The Efficiency of Performance-based-fee Mutual Funds

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ABSTRACT

This paper compares the performance of mutual funds which charge management fees total or partially on returns with those which charge management fees exclusively on assets under management. Despite the conclusions from agency theory, which advocates the use of performance-based management fees in order to mitigate the investor-manager agency problems, only a minority of mutual funds worldwide tie the managers' remuneration to the fund performance. In particular, we study mutual fund efficiency through the comparative analysis of the risk-adjusted measures and the performance-expenses relationship. We apply our study to a sample of Spanish mutual funds, from 1999 to 2009, where both type of management fees are authorized. In short, we find that funds with performance-based management fees perform significantly better than the other risky funds considered. Moreover, we have found a strong positive performance-expenses relationship for these funds and negative for the remaining. These results seem to point to more efficient management in the performance-based fees funds, contrasting with their low presence in the fund industry.

1. INTRODUCTION

Since the seminal paper by Jensen (1968), literature on mutual fund performance evaluation generally concludes that, on average, equity mutual funds underperform the appropriate benchmark return. One of the more recurrent arguments is the high level of fees charged; in fact, fund performance is not significantly negative when before-expenses returns are considered. In particular, Grinblatt and Titman (1989), Malkiel (1995), Droms and Walker (1996), Gruber (1996) and Cesari and Panetta (2002), among others, find that mutual funds do not underperform the market when gross returns (before-expenses) are considered. A similar result is found by Martínez (2003) for the Spanish market. Therefore, the amount of expenses charged to investors appears to be a key element in mutual fund performance evaluation.

With that being so, the aim of this paper is to analyse whether the way that expenses are charged to investors is also relevant with regard to mutual fund performance evaluation and performance-expenses relationship.

Annual operating expenses include management fees, which investors have to pay to managers for portfolio supervision services; custody fees, paid for asset administration and custody, and other distribution, legal and administrative costs. Management fees are the main component of expenses, usually accounting for 90-95% of them.

Mutual fund management fees are generally charged to investors as a fixed percentage of total assets under management (*asset-based fee*); thus, asset growth, instead of returns, appears to be a desirable objective from a fund-manager perspective. However, as the asset volume increases with both capital inflows and asset appreciation, an implicit incentive to managers to achieve good performance could also be recognized in this fee structure.

Additionally, current worldwide mutual fund regulations usually allow management fees to be charged total o partially on returns obtained (*performance-based fee*).[1] In fact, all the country members of the International Organization of Securities Commissions, IOSCO, envisage this type of management fee. In spite of this legal possibility, only a minority of mutual funds in practice uses remuneration structures tied to the attained fund returns. For instance, research from Lipper (2007) shows that the overall proportion of U.S. open-end funds using such structures remains at just over 2%. In the case of the major European fund markets, between 10% and 20% of funds use performance-fee management fees.

[1] Thus, mutual funds could charge both a fee based on the asset volume and an incentive fee based on the fund's performance.

Mutual funds which choose to charge management fees on returns are in fact linking the manager's remuneration to his/her effort and to the performance obtained. So, according to agency theory literature, it should be understood as a commitment to the interest of investors, mainly focused on high returns.

Many academic articles have theoretically analysed the optimality of this fee structure. Grinblatt and Titman (1989), Golec (1992), Roll (1992), Das and Sundaram (1998a, b and 2002), Palomino and Prat (2003) and, recently, Li and Tiwari (2009) are some of the most significant. The prevailing conclusion is that performance-based fees seem to be more appropriate. Thus, Das and Sundaram (1998b) conclude that if risk aversion is assumed in the preferences of investors and managers, the optimal contract has to be linear, and must include a base fee for the amount of assets under management and an additional remuneration depending on returns above those of a benchmark portfolio. The reason put forward is that this type of fee best aligns the interests of managers and investors, with managers encouraged to obtain high returns as their remuneration depends on them.

Therefore, in our opinion, this type of mutual funds appears as a very interesting subgroup which deserves separate analysis from the aggregate mutual fund industry. Unfortunately, financial literature has devoted little attention to these funds mainly motivated by their low quantitative relevance (both in number of funds and asset volume under management). This paper focuses on this small but promising group of mutual funds. In particular, the paper seeks to investigate the extent to which these funds are more efficient than the remainders, mainly through the analysis of its performance evaluation and the performance-expenses relationship. Our main concern is that these performance-based-fee funds are more efficient than the ones which charge management fees only on the asset volume under management.

Regarding performance issues, Volkman (1999), Elton *et al* (2003) and Giambona and Golec (2007) agree to show that U.S. mutual funds with performance-based fees perform relatively better than other actively managed funds.

Some other articles focus on the risk-taking behaviour of the managers paid on performance. For instance, Brown *et al* (1996), Chevalier and Ellison (1997), Elton *et al* (2003), Golec and Starks (2004), and Low (2006) conclude that performance-based fees may encourage risk-taking by managers as increases in stock return volatility make for bigger fees. However, since they can increase the sensitivity of the manager's portfolio to firm stock price movements, little risk can be assumed (Carpenter (2000); Ross, (2004)).

In a related article, Massa and Patgiri (2009) also analyse the impact of the incentives on the manager's remuneration on the risk and performance obtained for U.S. mutual funds. Instead of a performance-based management fee, they consider the shape of the asset-based fee structure as the incentive component, with the fee percentage being usually diminished as the managed asset volume increases. In our opinion, the existence of a performance-based fee may be able to capture in a more direct way the incentive for the fund manager than the shape in the asset-based fee.[2]

From the efficiency point of view, higher expenses should be linked to better performance and/or services (Grossman and Stiglitz (1980)). Thus, in an empirical setting we would expect a cross-sectional positive relationship between fund expenses and before-expenses risk-adjusted fund returns. Funds which incur high costs, and translate them to investors as high total expenses, could only survive in the market if their performance (or other services) compensates such overheads. So, we expect that fund expenses adjust to make after-expenses risk-adjusted returns very similar across funds.

Contrary to these theoretical implications, Gil-Bazo and Ruiz-Verdú (2009) has recently found a robust negative relation between raw risk-adjusted performance and expenses in a comprehensive sample of U.S. equity mutual funds. Nevertheless, that seems not to be the case for the best-governed funds, which appear to charge fees more in line with performance. This paper seeks to empirically analyse this performance-expenses relationship separately for funds charging the management fee total or partially on returns. Given the special features of this type of funds, we hypothesize a different behaviour of these funds in this regard.

We apply our study to a sample of Spanish mutual funds, from 1999 to 2009. Available information for them allows us to identify the type and amount of management fee charged to investors; so, a comparative study can be carried forward. Although Spanish legislation envisages that management fees be charged on the basis of the total volume of assets under management, the returns obtained or a combination of the two, the typical management fee in the Spanish mutual fund industry is a fixed percentage of asset volume, with no explicit performance component. However, 7.6% of Spanish mutual funds used performance-based management fees along the sample period, for a 4.7% of the total asset volume under management.[3] So, the Spanish mutual fund industry appears to be as a very appropriate testing ground for evaluating the efficiency of the particular group of funds which establish the management fees on achieved performance.

[2] Some words of caution should be included here. The ideal way to deal with the manager's incentives must consider the final remuneration paid to the manager from the management company. Unfortunately, this information is not always available to researchers. This is also the case in the present paper. Instead of that, we use the costs that management companies charge to investors in order to compensate for management and other services. We suppose that the way investors are charged by the management companies is closely related to the way that fund managers are compensated from the management companies.

[3] In a related paper, Díaz-Mendoza and Martínez (2009) analyse the attributes of a sample of Spanish mutual funds which determine the choice of a performance-based fee as opposed to an asset-based fee.

The most important finding from this study can be summarized as follows: mutual funds which charge management fees to investors based on performance seem to be more efficient than funds which establish them exclusively on assets under management. Risk-adjusted measures are found to be slightly more positive in this group of funds, and, more important, the cross-sectional performance-expenses relationship is significantly positive for these funds, whereas it is clearly negative for the rest of funds. Therefore, costly funds in this group compensate investors with high risk-adjusted returns, although such relation is found to be driven for the more profitable funds.

Accordingly, the paper contributes to the existing literature on mutual fund performance evaluation by detecting a type of fund with apparent superior managerial skills. With the only exception of the U.S. fund industry, financial literature has devoted very limited attention to this group of funds, now presented as being very promising funds in terms of portfolio management. Regulators, management companies and fund investors can benefit from the findings of the paper regarding the disparity in the efficiency of the different type of funds.

The paper also gives support to the agency theory literature, which suggests that portfolio management should be compensated through incentive contracts in order to better align the manager's interest with that of the investors. Our findings confirm that fund managers compensated partial or totally on returns perform better than the ones paid on the volume of asset under managements. Hence, the incentives triggered by the performance-based fees in the manager work correctly.

The rest of this paper is organized as follows. Section 3.2 describes the data and variables employed in the analysis. Section 3.3 presents the results regarding the efficiency of the fund sample, separately for funds using asset-based or performance-based management fees. Alternative estimation methodologies are checked in section 3.4, in order to evaluate the robustness of the findings, and finally, Section 3.5 concludes and summarizes the main findings of the paper.

2. DATA AND DESCRIPTIVE ANALYSIS

The Spanish mutual fund industry has shown a rapid increase in volume of asset managed during the last two decades. According to the Spanish Asset Management Association (*Asociación de Instituciones de Inversión Colectiva y Fondos de Pensiones*, INVERCO (2010)), the volume of assets under management by mutual funds at year-end 2009 was equivalent to 18.8% of total Spanish family savings, compared to 0.4% in 1985. Despite the massive figures of redemptions in the fund industry worldwide in 2007 and, especially, in 2008, the Spanish industry managed 0.17

trillion Euros (compared with just 0.0017 trillion Euros in 1985), equivalent to 19.0% of GDP. This made Spain the sixth biggest European country in terms of assets under management.

In accordance with current Spanish legislation, management fees can be charged on the basis of the total volume of assets under management, the returns obtained or a combination of the two. Given the main objective of the paper, funds are classified into two groups according to the type of management fee charged. We will use the term *asset* funds for those that establish the management fee exclusively on volume of assets; funds that tie management fees partial or exclusively to returns are referred to as *mixed* funds. Similar to other countries, only a minority of Spanish mutual funds ties the remuneration of managers to returns; moreover, almost all *mixed* funds combine the two types of fee by charging a base fee proportional to the assets under management, plus an additional incentive fee dependent on the fund's overall performance.

