets. The difference between the two values is attributable to other fund expenses. The expense ratio including the management fee also shows a similar U-shaped pattern, i.e., a higher level of expenses is reflected for the best and worst funds' performance. Thus, at the extremes of the line, i.e., D1 and D10, the expense ratio is about 1.4% annual and the management fee about 0.8% annual. On the other hand, the valley of the figure is between D5 and D6 when the performance is close to zero. Casavecchia and Hulley (2013) also found a U-shaped relationship between performance and fees.

This same U-shaped behavior is also observed in Figure 2e, which represents the average turnover within each decile of funds. Thus, funds in the valley are located on decile 5: when abnormal performance is virtually zero then the average turnover is lower. However, from this point the turnover increases both on the right and on the left, i.e., for both the best and the worst funds. Unlike the previous figures, this figure is not symmetrical: a comparison of D1 and D10 shows that the turnover of the worst funds is higher than the top funds.

Finally, Figure 2f shows the average size of the funds in each decile. Although a clear pattern cannot be inferred, it shows that funds with abnormal performance close to zero, as in D5, are larger than the rest. At the extremes, both the worst and the best funds are smaller and it is striking that in D10 the best performing funds are

in fact the smallest funds. In relation to mutual fund size, Casavecchia and Hulley (2013) find that small funds show high idiosyncratic risk and fees. Our results, as Figures 2c, 2d and 2f show, reflect the same tendency.

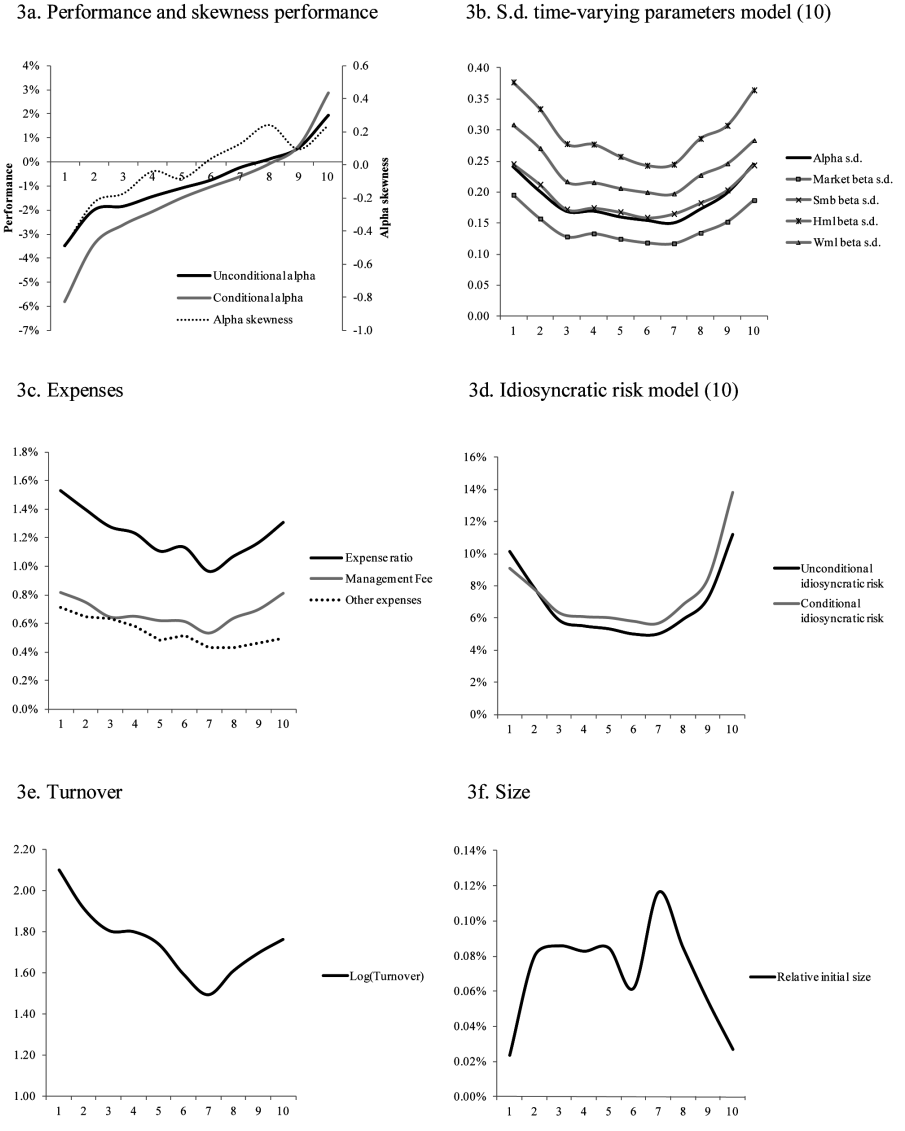
In sum, the data in Table 5 and Figures 2a-2f allow us to infer, on average, certain characteristics of funds according to their performance. Thus, when funds are ranked from worst to best performance, the funds both at the bottom and at the top show: (a) alpha skewness with the same sign as abnormal performance; (b) higher level of active management as evidenced by the higher time-varying parameters, idiosyncratic risk and turnover; (c) higher management fee and consequently higher expenses; and (d) smaller size of managed assets. But when the two groups of funds are compared, the funds at the top exhibit lower alpha skewness and turnover but higher idiosyncratic risk and smaller size than those at the bottom. On the other hand, funds in central deciles, and therefore with performance close to zero, present lower skewness, active management and fees.

