"Spanish mutual fund misclassification: Empirical evidence"

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Spanish mutual fund misclassification: Empirical evidence[1]

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Abstract

The extensive offer of mutual funds on the market favors the use of mutual fund classifications as a tool for defining fund characteristics, comparing them and evaluating their results. However, a number of studies provide evidence that fund managers manipulate the characteristics of the mutual fund portfolios in line with economic incentives. In this context, knowing the capacity of the fund categories to convey fund characteristics is essential, since an unsuitable classification system may give out confusing signals and encourage investors to select funds that are not suited to their needs. Using a database of Spanish mutual funds, the objective of this study is to examine whether funds that belong to the same category are comparable and whether funds in different categories are indeed different. A Discriminant analysis enables us to determine which funds are initially correctly or incorrectly classified and to which category misclassified funds should be assigned, being the explanatory variables the percentages of the investment style defined by the asset class factor model proposed by Sharpe. The results show that 33% of such funds are misclassified, a figure that highlights the difficulties experienced by current classification systems in differentiating between mutual fund characteristics and in providing a reliable reference for fund evaluation and selection.

Key words: Mutual Funds; Investment Objectives; Mutual Fund Classifications, Asset Class Factor Model; Investment Style.

1. Introduction

Mutual funds are usually classified according to the market risk classes they invest in or according to their investment style. Classifications are widely used by investors and the specialist press to define fund characteristics, to compare them and to evaluate their results. These decisions implicitly presuppose that funds belonging to the same category have similar characteristics and risk.

The extensive offer of mutual funds on the market encourages investors to select the fund category that best matches their preferences and the level of risk they are willing to accept, and then to choose a mutual fund, often taking into consideration raw returns alone and ignoring any potential differences in their risk or characteristics.

A number of papers published in recent years, including Elton, Gruber and Blake (2001), Torre and García (2001a), Brown and Goetzmann (1997), diBartolomeo and Witkowski (1997), Brown, Harlow and Starks (1996), Orphanides (1996), Chevalier and Ellison (1995) and Lakonishok, Shleifer, Thaler and Vishny (1991)[4] find empirical evidence that mutual fund managers manipulate the risk in their portfolios differently due to compensation incentives. In other words, they accept higher levels of risk than might be expected from the declared investment objectives.

Specialist firms continuously compare and evaluate the results of a particular mutual fund with other funds in the same category or with funds having similar investment objectives. Management companies are interested in being able to announce that one or several of their funds have achieved a place in the rankings as the best performing fund in its category. In this context, the competitive nature of the fund industry, in which funds with comparable investment objectives compete against each other, makes it more likely for fund managers to find incentives to alter the

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[4] Some non-academic publications, including Herzfeld (1991), Stone (1994), Simon (1994), Schwimmer (1994) and Hector (1995), also point in this direction.

nature of the portfolio and accept additional risks, in a bid to increase the fund's raw return, improve its position with respect to its competitors and thus attract more investors.

Sirri and Tufano (1992) found that, for a sample of 632 US mutual funds, investors responded to the published fund ranking, and registered the existence of a positive relation between return obtained by the funds and the contributions received by them[1]. In other words, the funds that for the analysis period obtained high raw returns experienced larger net new money inflows in the following periods[2].

Najand and Prather (1999) and Vallejo (2003), among others, call into question the capability of mutual fund classifications to convey risk suitably, concluding that there are significant differences between the risks of funds belonging to the same category and that there is no evidence to suggest that the risks of funds classified in different categories are heterogeneous.

Determining the capacity of fund categories to convey fund characteristics is therefore essential, as an inadequate classification system may give out confusing signals and encourage investors to choose funds that do not always meet their particular needs and which are not necessarily managed by the best qualified managers.

Having a classification system adjusted to fund characteristics provides a number of advantages: it (1) reduces the incentives for managers to move from one style to another, in order to enhance their ex-post performance ratios, (2) improves the information on the results that fund investors can expect, and (3) provides a tool for the proper evaluation of the funds.

DiBartolomeo and Witkowski (1997, p. 33) consider that funds are not correctly classified because of: (1) the ambiguity of the classification systems currently in use, which use some broad criteria to be able to include mutual funds with differing investment objectives, and (2) the increase in competition in the mutual fund industry and the existence of portfolio performance-related remuneration structures making management decisions subordinate to economic incentives.