The dataset was obtained from Comisión Nacional del Mercado de Valores (CNMV), the body that supervises and inspects Spanish stock markets and mutual funds. It initially comprised monthly information regarding all the Spanish open-end funds that existed during the ten-year period from June 1999 to June 2009. Since the dataset includes all funds that existed during this period, our data are free of the survivorship-bias documented by Brown *et al*. (1992) and Brown and Goetzmann (1995). The proportion of *mixed* funds in the Spanish fund industry is limited: only an average 7.6% of the open-end funds charge management fees on performance, accounting for a reduced 4.7% of the volume of assets.

The study is focus on the funds investing mainly on risky assets: Equity funds (EFunds) and Global funds (GFunds), according to the Spanish fund classification.[4] Equity funds include funds which invest more than 30% in equities; Global funds contain those funds whose investment policy is not precisely defined and which do not belong to any other category. This sample selection accounts for an average 40% of the number of Spanish open-end funds, but only for a 21.7% of the total assets managed in the industry. However, the sample covers an average 80.4% and 81.5% of the number of funds and assets under management within *mixed* funds category, respectively. So, the sample chosen can be considered to be very representative of the group of funds charging management fees total or partially on performance, yielding a total of 127,257 fund-month observations.

For each mutual fund in the sample, the dataset includes the date of the inception in the CNMV registers, the investment objective, and monthly information regarding the net (after-

[4] Bond funds (BFunds), which invest more than 70% in fixed income assets, Guaranteed funds (GUARANT), and others funds (OTHERS) were excluded from the analysis. The first and second ones are removed because of their limited use of performance-based management fees; the third one because of its recent emergence in the Spanish fund industry. When all said and done, risky funds are the most analysed in the literature on mutual funds.

expenses) asset value, the total volume of assets under management, and the performance-based and the asset-based management fee charged. Finally, the total annual expenses are also provided and monthly expenses are computed just by dividing annual expenses by 12.

Net asset values allow us to compute the net fund returns (NRET), which is the figure usually displayed to investors; gross (before-expenses) fund returns (GRET) are obtained adding monthly expenses to the net fund returns. Additionally, given the empirical evidence that incentives affect fund returns and risk-taking, we construct alternative risk-adjusted performance measures.

In order to estimate the risk-adjusted fund excess returns (Jensen's alpha), CAPM, Fama and French (1993) and Carhart (1997) multifactor models are used. So, we need to construct the hedge portfolios that underlie market (MKT), size (SMB), Book-to-Market (HML) and momentum (WML) factors. We use the Factset-JCF database to extract, for the period June 1999-June 2009 the following information for the Spanish Stock Market: i) monthly returns (adjusted for dividends, capital increases, splits and reverse splits), ii) the average return of the three-month interest rate of government bonds as the proxy for the return of the risk-free asset, iii) the Book-to-Market ratio is calculated by dividing the book value of the equity per share by the closing stock price, iv) the market value we consider is the product of the closing stock price and the number of shares. The alpha from CAPM is called α_{CAPM}, the corresponding to the three-factor Fama and French model is α_{FF}, and, finally, the alpha for the four-factor model of Carhart is denoted as α_{FFM}. In order to gain robustness in results, all the risk-adjusted returns are estimated separately both with net returns (after-expenses, α^{N}_{CAPM}, α^{N}_{FF} and α^{N}_{FFM}) and gross returns (before-expenses, α^{G}_{CAPM}, α^{G}_{FF} and α^{G}_{FFM}).

Thus, we estimate the alphas of the mutual funds of the excess returns on the risk-free rate with respect to the risk factors. Therefore, the following evaluation models are estimated with a rolling time-series ordinary least squares (OLS) regression:

$$
\begin{aligned}
&MODEL\ 1\text{:}\ R_{pt} - r_{ft} = \alpha_{pCAPM} + \left(R_{mt} - r_{ft}\right)\beta_{mp} + u_{pt} \\
&MODEL\ 2\text{:}\ R_{pt} - r_{ft} = \alpha_{pFF} + \left(R_{mt} - r_{ft}\right)\beta_{mp} + SMB_t\beta_{SMBp} + HML_t\beta_{HMLp} + \varepsilon_{pt} \\
&MODEL\ 3\text{:}\ R_{pt} - r_{ft} = \alpha_{pFFM} + \left(R_{mt} - r_{ft}\right)\beta_{mp} + SMB_t\beta_{SMBp} + HML_t\beta_{HMLp} + WML_t\beta_{WMLp} + \pi_{pt}
\end{aligned}
$$

where R_{pt} is the (after or before-expenses) return on fund p in month t; r_{ft} is the return on the risk-free asset in month t; R_{mt} is the return on the value-weighted market portfolio proxy in t; SMB_t and HML_t are the Fama-French factors to capture the effects of size and Book-to-Market, respectively; WML_t is the price momentum in t, calculated as the difference in month t between the returns on the portfolios of winners and losers. The portfolio of winners (losers) is the equally weighted portfolio containing the 30% of the stocks with the highest (lowest) returns in the previous period beginning in month t-12 and ending in t-2.[5] Finally, u_{pt}, ε_{pt}, and π_{pt} are the error terms.

The constant term in each previous time series regression, the so-called Jensen alpha, measures the monthly risk-adjusted fund return. The alternative slope coefficients (β_p) capture the sensitivity of fund excess returns to the corresponding factor; so, they measure the fund exposure to the alternative risk factors.

The first alphas (and betas) are estimated with a set of 36 observations, corresponding to our first 36 months in the sample and they are assigned to May 2002 for the subsequent cross-section estimation. Next, the alphas corresponding to June 2002 are estimated with the first 37 observations of the sample. We continue successively up to a total of 60 months. From here, the set of observations for the alpha estimation remains constant, incorporating an additional observation as it eliminates the first one. In the end, we have for each fund a series of 86 alphas relative to the three alternative models which refer to every month from May 2002 to June 2009. These risk-adjusted fund returns will be used to separately assess the performance of the *asset* funds versus the *mixed* funds ones, and, of course, in the cross-sectional performance-expenses relationship estimation.

We then describe the set of fund attributes considered as control variables in the empirical estimation of the performance-expenses relationship. All of them are variables likely related to the fund performance, and whose effect should be considered in order to clearly identify the performance-expenses relationship.

Firstly, we consider the number of years from the registration of the fund (AGE). The volatility of performance (VOLAT) is measured by the standard deviation of the twelve previous monthly fund returns, in percentage terms. Fund size is proxied by the total volume of assets under management in thousands of Euros (ASSETS).[6] Total expenses borne by the fund includes the management fee, custody fee, and other operating costs; and is computed as a percentage of the average volume of assets during the year. Dividing annual expenses by 12, we get a proxy for monthly expenses (EXPENSES).

[5] See Fama and French (1993) for details regarding the construction of the SMB and HML factors, and Carhart (1997) and Jegadeesh and Titman (1993) for the construction of the momentum factor.

[6] In the empirical analysis in Section 3, this variable is measured as its neperian logarithm.

2.1.Descriptive analysis of the data

Summary monthly statistics for the four factors portfolios considered, market (MKT), size (SMB), book to market (HML) and momentum (WML), are reported in Table 3.1 for the period from June 1999 to June 2009. All the premiums are positive, indicating that risky, small, value-oriented and especially past-winners stocks obtained superior returns. Note also the relatively high variance of the monthly factors returns; both together suggest that these factors could account for much cross-sectional variation in the mean return on the Spanish stock portfolios over the period analysed. Regarding the Pearson correlation matrix, the low cross-correlations imply that multicollinearity does not seem to substantially affect the estimated factor-loadings.[7]

Table 3.2 reports the number of funds (Panel A) and the relative asset volume under management (Panel B) according to the fund investment objective (Equity, Global, Bond, Guaranteed and Others funds) and the type of management fee charged (*asset* and *mixed* funds), at each year-end of the sample period, from June 1999 to June 2009.

As mentioned before, the number of *mixed* funds in the Spanish industry on average is 7.6% over the total, going from a 4.6% in 1999 to a maximum 10.6% in 2006, when 299 *mixed* funds were registered in CNMV. Regarding the market share, *mixed* funds account for an average 4.7% of the assets under management, with the minimum occurring in 2002 (1.5%) and a maximum 9.1% achieved in 2006, for a total of 24,593 million of Euros. A considerable increase in the presence of *mixed* funds in the Spanish mutual fund industry can be observed, with its highest relevance reached in the period 2005-2007. Not surprisingly, during 2008 a considerable decrease in both the number and relative assets under management by *mixed* funds is observed. In fact, whereas the total asset volume in the Spanish industry fell a 30%, the *mixed* funds managed a 70% less than in 2007 (6,296 million of Euros).

According to the fund investment objective, Table 3.2 shows that Equity and Global funds include the most part of *mixed* funds, in number and assets managed. Therefore, investors in risky Spanish funds are more likely to pay management fees linked to fund performance than others. Accordingly, limiting the analysis to the Equity and Global funds only removes a 20% of the fund-month observations with performance-based management fees. The outstanding role of Global funds in the group of performance-based fee funds should also be highlighted; as they are a relatively small type of funds, the number and size of *mixed* funds with such investment objective is very significant. Global funds account for an average 5.9% of the total asset volume along the

[7] Although not shown in the Table, both the VIF (Varianza Inflation Factor) test and the Condition Index confirm that there are no multicollinearity problems between our four estimates of risk factors.

sample period, but for a considerable 57% (2.65/4.65) regarding the asset under management by *mixed* funds.

Table 3.3 reports summary statistics of the relevant variables for the sample, separately for *asset* and *mixed* funds.[8] As can be deduced from the table, economically significant differences over the ten-year period are observed in almost all the attributes, for the two types of funds. In comparison with *asset* funds, *mixed* funds managed a significant higher volume of assets on average during our sample period and were less volatile. These surprising findings are mainly due to the last two years of the sample, where a substantial increase in size and a noteworthy reduction in the risk-taking behaviour of the *mixed* funds took place.[9] As expected, *mixed* funds are younger than *asset* funds.

The negative performance of the Spanish risky *asset* funds, independently of the measure considered, is remarkable. All the before-expenses measures of performance are on average negative, except when the four-factor Carhart model is used. For instance, the monthly mean gross risk-adjusted return (when the CAPM model is used) reaches the negative figure of -0.02%. This is consistent with the findings of the literature on Spanish mutual fund evaluation.[10]

Nevertheless, the performance evaluation of the Spanish risky funds which charge management fee on returns is not so negative; in fact, only one of the measures of gross performance is negative. For comparison, the monthly mean gross risk-adjusted return (when the CAPM model is used) is +0.03 for the *mixed* funds. Such a statistically significant difference in performance is robust across the alternative measures considered. Note also that all the maximum (minimum) values of the alternatives risk-adjusted returns are higher (lower) for the *mixed* funds than for the *asset* ones.