Thus, as we postulated, funds that try to beat the market, represented by the factors of model [10], may be differentiated from the market by implementing strategies that involve time-varying parameters, idiosyncratic risk and in consequence, higher turnover. This high degree of active management is also accompanied by higher expenses. That is, more active management commands a higher fee. However, the results of these strategies can vary greatly, so that some funds achieve a negative and others a positive abnormal performance. Moreover the results of the strategies are sometimes outliers that produce a skewed distribution of the conditional abnormal performance. This drives the abnormal performance on the left (right) for the worst (best) mutual funds. Smaller funds also appear likely to pursue higher levels of active management and achieve more mixed performance results. On the other hand, funds that are not differentiated from the market display lower active management, lower fees and abnormal performance close to zero. This evidence is in line with the theoretical proposals of Sharpe (1991 and 1992), in that funds that attempt to beat the market must differentiate themselves from it.

3.3.2. Performance estimated with net returns

In general, the results using net returns (after expenses) of mutual funds are similar to those discussed in the previous section using gross returns. Panel B of Table 5 and Figures 3a to 3f show the value of some characteristic variables of mutual fund management with deciles again ranked from lowest to highest conditional performance. Figure 3a shows the mean and skewness of the distribution of conditional performance across deciles, and is very similar to Figure 2a. However, unlike the latter, the point when the performance is close to zero has now moved rightward, specifically to deciles D7 and D8. Consequently, now the performance distribution across deciles is asymmetric; in other words, the values of negative performance in D1 are higher, in absolute terms, than the positive performance in D10. Figures 3b, 3c, 3d, 3e are very similar to those discussed for gross returns, although now in some cases U-shaped behavior is seen more clearly and the turning point or valley has also moved to the right in D7 and D8, precisely where the abnormal performance takes values close to zero. The conclusions reached with net returns are therefore the same as those with gross returns. A difference is seen in Figure 3c: although U-shaped be-

Figure 3: PERFORMANCE (ESTIMATED WITH NET RETURNS) AND ACTIVE MANAGEMENT



Funds are grouped in deciles from low to high conditional performance. Estimates are from results of performance from applying model [10] with net returns. Performance is annualized.

Source: Own elaboration.

havior remains, the expense ratio of the worst funds in decile 1 takes a value of 1.53%, which is slightly greater than the value of 1.31% for the top funds in D10. This means that when net returns are used, the higher amount from "other expenses" increases the expense ratio of the funds and worsens the poorest performing funds. Figure 3f shows even more clearly than Figure 2f that funds with worse and better performance (D1 and D10) are smaller funds.

3.4. Performance persistence

The above results provide evidence that on average, mutual funds with higher levels of active management show an abnormal performance farther from zero. As we proposed in our theoretical presentation, assessing mutual funds is equivalent to measuring the performance of their investment strategies. For some funds, these strategies lead to positive performance but for others it is negative. An interesting question arising from the above evidence is to analyze whether the results of these strategies are to some extent due to luck or to managers' ability. That is, strategies could be perceived as active management bets, the results of which may be negative or positive. In fact, as Figure 2a shows, the symmetry between positive and negative values in the distribution of the abnormal performance from gross returns could support this hypothesis. In the same vein, the fact that the worst and best funds achieve their performance with greater time variance of the conditional alpha (as shown in Figures 2b and 3b) and greater skewness (as shown in Figures 2a and 3a) suggests that the alpha distribution is not uniform over time. It is therefore necessary to analyze whether mutual funds develop strategies that achieve abnormal performance with a certain degree of persistence.

For this purpose we apply a methodology similar to that proposed by Carhart (1997), which has subsequently been used in a large number of studies in the performance persistence literature such as Bollen and Busse (2005), Kosowski *et al.* (2006), Busse *et al.* (2010), Fama and French (2010) and Abdelsalam *et al.* (2014), among others. First, each month funds are ranked in ascending order according to conditional performance. These funds are then grouped into deciles, with the worst performing funds corresponding to the first decile through to the best performing funds in the tenth decile. For each decile, we form a portfolio that follows a strategy of investing in funds according to their past performance. For instance, D1 (D10) is an equally-weighted portfolio that invests in funds that in the previous month were included in the first (tenth) decile, i.e., the worst (best) funds from the previous period. In the second month each portfolio starts investing according to the performance of the first month and so on, and the portfolio is reviewed at the beginning of each month until the end of the sample period. This allows us to identify the mutual funds that form each decile-portfolio each month (except for the first period). With this data, we estimate the abnormal performance of each decile-portfolio as the average of the monthly conditional funds' performance, estimated in Section 3.1 by model [10]. If there were some degree of persistence it would be expected that a portfolio that invests in the past worst (best) funds would achieve a poor (good) performance.

