



PERFORMANCE AND CHARACTERISTICS OF MUTUAL FUNDS: EVIDENCE FROM THE PORTUGUESE MARKET

DESEMPENHO E CARACTERÍSTICAS DOS FUNDOS DE INVESTIMENTO: EVIDÊNCIAS DO MERCADO PORTUGUÊS

DESEMPEÑO Y CARACTERÍSTICAS DE LOS FONDOS DE INVERSIÓN: EVIDENCIAS DEL MERCADO PORTUGUES

DOI: <http://dx.doi.org/10.18028/2238-5320/rgfc.v5n4p125-148>

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ABSTRACT

In this paper we aim to study the relation between fund performance and fund attributes in the Portuguese market. The sample includes 124 equity funds, bond funds and money market funds that traded in the 2004-2011 period. A comprehensive set of fund-specific characteristics, never used before in conjunction in the literature, was considered. The methodology which was adopted had two distinct phases. Firstly, we compared the returns of each category of funds with the appropriate reference markets. Secondly, the fund performance, measured by the Jensen's alpha, was used in a multi-factor model with panel data in which the independent variables were the fund attributes. The results show that Portuguese funds were, in general, not able to beat the benchmarks which is consistent with the existence of efficient financial markets. Only the fixed income mutual funds performed well. Moreover, it is possible to conclude that, for each category of mutual funds, their characteristics are useful to the investor in the moment of choosing the best funds. For example, in the case of funds that invest in Portuguese stocks, the best performance occurs among older and larger funds, funds with higher costs, funds with good past performance and funds whose trading activity is low.

Keywords: mutual funds. fund characteristics. panel data. risk-adjusted performance. Portugal.

RESUMO

Este artigo tem como objetivo o estudo da relação entre o desempenho dos fundos de investimento a atuar em Portugal e as suas características. A amostra inclui 124 fundos de ações, de obrigações e de tesouraria e mercado monetário que operaram no período 2004-2011. Nas características dos fundos consideraram-se um grupo alargado de fatores nunca

Recebido em 17.06.2015. Revisado por pares em 22.06.2015. Reformulações em 29.06.2015 e 13.07.2015. Recomendado para publicação em 01.08.2015. Publicado em 14.12.2015



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antes utilizados em conjunto na literatura. A metodologia desenvolveu-se em duas fases. Em primeiro lugar, compararam-se as rendibilidades de cada categoria de fundos com os mercados de referência adequados. Em segundo lugar, o desempenho dos fundos, medido pelo alfa de Jensen, foi utilizado num modelo multifatorial com dados em painel em que as variáveis independentes são as características dos fundos. Os resultados mostram que os fundos, em geral, tiveram dificuldade em superar os mercados de referência o que é consistente com a existência de mercados financeiros eficientes. Apenas os fundos na categoria de obrigações europeias com taxa fixa apresentaram um bom desempenho. Conclui-se ainda que, para cada categoria de fundos, as suas características são úteis para o investidor no momento da escolha dos melhores fundos de investimento. Por exemplo, o melhor desempenho dos fundos que investem em ações Portuguesas ocorre entre os fundos mais antigos e de maior dimensão, com custos mais elevados, com um histórico de rendibilidades elevadas e que transacionam menos.

Palavras-chave: fundos de investimento. características dos fundos. dados em painel. desempenho ajustado ao risco. Portugal.

RESUMÉN

Este artículo tiene como objetivo estudiar la relación entre el comportamiento de los fondos de inversión que operan en Portugal y sus características. La muestra incluye 124 fondos de acciones, de bonos y de dinero que operaban en el período 2004-2011. Como características de los fondos se consideraron una amplia gama de factores nunca antes usados conjuntamente en la literatura. La metodología tuvo dos fases. En primer lugar, se compararon los rendimientos de cada categoría de fondos con los mercados de referencia apropiados. En segundo lugar, el desempeño de los fondos, medido por el alfa de Jensen, fue utilizado en un modelo multifactorial con datos de panel en el que las variables independientes son las características de los fondos. Los resultados muestran que los fondos en general, tuvieron dificultades para superar los mercados de referencia lo que es consistente con la existencia de mercados financieros eficientes. Sólo los fondos en la categoría de los bonos europeos de tasa fija tuvieron un buen desempeño. Si concluye además que, para cada categoría de fondos, sus características son útiles para el inversor en la elección de los mejores fondos de inversión. Por ejemplo, los mejores desempeños en los fondos que invierten en acciones portuguesas se producen entre los fondos de más edad y más grandes, con mayores costos, con un historial de altos rendimientos y que llevan a cabo menos transacciones.

Palabras clave: fondos de inversión. características de los fondos. datos de panel. desempeño ajustado al riesgo. Portugal.

1. INTRODUCTION

Mutual funds are one of the most successful financial innovations of the 20th century and are currently one of the most important vehicles of investment of savings worldwide. In fact, a significant portion of the investments in the capital markets is no longer made by individual investors, but by professional portfolio managers. The development of the fund industry was particularly impressive over the last three decades which is reflected in the strong growth in both the number of funds and in the value of assets under management

(FRENCH, 2008). In 2011, the amount invested in mutual funds around the world amounted to 23.8 trillion dollars (INVESTMENT COMPANY INSTITUTE, 2012).

Despite the importance of this investment vehicle and the voluminous literature on the subject, there is still no consensus in the academy neither about the ability of portfolio managers to achieve abnormal returns nor about the fund characteristics which may explain their performance.