The objective of this study is to examine whether funds that belong to the same category are comparable and whether funds in different categories are indeed different. The paper is organized as follows. Section 2 reviews the existing literature related to this issue. Section 3 details the mutual fund sample and data sources used. Section 4 describes the methodologies employed. Section 5 provides the empirical evidence and Section 6 concludes the paper.

2. Mutual Fund Misclassification: Literature Review

In recent years much attention has been paid to the correct classification of mutual funds by regulators and academic researchers. Early outstanding work includes LeClair (1974) and, more recently, Tierney and Winston (1991), Burr (1994), Witkowski (1994), Bailey (1995), Brown and Goetzmann (1997), diBartolomeo and Witkowski (1997), Gallo and Lockwood (1997), Kim, Shukla and Tomas (1995 and 1999), Otten and Bams (2001).

DiBartolomeo and Witkowski (1997), Kim, Shukla and Tomas (1999) and Otten and Bams (2001) found that many mutual funds were misclassified, i.e., to a great extent their characteristics were suited to categories other than the one they were actually assigned to.

Specifically, diBartolomeo and Witkowski (1997) found that as many as 40% of funds analyzed were misclassified. Of these, 60% were classified in a lower-risk category and 40% – in a category with higher risk. They also found that funds classified in riskier categories tend to obtain higher results than the average for their original category. To do this, they construct six indices representative of each category, as an equal weighted sum of the funds belonging to each one. They regress fund's returns against the returns of the six objective indices and classify them as belonging to the objective group whose index provides the best fit. The objective indices are equal

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[1] Kane, Satini and Aber (1991), Goetzmann, Greenwald and Huberman (1992), Ippolito (1992), Patel, Zeckhauser and Hendricks (1992), Cappon, Fitzsimons and Prince (1996), Chevalier and Ellison (1997), Sirri and Tuffano (1993 and 1998) and Torre and García (2001b) have all analyzed this effect and obtained similar results.

[2] However, investor response to results is not symmetrical, as the funds with the worst results are not affected by equally significant refunds, being investors rather less flexible about leaving funds than they are about joining them. Similar considerations can be found in Sirri and Tufano (1998), Chevalier and Ellison (1997), Goetzman and Peles (1997) and Gruber (1996).

to weighted returns of all funds in that objective group[1]. They also analyze the factors that might contribute to unsuitable fund classification, finding that belonging to a larger management company reduces the possibility of being misclassified and being a large fund increases this possibility. The reasons for this, in the former case, would appear to be that large management companies are more demanding as regards compliance with fund characteristics, and in the latter case, the greater difficulties of the larger funds to manage assets in accordance with their investment style because of the large amounts of money involved.

Brown and Goetzman (1997) investigated the accuracy of current mutual fund classification system and whether they were useful in providing information for explaining differences in future returns between funds, concluding that the current classification system was not efficient in answering such questions. They then proposed an empirically determined classification system based on fund returns, which in their opinion reduces the incentives for managers to alter their investment style in a bid to improve their position against the other competitors. Grouping funds in 8 categories, they found that the system proposed had a greater capability for explaining the future variability of fund returns than the traditional classifications. Gallo and Lockwood (1997) found that classifications based on factorial models provided greater capacity for diversification according to styles than conventional classifications.

Kim, Shukla and Tomas (1999) classified the funds using attributes in addition to returns. The fund characteristics they use were selected by performing a principal factor analysis. The variables are as follows: standard deviation of return, income ratio, beta, R-square (R^2) of the fund and market returns regression, price to earning ratio, price to book ratio, % stocks, debt as a percent of total capitalization, market capitalization and average return. Fund classification is performed by a discriminant analysis in which these variables are used as the explanatory factors. Their results show that 46% of the funds are classified in the category to which they belong, while 54% are misclassified[2].

The present paper provides further evidence on the capacity of categories established by the Spanish Securities Market Commission (CNMV) to classify adequately Spanish mutual funds that invest largely in equity. Unlike previous papers, here the percentages assigned to each asset class that best define fund investment style are considered as determinant variables. In their information for investors, most Spanish mutual funds do not state which portfolio best defines their investment style[3], and for that reason the fund investment style has been estimated by taking into account the asset class factor model proposed by Sharpe (1988, 1992). Subsequently, given the estimated fund investment style, a determinant analysis enables us to establish to what extent classification based on estimated investment style coincides with the one proposed by the CNMV, which categories have major classification problems and in which categories funds should be classed when classification based on estimated investment style does not coincide with the category to which they are assigned.