Results using gross returns are shown in Panel A of Table 6 and in Figure 4a, and for net returns, in Panel B, and Figure 4b. In both cases a slight increase is seen in the abnormal performance from the decile-portfolio that invests in the worst past mu-

Table 6: PERSISTENCE

Panel A (Gross returns)										
	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
Conditional alpha	-1.00%	-0.93%	-0.76%	-0.42%	-0.36%	0.11%	0.23%	0.38%	0.48%	1.63%
	(0.222)	(0.125)	(0.113)	(0.312)	(0.376)	(0.771)	(0.600)	(0.375)	(0.388)	(0.016)
Panel B (Net returns)										
	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
Conditional alpha	-2.42%	-2.15%	-2.03%	-1.46%	-1.46%	-1.07%	-0.95%	-0.82%	-0.77%	0.32%
	(0.004)	(0.000)	(0.000)	(0.001)	(0.000)	(0.007)	(0.027)	(0.065)	(0.165)	(0.629)
Panel C. (Worst mutual funds. Funds are grouped in centiles. Gross returns)										
	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
Conditional alpha	-1.54%	-1.22%	0.27%	-0.69%	-1.21%	-1.88%	-0.31%	-2.08%	-0.58%	-0.72%
	(0.398)	(0.346)	(0.810)	(0.510)	(0.163)	(0.048)	(0.707)	(0.008)	(0.462)	(0.367)

The table shows the performance, estimated by model [10], of the decile-portfolios which follow an investment strategy based on past performance. For instance D1 (D10) is an equally-weighted portfolio that invests in those funds that in the previous month were included in the first (tenth) decile, i.e. the worst (best) funds from the previous period. Portfolios are rebalanced at the end of each period. P-values are from the Newey and West (1987) heteroskedasticity and autocorrelation consistent covariance estimator.

Source: Own elaboration.

Table 6: PERSISTENCE (continuation)

Panel D. (Top best mutual funds. Funds are grouped in centiles. Gross returns)

	C91	C92	C93	C94	C95	C96	C97	C98	C99	C100
Conditional alpha	1.00%	0.09%	1.21%	1.57%	1.86%	1.59%	0.78%	1.15%	3.21%	3.48%
	(0.187)	(0.904)	(0.120)	(0.049)	(0.025)	(0.090)	(0.407)	(0.272)	(0.007	(0.013)

Panel E. (Worst mutual funds. Funds are grouped in centiles. Net returns)

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
Conditional alpha	-3.07%	-2.38%	-1.30%	-2.38%	-2.47%	-2.92%	-2.42%	-3.08%	-1.88%	-2.20%
	(0.096)	(0.064)	(0.255)	(0.023)	(0.008)	(0.001)	(0.006)	(0.000)	(0.022)	(0.008)

Panel F. (Worst mutual funds. Funds are grouped in centiles. Net returns)

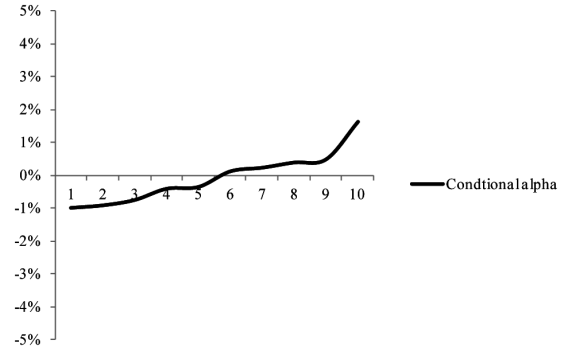
	C91	C92	C93	C94	C95	C96	C97	C98	C99	C100
Conditional alpha	-0.08%	-0.50%	-0.22%	0.17%	0.53%	-0.22%	-0.45%	0.08%	1.33%	2.16%
	(0.908)	(0.535)	(0.738)	(0.832)	(0.522)	(0.802)	(0.617)	(0.939)	(0.291)	(0.111)

The table shows the performance, estimated by model [10], of the decile-portfolios which follow an investment strategy based on past performance. For instance D1 (D10) is an equally-weighted portfolio that invests in those funds that in the previous month were included in the first (tenth) decile, i.e. the worst (best) funds from the previous period. Portfolios are rebalanced at the end of each period. P-values are from the Newey and West (1987) heteroskedasticity and autocorrelation consistent covariance estimator.

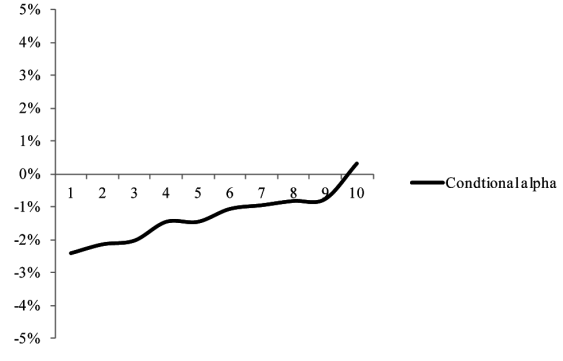
Source: Own elaboration.