Although the next section will analyse this issue in greater depth, these findings seem to put forward a different behaviour between *asset* and *mixed* funds in terms of asset management and performance evaluation. However, no significant differences regarding fund expenses are found between *mixed* and *asset* funds. So, irrespective of the way that performance fees are charged to investors, the total cost for them is similar, accounting for a monthly average of 0.15% of the assets under management.

Table 3.4 reports the results for the models 1-3 for the whole sample of funds and for the *asset* and *mixed* funds. Regarding the risk factor loadings, the results suggest that Spanish risky

[8] The irregular number of observations used for each variable is caused by the existence of missing values in some of them.

[9] The statistics for each year of the sample are not shown in the table, but are available to readers upon request.

[10] For the Spanish market, most of the empirical studies conclude that mutual funds, on average, underperform the appropriate benchmark return. See, for instance, Rubio (1993), Martínez (2003).

funds tend to follow patterns in their investments. The performance of these funds is generated by small and value stocks with negative momentum. The coefficients associated to *mixed* funds, related to *asset* funds, are always lower for Market, Size and Book-to-Market factors and higher for momentum factor.

Next, the risk premiums are also estimated, according to the two-steps procedure of Fama and MacBeth (1973). Therefore, for the three models we used in the first step, we run an OLS cross-sectional regression of fund excess returns to the estimated risk exposures (betas) for each month from May 2002 until December 2008 as follows:[11]

$$MODEL\ \ 4\!:\ R_{pt} = \gamma_{0t} + \gamma_{1t}\hat{\beta}_{mpt} + u_{pt}$$
$$MODEL\ \ 5\!:\ R_{pt} = \gamma_{0t} + \gamma_{1t}\hat{\beta}_{mpt} + \gamma_{2t}\hat{\beta}_{SMBpt} + \gamma_{3t}\hat{\beta}_{HMLpt} + \varepsilon_{pt}$$
$$MODEL\ \ 6\!:\ R_{pt} = \gamma_{0t} + \gamma_{1t}\hat{\beta}_{mpt} + \gamma_{2t}\hat{\beta}_{SMBpt} + \gamma_{3t}\hat{\beta}_{HMLpt} + \gamma_{4t}\hat{\beta}_{WMLpt} + \pi_{pt}$$

where R_{pt} is the (after or before-expenses) excess return on fund p in month t; the regressors, $\hat{\beta}_p$, are the betas estimated in the first step from models 1-3 respectively. Finally, u_{pt}, ε_{pt}, and π_{pt} are the error terms. The respective slope coefficients γ_{1t}, γ_{2t}, γ_{3t}, and γ_{4t} represent the premium paid for the fund returns to the Market, Size, Book-to-Market and momentum risk exposures.

Table 3.5 shows the final estimator as the average of the 80 cross-sectional monthly gammas estimates, separately for the *asset* funds and the *mixed* ones. Irrespective of the model considered, and of the moment in which returns are measured (before or after the expenses were deducted), all the risk premiums are not statistically different from zero. We have not found evidence of fund returns reflecting the risks assumed. Moreover, results in Table 3.5 allow us to conclude that both, *asset* and *mixed* fund returns behave similarly regarding this issue.

In Table 3.6, the coefficients of correlation between all the variables considered are presented, separately for the whole sample (Panel A), *asset* (Panel B) and *mixed* funds (Panel C). Regarding the differences between both types of funds, three issues of interest appear. First, the correlation between the alternative risk-adjusted performance measures and the fund age is negative for *mixed* funds, but positive or very close to zero for *asset* funds. Second, volatility is positively correlated to alphas for *mixed* funds (especially from the four-factor Carhart model) but negatively correlated for *asset* funds. Third and more important, expenses correlate negatively with all measures of *asset* funds risk-adjusted performance (even for the before-expenses ones), but positively (except for the three-factor FF model) for the *mixed* ones. Thus, for the gross risk-adjusted returns based on the CAPM, FF three-factor, and Carhart four-factor models, the

[11] We run 80 cross-sectional regressions and not 86 because the annual fund expenses for 2009 it is not available.

correlations with the monthly expenses become 0.06, -0.06 and 0.08, respectively, for the *mixed* funds; whereas that for the *asset* funds the figures are -0.07, -0.10 and -0.06. We will go back to this relevant issue in the empirical section of the paper.

Additionally, in order to analyse further the statistical differences between performance for *mixed* funds and *asset* funds, we use the simple matching estimator methodology of Abadie and Imbens (2006).[12] This methodology provides a systematic procedure to find matches when matching is done on several variables simultaneously. We use the simplest methodology, where only one matched fund is considered. So, each *mixed* fund is matched to one *asset* fund with similar values of one or more matching variables. In our empirical application, fund size, age, and expenses are utilized as matching variables, both individual or simultaneously. Once the matching procedure is completed, and a matched *asset* fund is identified for each *mixed* fund, the difference in the alternative performance measures between *mixed* and *asset* funds is estimated by averaging the differences between each *mixed* fund and the corresponding matched *asset* fund. A positive coefficient indicates that the value of the performance variable is higher for *mixed* funds than for *asset* funds.

Instead of a monthly frequency, in which the highly-information-demanding matching procedure finds serious difficulties to operate correctly, in Table 3.7 we consider annual frequency for all the variables. Similar to Gil-Bazo, Ruiz-Verdú and Santos (2009) the annual performance measure is merely computed as the sum of the twelve monthly ones. Panel A reports the average of the alternative annual performance measured separately for *mixed* and *asset* funds, and tests the statistic significance of the differences between both. Panel B shows the matching estimator (and *t*-statistic) for the difference in performance between the *mixed* and the matched *asset* funds, using individually size, age and expenses as matching variables. In Panel C, we use the matching variables simultaneously.

Panel A corroborates the negative performance obtained for the Spanish risky *asset* funds, and the significantly better behaviour of the *mixed* funds, also in annual terms. For instance, the gross no-risk-adjusted annual performance (GRET) is -0.90% for the *asset* funds, but a significantly better (although also negative) -0.23% is reported for the *mixed* ones. As it was found in Table 3.3, the best performance is reached when the four-factor Carhart model is used to estimate fund risk-adjusted performance; in this case, the average annual alpha estimates are 0.07% and 0.24% for the *asset* and *mixed* funds, respectively.

[12] See Abadie *et al*. (2004) for the implementation of the matching estimator in Stata, and Gil-Bazo, Ruiz-Verdú and Santos (2009) for an application to the US fund industry.

As such differences could be motivated by attributes others than the way the management fee is charged, Panels B and C compare the performance of *mixed* and *asset* funds with similar attributes, the matching variables. The coefficient in each cell is the matching estimator, and must be understood as the mean difference in the respective performance measure between the *mixed* funds and the matched *asset* funds. Thus, for instance, the first value in Panel B indicates that *mixed* funds obtain on average an annual net return 2.88% higher than the one earned by the matched *asset* funds, with a similar asset volume (as the matching variable is size, ASSETS).

Although not all the coefficients are statistically different from zero, it should be pointed out that all of them are positive, irrespective of the performance measure and the matching variables considered. The economic significance of the matching estimators is (as expected) higher for the non-risk-adjusted performance measures. For instance, when size, age and expenses are the matching variables, *mixed* funds obtain an annual gross return 3.53% superior than the matched *asset* funds. This difference is substantial, considering that the average annual gross return for *mixed* funds is -0.23 %.

These findings allow us to conclude that *mixed* funds performed on average better than *asset* ones with similar size, age and expenses,

As regards the effect of each of the matching variables, the findings are not conclusive. The smaller estimator for the risk-adjusted performance measures is found when funds are matched by size; moreover, these estimators are always lower than the non-matched difference in Panel A. Thus, we could be tempted to conclude that size is driven mainly the differences in risk-adjusted performance between *mixed* and *asset* funds. However, when performance is not adjusted by risk, all the matching estimators are larger than the differences in Panel A; this implies that the matching variables considered are not capable of explaining the differences in raw returns between *mixed* and *asset* funds.

3. EMPIRICAL ANALYSIS OF THE EFFICIENCY

This section deals with the efficiency of the Spanish risky mutual funds. As mentioned before, the focus is on analysing the differences between the funds which charge the management fee exclusively on asset volume (*asset* funds) and the ones which tie the management fee total or partially to the performance (*mixed* funds). Our hypothesis is that *mixed* funds are more efficient than *asset* funds. If that is the case, it could be concluded that the commitment with investors, that the performance-based fee implies, works in the correct way, increasing the returns to investors.

Thus, *mixed* funds should be considered as an exceptional type of funds, in spite of its limited presence in the fund industry worldwide.

The analysis of the fund efficiency will be carried out through two complementary strategies. The first one is to analyse the alternative risk-adjusted and non-risk-adjusted estimations. We will evaluate the differences in performance between the two groups of mutual funds by just reporting the proportion of (significantly) positive and negative estimations for the alternatives performance measures considered. Our hypothesis is that the proportion of significantly positive fund-month observations should be higher for the *mixed* funds than for the *asset* funds. Secondly, we will empirically examine the relationship between the performance achieved by the fund and the expenses charged to investors. According to the Grossman and Stiglitz's efficiency criterion, a positive cross-sectional relationship should be found between the before-expenses fund performance and the expenses charged. We will expect a significant difference in the estimated slope of that linear relation for both groups of funds, with it being higher for the *mixed* funds than for the *asset* ones. This will allow us to confirm a higher efficiency of the Spanish *mixed* funds.

3.1.- Performance evaluation

In order to assess the differences in performance shown in Tables 3.3 and 3.7, we report in Table 3.8 the distribution of the fund-month performance measure observations in our sample period according to its quantity, separately for the two groups of funds considered. Panel A shows the percentage of positive values for the net (NRET) and gross returns (GRET), and for the alternative estimations of risk-adjusted returns (α^N_{CAPM}, α^N_{FF}, α^N_{FFM}, α^G_{CAPM}, α^G_{FF} and α^G_{FFM}). Panels B and C report the percentage of statistically significant (at the 5% of significance) positive and negative estimations, respectively.

As expected from the statistical evidence in Table 3.3, less than one half of the risk-adjusted performance estimations for the *asset* funds are positive. Attending to the gross risk-adjusted measures, the figures range from 36% for the FF three-factor model to 48% for the CAPM and the Carhart four-factor ones. When we turn to the *mixed* funds the estimations are significantly higher, suggesting a relatively better performance of these funds. Thus, for instance, a 48.13% of the *asset* funds obtained positive Carhart four-factor alphas, whereas it was a significantly higher 52.76% of in the case of the *mixed* funds. However, when we look at the after-expenses risk-adjusted estimations (the net ones), no relevant differences are found, except for the CAPM alpha (α^{N}_{CAPM}).[13]

Panel B corroborates previous results. *Mixed* funds obtained significantly positive alphas more often than *asset* funds, irrespective of the way performance is evaluated, but especially in the case of before-expenses alphas. The percentage of such fund-month observations for the *mixed* funds is in the range of 7%-11%, depending on the model considered; whereas that for the *asset* funds the range is 4%-8%.