3. Data

3.1. Mutual funds data

Mutual fund data were collected from the database of Spanish Pension Fund and Mutual Fund Association (INVERCO). The sample consists of all open-end Spanish securities investment funds that were continuously in operation during the period from December 1991 to October

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[1] The process of fund classification and objective indices calculation is iterated until every objective index consists of all the funds that are actually classified in that objective group.

[2] It needs to be remembered that these figures are the result of applying discriminant analysis iteratively until 99% of the funds are classified in the category they were classified in prior to iteration. Specifically, they repeated the analysis 16 times to achieve consistency of 99.4%.

[3] The investor information provided by most funds is limited to the legal restrictions on mutual funds and to the criteria that define the category they are included in. Possible differences or similarities between funds belonging to the same category are not evident. In Spain, funds may belong to any of the 15 categories established by the CNMV.

2000[1]. The screening resulted in a sample of 93 funds classified by CNMV in six categories (Table 1): 29 in Domestic Equity (DE), 9 in European Equity (EE), 8 in International Equity (IE), 37 in Domestic Balanced (DB), 3 in International Balanced (IB) and 7 in Global Funds (GF). Table 1 provides a description of the characteristics defining each mutual fund category.

Table 1

Description of the Mutual Fund Caracteristics in Each Category

Category	Characteristics	Nº Sample Funds
Domestic Equity (DE)	More than 75% in Spanish equity and less than 30% in assets valued in non-euro currency.	29
European Equity (EE)	More than 75% in equity, the investment in domestic equity not exceeding 75% and less than 30% in assets valued in non-euro currency.	9
International Equity (IE)	More than 75% in equity and more than 30% in assets valued in non-euro currency.	8
Domestic Balanced (DB)	Between 30% and 75% in equity and less than 5% in assets valued in non-euro currency.	37
International Balance (IB)	Between 30% and 75% in equity and more than 30% in assets valued in non-euro currency.	3
Global Funds (GF)	Fund without a defined investment policy and that no belonged to any other category.	7
TOTAL		93

Although the database may suffer from survivorship bias, there is no evidence concerning the possible consequences of not taking survivorship bias into consideration in suitable fund classification. Furthermore, in Spain the level of exhaustion and disappearance of funds is low, owing to (1) the continuing growth of collective investment in the 1990s, which helped towards its development and consolidation and (2) the concentration of this industry in the country's major financial groups[2].

Monthly returns were calculated by taking into consideration the realization values of the participation in the fund at the beginning and end of each period only, regardless of the distribution of results. This was because all mutual funds analyzed were of the capitalization or accumulative type, i.e., they systematically plow back profit from investments rather than distribute them[3]. The expression is the following:

$$R_{Fi,t} = \frac{VR_{Fi,t} - VR_{Fi,t-1}}{VR_{Fi,t-1}}, \tag{1}$$

where

$R_{Fi,t}$, is the return obtained by the i-th fund in period t;

$VR_{Fi,t-1}$, is the realization value of the participation in the i-th fund in t-1;

$VR_{Fi,t}$, is the realization value of the participation in the i-th fund in t.

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[1] In the early 1990s, collective investment was relatively scarce in Spain and only developed fully during the following decade. According to the National Securities Market Commission (CNMV), in 1991 there were 373 mutual funds managing 23,000 million euros. By 2001, the number of mutual funds had grown to 2,520, which managed 177,844 million euros.
[2] Around 70% of the assets of the funds in the sample are managed by 11% of the management companies (6 management companies).
[3] Virtually no mutual fund in Spain distributes profits. Tax levels are one of the major reasons for this, as distributed profits are taxed at the marginal rate and capital gains from the sale of one-year-plus participations in funds are taxed at a fixed rate of 15%.

3.2. Asset Class Index

According to Sharpe's asset class factor model (1988, 1992), the asset classes taken into consideration to estimate fund investment styles must reflect the asset universe in which sample funds invest and be represented by indices, whose composition and mode of calculation are known a priori by the investor[1]. Table 2 shows the eight asset classes considered and the indices selected to represent each one.