Figure 4: PERFORMANCE PERSISTENCE

4a. Performance estimated from gross returns



4b. Performance estimated from net returns

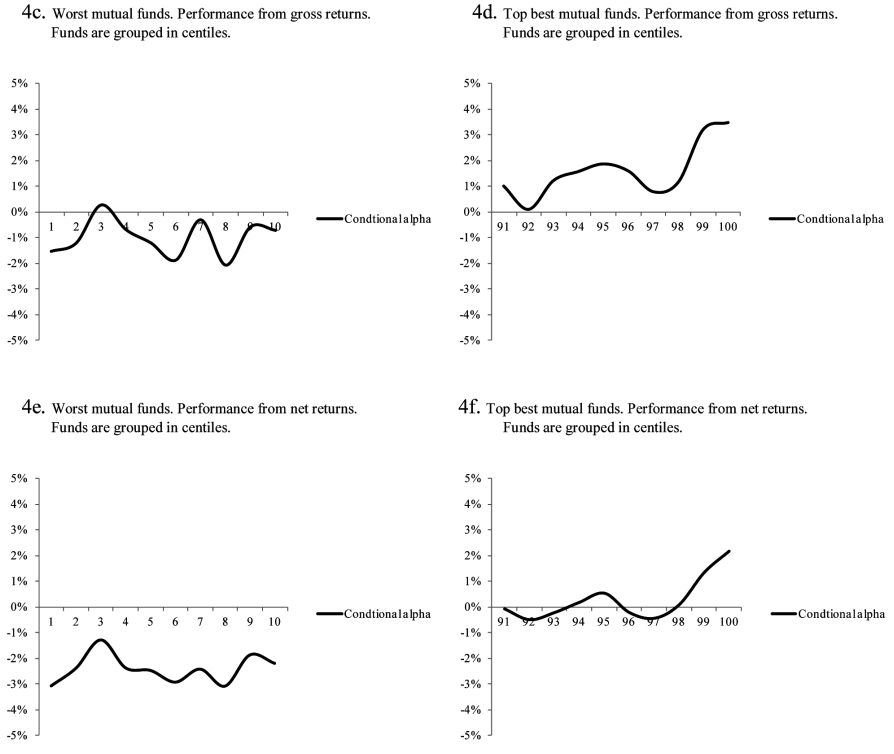


Annualized conditional performance of portfolios based on past conditional performance from model [10].

Source: Own elaboration.

tual funds (D1) leading up to the decile-portfolio with the best past performance (D10). Using gross returns, Panel A of Table 6 shows that the annual abnormal performance of portfolios ranges from -1% (D1) to 1.63% (D10), but only for decile ten it is significantly different from zero. Certainly this range does not represent a significant economic impact. Compared to the performance of the funds, these values are within the range of 4.22% -4.32% as shown in Panel A of Table 2. These values are also far from the range reached in a hypothetical situation of maximum persistence, i.e., that in which the worst and best funds continue in the same decile in the future; in this case

Figure 4: TOP BEST AND WORST MUTUAL FUNDS: PERFORMANCE PERSISTENCE (continuation)



Annualized conditional performance of portfolios based on past conditional performance from model [10]. Funds are grouped in centiles from low to high conditional performance. The horizontal axis shows the centile.

Source: Own elaboration.

we calculate that the annual performance ranges between -33.2% for D1 and 33.6% for D10. When using net returns, Panel B of Table 6 shows that the annual abnormal performance of the decile-portfolios ranges from -2.42% for D1 to 0.32% for D10, with significant values for the first seven decile-portfolios. In this context, the presence of expenses in the funds has two main effects: (i) abnormal performance is reduced, and (ii) different levels of expenses among mutual funds contribute to evidencing persistence. However, the range of -2.42% to 0.32% again does not imply a significant economic impact when compared to the range achieved by the funds in Panel B of Table 2 (-5.79% to 2.88% for D1 and D10) or the range that would be achieved for the maximum persistence case (from -34.6% in D1 to 32.2% in D10).

Some studies point out the likelihood of finding evidence of persistence in the effect of extreme values in the cross-sectional distribution of abnormal perfor-

mance. We therefore repeat the previous analysis, but considering deciles within each of the extreme deciles, i.e., centiles from 1% to 10% for the worst mutual funds and 91% to 100% for the best. Results are shown in panels C to F in Table 6 and in Figures 4c to 4f. With gross returns, Panel C shows how the result of following strategies based on past performance among the worst mutual funds is negative and close to zero, but only significant in cases C6 and C8 and with no trend, as shown in Figure 4c. However, Figure 4d does show a positive trend for the best funds, i.e., investing in the best funds leads to a better performance, which is particularly relevant in centiles C99 and C100. This means that investing in 1% and 2% of the better classified funds in the previous month may lead to an annual performance of 3.21% and 3.48%, respectively, as shown in Panel D.

When using net returns, Panel E and Figure 4e show a negative performance, but with no trend, for the worst mutual funds. In the case of the best funds, Panel C and Figure 4f show a pattern similar to that for the case of gross returns, but with a lower value of abnormal performance.

In sum, when gross returns are used there is no significant evidence of persistence, except in the top decile of funds. With net returns, persistence in the expenses incurred leads to persistence in most deciles, particularly in the worst funds. However, persistence has a moderate economic effect. When the deciles from the worst and best funds are subdivided, we find evidence of a slight increase in the performance achieved by investing in the 2% of the top best funds in the previous period. This result is in line with those of other studies such as Lynch and Musto (2003), Cohen *et al*. (2005) and Kosowski *et al*. (2006), who found persistence among winners. Such evidence is relevant to the extent that the investor should select the best past funds in order to obtain good performance in the future.