Regarding the percentage of significantly negative risk-adjusted estimations, Panel C reveals that, surprisingly, they occur more often in *mixed* funds than in *asset* funds. This finding is in line with the risk taking increase suggested by the agency theory literature, and reported by the empirical evidence aforementioned. It should be highlighted that it is only in the before-expenses (gross) case that the percentages of significantly positive alphas are noticeably superior than the negative ones for both groups of funds . Thus, a 6.21% (7.88%) of the month-fund performance estimates of the four-factor Carhart for the *asset* (*mixed*) funds are significantly positives, whereas only a 1.34% (2.19%) is negative. As can be seen in the Table, opposite figures are found when net risk-adjusted measures are computed.[14]

To sum up, Table 3.8 shows evidence that for our fund sample and period considered *mixed* funds perform relatively better than *asset* funds, irrespective of the way performance is computed. Bad *mixed* funds also seem to be worse than the bad *asset* funds. Elton *et al* (2003) find similar evidence for the US fund market.

3.2.- Performance-expenses relationship

Once the comparative performance of *asset* funds and *mixed* funds has been evaluated, we next try to analyse whether there is a dissimilar relationship between the ability to generate abnormal returns and the fund expenses charged to investors.

According to economic efficiency principles, funds charging high expenses to investors should provide them with valuable services in term of returns, risk and others.

Data on costs translated to investors are easily available for researchers as the fees paid to the management company. Regarding fund services, the fund return-risk profile is likewise

[13] The comparatively better behavior of *mixed* funds versus the *asset* ones, when gross risk-adjusted performance is computed instead of the net ones, could be explained by higher costs charged to investors in the former. However, evidence in Table 3 does not support such a justification.

[14] The case for the FF three-factor net alphas is noteworthy; 6.81% (7.93%) of them are significantly negatives for the *asset* (*mixed*) funds, accounting for three times the percentage of significantly positive alphas.

accessible to empirical analysis. Other fund services are more difficult to measure or estimate; fund services are therefore usually approximated through the (risk-adjusted) return provided to investors. This subsection deals with the cross-sectional estimation of the performance-expenses relationship in order to empirical assess the economic efficiency of the fund industry. Our aim is to investigate the existence or not of a distinct behaviour depending on the way the management fee is established, this is to say, for *mixed* and for *asset* funds.

Efficiency requires fund services to compensate costs, and consequently, once expenses are deducted, net performance should not be as diverse between funds. Alternatively, a close one-to-one relationship connecting expenses and gross performance should be present in the mutual fund industry. In contrast to this prediction, Gil-Bazo and Ruíz-Verdú (2009) recently found a puzzling and robust negative relation between gross performance and expenses in a sample of diversified U.S. equity mutual funds: funds with worse gross performance charge higher expenses.[15] Finally, they show that this relation may be explained as the outcome of strategic fee setting by mutual funds in the presence of investors with different degrees of sensitivity to performance.

Similar results are reported in a European study by Otten and Bams (2002), who find that the relationship between management expenses and risk-adjusted performance is significantly negative in Germany, Netherlands and UK over the period 1991-1998.

In keeping with the main objective of the paper, this subsection tries to contrast if the results obtained by the literature are driven by asset-based fee funds. Taking into account that the vast majority of funds belong to this type, the results could be explained by the high proportion of *asset* funds. In order to do so, we will analyse the relation performance-expenses in both groups of funds, *asset* funds and *mixed* funds, separately. We hope that this relation is not as negative, at least in the group of funds with performance-based fees. This would mean that m*ixed* funds are more efficient than *asset* funds, confirming previous conclusions. Therefore, the following model is estimated with a cross-sectional OLS regression for each of the 80 months from May 2002 until December 2008:

$$\textit{MODEL 7}: \text{PERFORMANCE}_{pt} = \lambda_0 + \lambda_1\text{EXPENSES}_{pt} + \Gamma\text{CV}_{pt} + \upsilon_{pt}$$

where PERFORMANCE_{pt} are the alternatives measures of fund performance: net return (NRET), gross return (GRET), and the estimations of the risk-adjusted excess returns, according to the CAPM (α_{CAPM}), the Fama and French (1993) (α_{FF}) and the Carhart (1997) (α_{FFM}) multifactor models, both with net and raw returns; EXPENSES_{pt} is the total expenses over assets; and CV_{pt} is a

[15] Previously, Elton *et al* (1993) and Carhart (1997) had shown similar results. However, Ippolito (1989) found that risk-adjusted returns are unrelated to expense ratio for U.S. funds.

set of control variables which includes age (AGE), volatility (VOLAT), and the neperian logarithm of assets under management in thousands of Euros (lnASSETS), with Γ being the 3x1 vector of parameters. Finally, υ_{pt} is the error term.

Results in Table 3.9 show the average of the cross-section 80 monthly estimates, over the period May 2002 to December 2008, for the previous model.[16] Once again, we report separately the results for the *asset* funds and the *mixed* ones. We will focus mainly on the coefficient of the expenses variable.

The results are very revealing. Let us first examine the case of the risk-adjusted performance measures. For the total sample, the performance-expenses relationship is clearly negative, even for the before-expenses case. Similar to previous studies for U.S. and European mutual fund markets, we find that the Spanish risky funds with relatively bad risk-adjusted performance do not charge the lowest management fees or expenses. On the contrary, they seem to charge higher than the average expenses. That is, in a cross-sectional analysis funds which incur in relatively high (low) expenses perform relatively badly (well), contrary to the suggestions of the efficiency principle.

When the *mixed* and *asset* funds are considered separately, we find significant economic and statistic differences. For the *asset* funds, the slope of the performance-expenses estimation is significantly negative, irrespective of the risk-adjusted performance measure considered, as for the whole sample. The cross-sectional relation of fund expenses and the risk-adjusted performance is very close to -1 for the gross measures and to an average of -1.7 for the after-expenses ones. Nevertheless, the group of *mixed* funds seems to conduct in a remarkably contrasting way. Irrespective of the performance measure, fund expenses vary cross-sectionally in the same direction as risk-adjusted performance; better (worse) funds translate into higher (lower) costs to investors. Thus, it seems there be a positive relationship between risk-adjusted returns offered to the investors by *mixed* funds and the costs they have to pay for them. The high values of the slope of this relation is also remarkable, reaching, for instance in the case of the net and gross Carhart four-factor alphas, coefficients of 1.03 and 1.41, respectively. It is also interesting to note that the performance of *mixed* funds is to some extent better estimated (in terms of the explained variance, R square) in the models of Table 3.9 than the *asset* ones.

Regarding the non-risk-adjusted returns, the average coefficient of the cross-section performance-expenses estimation to the *mixed* funds is 5.89 for the net returns, and -1.15 to the *asset* ones. When before-expenses returns are considered (GRET), all the coefficients are

[16] We choose this two-step procedure instead of a pooled regression in order to better capture the performance-expenses relationship. Results from the pool regression are similar and are available upon request.

(obviously) increased by +1, resulting in a non significant relation for the *asset* funds. It should be emphasized that the non-adjusted performance-expenses relationship for the whole sample of Spanish risky funds is very close to zero (+0.08) for the net returns and very close to one (1.08) for the before-expenses returns.

Table 3.9 also allows us to analyse the effects of other fund characteristics, such as size, age and volatility, to explain risk-adjusted returns separately for *mixed* and *asset* funds.[17]

Irrespective of the way the management fees are charged, and contrary to previous findings of related literature, older funds in our sample obtained higher performance than younger ones. Regarding the effect of fund volatility on performance, a positive relationship is reported, although lower for the *mixed* funds than for the *asset* ones. Finally, a robust positive relation is found between performance and total fund assets, but only for the *asset* funds.[18] Concerning *mixed* funds, however, larger funds do not seem to achieve better performance.

4.- ROBUSTNESS ANALYSIS

Several additional analyses have been performed to check the robustness of previous findings regarding the performance-expenses relationship. In this section, we present each of them separately.

Firstly, we use the novel multi-way clustering econometric methodology outlined by Petersen (2009) –in a Finance context- and by Gow *et al.* (2009) –in Accounting- in order to control for cross-sectional and time-series dependence. We use as clusters the investment fund and the date to correct for cross-sectional and time-series dependence simultaneously. We likewise develop a SAS program to estimate three-way cluster-robust standard errors, following the theoretical derivation in Cameron *et al.* (2009). This allows us to simultaneously correct for within-date (time-series) dependence, within-investment funds (cross-sectional) dependence and within-investment style (cross-sectional) dependence. The results clearly show a negative relation between before-fee performance and expenses for *asset* funds but this is not the case for the *mixed* ones. The R-squared values of these pooled time-series cross-sectional (model 7) regressions are lower than those obtained with cross-sectional regressions.[19]

[17] See Ferreira, Freitas and Ramos (2009) and references herein for a recent comprehensive study on this issue.
[18] Otten and Bams (2002) likewise found a significantly positive relationship between the log of fund assets and risk-adjusted performance in the European industry, contrary to the negative size effect reported in the U.S. market.
[19] All results and/or SAS program to estimate three-way cluster-robust standard errors are available upon request.

Second, net and gross no risk-adjusted fund returns (NRET and GRET, respectively) are available from June 1999 to June 2009. We estimate the regressions of model 7 from June 1999 to December 2008 and results remain unaltered.