The empirical evidence regarding the mutual funds characteristics (e.g., mutual fund age, size, level of risk, etc.) that may influence their performance is to a large extent, mixed. For each one of the main characteristics of the mutual funds there are studies that conclude that the effect on performance is positive, negative or nonexistent (see table A1 in annex).

Identifying the factors that explain the performance of mutual funds is of great interest to investors as they may guide them in selecting the best investment alternatives. This information is all the more precious as it is known that some of the characteristics of the mutual funds that can have a material impact on its performance, as its risk-taking policies for example, are not directly observable by investors.

This paper aims to address two main issues. First, what is the assessment on the performance of the Portuguese mutual funds¹ (equity funds, bond funds and money market funds)? And, secondly, what is the relationship between the mutual funds main characteristics and their performance? In order to answer to these questions we will analyze the mutual funds that were traded in Portugal between 2004 and 2011. The characteristics considered were the costs of mutual funds and commissions charged, size, age, net flows, historical performance, level of risk and, finally, portfolio turnover.

The relevance of this study in a mutual fund market such as the Portuguese market is clearly strengthened by recent empirical evidence that suggests that the performance of mutual funds depends on the national economies in which the funds operate. This means that the results obtained for instance in samples from the US and UK cannot be directly extrapolated to other countries (FERREIRA *et al.*, 2012). Therefore, the fact that the number of studies which address mutual funds operating in economies other than the USA and the UK is still quite limited constitutes an additional motivation for the present study. The results obtained in our study can thus be regarded as an out-of-sample evidence.²

This article contains several contributions that are worth-mentioning. Firstly, as far as we know, the study of the relationship between the performance of the mutual funds (in its various categories) and their characteristics is the first held specifically for the Portuguese

market. In the article by Ferreira *et al.* (2012), the authors analyzed this relationship for the Portuguese mutual funds, in a study with a sample that included 27 other countries. Despite the outstanding contribution that this study represents the results were not presented in a country-by-country basis but in two distinct groups (US mutual funds and mutual funds located outside the US), so it is not possible to draw specific conclusions for the Portuguese mutual fund industry. In addition, the study by Ferreira *et al.* (2012) considered only equity mutual funds therefore excluding bond funds and money market funds. These last two categories of mutual funds will be studied in the present article.

Secondly, our analysis addresses the methodological problems that put into question the results obtained in a significant number of previous empirical studies. According to Prather, Bertin and Henker (2004), the survivorship bias and the choice of the reference markets which are best suited for the assessment of mutual funds' performance are the two key factors in the study of this topic. Accordingly, the sample of our study was selected so as not to suffer from the survivorship bias and the selection of the benchmark market for each category of funds was carried out to reflect in an adequate way the investment opportunities faced by the portfolio managers in each one of those mutual fund categories. This procedure thus makes possible to achieve more robust results about the performance of the mutual funds and about those characteristics that affect that performance.

Thirdly, it should be noted that in order to identify the features of the mutual funds that had an impact on their performance, we recurred to a comprehensive set of characteristics which were, to the best of our knowledge, not considered together in any of the previous studies.

This article is organized into four sections. The following section describes our sample of funds and the selected reference markets. In section 3 we present the results of the empirical study. Section 4 concludes the article.

2. SAMPLE

2.1. Portuguese Mutual Funds

The sample of this study is comprised of 124 Portuguese mutual funds that operated in the 96 months between January 2004 and December 2011, for a total of 7732 observations mutual fund/month. The sample includes the 94 mutual funds in business at 31 December 2011 and also the 30 mutual funds that did not survive for the entire sample period. The consideration of the mutual funds that did not survive throughout the entire sample period eliminates the survivorship bias.

The sample of 124 mutual funds includes funds classified by the Portuguese Securities Market Commission (CMVM) as belonging to one of the following categories: i) equity funds, ii) bond funds, iii) treasury funds or iv) money market funds. Based on this classification, on the classification proposed by the Portuguese Association of Mutual Funds and Pensions Funds (APFIPP), on the analysis of the mutual funds' prospects and on the composition of their portfolios, it was made a breakdown of the initial sample into seven distinct sub-samples, each of which representing one of the categories of funds to be studied.

Thus the 52 equity funds have been broken down into different four categories: 4 US equity funds, 22 EU, Switzerland and Norway equity funds, 18 international equity funds and 8 Portuguese equity funds. The 46 bond funds were broken down into two categories: 24 euro variable-income funds and 22 euro fixed-income funds. Finally, the category of euro money market funds comprises the 26 different funds classified by the APFIPP as either treasury funds or money market funds. The so called treasury funds and money market funds were grouped in the same category due to the high similarity between them in terms of investment policy, levels of risk and liquidity.

In the computation of the funds logarithmic returns we used the daily prices of each mutual fund which were available on the CMVM site. Those prices are net of taxes and costs (management fees, deposit fees and audit and supervision costs) but are not net of subscription fees, redemption fees and transfer fees. Since 11 of the funds of the sample do not capitalize their capital gains, the information regarding the distributed dividends was collected for those funds. This information was obtained from the annual reports published by the management firms and it was assumed that dividends were reinvested.

2.2. Characteristics of Funds

It was obtained information about the characteristics of the mutual funds included in the sample. The eight characteristics considered were: fees, costs, size, net flows, historical performance, age, level of risk and portfolio turnover. The data was obtained from the CMVM databases.