3.5. Non-survivor mutual funds

We now report the results of the above analysis for non-survivor funds during the sample period. First, Table 7 shows the performance results. A comparison of these results with those presented in Table 2 shows how the non-survivor mutual funds achieve, in aggregate, a worse performance than the survivor funds. For instance, considering gross returns, the conditional annualized performance ranges from -17.21% in D1 to 4.94% in D10 while those values are -4.32% and 4.22%, respectively, for the case of survivor funds. Overall, the worst non-survivor funds have a particularly poorer performance than the worst surviving funds. With respect to the mean performance of the two groups, Table 8 shows the difference in performance between the non-survivor and survivor funds; in general, the performance of non-survivor funds is about 3% lower than that of the survivor funds. This evidence is similar to previous mutual fund research such as Elton *et al.* (1996), Carhart *et al*. (2002) and Rohleder *et al.* (2011), among others. It is clear that the non-survivor funds have a significant bias whether or not they are included in the performance analysis of the funds industry. Including them implies that funds with 100% data for a sample period are mixed with others with a limited sample period, and therefore they are not comparable. Conversely, if they are omitted, as shown in Figure 2a, surviving funds would present a certain symmetry in the cross-sectional performance distribution, when really the presence of non-survivor funds, as intuited from Figure 5a, leads to an asymmetric distribution due to the negative performance of the non-survivor funds.

Table 7: NON-SURVIVOR MUTUAL FUNDS PERFORMANCE RESULTS

Panel A (Gross returns)

		Mean of conditional performance (annualized)					Unconditional performance (annualized)				
		Percentage of funds in decile				Average	Percentage of funds in decile				Average
Decile by conditional performance	Number of funds	<0	p-value < = 0.05	>0	p-value < = 0.05		<0	p-value < = 0.05	>0	p-value < = 0.05	
D1	85	100.00%	52.94%	0.00%	0.00%	-17.21%	97.65%	45.88%	2.35%	0.00%	-13.15%
D2	84	100.00%	51.19%	0.00%	0.00%	-7.51%	96.43%	45.24%	3.57%	0.00%	-5.53%
D3	85	100.00%	28.24%	0.00%	0.00%	-4.86%	90.59%	28.24%	9.41%	0.00%	-3.67%
D4	84	100.00%	26.19%	0.00%	0.00%	-3.61%	90.48%	13.10%	9.52%	1.19%	-2.64%
D5	84	100.00%	11.90%	0.00%	0.00%	-2.54%	95.24%	19.05%	4.76%	0.00%	-2.53%
D6	85	100.00%	1.18%	0.00%	0.00%	-1.71%	83.53%	12.94%	16.47%	0.00%	-1.62%
D7	84	100.00%	0.00%	0.00%	0.00%	-0.88%	77.38%	4.76%	22.62%	0.00%	-0.97%
D8	85	71.76%	0.00%	28.24%	0.00%	-0.12%	64.71%	1.18%	35.29%	0.00%	0.11%
D9	84	0.00%	0.00%	100.00%	0.00%	0.80%	52.38%	1.19%	47.62%	0.00%	0.05%
D10	85	0.00%	0.00%	100.00%	8.24%	4.94%	32.94%	0.00%	67.06%	1.18%	4.60%
All funds	845	77.16%	17.16%	22.84%	0.83%	-3.27%	78.11%	17.16%	21.89%	0.24%	-2.54%

The table shows a summary of the results of non-survivor mutual fund performance applying model [10]. Gross daily returns are used in Panel A and net daily returns in Panel B. Alpha is annualized from daily data. Conditional performance is estimated considering time-varying parameters by means of a monthly rolling window. The results are displayed by grouping funds by deciles ranked from worst to best according to conditional performance.

Source: Own elaboration.

Table 7: NON-SURVIVOR MUTUAL FUNDS PERFORMANCE RESULTS (continuation)

Panel B (Net returns)

		Mean of conditional performance (annualized)					Unconditional performance (annualized)				
		Percentage of funds in decile				Average	Percentage of funds in decile				Average
Decile by conditional performance	Number of funds	<0	p-value < = 0.05	>0	p-value < = 0.05		<0	p-value < = 0.05	>0	p-value < = 0.05	
D1	85	100.00%	64.71%	0.00%	0.00%	-18.63%	97.65%	55.29%	2.35%	0.00%	-14.97%
D2	84	100.00%	65.48%	0.00%	0.00%	-8.95%	97.62%	53.57%	2.38%	0.00%	-7.30%
D3	85	100.00%	65.88%	0.00%	0.00%	-6.33%	95.29%	54.12%	4.71%	0.00%	-5.06%
D4	84	100.00%	51.19%	0.00%	0.00%	-4.89%	94.05%	44.05%	5.95%	0.00%	-3.93%
D5	84	100.00%	48.81%	0.00%	0.00%	-3.87%	96.43%	48.81%	3.57%	0.00%	-3.60%
D6	85	100.00%	34.12%	0.00%	0.00%	-3.08%	92.94%	38.82%	7.06%	0.00%	-2.83%
D7	84	100.00%	17.86%	0.00%	0.00%	-2.20%	91.67%	27.38%	8.33%	0.00%	-2.25%
D8	85	100.00%	9.41%	0.00%	0.00%	-1.26%	89.41%	20.00%	10.59%	0.00%	-1.48%
D9	84	86.90%	0.00%	13.10%	0.00%	-0.35%	80.95%	3.57%	19.05%	0.00%	-1.02%
D10	85	0.00%	0.00%	100.00%	3.53%	3.70%	57.65%	3.53%	42.35%	0.00%	3.72%
All funds	845	88.64%	35.74%	11.36%	0.36%	-4.59%	89.35%	34.91%	10.65%	0.00%	-3.87%

The table shows a summary of the results of non-survivor mutual fund performance applying model [10]. Gross daily returns are used in Panel A and net daily returns in Panel B. Alpha is annualized from daily data. Conditional performance is estimated considering time-varying parameters by means of a monthly rolling window. The results are displayed by grouping funds by deciles ranked from worst to best according to conditional performance.