Third, we also estimated the performance-expenses relationship by the quantile regressions (Koenker and Bassett, 1978). Table 3.10 and Figure 1 show the results for the four-factor Carhart risk-adjusted performance estimates, both with net and gross (α^{N}_{FFM} and α^{G}_{FFM}, respectively), but similar results are found for the alternative performance measures considered. For the sake of concision, only the coefficients for the EXPENSES variable in model 7 are reported. An interesting pattern across the quantiles is found, with the effect of the expenses being non uniform along the quantile regressions. In fact, a monotonic increase in the effect of expenses on performance is reported when we move to higher quantiles of performance. Therefore, fund expenses are charged to investors more in line with performance the more performance the fund obtains. In addition to this (increasing-with-performance) expected pattern in the effect of fund expenses on performance, the most interesting issue in the Table 3.10 is the sign of these effects. Thus, regarding the *asset* funds, the negative global coefficient of expenses on performance displayed in Table 3.9 is shown now to be motivated mainly for the first quantiles. In fact, when gross four-factor Carhart risk-adjusted performance measure is analysed, the coefficients for the higher three quintiles are significant positives; nevertheless, they are smaller in economic significance than the negative ones from the first quantiles. As a consequence, *asset* funds in the best performance ranking charged costs to investors directly related to the performance offered to them. When we look at the after-expenses risk-adjusted performance measures, all the coefficients are significantly negatives, except the last one. On the contrary, *mixed* funds in the (four) worst quintiles of performance charged higher expenses the lower risk-adjusted performance they achieved. Accordingly, these results in Table 3.10 allow us to conclude that the positive performance-expenses relationship reported previously in Table 3.9 for *mixed* funds is exclusive to the funds in the highest quantiles of performance.[20]

5. CONCLUDING REMARKS

The efficiency of Spanish mutual funds which charge management fees total or partially on returns (*mixed* funds) is analysed in detail. Performance-based fees are occasional in the worldwide

[20] Although not reported in the Table, a monotonic increasing (decreasing) pattern is also found in the effects of volatility (age) on performance along the quantile regressions, for *asset* and *mixed* funds. However, the pattern for the fund size effect is increasing for the *asset* funds, but decreasing for the *mixed* ones.

mutual fund industry, even though agency theory literature puts forward this type of compensation for managers in order to best align investors' and managers' interests. Thus, very little academic research is devoted to this type of funds. However, the incentives created by these performance fees to the fund managers may induce a different behaviour in the portfolio management with relevant implications in the fund performance evaluation.

Our main finding regarding performance evaluation is that *mixed* funds perform significantly better than the rest of risky Spanish funds analysed. Moreover, we have found strong cross-section evidence that for *mixed* funds, expenses affect performance positively, once the effect of volatility, age and size is controlled for; whereas this effect is negative for the rest of funds. Although a performance-increasing pattern is found in the performance-expenses relationship for the whole sample, the aggregate differences found between *mixed* and the remainder funds are very appealing from an academic and a practical point of view. As a negative relation is the most common result in the literature of equity mutual funds, our findings identify a particular group of funds, which deserve, in our opinion, additional academic attention. In short, our results seem to point to a greater efficiency of *mixed* funds, according to the Grossman and Stiglitz's efficiency criterion.

The implications of our findings are several. First, aggregate fund performance evaluation studies may hide particularly well-managed funds. So, investors would be grateful for academic research identifying fund characteristics which determine performance. According to our results, the way the management fee is charged to investors seems to be one of them. Second, the incentives that the performance-based fees trigger among fund managers are shown to be strong enough to improve the return-risk profile of the management. Thus, agency theory suggestions seem to be corroborated with our findings. Finally, the limited appliance of the performance-based fees in the mutual fund industry contrasts with the performance evaluation results of the funds using it. Further in-depth academic research seems to be needed in order to clarify the reasons behind this puzzling behaviour.

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TABLE 1. DESCRIPTIVE STATISTICS FOR THE RISK FACTORS

This Table shows the monthly descriptive statistics for the four risk factors considered. MKT is the excess return of the value-weighted market portfolio proxy over the risk-free asset; SMB and HML are the Fama-French factors-mimicking portfolios to capture the effects of size and Book-to-Market, respectively; and WML is the factor-mimicking for one-year return momentum of Carhart (1997).

	Obs	Mean	Std. Dev	Min	Max	Pearson Cross Correlations			
						MKT	**SMB**	**HML**	**WML**
MKT	121	0.21	5.61	-15.24	17.81	1.00			
SMB	121	0.28	3.82	-8.20	11.78	-0.40	1.00		
HML	121	0.13	3.44	-10.97	9.39	0.03	-0.10	1.00	
WML	121	0.69	4.60	-23.83	12.83	-0.24	0.06	-0.26	1.00

TABLE 2. DISTRIBUTION OF THE SPANISH FUND INDUSTRY

Panel A shows the distribution of the Spanish fund industry at year-end from 1999 to 2009 period, grouped according to the type of management fee charged. *Asset* funds charge management fees on the basis exclusively of the total assets under management, and *mixed* funds total or partially on the returns obtained. Funds are classified depending on their investment objectives: equities, EFunds; fixed-income assets, BFunds; global, GFunds, Guaranteed, GUARANT, and others. The number of funds of each type is reported. Panel B reports the relative percentage of assets under management for each type of mutual fund.

Panel A: Number of funds

		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	TOTAL
EFunds	***Asset***	558	722	848	833	716	696	687	700	724	711	585	7,780
	Mixed	68	81	84	87	97	89	106	107	87	58	60	924
	Total	626	803	932	920	813	785	793	807	811	769	645	8,704
BFunds	***Asset***	884	897	849	828	862	833	813	779	774	789	767	9,075
	Mixed	22	31	23	26	28	25	28	39	30	35	35	322
	Total	906	928	872	854	890	858	841	818	804	824	802	9,397
GFunds	***Asset***	43	98	93	100	144	196	229	267	311	335	145	1,961
	Mixed	9	16	21	32	52	90	117	151	159	134	56	837
	Total	52	114	114	132	196	286	346	418	470	469	201	2,798
GUARANT	***Asset***	582	605	637	597	620	664	724	780	837	846	841	7,733
	Mixed	1	1	2	5	4	1	1	2	4	4	21	46
	Total	583	606	639	602	624	665	725	782	841	850	862	7,779
OTHERS	***Asset***	0	0	0	0	0	0	0	0	0	0	165	165
	Mixed	0	0	0	0	0	0	0	0	0	0	60	60
	Total	0	0	0	0	0	0	0	0	0	0	225	225
total	***Asset***	2,067	2,322	2,427	2,358	2,342	2,389	2,453	2,526	2,646	2,681	2,503	26,714
	Mixed	100	129	130	150	181	205	252	299	280	231	232	2,189
	Total	2,167	2,451	2,557	2,508	2,523	2,594	2,705	2,825	2,926	2,912	2,735	28,903

Panel B: Relative percentage of assets

EFunds	***Asset***	19.60	25.01	19.68	14.19	13.16	12.43	13.96	15.02	13.99	7.65	7.03	14.73
	Mixed	1.11	1.46	1.00	0.71	0.78	1.13	1.57	1.76	1.46	0.39	0.48	1.14
	Total	20.71	26.47	20.68	14.90	13.94	13.56	15.53	16.78	15.44	8.04	7.51	15.87
BFunds	***Asset***	55.41	48.55	54.24	61.54	58.79	55.71	52.37	47.48	48.29	54.85	53.76	53.36
	Mixed	0.57	0.61	0.24	0.20	0.28	0.32	0.46	1.27	1.21	1.23	1.35	0.71
	Total	55.99	49.16	54.48	61.74	59.07	56.02	52.83	48.75	49.50	56.07	55.11	54.07
GFunds	***Asset***	0.41	0.84	1.09	0.93	2.59	3.48	4.30	6.51	6.35	4.49	1.36	3.22
	Mixed	0.31	0.37	0.43	0.54	0.91	4.29	4.74	6.04	5.29	1.81	0.60	2.65
	Total	0.73	1.22	1.52	1.46	3.50	7.77	9.03	12.55	11.64	6.30	1.96	5.87
GUARANT	***Asset***	22.58	23.10	23.32	21.83	23.47	22.63	22.59	21.89	23.36	29.43	29.94	23.76
	Mixed	0.01	0.06	0.01	0.08	0.01	0.01	0.02	0.03	0.06	0.15	0.44	0.07
	Total	22.58	23.16	23.33	21.90	23.48	22.64	22.61	21.92	23.41	29.58	30.38	23.83
OTHERS	***Asset***	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.88	0.28
	Mixed	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.15	0.08
	Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.04	0.36
total	***Asset***	98.00	97.51	98.33	98.48	98.01	94.25	93.21	90.91	91.99	96.42	95.97	95.35
	Mixed	2.00	2.49	1.67	1.52	1.99	5.75	6.79	9.09	8.01	3.58	4.03	4.65
	Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

TABLE 3. DESCRIPTIVE STATISTICS

The Table shows the descriptive statistics for the assets under management (ASSETS), volatility (VOLAT), total expense ratio (EXPENSES), years from inscription (AGE), and alternatives measures of performance: net return (NRET), gross return (GRET), and the estimations of the risk-adjusted fund excess returns, (Jensen's alpha), according to the CAPM (α_{CAPM}), the Fama and French (1993) (α_{FF}) and the Carhart (1997) (α_{FFM}) multifactor models, both with net and raw returns. The symbols ***, **, and * denote that the difference between *mixed* funds and *asset* funds is statistically significant at the 1%, 5% and 10% significance levels, respectively.

		Obs	Mean	Std. Dev.	Min	Max
ASSETS***	***Asset***	107,229	45,346.52	10,3791.00	1.00	2,278,357.00
	Mixed	20,028	54,500.47	16,5513.70	1.00	2,975,930.00
	Total	127,257	46,787.19	11,5756.30	1.00	2,975,930.00
VOLAT***	***Asset***	97,754	3.65	2.53	0.00	46.20
	Mixed	18,514	2.94	2.71	0.00	46.19
	Total	116,268	3.54	2.58	0.00	46.20
EXPENSES	***Asset***	98,764	0.15	0.06	0.00	1.48
	Mixed	18,399	0.15	0.09	0.00	1.61
	Total	117,163	0.15	0.07	0.00	1.61
AGE***	***Asset***	107,178	6.24	4.46	0.00	22.64
	Mixed	19,988	4.76	3.93	0.00	22.10
	Total	127,166	6.01	4.41	0.00	22.64
NRET***	***Asset***	106,531	-0.18	4.86	-98.92	102.61
	Mixed	19,837	-0.08	4.41	-96.79	74.83
	Total	126,368	-0.16	4.79	-98.92	102.61
GRET*	***Asset***	98,492	-0.05	4.63	-68.48	92.50
	Mixed	18,314	0.02	4.28	-90.64	74.95
	Total	116,806	-0.04	4.58	-90.64	92.50
α^{N}_{CAPM}*	***Asset***	44,354	-0.19	0.66	-3.20	2.72
	Mixed	6,170	-0.17	0.69	-2.46	3.16
	Total	50,524	-0.19	0.67	-3.20	3.16
α^{G}_{CAPM}***	***Asset***	38,758	-0.02	0.68	-2.98	2.81
	Mixed	5,203	0.03	0.72	-2.14	3.25
	Total	43,961	-0.01	0.69	-2.98	3.25
α^{N}_{FF}***	***Asset***	44,354	-0.38	0.66	-3.48	2.56
	Mixed	6,170	-0.33	0.69	-2.85	3.54
	Total	50,524	-0.37	0.66	-3.48	3.54
α^{G}_{FF}***	***Asset***	38,758	-0.23	0.67	-3.26	2.63
	Mixed	5,203	-0.14	0.73	-2.71	3.62
	Total	43,961	-0.22	0.68	-3.26	3.62
α^{N}_{FFM}***	***Asset***	44,354	-0.15	0.57	-2.90	3.03
	Mixed	6,170	-0.12	0.62	-2.58	3.70
	Total	50,524	-0.15	0.57	-2.90	3.70
α^{G}_{FFM}***	***Asset***	38,758	0.02	0.58	-2.72	3.10
	Mixed	5,203	0.07	0.66	-2.44	3.78
	Total	43,961	0.02	0.59	-2.72	3.78