The fees represent the sum of the subscription fees, the redemption fees and the transfer fees that are charged by each mutual fund to investors in a given year. These fees were set as a percentage of the price of the respective mutual fund.³

The costs are given by the overall rate of fund costs, which represents the total of management fees, deposit fees and audit and supervision fees incurred by the fund in a given

year. The costs are expressed as a percentage of the average net asset value (NAV)⁴ of the fund in a given year.

The size of the fund consists of the total assets under management and is represented by its NAV on the last day of each month.

The monthly net flows were computed as the change in NAV, assuming the reinvestment of both capital gains and dividends. For the vast majority of the funds which capitalize their gains, the change in the NAV was calculated at the end of each month. For the funds that paid dividends, the NAV was previously adjusted to include the reinvestment of that income.⁵

The historical performance of each fund is computed for each month as the average of its risk-adjusted return - represented by the Jensen's alpha (JENSEN, 1968) – in the previous 12 months. The formula that was followed in the computation of the risk-adjusted returns will be presented in the next section of the article.

The age of each fund was computed on a monthly basis as the number of years since its inception.

The risk level of each fund is proxied by its risk class. The risk classification of Portuguese mutual funds is represented on a scale from 1 to 7, in which 1 represents the lowest risk and 7 stands for the highest level of risk. The risk classes of each fund are published annually by the funds themselves and are based on the annualized standard deviation of their historical returns.⁶

Finally, the portfolio turnover is given by the value of purchases and sales of each fund in a given year. As it happens with the costs, the average portfolio turnover is expressed as a percentage of the average NAV in a given year.

The fees, the costs, the average portfolio turnover and the level of risk of each fund are yearly data which were collected from the prospectus of the funds.

Table 1, below, presents some descriptive statistics of the seven categories of funds under study.

Table 1 – Individual Fund Characteristics

Table 1 shows the characteristics of the sample of mutual funds in each category for the period 2004-2011. N refers to the number of mutual funds in each category. In the table are presented the averages and medians (in parentheses) of the various characteristics by category of funds. The values of the fees are a percentage of the value of the stock of the respective fund. The values of costs and portfolio turnover are presented as a percentage of NAV. The fund size is expressed in millions of euros. Net flows are expressed in change of millions of euros. The funds age is expressed in years, since the inception of the funds. The values for the risk level refer to a scale of 1 to 7 where 1 is the lowest risk and 7 is the class with the highest risk.

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Mutual Fund Category	N	Fees	Costs	Size	Net Flows	Age	Risk	Portfolio Turnover
US Equity Funds	4	0,91 (1,00)	2,21 (2,28)	24,68 (21,27)	-0,01 (0,02)	9,79 (9,58)	4,81 (5,00)	371 (205)
EU, Switzerland and Norway Equity Funds	22	1,07 (1,00)	1,76 (2,02)	33,44 (13,37)	-0,09 (0,00)	10,46 (10,04)	4,93 (5,00)	247 (192)
International Equity Funds	18	1,20 (1,00)	2,09 (2,29)	30,03 (19,09)	-0,21 (0,06)	8,94 (8,33)	4,87 (5,00)	233 (197)
Portuguese Equity Funds	8	1,00 (1,00)	1,90 (2,03)	53,02 (30,73)	-0,16 (-0,01)	11,85 (11,75)	4,86 (5,00)	360 (304)
Euro Variable-income Funds	24	0,49 (0,50)	0,86 (0,80)	212,40 (54,52)	-2,43 (-0,50)	10,11 (10,50)	1,55 (1,00)	154 (102)
Euro Fixed-income Funds	22	0,53 (0,50)	1,06 (1,05)	25,12 (18,96)	-0,34 (-0,07)	9,49 (10,17)	2,19 (2,00)	424 (314)
Euro Money Market Funds	26	0,01 (0,00)	0,70 (0,67)	273,67 (134,15)	-2,43 (-1,24)	10,57 (10,75)	1,11 (1,00)	249 (181)

The data highlight some salient differences between the categories of mutual funds. Equity funds tend to have higher fees and costs than funds that invest mainly in bonds. Money market funds, given their lower returns, tend to have lower fees and lower costs. Money market funds and euro variable-income funds are the largest in the selected sample. The average age of the funds is not very different in the various categories: it varies between 9 and 12 years. The ranking according to the indicators of risk goes as expected. The euro fixed-income funds, the US equity funds and the Portuguese equity funds have the highest average values in portfolio turnover. However, from the comparison between the averages and the medians can be inferred that, in the case of US equity funds, the result stems from the very high values in portfolio turnover of a limited number of funds that have presented a more active investment strategy.

2.3. Benchmarks

In assessing the performance of the funds, the objective is to compare the returns of each mutual fund with the returns of the appropriate benchmark. The particular care in the selection of the relevant benchmarks is justified by the fact that the sample includes funds that follow a wide range of investment policies, with different risk/return combinations and with different investment horizons and liquidity levels. Thus, for each one of the seven categories of mutual funds we computed the logarithmic returns of a benchmark that reflects the investment opportunities available to the portfolio managers that operate in that particular market segment.

In the case of the US equity mutual funds the selected benchmark was the Standard & Poor's 500 index. For the EU, Switzerland and Norway equity funds and for the international equity

funds we used as benchmarks two Morgan Stanley indices: the MSCI Europe and the MSCI World, respectively. In the case of the Portuguese equity funds we resorted to the Portuguese Stock Index 20. In order to capture the evolution of the bond market we used two indices: the Barclays Eur FRN Corporates index and the Barclays Euro Aggregate Bond Index for the euro variable-income funds and for the euro fixed-income funds, respectively. The Citigroup CGBI WMMI Euro 3-Month Euro Deposit Index was chosen as representative of the investment opportunities in the case of the money market funds of our sample.