Source: Own elaboration.

Table 8: Comparing performance (annualized) of non-survivor and survivor mutual funds

Performance difference	Conditional Gross returns	Unconditional Gross returns	Conditional Net returns	Unconditional Net returns
Non-survivor – survivor	-3.14%	-2.96%	-3.25%	-3.06%
P-value of t-test of means with different variances	(0.000)	(0.000)	(0.000)	(0.000)

The table compares the performance (annualized) of non-survivor and survivor mutual funds, including different performance measurement and considering gross and net returns.

Source: Own elaboration.

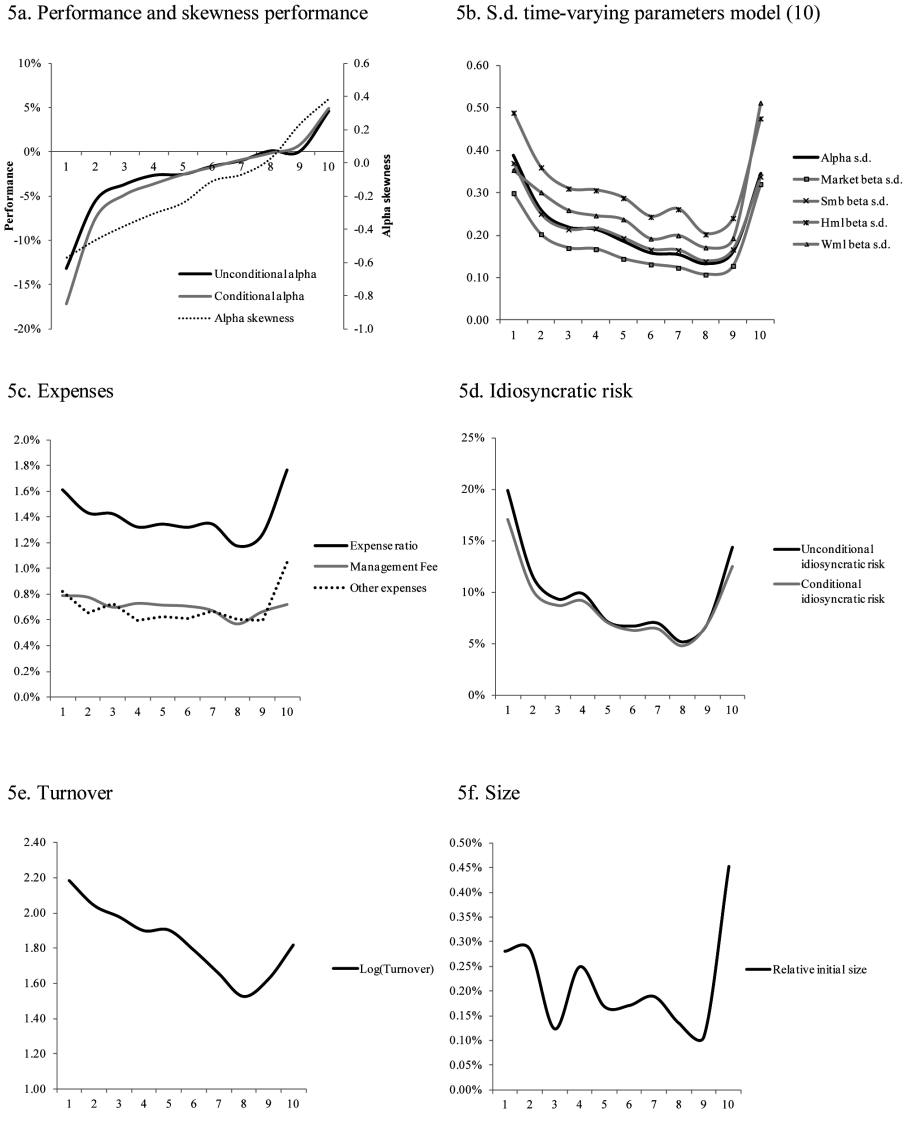
The results of the analysis of the relationship between performance, active management and expenses are shown in Table 9 and in Figure 5 when gross returns are used (figures using net returns are quite similar and are not shown to save space). They are similar to those of survivor funds presented in Table 5 and Figures 2 and 3, but with some differences. With gross returns, Figures 5b to 5e show U-shaped behavior in the variables measuring active management and expenses. However, the shape differs in that the valley of the figure is placed to the right, so that the values of the variables show a decrease from D1 to D8, followed by continuous growth through D9 and D10. This behavior also coincides with the negative performance in deciles D1 to D8, whereas in D9 and D10 it is positive. Therefore, as for the survivor mutual funds case, Figures 5b and 5d show that both the best and the worst funds have a higher degree of differentiation with respect to model [10], i.e., as interpreted above, a greater degree of active management. Figure 5d shows that the idiosyncratic risk for D1 is slightly higher than for D10; however this result is contrary to that found for survival funds, where it was higher for D10 than for D1.