Table 2

Index Representative of Asset Classes Considered and Their Caracteristics

Asset Class	Representative Index	Caracteristics
Spanish Monetary Market	AFI one-day Repos index (I_{SMM})	Represents the Spanish Monetary Market assets.
Spanish Debt Market	AFI Mid and Long-Term Debt Index (I_{SDM})	Replicates evolution of the Spanish state Bonds and Obligations with greatest liquidity, whose residual life is higher than two years and takes reinvestment of coupons into account.
International Debt Market	J. P. Morgan Government Bond Index Broad (I_{IDM})	Represents the 13 major developed debt markets. Includes issues complying with minimum liquidity requirements, which have a residual life greater than 13 months and takes reinvestment of coupons into account.
Spanish Equity: Value	MSCI Developed Markets –Spain Value- (I_{SVE})	Capitalization-weighted index, which represents the value shares of the Spanish Equity Markets and takes reinvestment of dividends into account.
Spanish Equity: Growth	MSCI Developed Markets –Spain Growth- (I_{SGE})	Capitalization-weighted index, which represents the growth shares of the Spanish Equity Markets and takes reinvestment of dividends into account.
European Equity	MSCI Developed Markets –Europe- (I_{EE})	Capitalization-weighted index, which represents 60% of the market capitalization of European equity market and takes reinvestment of dividends into account.
United States Equity	MSCI Developed Markets –United States- (I_{UE})	Capitalization-weighted index, which represents 60% of the market capitalization of US equity market and takes reinvestment of dividends into account.
Japan Equity	MSCI Developed Markets –Japan- (I_{JE})	Capitalization-weighted index, which represents 60% of the market capitalization of Japan equity market and takes reinvestment of dividends into account.

The AFI one-day Repos index (I_{SMM}) and the AFI Mid and Long-Term Debt Index (I_{SDM})[2] represent the Spanish money market and the Spanish mid- and long-term Treasury note market; they are prepared by International Financial Analysts -AFI (*Analistas Financieros Internacionales*).

The J.P. Morgan Government Bond Index Broad (I_{IDM}) represents the thirteen most important developed mid- and long-term Treasury note markets. It reinvests coupons.

The five indices associated to the equity markets are prepared by Morgan Stanley Capital International (MSCI) and take gross dividend reinvestment into account. The Spanish equity market is divided into two indices representative of value and growth shares respective.

The monthly return of the indices was calculated in Spanish currency as:

$$R_{Ii,t} = \frac{P_{Ii,t} - P_{Ii,t-1}}{P_{Ii,t-1}}, \tag{2}$$

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[1] As Sharpe points out (1992, p. 8), while not strictly necessary, asset classes should be mutually exclusive, exhaustive and differ in their returns.
[2] Takes reinvested coupons into account.

where

$R_{Ii,t}$, is the return obtained by the i-th index in period t;

$P_{Ii,t-1}$, is the price of the i-th index in t-1;

$P_{Ii,t}$, is the price of the i-th index in t.

4. Methodology

4.1. Asset class factor model: mutual fund investment style

The asset class factor model (ACFM) proposed by Sharpe (1988 and 1992) as a means of determining fund investment style is a particular case of a factor model, where (1) the variable to be explained, $\widetilde{R}_i$, is the return associated with a mutual fund, (2) the explanatory factors, $\widetilde{F}_j$, are the returns associated with the indices representative of the asset classes the fund invests in, and the sensitivity coefficients, x_{ij}, can be interpreted as the weighting that each of the "n" asset classes considered have in the portfolio defining the fund's investment style[1].

Resolving the model involves the use of a parametric quadratic program that minimizes the variance of the residual return, expressed analytically as follows:

$$\text{Min } \sigma^2(\widetilde{e}_i) = \text{Min } \sigma^2\left[\widetilde{R}_i - \left(x_{i1}\widetilde{F}_1 + x_{i2}\widetilde{F}_2 + x_{i3}\widetilde{F}_3 + \ldots + x_{in}\widetilde{F}_n\right)\right]$$
$$\text{subject to}$$
$$\sum_{t=1}^{n} x_{ij} = 1 \qquad\qquad\qquad\qquad (3)$$
$$0 \le x_{ij} \le 1, \forall x_{ij}$$

The solution is a vector of n sensitivity coefficients $(x_{i1}, x_{i2}, x_{i3}, \ldots, x_{in})$ that represent the fund's investment style.

In the study, the investment style was estimated for each of the 93 sample funds in June 2000, by using the series of monthly returns for the five years prior to the moment of estimation, i.e., sixty observations (July 1996 – June 2000).