As a proxy of the risk-free rate, necessary to compute the mutual fund excess returns, it was considered the annualized return of the 1-month Euro Interbank Offered Rate (Euribor).

3. EMPIRICAL RESULTS

In this section we present the results regarding the performance assessment of the mutual funds operating in Portugal in the period 2004-2011 as well as the determinants of their performance.

3.1. Performance of Mutual Funds

In the empirical study about the performance of the mutual funds included in the sample, we computed the annual returns of the 124 mutual funds and of the seven benchmarks. The excess returns were obtained by subtracting the risk-free rate from those returns. On the basis of these excess returns – mutual funds excess returns and benchmarks excess returns -, and using for each fund the appropriate benchmark, we estimated the Jensen's alpha for each fund of the sample.

The Jensen's alpha allows one to break the funds' returns into two components: one component of systematic return (because it can be replicated by investing in the benchmark) and one component of non-systematic return that can be attributable to factors that are particular of each fund. A positive (negative) alpha is consistent with a performance better (worse) than expected in the sense that it means that the fund exhibited an abnormal return considering the accepted risk. On the basis of funds alphas it was computed the average alpha for each category of mutual funds.

The results are shown in table 2, below. In the estimation of the regression it was used the method of least squares (OLS – *Ordinary Least Squares*). Since the violation of the assumptions underlying the linear regression models – namely the assumption of homoscedasticity and the absence of autocorrelated residuals – implies that the estimators

obtained through OLS are no longer efficient, thus invalidating the statistical inference, we used the Newey and West (1987) procedure in order to correct the problems of heteroskedacity and autocorrelation.

Table 2 – Jensen’s alpha in each category of mutual funds

Table 2 shows the estimates of the Jensen’s alphas in each category of mutual funds. The Jensen’s alphas were obtained by estimating the linear regression $R_{p,t} = \alpha_p + \beta_p R_{m,t} + \varepsilon_{p,t}$, where $R_{p,t}$ is the excess return of mutual funds p in year t , $R_{m,t}$ is the excess return of the market portfolio m in year t and where α_p stands for the Jensen’s alpha of the mutual fund p . The sample period includes the years 2004 to 2011. The alphas presented in the table are the average and the median (in parentheses) values obtained for the N mutual funds in each category. Also shown in the table is the number of mutual funds and the percentage of mutual funds (rounded to the nearest unit) in each category that exhibited positive Jensen’s alphas ($\alpha > 0$) and negative Jensen’s alphas ($\alpha < 0$) as well as the number of mutual funds and the percentage of mutual funds (rounded to the nearest unit) in each category that exhibited significant positive Jensen’s alphas ($\alpha > 0^*$) and negative Jensen’s alphas ($\alpha < 0^*$), in this case both for a 10 percent level of significance. The estimation errors were adjusted following the procedure suggested by Newey and West (1987).

Mutual Fund Category	Jensen’s alpha	alpha > 0		alpha > 0*		alpha < 0		alpha < 0*	
		N	%	N	%	N	%	N	%
US Equity Funds	-0,08 (-0,26)	2	50%	0	0%	2	50%	0	0%
EU, Switzerland and Norway Equity Funds	-2,66 (-0,87)	7	33%	2	9%	14	67%	1	5%
International Equity Funds	0,77 (-1,33)	7	38%	1	6%	10	56%	0	0%
Portuguese Equity Funds	-2,37 (-2,26)	0	0%	0	0%	8	100%	0	0%
Euro Variable-income Funds	0,36 (-0,05)	11	46%	5	21%	12	50%	4	17%
Euro Fixed-income Funds	2,46 (2,01)	16	73%	9	41%	2	9%	0	0%
Euro Money Market Funds	-0,93 (-0,96)	3	12%	0	0%	20	77%	11	42%
Full sample	-0,27 (-0,62)	46	37%	17	14%	68	55%	16	13%

From the data in table 2 it is possible to conclude that, of the seven categories of funds under study, three have had positive values in the Jensen’s alpha – the international equity funds, the euro variable-income funds and the euro-fixed-income funds – while the remaining four categories have exhibited non-positive Jensen’s alphas. The euro fixed-income funds have produced the highest average alpha (2.46%) and the EU, Switzerland and Norway equity funds and the Portuguese equity funds have had the lowest average alphas (-2.66% and 2.37%, respectively).

An analysis of the number and proportion of funds with positive and negative alphas in each category provides a more detailed understanding of the results. So it is possible to verify that none of the US equity funds had alphas statistically different from zero.

The performance of the EU, Switzerland and Norway equity funds was clearly below the market (average alpha of -2.66%). However, the average result on the return of these funds is hampered by the fact that the returns of the funds with negative performance differ more from the market returns than the returns of the funds with positive performance.

The international equity funds constitute the only category to have a performance that is on average superior to the market (alpha of 0.77%). But here too the return distribution is asymmetrical. In this case, the comparison between the average alpha and median alpha shows that the returns of funds with positive performance deviate more from the market return than the returns of the funds with negative performance. In spite of this, only one of the funds in this category has shown a statistically significant positive alpha.

The returns shown by the funds that hold Portuguese stocks highlight the difficulty in overperforming the market. In fact, all funds in this category have obtained negative alphas.