Figure 5c shows that the funds in the extreme deciles have higher expenses, but they are even higher among the best performing non-survivor funds corresponding to D10. Figure 5e shows that the worst funds have the highest turnover, and that it decreases until decile D8 to increase thereafter in the better performing funds from D9 to D10. Regarding fund size, and in line with findings for survivor funds, there is no performance-related pattern; however, contrary to the evidence for the survivor funds, in the case of non-survivor funds the worst and the best performance lie in the largest funds within the segment of non-survivor funds.

4. Conclusions

The paper analyzes the relationship between performance and active management for a sample of U.S. equity mutual funds, and it is free of survivorship bias. To assess performance a multifactor model is applied, and all results are estimated for both gross and net returns, i.e., the returns obtained by investors after deducting management expenses.

Figure 5: NON-SUVIVOR MUTUAL FUNDS: PERFORMANCE (ESTIMATED WITH GROSS RETURNS) AND ACTIVE MANAGEMENT



Non-survivor mutual funds are grouped in deciles from low to high conditional performance. Estimates are from results of performance from applying model [10] with gross returns. Performance is annualized.

Source: Own elaboration.

Table 9: NON-SURVIVOR MUTUAL FUNDS: PERFORMANCE, ACTIVE MANAGEMENT AND EXPENSES

Panel A (Gross returns)

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
Conditional Alpha	-13.15%	-5.53%	-3.67%	-2.64%	-2.53%	-1.62%	-0.97%	0.11%	0.05%	4.60%
Unconditional alpha	-17.21%	-7.51%	-4.86%	-3.61%	-2.54%	-1.71%	-0.88%	-0.12%	0.80%	4.94%
Relative initial size	0.2804%	0.2845%	0.1233%	0.2487%	0.1683%	0.1707%	0.1887%	0.1345%	0.1081%	0.4517%
Conditional idiosyncratic risk	19.87%	11.55%	9.33%	9.85%	7.11%	6.68%	6.98%	5.15%	6.94%	14.35%
Unconditional idiosyncratic risk	17.07%	10.21%	8.73%	9.18%	7.07%	6.31%	6.46%	4.81%	6.96%	12.51%
Alpha skewness	-0.571	-0.464	-0.378	-0.304	-0.239	-0.109	-0.069	0.029	0.236	0.390
Alpha s.d.	0.387	0.260	0.219	0.213	0.186	0.158	0.154	0.133	0.162	0.345
Market beta s.d.	0.300	0.203	0.171	0.168	0.145	0.132	0.124	0.108	0.129	0.321
Smb beta s.d.	0.371	0.251	0.215	0.217	0.194	0.167	0.165	0.139	0.168	0.339
Hml beta s.d.	0.489	0.361	0.311	0.306	0.288	0.244	0.262	0.203	0.241	0.476
Wml beta s.d.	0.354	0.302	0.260	0.247	0.238	0.193	0.201	0.172	0.194	0.513
Log(Turnover)	2.183	2.042	1.977	1.898	1.901	1.788	1.656	1.525	1.622	1.816
Expense ratio	1.61%	1.43%	1.42%	1.32%	1.34%	1.32%	1.34%	1.17%	1.26%	1.77%
Management Fee	0.79%	0.78%	0.70%	0.73%	0.71%	0.71%	0.67%	0.57%	0.66%	0.72%
Other expenses	0.82%	0.66%	0.73%	0.59%	0.63%	0.61%	0.67%	0.61%	0.60%	1.05%

The table shows the average of the deciles for some characteristics of the mutual funds. Deciles are formed according to conditional performance from worst (D1) to best (D10) mutual funds. Performance is annualized.

Source: Own elaboration.

Table 9: NON-SURVIVOR MUTUAL FUNDS: PERFORMANCE, ACTIVE MANAGEMENT AND EXPENSES (continuation)

Panel B (Net returns)

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
Conditional Alpha	-14.97%	-7.30%	-5.06%	-3.93%	-3.60%	-2.83%	-2.25%	-1.48%	-1.02%	3.72%
Unconditional alpha	-18.63%	-8.95%	-6.33%	-4.89%	-3.87%	-3.08%	-2.20%	-1.26%	-0.35%	3.70%
Relative initial size	0.2775%	0.2807%	0.1355%	0.2573%	0.2021%	0.1459%	0.1948%	0.1514%	0.0797%	0.4532%
Conditional idiosyncratic risk	20.80%	12.20%	9.90%	8.35%	7.89%	6.99%	7.72%	4.89%	5.81%	13.27%
Unconditional idiosyncratic risk	17.80%	11.01%	8.95%	7.99%	8.10%	6.46%	6.70%	4.93%	5.82%	11.54%
Alpha skewness	-0.590	-0.425	-0.375	-0.261	-0.259	-0.130	-0.090	0.037	0.219	0.396
Alpha s.d.	0.406	0.262	0.230	0.202	0.186	0.163	0.161	0.140	0.147	0.316
Market beta s.d.	0.313	0.207	0.181	0.156	0.147	0.138	0.129	0.110	0.118	0.302
Smb beta s.d.	0.389	0.255	0.223	0.209	0.191	0.174	0.172	0.147	0.155	0.310
Hml beta s.d.	0.515	0.368	0.320	0.307	0.283	0.249	0.263	0.217	0.225	0.433
Wml beta s.d.	0.379	0.306	0.270	0.246	0.229	0.200	0.208	0.178	0.183	0.475
Log(Turnover)	2.184	2.051	1.967	1.898	1.908	1.807	1.656	1.646	1.538	1.722
Expense ratio	2.07%	1.49%	1.58%	1.35%	1.36%	1.41%	1.28%	1.22%	1.10%	1.12%
Management Fee	0.80%	0.77%	0.77%	0.74%	0.72%	0.72%	0.72%	0.58%	0.56%	0.67%
Other expenses	1.27%	0.73%	0.81%	0.62%	0.65%	0.69%	0.56%	0.64%	0.54%	0.45%