4.2. Discriminant analysis: mutual fund misclassification

Discriminant analysis that takes into account the set of selected variables or attributes enables us to determine which funds are initially correctly or incorrectly classified and to which category misclassified funds should be assigned.

Given a dependent qualitative variable and a set of one or more independent quantitative variables, discriminant analysis provides some linear functions, known as discriminant functions, of the independent variables with which to classify individuals in one of the groups or categories the dependent variable establishes.

The characteristics selected in the analysis as explanatory or independent variables are the percentages that define the investment style of each fund in June 2000, i.e., the percentage of assets of the Spanish money market, Spanish debt market, international debt market, international equity, Spanish equity[2], European equity, US equity and Japanese equity that represent their investment style - $(x_{i1}, x_{i2}, x_{i3}, \ldots, x_{in})$[3].

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[1] The third characteristic requires two restrictions to the model: (1) that the estimated coefficients make up the unit and (2) that they have values between zero and the unit.
[2] We aggregate the percentages invested in Spanish value and growth equity into a single variable.
[3] The investment style results estimated by the asset class factor model for each fund in the sample and other information concerning the empirical study not shown in the paper are available from the authors on request.

Integrated in the dependent variable are the six categories established by the CNMV to classify the mutual funds that mostly invest in equity and which are considered as given. Although diBartolomeo and Witkowski (1997) and Kim, Shukla and Tomas (1999) use a similar approach, in other papers such as Brown and Goetzmann (1997) categories are estimated a priori by means of a prior analysis to group the funds.

Discriminant analysis requires that the number of individuals comprising each group should be greater than the number of explanatory variables, which in our case is seven. As Table 1 shows, the categories Balanced International Equity Funds and Global Funds do not achieve the minimum size required. In view of the similarity between the estimated investment styles for funds in both categories and the asset classes in which they can invest, we grouped both categories together in one called Global Funds[1].

There are some major differences between the number of individuals forming each category. As a result, and to prevent discriminant analysis from favoring the classification of mutual funds in the larger categories, we considered the probabilities of belonging to any category to be the same.

The fact that the sample analyzed represents the total population, the non use of discriminant analysis as a predictive tool and the limited number of observations available in some categories advised against segregating a part of the sample to check the results of the discriminant functions. We estimated the discriminant functions taking into account all the funds in the sample, although this might bias the classification capability of the estimated discriminant functions upwards. The stage-by-stage method was used in discriminant function estimation[2].

5. Empirical Results

The discriminant analysis provided four discriminant functions, whose coefficients are presented in Table 3, and in those are considered solely four explanatory variables: % of Spanish equity, % of US equity, % of European equity and % of Japanese equity.

Table 3

Discriminant Functions Coefficients

	D1	D2	D3	D4
% Spanish Equity	-0.428	0.906	0.173	-0.039
% European Equity	0.589	0.607	-0.686	-0.070
% US Equity	0.759	0.292	0.401	-0.552
% Japan Equity	0.445	0.320	0.260	0.824

The model obtained is statistically significant and the results of the Wilks' Lambda statistic for the discriminant functions show that the information provided by the first three functions in the classification of individual funds is statistically significant at 0.01, i.e., the null hypothesis that the centers of the categories are equal and, therefore, the groups may be considered to be separate. The value of the Lambda when the four discriminant functions are considered is small, at around 0.125. The information attributable to each discriminant function is, respectively, 79.2% of the variance, 16.9%, 3.9% and 0% in the case of the fourth discriminant function.

Table 4 contains the results of the matrix of classification and summarizes the results obtained in the analysis. The diagonal of the table contains the funds from each category originally classified correctly and in parenthesis the percentage they represent of the total number of funds originally classified in that category. The other cells show the incorrectly classified funds located in their proper categories taking the results of the discriminant analysis into account.

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[1] The discriminant analysis is sensitive to the ratio between sample size and the number of predictive variables, and may provide unstable results as this ratio is reduced. Five is the minimum recommended size for this ratio. In our case it is (93/7=13.2).

[2] The analysis was repeated by using the simultaneous method, with similar results.