The negative alphas found in the case of the mutual equity funds indicates that these funds were not able to exploit the anomalies that have been found in those markets such as the momentum effect detected for example by Chui, Titman and Wei (2010) and by Lobão and Lopes (2014) on international stock markets and on the Portuguese stock market, respectively.

When it comes to both the euro variable-income mutual funds and to the euro fixed-income funds, the picture is different. The average alpha is positive for both types of mutual funds.

The euro fixed-income mutual funds are, from all the funds included in the study, the ones that have shown a higher positive return (average alpha of 2.46%). This result reflects the existence of a high percentage of funds (73%) that were able to beat the market. Moreover, more than 40% of the funds in this category have shown statistically significant positive returns. Of a total of 22 funds in this category, only two have had a negative alpha.

The euro variable-income funds have had a much lower average alpha (0.36%) as a result of the asymmetric distribution of the funds' returns around the market return. In fact, when one considers the median return, the value is negative, albeit marginally (-0.05%).

Finally, an analysis of the money market mutual funds shows that these funds have underperformed the relevant market over the sample period (average alpha of -0.93%). Of the total of 26 funds in this category, only 3 have had a positive alpha, although in any case the values were statistically significant at conventional levels of significance.

Overall, the results show that the funds based in Portugal had difficulty in overperforming the market in the period from 2004 to 2011. Both the average alpha (-0.27%) and the median alpha (-0.62%) were negative for the whole sample. Nevertheless, 17 funds (about 14% of the total) have had a significantly positive abnormal return which compares with a slightly lower percentage of funds (13%) whose performance was significantly negative. In the analysis by category of mutual funds, it is worth highlighting the funds in the category of euro fixed-income because of its ability to overperform the respective benchmark.

3.2. Fund Performance and fund characteristics

In order to test for the existence of a relationship between the fund characteristics and the fund performance, it was built a multifactorial panel data model. This model considers the variables that in theory could explain the funds' excess returns: the fees charged by the funds, the costs incurred by the funds, their size, the net flows of funds, its historical performance, the age of the funds, their risk level classification and, finally, its average portfolio turnover. The adopted model is as follows:

$$\alpha_{i,t} = \beta_0 + \beta_1 FEES_{i,t} + \beta_2 COST_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 FLU_{i,t} + \beta_5 HIS_{i,t} + \beta_6 AGE_{i,t} + \\ + \beta_7 RIS_{i,t} + \beta_8 TURN_{i,t} + \varepsilon_{i,t}$$

where $\alpha_{i,t}$ is the Jensen's alpha of mutual i in period t , $FEES_{i,t}$ is the sum of fees charged by fund i in period t , $COST_{i,t}$ is the overall rate of costs supported by fund i in period t , $SIZE_{i,t}$ is the size of fund i in period t , $FLU_{i,t}$ are the net flows of fund i in period t , $HIS_{i,t}$ is the historical performance of fund i in period t , $AGE_{i,t}$ is the age of fund i in period t , $RIS_{i,t}$ is the risk class to which fund i belonged in period t and $TURN_{i,t}$ is the average portfolio turnover of fund i in period t .

The model which we have just presented was applied to the monthly data collected for each of the 124 mutual funds in the sample. The Jensen's alphas were computed as described in the previous section. Building on the Jensen's alphas and on the information regarding to the funds characteristics, the panel data model was estimated for each one of the seven categories of mutual funds.

Taking into account the heteroskedasticity of the dependent variable and thus the inefficiency of the estimates obtained by OLS, it was used in the estimation of the model the method of weighted least squares (WLS). In the estimation it was also considered the existence of time fixed effects (with a monthly frequency): it was assumed that part of the variation of the variables in a given period is constant for all funds. The average of both the dependent and independent variables was subtracted from the respective variables in the period. By testing the redundancy of time fixed effects (likelihood ratio) we were able to confirm - by rejecting the null hypothesis of redundancy of fixed effects for a significance level of 1% - that the estimate with time fixed effects is adequate.

The results obtained relating the funds' performance to their characteristics are presented in table 3 below.

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Table 3 – The relationship between fund performance and funds characteristics

Table 3 shows the estimates, for each category of funds, of the coefficients obtained by estimating $\alpha_{i,t} = \beta_0 + \beta_1 FEES_{i,t} + \beta_2 COST_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 FLU_{i,t} + \beta_5 HIS_{i,t} + \beta_6 AGE_{i,t} + \beta_7 RIS_{i,t} + \beta_8 TURN_{i,t} + \varepsilon_{i,t}$ where $\alpha_{i,t}$ is the Jensen's alpha of mutual i in period t , $FEES_{i,t}$ is the sum of fees charged by fund i in period t , $COST_{i,t}$ is the overall rate of costs supported by fund i in period t , $SIZE_{i,t}$ is the size of fund i in period t , $FLU_{i,t}$ are the net flows of fund i in period t , $HIS_{i,t}$ is the historical performance of fund i in period t , $AGE_{i,t}$ is the age of fund i in period t , $RIS_{i,t}$ is the risk class to which fund i belonged in period t and $TURN_{i,t}$ is the average portfolio turnover of fund i in period t . The standard deviation of each estimate is reported in parenthesis. The sample period covers the 96 months from January 2004 to December 2011. N refers to the number of observations in each category of mutual funds and R^2 is the coefficient of determination expressed as a percentage. ***, **, and * indicate the estimated coefficients which were found to be statistically significant at 1%, 5% and 10% significance levels, respectively. All the regressions were found to be statistically significant at 1% significance level.