TABLE 4. RISK EXPOSURES ESTIMATES

This Table reports the results of the estimation of models 1, 2 and 3 in a rolling time series regression:

$$MODEL\ 1:\ R_{pt} - r_{ft} = \alpha_{pCAPM} + \left(R_{mt} - r_{ft}\right)\beta_{mp} + u_{pt}$$

$$MODEL\ 2:\ R_{pt} - r_{ft} = \alpha_{pFF} + \left(R_{mt} - r_{ft}\right)\beta_{mp} + SMB_t\beta_{SMBp} + HML_t\beta_{HMLp} + \varepsilon_{pt}$$

$$MODEL\ 3:\ R_{pt} - r_{ft} = \alpha_{pFFM} + \left(R_{mt} - r_{ft}\right)\beta_{mp} + SMB_t\beta_{SMBp} + HML_t\beta_{HMLp} + WML_t\beta_{WMLp} + \pi_{pt}$$

where R_{pt} is the (net or gross) return on fund p in month t; r_{ft} is the return on the risk-free asset in month t; R_{mt} is the return on the value-weighted market portfolio proxy in t; SMB_t and HML_t are the Fama-French factors-mimicking portfolios to capture the effects of size and Book-to-Market in t, respectively; and WML_t is the factor-mimicking for return momentum in t of Carhart (1997). The cross-sectional average is computed for each coefficient monthly from May 2002 until December 2008; then, the time average of the 80 monthly mean coefficients is reported in the Table. The symbols ***, **, and * denote that the coefficient is statistically significant at the 1%, 5% and 10% significance levels, respectively.

		CONST	MKT	SMB	HML	WML	R^2 (%)
$CAPM^N$	***Asset***	-0.28***	0.08***				7.41
	Mixed	-0.26***	0.07***				6.14
	Total	-0.28***	0.08***				7.24
$CAPM^G$	***Asset***	-0.12***	0.05***				4.41
	Mixed	-0.09	0.04***				3.76
	Total	-0.12***	0.05***				4.31
FF^N	***Asset***	-0.47***	0.16***	0.28***	0.12***		13.82
	Mixed	-0.41***	0.13***	0.24***	0.09***		11.89
	Total	-0.46***	0.15***	0.28***	0.12***		13.57
FF^G	***Asset***	-0.32***	0.13***	0.30***	0.12***		11.13
	Mixed	-0.25***	0.11***	0.25***	0.09***		9.80
	Total	-0.31***	0.13***	0.30***	0.12***		10.95
FFM^N	***Asset***	-0.21***	0.15***	0.27***	0.05***	-0.33***	28.56
	Mixed	-0.17***	0.13***	0.23***	0.03***	-0.31***	25.21
	Total	-0.21***	0.15***	0.27***	0.05***	-0.33***	28.14
FFM^G	***Asset***	-0.05	0.12***	0.29***	0.05***	-0.35***	26.97
	Mixed	0.00	0.10***	0.24***	0.02***	-0.32***	23.92
	Total	-0.05	0.12***	0.28***	0.04***	-0.35***	26.60

TABLE 5. RISK PREMIUMS ESTIMATES

The Table reports the time average of the 80 monthly cross-sectional estimates from May 2002 until December 2008 of the following models:

$$MODEL\ \ 4:\ R_{pt} = \gamma_{0t} + \gamma_{1t}\hat{\beta}_{mpt} + u_{pt}$$

$$MODEL\ \ 5:\ R_{pt} = \gamma_{0t} + \gamma_{1t}\hat{\beta}_{mpt} + \gamma_{2t}\hat{\beta}_{SMBpt} + \gamma_{3t}\hat{\beta}_{HMLpt} + \varepsilon_{pt}$$

$$MODEL\ \ 6:\ R_{pt} = \gamma_{0t} + \gamma_{1t}\hat{\beta}_{mpt} + \gamma_{2t}\hat{\beta}_{SMBpt} + \gamma_{3t}\hat{\beta}_{HMLpt} + \gamma_{4t}\hat{\beta}_{WMLpt} + \pi_{pt}$$

where R_{pt} is the (after or before-expenses) excess return on fund p in month t; the alternative $\hat{\beta}_p$, are the betas estimated from models 1-3 respectively. The symbols ***, **, and * denote that the coefficient is statistically significant at the 1%, 5% and 10% significance levels, respectively.

		***Asset* funds**						***Mixed* funds**					
		γ_0	γ_1	γ_2	γ_3	γ_4	**R^2 (%)**	γ_0	γ_1	γ_2	γ_3	γ_4	**R^2 (%)**
α^N_{CAPM}	***mean***	-0.01	0.11				10.16	-0.03	-0.01				12.86
	t	0.00	0.01					-0.01	0.00				
α^G_{CAPM}	***mean***	0.16	0.16				10.00	0.18	0.53				12.72
	t	0.04	0.01					0.05	0.03				
α^N_{FF}	***mean***	-0.02	0.22	0.40	-0.26		30.67	-0.03	-0.22	0.78	-0.92		32.95
	t	-0.01	0.02	0.06	-0.03			-0.01	-0.01	0.12	-0.10		
α^G_{FF}	***mean***	0.12	0.18	0.52	0.13		31.62	0.11	1.01	0.48	0.13		35.80
	t	0.05	0.01	0.08	0.01			0.04	0.05	0.07	0.01		
α^N_{FFM}	***mean***	0.10	-0.17	0.91	-0.41	0.76	40.51	-0.13	-0.15	0.87	-0.84	-0.02	44.77
	t	0.08	-0.01	0.14	-0.05	0.12		-0.12	-0.01	0.13	-0.09	0.00	
α^G_{FFM}	***mean***	0.22	-0.24	1.05	-0.14	0.64	42.10	-0.07	1.33	0.61	0.02	-0.56	49.28
	t	0.17	-0.02	0.16	-0.02	0.10		-0.05	0.10	0.08	0.00	-0.07	

TABLE 6. CORRELATION BETWEEN VARIABLES

This table shows the Pearson correlation coefficients between the assets under management (ASSETS), volatility (VOLAT), total expense ratio (EXPENSES), years from inscription (AGE), net return (NRET), gross return (GRET), and the net and gross risk-adjusted returns, according to the CAPM, three-factor FF and four-factor Carhart models (α^N_{CAPM}, α^N_{FF} , α^N_{FFM}, α^G_{CAPM}, α^G_{FF} and α^G_{FFM}). Panel A is for the whole sample, and Panel B and C are for the *asset* funds and *mixed* ones, respectively. The symbols ***, **, and * stand for significance levels of 1%, 5% and 10%, respectively.

Panel A: Whole sample

	ASSETS	VOLAT	EXPENSES	AGE	NRET	GRET	α^N_{CAPM}	α^G_{CAPM}	α^N_{FF}	α^G_{FF}	α^N_{FFM}	α^G_{FFM}
ASSETS	1.00											
VOLAT	-0.07***	1.00										
EXPENSES	-0.03***	0.21***	1.00									
AGE	0.15***	0.00	0.11***	1.00								
NRET	0.02***	-0.1***	0.02***	0.03***	1.00							
GRET	0.03***	-0.12***	0.04***	0.03***	1.00***	1.00						
α^N_{CAPM}	0.08***	-0.21***	-0.10***	-0.01**	0.07***	0.07***	1.00					
α^G_{CAPM}	0.09***	-0.2***	-0.04***	-0.01**	0.07***	0.07***	1.00***	1.00				
α^N_{FF}	0.05***	-0.15***	-0.15***	-0.01*	0.02***	0.00	0.96***	0.96***	1.00			
α^G_{FF}	0.07***	-0.15***	-0.09***	-0.01	0.00	0.00	0.96***	0.96***	1.00***	1.00		
α^N_{FFM}	0.10***	-0.07***	-0.10***	0.02***	0.09***	0.08***	0.94***	0.93***	0.93***	0.93***	1.00	
α^G_{FFM}	0.11***	-0.05***	-0.03***	0.03***	0.08***	0.08***	0.93***	0.94***	0.93***	0.93***	1.00***	1.00

Panel B: *Asset* funds

	ASSETS	VOLAT	EXPENSES	AGE	NRET	GRET	α^N_{CAPM}	α^G_{CAPM}	α^N_{FF}	α^G_{FF}	α^N_{FFM}	α^G_{FFM}
ASSETS	1.00											
VOLAT	-0.04***	1.00										
EXPENSES	-0.02***	0.22***	1.00									
AGE	0.21***	-0.03***	0.14***	1.00								
NRET	0.03***	-0.09***	-0.01***	0.03***	1.00							
GRET	0.03***	-0.12***	0.00	0.03***	1.00***	1.00						
α^N_{CAPM}	0.08***	-0.25***	-0.13***	0.00	0.07***	0.07***	1.00					
α^G_{CAPM}	0.09***	-0.26***	-0.07***	0.00	0.07***	0.07***	1.00***	1.00				
α^N_{FF}	0.05***	-0.19***	-0.16***	0.00	0.02***	0.00	0.96***	0.96***	1.00			
α^G_{FF}	0.07***	-0.2***	-0.10***	0.01*	0.00	0.00	0.96***	0.96***	1.00***	1.00		
α^N_{FFM}	0.10***	-0.11***	-0.14***	0.03***	0.09***	0.08***	0.94***	0.93***	0.93***	0.93***	1.00	
α^G_{FFM}	0.11***	-0.1***	-0.06***	0.04***	0.08***	0.08***	0.93***	0.94***	0.93***	0.93***	1.00***	1.00

Panel C: *Mixed* funds

	ASSETS	VOLAT	EXPENSES	AGE	NRET	GRET	α^N_{CAPM}	α^G_{CAPM}	α^N_{FF}	α^G_{FF}	α^N_{FFM}	α^G_{FFM}
ASSETS	1.00											
VOLAT	-0.16***	1.00										
EXPENSES	-0.05***	0.18***	1.00									
AGE	-0.02***	0.08***	0.03***	1.00								
NRET	0.02	-0.11***	0.17***	0.01*	1.00							
GRET	0.02	-0.11***	0.19***	0.01	1.00***	1.00						
α^N_{CAPM}	0.11***	-0.01	0.02	-0.09***	0.08***	0.08***	1.00					
α^G_{CAPM}	0.11***	0.07***	0.06***	-0.10***	0.07***	0.07***	1.00***	1.00				
α^N_{FF}	0.10***	0.03	-0.09***	-0.08***	0.03***	0.02	0.97***	0.96***	1.00			
α^G_{FF}	0.11***	0.11***	-0.06***	-0.09***	0.01	0.01	0.97***	0.97***	1.00***	1.00		
α^N_{FFM}	0.10***	0.15***	0.05***	-0.05***	0.08***	0.08***	0.93***	0.94***	0.93***	0.94***	1.00	
α^G_{FFM}	0.10***	0.21***	0.08***	-0.05***	0.07***	0.07***	0.94***	0.94***	0.93***	0.94***	1.00***	1.00

TABLE 7. MATCHING ESTIMATORS

Panel A in this Table shows the average for the annual alternative measures of performance: net return (NRET), gross return (GRET), and the estimations of the risk-adjusted fund excess returns, (the Jensen alpha), according to the CAPM (α_{CAPM}), the Fama and French (1993) (α_{FF}) and the Carhart (1997) (α_{FFM}) multifactor models, both with net and raw returns, separately for *asset* funds and *mixed* funds. It also reports the means differences test between the two groups of funds. Panel B reports the matching estimator coefficient between *mixed* and matched *asset* funds for the same performance measures, and its t-statistic. In this panel, we use the matching variables individually including size, age, and expenses. In Panel C the matching variables are used simultaneously. The symbols ***, **, and * denote that the difference between *mixed* funds and *asset* funds is statistically significance at the 1%, 5% and 10% significance levels, respectively.