The table shows the average of the deciles for some characteristics of the mutual funds. Deciles are formed according to conditional performance from worst (D1) to best (D10) mutual funds. Performance is annualized.

Source: Own elaboration.

The study shows how mutual fund performance can be expressed as the result of the fund managers' strategies or investment decisions. This would imply that the assessment of mutual fund performance by a model would be equivalent to the assessment of the strategies followed by the fund using the same model. In order to obtain a nonzero abnormal performance, fund strategies should provide different results from those obtained by a linear combination of the risk factors of the model. Although investment strategies are not observable, it is reasonable to assume that a greater differentiation involves a greater degree of active management and this, in turn, implies higher expenses caused by higher portfolio turnover, information retrieval or management fees.

In a context where financial markets show a low level of efficiency, fund managers would normally be better informed and differentiating strategies could be implemented in an attempt to achieve a positive abnormal performance. However, in a context of high efficiency, differentiation strategies could be a fruitless effort by managers in their attempts to attain a positive and persistent performance. In the latter case, the strategies may resemble bets taken by managers, the results of which would be, to some extent, random. Therefore, the greater the differentiation or active management associated with these strategies, the greater the possibility that these strategies will obtain an abnormal performance farther from zero, but for either positive or negative values.

Some of our results on performance are in line with those reported by previous literature: in aggregate, mutual funds do not obtain a positive performance and most of them have a negative performance. The expenses incurred by the fund for both operating costs and, especially, management fees, have a negative effect on performance. In aggregate, considering a time-varying model for assessing net returns, abnormal performance takes a negative annualized value of -1.34%. In the case of non-survivor funds this value is worse –at -4.59%– mostly due to the effect of high negative performance evidenced by the worst funds.

However, focusing on different tails of the distribution of performance, the analysis of the relationship between active management and performance indicates that both the worst and the best funds have higher levels of active management. This is reflected in the U-shaped relationship between performance and active management, implying that funds that try to beat the market may differentiate themselves from it by implementing strategies that involve time-varying parameters, idiosyncratic risk and, accordingly, higher turnover. However, the results of these strategies can be very different, so that some mutual funds achieve a negative and others a positive performance. In contrast, funds that are not differentiated from the market imply lower active management, lower fees and performance close to zero. For survivor funds we found that better funds show higher idiosyncratic risk than worse funds, but this is not the case for non-survivors, in other words, high levels of active management are accompanied by the best of worst performance.

In summary, both the worst and the best funds pursue differentiation strategies. The open question that remains is what actually determines the outcome of these strategies and, therefore, their classification into one group or another. Is it a fortuitous result in a context of efficient markets, or is it really a consequence of managers' ability? Our results give greater support to the first hypothesis. Hence, in gen-

eral, the performance of the best and worst funds is not persistent in time, but it shows variability and skewness, so that the worst (best) mutual funds sometimes show a greater extreme performance with a negative (positive) sign. Significant evidence of performance persistence is only found for the top decile funds, but their relevance in economic terms is limited when it is compared with the expected results under a perfect persistence hypothesis. When using net returns, the effect of differences on the expense ratio drives evidence of significant persistence for the worst funds. Therefore, this result is due to persistence in these higher costs rather than persistence in the failures of managers. When we performed a more detailed analysis on the funds at the tails of the performance distribution, we found that 2% of the top best funds are more persistent in their successes, i.e., in pursuing differentiation strategies that provide added value to the fund. However, there is no such evidence among the worst funds, but the failures are not persistent. Nevertheless it should be noted that in the analysis of persistence the non-survivor funds are not considered and within them the worst funds obtain a markedly negative performance.

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Fecha de recepción del original: febrero, 2018
Versión final: agosto, 2018

RESUMEN

Este trabajo analiza la relación entre gestión activa y eficiencia para los fondos de inversión de renta variable del mercado de Estados Unidos de América, durante el periodo 2001-2011 y considerando tanto rendimientos brutos como netos. Se utilizan diferentes medidas de gestión activa, como la variación temporal de parámetros, el riesgo específico y la rotación de la cartera. Se evidencia una relación en forma de "U", de modo que tanto los mejores como los peores fondos muestran mayores niveles de gestión activa. Este comportamiento también es encontrado en la relación entre los gastos del fondo y su eficiencia. Por lo tanto, la gestión activa conlleva mayores costes y la selección de diferentes estrategias o apuestas de inversión, cuyo resultado en términos de eficiencia es desigual. No obstante, se evidencia cierto nivel de persistencia en el éxito de las apuestas de inversión realizadas por los mejores fondos.

Palabras clave: gestión activa, fondo de inversión, eficiencia.

Clasificación JEL: G23, G11.