Mutual Fund Category	N	FEES	COST	SIZE	FLU	HIS	AGE	RIS	TURN	R ²
US Equity Funds	336	0,1438 (2,7785)	2,9967** (1,1958)	-0,0008*** (0,0001)	0,0109*** (0,0013)	0,7311*** (0,0704)	0,0007 (0,0024)	0,0205*** (0,0073)	0,0015*** (0,0005)	88,62%
EU, Switzerland and Norway Equity Funds	1661	-0,7461** (0,3663)	-0,0637 (0,4769)	-0,0001 (0,0000)	0,0011 (0,0007)	-0,0276 (0,0469)	0,0013*** (0,0004)	-0,0255*** (0,0055)	-0,0017 (0,0021)	30,49%
International Equity Funds	1216	-1,669 (1,0369)	0,6443 (0,735)	-0,0002*** (0,0001)	0,0114*** (0,0039)	-0,2518*** (0,0512)	0,0017 (0,0012)	0,0026 (0,0077)	-0,009*** (0,0031)	34,22%
Portuguese Equity Funds	632	0,1452* (0,0877)	1,506*** (0,2289)	0,0000*** (0,0000)	0,0002 (0,0002)	0,2741*** (0,0653)	0,004*** (0,0004)	0,0022 (0,0028)	-0,0015*** (0,0003)	91,43%
Euro Variable-income Funds	1500	-0,4262 (0,4817)	-1,0122* (0,5647)	0,0000** (0,0000)	0,0000 (0,0000)	0,0026* (0,0015)	0,0001 (0,0002)	-0,0031 (0,003)	-0,0007 (0,0008)	21,24%
Euro Fixed-income Funds	1036	0,0338 (0,122)	-0,463* (0,2517)	0,0000 (0,0000)	0,0000 (0,0001)	0,2131*** (0,0444)	0,0001 (0,0002)	0,0036 (0,0026)	0,0002 (0,0001)	25,33%
Euro Money Market Funds	1351	-0,1967 (0,2877)	-0,1197 (0,2085)	0,0000 (0,0000)	0,0000 (0,0000)	0,0256*** (0,0087)	0,0000 (0,0001)	0,0059 (0,0051)	-0,0001 (0,0002)	19,14%

The results show that it is possible to explain the excess returns exhibited by the mutual funds recurring to their characteristics.

With regard to the fees (FEES), the results indicate that the relationship between them and the performance of the EU, Switzerland and Norway equity funds is negative and statistically significant for a 5 percent significance level. For this category of funds and as mentioned by Carhart (1997) and Pollet and Wilson (2008), it is possible to conclude that investments in funds with high fees should be avoided since the investor will earn smaller gains, in addition to having to bear the higher fees. However, for the Portuguese equity funds it was obtained the opposite result: in fact, in this case, the results point to the existence of a positive and significant relationship at a 10 percent significance level. This latter result is consistent with the perspective that the funds which produce higher returns are able to charge higher fees because those returns more than compensate investors for the higher fees they have to pay.

With regard to the costs incurred by the funds (COST), the results suggest the existence of a positive relationship between the overall rate of costs and the performance exhibited by both the Portuguese equity funds and US equity funds. These results are statistically significant at 1 percent and 5 percent significance levels, respectively. The results are similar to those achieved by Droms and Walker (1996) and Wermers (2000) for equity funds in the US, and seem to support the perspective that higher costs of obtaining and managing information lead to higher returns which are capable of compensate the funds for the costs they have incurred. However, this interpretation seems to be valid only for equity funds since in the case of the bond funds (euro fixed-income funds and euro variable-income funds), the results point to the existence of a negative relationship between fund costs and fund performance (statistically significant for a 10 percent significance level).

The results also show that the impact of size (SIZE) and of net flows (FLU) on the performance of bond funds and of money market funds is in general not significant. In the case of international equity funds and of US equity funds the results point to the existence of a negative relationship between fund size and performance (significant at a 1 percent significance level). On the other hand, for the categories of international equity funds and US equity funds, the results point to the existence of a positive relationship between net flows and fund performance (statistically significant at 1 percent significance level). In the latter case, the results are consistent with the smart money hypothesis suggested by Gruber (1996), according to which investors are able to channel their savings to those funds that will produce higher returns. If, on the one hand, the results seem to suggest that bigger funds tend to

perform worse, on the other hand, they seem to indicate that the higher the fund growth, the better will be its performance. The apparent contradiction between these two results can be resolved. In fact, the results suggest that funds with higher growth of its assets are those with higher returns but, as the fund becomes a large fund, this profitability will be affected. The positive relationship between the profitability and growth of a fund (represented by its net flows) can be explained by the fact that capitalization gains contribute to the growth of the funds and also by the fact that increased knowledge in the market about a fund's success attracts new clients (CICCOTELLO, 1996). On the other hand, and as a result of their growth, funds can reach dimensions susceptible to negatively affect its profitability. While managers of small mutual funds can focus on a few investment opportunities, when funds become larger, the search for new investment opportunities may lead to the dilution of the positive effects related to the ability of managers. Therefore, fund growth is expected to reduce marginal investment returns, giving rise to diseconomies of scale. Moreover, the bigger the fund - and therefore the bigger the trading volume - the harder it is for portfolio managers not to signal their expectations to the market with respect to prices. In consequence, those fund managers will tend to be negatively affected by the impact of the trading conducted by the remaining investors in reaction to that signal (INDRO *et al.*, 1999).