Panel A: Average of the alternative performance measures

	NRET	GRET	α^N_{CAPM}	α^G_{CAPM}	α^N_{FF}	α^G_{FF}	α^N_{FFM}	α^G_{FFM}
Asset	-2.51	-0.90	-0.79	-0.08	-1.70	-0.97	-0.62	0.07
Mixed	-1.51	-0.23	-0.52	0.11	-1.09	-0.45	-0.33	0.24
Total	-2.35	-0.79	-0.75	-0.05	-1.60	-0.89	-0.58	0.10
difference	1.00***	0.67***	0.27**	0.19	0.60***	0.52***	0.29***	0.16
t-statistic	6.22	4.31	2.21	1.59	4.68	4.34	2.81	1.60

Panel B: Matching estimator with matching variables individually

	NRET		GRET		α^N_{CAPM}		α^G_{CAPM}		α^N_{FF}		α^G_{FF}		α^N_{FFM}		α^G_{FFM}	
matching variables	**coef**	**t**	**coef**	**t**	**coef**	**t**	**coef**	**t**	**coef**	**t**	**coef**	**t**	**coef**	**t**	**coef**	**t**
ASSETS	2.88***	4.67	2.54***	4.07	0.15	1.02	0.06	0.41	0.46***	3.08	0.37***	2.67	0.17	1.37	0.04	0.30
AGE	1.98**	2.18	1.70*	1.88	0.37*	1.90	0.26	1.38	0.75***	3.73	0.64***	3.34	0.36**	2.13	0.23	1.35
EXPENSES	3.32***	4.28	3.33***	4.29	0.18	0.92	0.24	1.27	0.38*	1.94	0.44**	2.41	0.22	1.35	0.21	1.28

Panel C: Matching estimator with matching variables simultaneously

	NRET		GRET		α^N_{CAPM}		α^G_{CAPM}		α^N_{FF}		α^G_{FF}		α^N_{FFM}		α^G_{FFM}	
matching variables	**coef**	**t**	**coef**	**t**	**coef**	**t**	**coef**	**t**	**coef**	**t**	**coef**	**t**	**coef**	**t**	**coef**	**t**
ASSETS AGE	2.35***	3.87	2.15***	3.54	0.27*	1.84	0.33**	2.29	0.40***	2.74	0.46***	3.26	0.27**	2.10	0.29**	2.33
ASSETS AGE EXPENSES	3.51***	4.97	3.53***	5.00	0.06	0.33	0.20	1.18	0.10	0.59	0.24	1.41	0.13	0.87	0.23	1.53

TABLE 8. PERFORMANCE MEASURES DISTRIBUTION

The Table shows the distribution of the fund-month performance measure observations in our sample according to its quantity, separately for the two groups considered, *asset* and *mixed* funds, and the t-statistic for the proportion differences test between both groups. Panel A details the percentage over each category of positive values for the net (NRET) and gross returns (GRET), and for the alternatives estimations of risk-adjusted returns (α^N_{CAPM}, α^N_{FF}, α^N_{FFM}, α^G_{CAPM}, α^G_{FF} and α^G_{FFM}). Panels B and C report the percentage over each category of statistically significant positive and negative estimations, respectively. The symbols ***, **, and * denote that the difference in proportions between *mixed* funds and *asset* funds is statistically significant at the 1%, 5% and 10% significance levels, respectively.

Panel A: Proportion of funds with positive values of the performance measures

	NRET	GRET	α^N_{CAPM}	α^G_{CAPM}	α^N_{FF}	α^G_{FF}	α^N_{FFM}	α^G_{FFM}
Asset	53.96	56.27	34.06	48.02	24.59	36.29	32.32	48.13
Mixed	58.04	61.04	32.53	49.97	24.51	39.53	32.98	52.76
difference	-4.08***	-4.77***	1.54**	-1.95***	0.09	-3.24***	-0.66	-4.63***
t	-10.60	-11.98	2.39	-2.64	0.15	-4.56	-1.05	-6.27

Panel B: Proportion of funds with significant positive values of the performance measures

	α^N_{CAPM}	α^G_{CAPM}	α^N_{FF}	α^G_{FF}	α^N_{FFM}	α^G_{FFM}
Asset	4.14	7.82	1.93	4.45	2.89	6.21
Mixed	4.75	10.97	2.71	6.77	3.44	7.88
difference	-0.61**	-3.15***	-0.78***	-2.32***	-0.55**	-1.67***
t	-2.23	-7.78	-4.09	-7.41	-2.39	-4.62

Panel C: Proportion of funds with significant negative values of the performance measures

	α^N_{CAPM}	α^G_{CAPM}	α^N_{FF}	α^G_{FF}	α^N_{FFM}	α^G_{FFM}
Asset	2.71	0.75	6.81	2.90	3.69	1.34
Mixed	4.59	1.63	7.93	4.15	4.73	2.19
difference	-1.87***	-0.89***	-1.12***	-1.25***	-1.04***	-0.85***
t	-8.15	-6.55	-3.24	-4.93	-4.00	-4.83

TABLE 9. FUND PERFORMANCE-EXPENSES RELATIONSHIP

The Table shows the time average of the cross-section performance-expenses relationship estimates for each of the 80 months from May 2002 until December 2008:

$$PERFORMANCE_{pt} = \lambda_0 + \lambda_1 EXPENSES_{pt} + \Gamma CV_{pt} + \upsilon_{pt}$$

where $PERFORMANCE_{pt}$ are the alternatives measures of performance: net return (NRET), gross return (GRET), and the estimations of the risk-adjusted returns, according to the CAPM (α_{CAPM}), the FF (α_{FF}) and the Carhart (α_{FFM}) multifactor models, both with net and raw returns; $EXPENSES_{pt}$ is the total expenses over assets; and CV_{pt} is a set of control variables which includes age (AGE), volatility (VOLAT), and the neperian logarithm of assets under management in thousands of Euros (lnASSETS), with Γ being the 3x1 vector of parameters. Finally, υ_{pt} is the error term. Results for *asset* funds and *mixed* funds are reported separately. The symbols ***, **, and * denote that the coefficient is statistically significant at the 1%, 5% and 10% significance levels, respectively.

		TOTAL		***Asset* funds**		***Mixed* funds**	
		Coef.	**t**	**Coef.**	**t**	**Coef.**	**t**
NRET	**Intercept**	-0.16	-1.27	-0.08	-0.58	-0.75***	-4.61
	EXPENSES	0.08	0.24	-1.15***	-3.54	5.89***	6.35
	VOLAT	0.01	0.09	0.04	0.40	-0.13	-1.38
	AGE	0.01**	2.22	0.01***	2.72	0.00	0.27
	lnASSETS	0.02	1.62	0.02*	1.68	0.02	1.38
	R^2 (%)	24.93		25.01		34.54	
GRET	**Intercept**	-0.16	-1.27	-0.08	-0.58	-0.75***	-4.61
	EXPENSES	1.08***	3.10	-0.15	-0.48	6.89***	7.43
	VOLAT	0.01	0.09	0.04	0.40	-0.13	-1.38
	AGE	0.01**	2.22	0.01***	2.72	0.00	0.27
	lnASSETS	0.02	1.62	0.02**	1.68	0.02	1.38
	R^2 (%)	25.15		25.05		35.46	
α^N_{CAPM}	**Intercept**	-0.38***	-26.11	-0.37***	-24.87	-0.53***	-7.05
	EXPENSES	-0.91***	-13.31	-1.67***	-21.56	1.51***	6.37
	VOLAT	0.03**	2.15	0.05***	2.97	0.00	-0.35
	AGE	0.01***	7.91	0.01***	8.43	0.00***	2.11
	lnASSETS	0.02***	9.91	0.02***	11.77	0.00	0.12
	R^2 (%)	18.21		22.64		28.83	
α^G_{CAPM}	**Intercept**	-0.35***	-22.55	-0.36***	-24.55	-0.58***	-6.45
	EXPENSES	-0.26***	-3.68	-0.87***	-11.06	1.92***	8.93
	VOLAT	0.03**	2.22	0.05***	3.03	0.00	-0.23
	AGE	0.01***	9.65	0.01***	9.42	0.00***	3.06
	lnASSETS	0.02***	9.32	0.02***	11.78	0.01*	1.78
	R^2 (%)	18.15		21.29		33.10	
α^N_{FF}	**Intercept**	-0.38***	-26.30	-0.37***	-22.36	-0.49***	-6.74
	EXPENSES	-1.07***	-15.96	-1.80***	-20.56	1.06***	4.72
	VOLAT	-0.01	-0.46	0.01	0.48	-0.02*	-1.90
	AGE	0.01***	8.07	0.01***	8.32	0.00***	2.26
	lnASSETS	0.01***	4.47	0.02***	6.92	-0.01	-1.10
	R^2 (%)	17.89		21.79		25.91	
α^G_{FF}	**Intercept**	-0.34***	-22.81	-0.35***	-21.63	-0.53***	-5.99
	EXPENSES	-0.43***	-6.23	-1.01***	-11.24	1.43***	7.00
	VOLAT	0.00	-0.35	0.01	0.59	-0.02	-1.61