The historical performance (HIS) appears to be one of the most robust explanations of fund profitability, since 6 of 7 estimates obtained in our study are shown to be statistically significant (5 of them at 1 percent significance level). However, the magnitude and signal of the relation is substantially different from one category to another. While positive changes in the historical performance are reflected in a higher return in the case of the bond mutual funds, the money market funds, the US equity funds and the Portuguese stock funds, for the remaining two categories - international equity funds and EU, Switzerland and Norway funds - the results suggest that the worse the past performance of a fund, the higher their future excess returns will be.

The results also show that the impact of age (AGE) on fund profitability is practically zero for the categories of bond funds and money market funds. For the categories of equity funds the impact of age in funds' excess returns is more significant and, for the Portuguese equity funds and for the EU, Switzerland and Norway equity funds, the results suggest the existence of a positive and statistically significant relationship (at 1 percent of significance). The results for these latter categories of funds suggest that younger funds tend to perform worse than funds that been in business for a longer period. These results can be explained by the fact that the

funds tend to bear higher costs at an early stage (GREGORY, MATATKO and LUTHER, 1997) and also by the fact that younger funds are the ones that are usually exposed to greater market risk because they tend to invest in a smaller number of different securities (BAUER, 2005).

The impact of the variable risk level (RIS) in funds' excess returns is practically zero for the categories of funds which, by the nature of their investments, tend to have lower levels of risk: bond funds and money market funds. In the case of equity funds, the impact of the variable risk level on profitability is more significant. In fact, the results obtained for the US equity funds suggest the existence of a positive relationship; for the EU, Switzerland and Norway, the results point to the existence of a negative and statistically significant relationship at a 1 percent significance level. Since the profitability expressed in a Jensen's alpha is already a risk-adjusted return, these results seem to suggest that the US equity funds, on average, tend to more than compensate the risk incurred by investor. Therefore, this enables the investor to obtain an abnormal return. On the contrary, the EU, Switzerland and Norway equity funds, that have a higher risk, do not produce the necessary return to compensate the investor by the risk he has to bear.

The average portfolio turnover (TURN) also does not seem to be a characteristic impacting the excess return of bond funds and money market funds. However, there was a statistically significant relationship (at 1 percent significance level of) in 3 of the 4 considered categories of equity funds. For the Portuguese equity funds and for the international equity funds the results show that there was a negative relationship between the portfolio return and the fund performance which suggests that - according to the position defended by authors such as Elton et al. (1993), Malkiel (1995) and Carhart (1997) - an active management does not imply higher risk-adjusted returns. On the contrary, the results seem to show that activism in fund management causes higher costs, which are not compensated by increased profitability. On the other hand, in the case of US equity funds, the results point to the existence of a positive relationship between average portfolio turnover and performance. These results corroborate the conclusions presented by several authors such as Grinblatt and Titman (1994), Wermers (2000) and Dahlquist, Engstrom and Söderlind (2000), and seem to confirm the ability exhibited by some managers to achieve superior returns through the adoption of active investment strategies.

In general, the results suggest that the characteristics of the funds are important in predicting their performance. While these features have a different explanatory power depending on the

considered category of funds - from a minimum of 19% in the case of money market funds up to more than 91% in the case of Portuguese equity funds - in either case, the regressions are statistically significant at a 1 percent significance level.

4. CONCLUSION

The strong growth in the mutual fund industry observed in the last decades makes the performance assessment of mutual funds and the study of the factors that influence that performance into issues of high interest for both investors and academics. Given the growing importance of mutual funds in the economic agents' decisions and the high disparity of returns generated by those instruments, it is then necessary to identify the most profitable funds as well as the factors that influence their performance.

In this paper we assessed the performance of 124 equity mutual funds, bond funds and money market funds operating in Portugal between 2004 and 2011. In addition, we analyzed the relationship between a comprehensive set of fund features and fund performance.

The results regarding the funds overall performance suggest that it was difficult in the period under study to obtain positive abnormal returns. This is reflected on an average Jensen's alpha of -0.27% in the whole sample. If, on the one hand, this result is consistent with the existence of efficient markets where it should be difficult to systematically overperform the relevant benchmark, on the other hand it should also be noted that 17 of the analyzed funds (about 14% of the total) have obtained statistically significant positive abnormal returns in the period under study. This indicates that, at least for those funds, the markets in which they operated did not seem to be efficient.

Among the various categories of funds analyzed, only the euro fixed-income funds have shown the ability to overperform the respective benchmark. In this category the average Jensen's alpha was 2.46%.

The results also show that it is relevant to consider funds characteristics when selecting mutual funds. The empirical relevance of these findings is clear: an investor could have increased the performance of its investments through the choice of funds with the most appropriate characteristics. For example, in the case of funds that invested in Portuguese stocks, one investor could have obtained significantly higher returns if he had selected larger and older funds, with higher costs, with a history of high returns and that had adopted passive investment strategies. Assuming the results can be extrapolated to the future, the results provide an indication of the features that investors should look for.

Although the results regarding the relationship between fund performance and fund characteristics are statistically significant within each category of funds, the nature of this relationship seems to differ substantially, both in direction and in magnitude between categories. The comparison of the results obtained within each category and between different categories carries at least two important implications. First, it suggests that the classification of funds among the various categories, depending on the assets that funds hold, is critical in the study of this issue. Second, the variability on the results depending on the fund categories under study advises caution in the use of these results as a guide for investment purposes and suggests the need for further research. For example, it would be interesting to assess whether the relationships that were established in the sample period will remain robust in the future, taking into account a larger sample and other tests of performance.