	AGE	0.01***	9.94	0.01***	9.29	0.00***	3.18
	lnASSETS	0.01***	4.07	0.02***	6.40	0.01	0.69
	R^2 (%)	17.44		20.05		29.45	
α^{N}_{FFM}	**Intercept**	-0.34***	-24.37	-0.33***	-17.52	-0.43***	-6.20
	EXPENSES	-1.03***	-15.76	-1.76***	-23.28	1.03***	3.55
	VOLAT	0.04***	3.81	0.06***	4.11	0.02**	2.06
	AGE	0.01***	11.05	0.01***	10.90	0.01***	4.62
	lnASSETS	0.01***	6.66	0.02***	8.70	-0.01	-1.63
	R^2 (%)	12.94		16.77		26.04	
α^{G}_{FFM}	**Intercept**	-0.30***	-24.24	-0.31***	-18.31	-0.50***	-5.91
	EXPENSES	-0.39***	-5.88	-0.97***	-12.80	1.41***	5.51
	VOLAT	0.04***	3.90	0.06***	4.20	0.02***	2.07
	AGE	0.01***	13.50	0.01***	12.30	0.01***	5.22
	lnASSETS	0.01***	6.37	0.02***	8.39	0.01	0.90
	R^2 (%)	12.75		15.02		30.74	

TABLE 10. FUND PERFORMANCE-EXPENSES RELATIONSHIP QUANTILE REGRESSION

The Table shows the results from the quantile regression of the model 7:

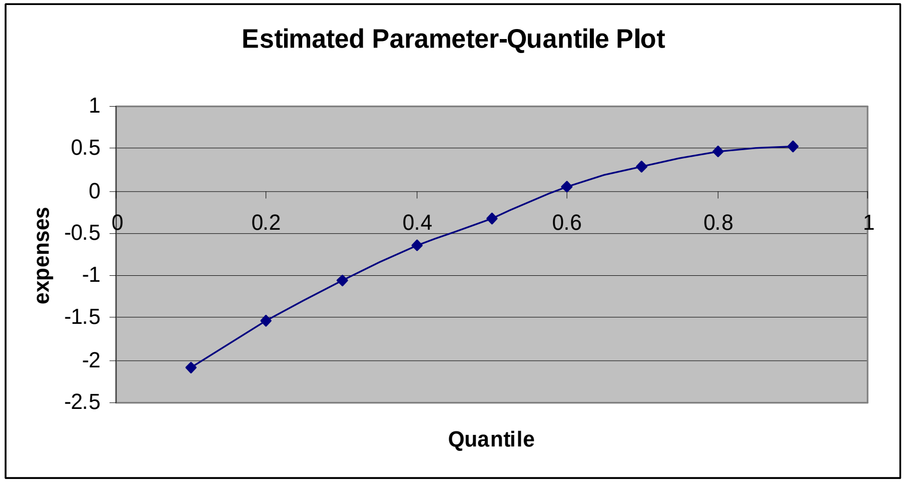
$$PERFORMANCE_{pt} = \lambda_0 + \lambda_1 EXPENSES_{pt} + \Gamma CV_{pt} + \upsilon_{pt}$$

where $PERFORMANCE_{pt}$ are the risk-adjusted performance measures according to the Carhart (α_{FFM}) multifactor model, both with net and raw returns; $EXPENSES_{pt}$ is the total expenses over assets; and CV_{pt} is a set of control variables which includes age (AGE), volatility (VOLAT), and the neperian logarithm of assets under management in thousands of Euros (lnASSETS), with Γ being the 3x1 vector of parameters. Finally, υ_{pt} is the error term. Only results for the coefficient of EXPENSES (and the Objective function and Predicted Value at Mean) are shown, separately for *asset* funds and *mixed* funds. The symbols ***, **, and * denote that the coefficient is statistically significant at the 1%, 5% and 10% significance levels, respectively.

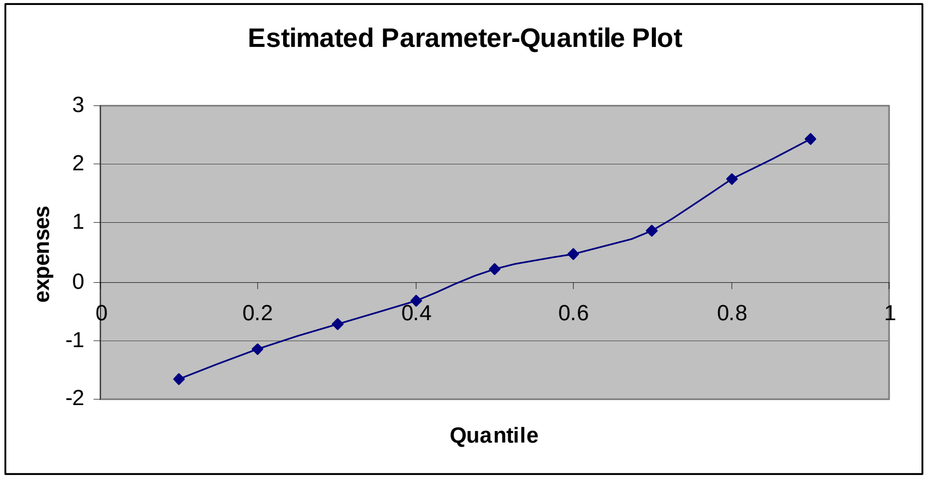
		***Asset* funds**				***Mixed* funds**			
	Quantile	**objective function**	**predicted Value at Mean**	**expenses estimate**	**t**	**objective function**	**predicted Value at Mean**	**expenses estimate**	**t**
α^{N}_{FFM}	**0.1**	3,677.15	-0.79	-2.93***	-33.35	540.38	-0.83	-1.82***	-13.19
	0.2	5,777.69	-0.57	-2.44***	-43.26	866.49	-0.59	-1.27***	-7.99
	0.3	7,206.70	-0.43	-1.97***	-35.84	1,072.77	-0.40	-0.98***	-6.94
	0.4	8,092.71	-0.30	-1.52***	-32.54	1,188.90	-0.25	-0.58***	-5.12
	0.5	8,513.97	-0.19	-1.18***	-23.65	1,229.62	-0.12	-0.07	-0.56
	0.6	8,474.23	-0.06	-0.85***	-15.11	1,200.56	0.00	0.28***	2.60
	0.7	7,894.43	0.08	-0.47***	-6.96	1,106.55	0.13	0.60***	4.88
	0.8	6,649.18	0.28	-0.35***	-4.09	926.39	0.33	0.98***	5.14
	0.9	4,341.82	0.63	-0.15	-1.35	610.24	0.64	1.93***	7.63
α^{G}_{FFM}	**0.1**	3,604.86	-0.63	-2.08***	-23.16	518.84	-0.67	-1.66***	-12.00
	0.2	5,662.90	-0.42	-1.52***	-27.53	839.87	-0.43	-1.14***	-6.54
	0.3	7,067.13	-0.27	-1.06***	-19.31	1,044.06	-0.23	-0.72***	-4.61
	0.4	7,938.92	-0.15	-0.64***	-12.94	1,158.91	-0.08	-0.33***	-2.42
	0.5	8,356.43	-0.03	-0.32***	-5.98	1,201.53	0.05	0.21*	1.73
	0.6	8,311.73	0.09	0.05	0.89	1,178.14	0.18	0.46***	3.67
	0.7	7,743.01	0.24	0.29***	4.24	1,084.87	0.33	0.88***	6.34
	0.8	6,520.72	0.44	0.46***	5.46	902.38	0.53	1.75***	9.44
	0.9	4,258.08	0.79	0.52***	4.57	591.48	0.84	2.44***	9.54

FIGURE 1. QUANTILE REGRESSION. EXPENSES COEFFICIENT AND PERFORMANCE QUANTILE

Panel A: α^{N}_{FFM}

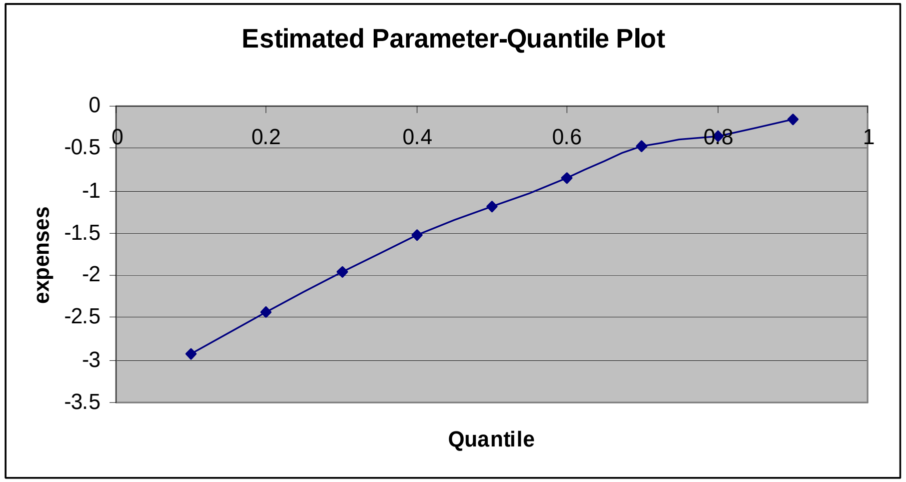


Asset funds

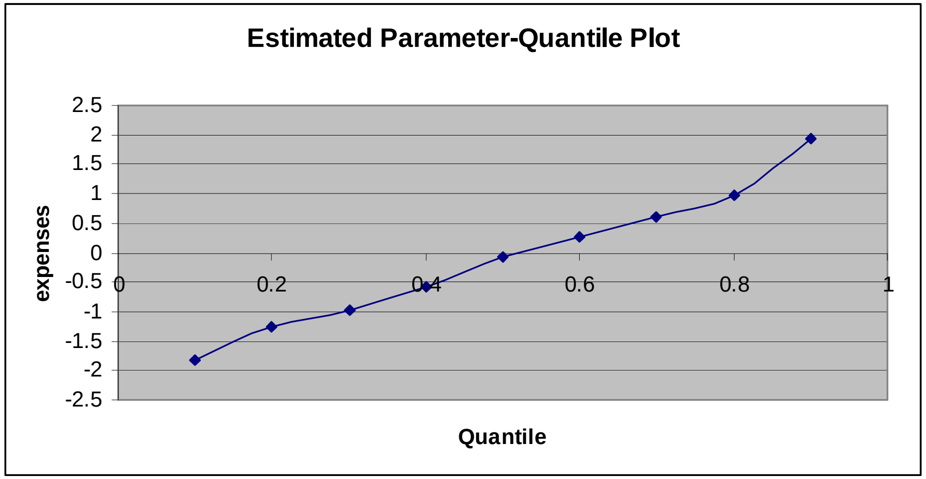


Mixed funds

Panel B: α^{G}_{FFM}



Asset funds



Mixed funds