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Mutual Fund Characteristics	Relation with Performance	Articles
Fees	Positive	CHORDIA (1996)
	Negative	CARHART (1997), POLLET and WILSON (2008)
	Nonexistent	CHEN <i>et al.</i> (2004), FERREIRA <i>et al.</i> (2012)
Costs	Positive	IPPOLITO (1989), DROMS and WALKER (1996)
	Negative	GRUBER (1996), GOLEC (1996), CARHART (1997), DAHLQUIST, ENGSTROM and SODERLIND (2000), OTTEN and BAMS (2002), GIL-BAZO and RIZ-VERDU (2009)
	Nonexistent	GRINBLATT and TITMAN (1994), CHEN <i>et al.</i> (2004), FERREIRA <i>et al.</i> (2012), LOW (2012)
Size	Positive	CICCOTELLO (1996), OTTEN and BAMS (2002), BERK and GREEN (2004), FERREIRA <i>et al.</i> (2012)
	Negative	GRINBLATT and TITMAN (1989), INDRO <i>et al.</i> (1999), DAHLQUIST, ENGSTROM and SODERLIND (2000), SAWICK and FINN (2002), CHEN <i>et al.</i> (2004), POLLET and WILSON (2008), YAN (2008), JONES (2009), FERREIRA <i>et al.</i> (2012), BESSLER <i>et al.</i> (2014)
	Nonexistent	DROMS and WALKER (1996), PRATHER, BERTIN and HENKER (2004), LOW (2012)
Historical Performance	Positive	GRINBLATT and TITMAN (1992), HENDRICKS, PATEL and ZECKHAUSER (1993), GOETZMANN and IBBOTSON (1994), BROWN and GOETZMANN (1995), MALKIEL (1995), VOLKMAN and WO HAR (1995), ELTON, GRUBER and BLAKE (1996), WERMERS (1997), CARHART (1997), FERREIRA <i>et al.</i> (2012), FULKERSON, JORDAN and RILEY (2013), BESSLER <i>et al.</i> (2014)
	Nonexistent	CORTEZ, PAXTON and ARMADA (1999), DAHLQUIST, ENGSTROM and SODERLIND (2000), OTTEN and BAMS (2002), FERREIRA <i>et al.</i> (2012)
Age	Positive	GREGORY, MATATKO and LUTHER (1997), BLAKE and TIMMERMAN (1998), BAUER (2005)
	Negative	OTTEN and BAMS (2002), FERREIRA <i>et al.</i> (2012)
	Nonexistent	PETERSON <i>et al.</i> (2001), CHEN <i>et al.</i> (2004), PRATHER, BERTIN and HENKER (2004), LOW (2012)
Net Flows	Positive	IPPOLITO (1989), GRINBLATT and TITMAN (1989), GRUBER (1996), ZHENG (1999), DAHLQUIST, ENGSTROM and SODERLIND (2000), LYNCH and MUSTO (2003), FONSECA and MALAQUIAS (2012)
	Negative	BESSLER <i>et al.</i> (2014)
	Nonexistent	CHEN <i>et al.</i> (2004)
Risk Level	Positive	LOW (2012)
	Negative	GOLEC (1996)
Portfolio Turnover	Positive	GRINBLATT and TITMAN (1994), WERMERS (2000), DAHLQUIST, ENGSTROM and SODERLIND (2000)

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Negative	ELTON <i>et al.</i> (1993), MALKIEL (1995), CARHART (1997)
Nonexistent	IPPOLITO (1989), DROMS and WALKER (1996), LOW (2012)

Table A1 – Summary table of the results obtained in the literature about the relation between fund characteristics and fund performance

¹ According to the Comissão de Mercado de Valores Mobiliários (2002), the Portuguese Securities Market Commission, Portuguese mutual funds are those that are both managed and traded by entities domiciled in Portuguese territory.

² Some relevant exceptions may be mentioned. It is the case of the studies conducted by Dahlquist, Engstrom and Söderlind (2000) about Swedish funds, by Otten and Bams (2002) about funds operating in five European countries and by Low (2012) about Malaysian funds.

³ Fees were estimated by summing initial fees, redemption fees and transfer fees. Redemption fees, that often vary with the investment holding period, were computed using the average of the fees charged for the following investment holding periods (in days): between 0-15 days, 16-90 days, 91-180 days, 181-360 days and, finally, more than 360 days.

⁴ The net asset value of a fund is calculated by subtracting to the sum of the values that constitute the portfolio the amount of fees and costs incurred up to the moment where the portfolio value is assessed (COMISSÃO DE MERCADO DE VALORES MOBILIÁRIOS, 2003).

⁵ In the case of the funds that distribute dividends, it was added to the fund's NAV the amount of dividends distributed, according to the information collected from the annual report issued by the funds.

⁶ Funds are said to be of risk level 1 if the standard deviation of annualized returns in the previous year was between 0% and 0.5%. Funds are said to be of risk level 2 if the standard deviation of annualized returns in the previous year was between 0.5% and 2%. Funds are said to be of risk level 3 if the standard deviation of annualized returns in the previous year was between 2% and 5%. Funds are said to be of risk level 4 if the standard deviation of annualized returns in the previous year was between 5% and 10%. Funds are said to be of risk level 5 if the standard deviation of annualized returns in the previous year was between 10% and 15%. Funds are said to be of risk level 6 if the standard deviation of annualized returns in the previous year was between 15% and 25%. And finally, funds are said to be of risk level 7 if the standard deviation of annualized returns in the previous year was higher than 25%.