Table 4

Matrix of Clasification

		Estimated Category					
		European Equity	Interna. Equity	Domestic Equity	Domestic Balanced	Global Funds	TOTAL
Original Category	European E.	**6 (66.7%)**	0 (0%)	1 (11.1%)	2 (22.2%)	0 (0%)	9 (100%)
	Interna. E.	1 (12.5%)	**7 (87.5%)**	0 (0%)	0 (0%)	0 (0%)	8 (100%)
	Domestic E.	3 (10.3%)	0 (0%)	**24 (82.8%)**	2 (6.9%)	0 (0%)	29 (100%)
	Domestic B.	5 (13.5%)	0 (0%)	5 (13.5%)	**21 (56.8%)**	6 (16.2%)	37 (100%)
	Global Fund	1 (10%)	2 (20%)	0 (0%)	2 (20%)	**5 (50%)**	10 (100%)
*67.3% of the funds are classified correctly[1].							

According to the results, nearly 33% of the mutual funds are not classified correctly and there is major translation between equity and balanced funds[2]. The international and domestic equity categories show a higher percentage of correctly classified funds, with 87.5% in international equity, where the misclassified fund is reclassified in European equity, and 82.8% in domestic equity, where misclassified funds are redistributed in European equity and domestic balanced funds.

Domestic balanced and global funds show greater dispersal in the characteristics of funds assigned to them. In both categories around 50% of the funds were misclassified. In the case of global funds this may be explained, first, by international balanced funds being included in the category and, secondly, by the flexibility in investment policy shown by the global funds, which can at any time invest in the assets they consider most suitable without being limited by a given investment style. The situation of domestic balanced funds is very different. Although it is, a priori, a category with less risk than pure equity categories, the results given in the table show that within this category there are funds with the characteristics of European and domestic equity funds and some even with a style similar to the global funds[3].

In accordance with Kim, Shukla and Tomas (1999, p. 2) and other works in the same field, it is not surprising to find funds with different characteristics in the same category, this being a consequence of the wide variety of funds that can be assigned to each one. But what is more serious is that mutual funds have characteristics much closer to those of funds in a different category to the one to which they are assigned, particularly if the first has greater risk. In this case, the classification may provide investors with some serious misinformation.

The results obtained, in line with other works published for the US market, highlight the problems facing mutual fund classifications commonly used to determine investment style. Fund selection purely on the basis of category may lead investors to take the wrong decisions, as there are funds in each category whose investment style is much closer to the one corresponding to another category.

6. Conclusion

The wide range of mutual funds available on the market encourages the use of fund classifications as a tool for defining their characteristics, making comparisons between them and evaluating their results. However, a number of studies provide evidence that managers manipulate the characteristics of fund portfolios in response to economic incentives.

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[1] The analysis was repeated by using the simultaneous method to estimate discriminant functions with similar results: the 69,9% of the funds is classified correctly.

[2] Comparison of estimated investment styles points up important differences between funds in the same category, while also showing that some funds classified in different categories have similar investment styles.

[3] Investors are concerned about fund return and risk, which is why we repeated the discriminant analysis taking as explanatory variables the return and risk obtained by the funds in the sample during the period from July 1996 to June 2000. Return was defined by the average of the monthly returns and risk by its standard deviation. Although the conclusions obtained are similar to these respected, the percentage of misclassified funds increased to 50%.

In this context, it is essential to know the capacity of fund categories to convey their characteristics, as an inadequate system of classification may emit confusing signals and encourage investors to select funds that do not always match their needs.

The present study analyzes to what extent the Spanish Securities Market Commission (CNMV) correctly classifies a sample of Spanish mutual funds. Like the results from some previous work, the results of the discriminant analysis, which considers the percentages defining the investment style for each fund as explanatory variables, show that nearly 33% of mutual funds are misclassified. Domestic balanced and global funds are the categories with greatest dispersal, with 50% of funds misclassified. This is a particularly serious situation as regards domestic balanced funds, as the results show that the majority of misclassified funds should be located in a category with higher risk levels.

These results highlight the problems facing current mutual fund classification systems in differentiating between their characteristics and being able to provide a suitable reference for evaluating and selecting funds. Therefore, the analysis and acknowledgement of the limitations of current fund classifications and the search for new classifications capable of grouping them adequately are essential moves for any future considerations concerning the improvement of information for investors and the collective investment industry.

References

1. Bailey J. V. Manager universes: the solution or the problem. In Squires J. R. (Ed.). Performance evaluation, benchmarks, and attribution analysis. New York: The Institute of Chartered Financial Analysts, 1995. -pp. 108-116.
2. Brown K. C., W.V. Harlow, L. T. Starks. Of tournaments and temptations: an analysis of managerial incentives in the mutual fund industry // The Journal of Finance, 1996. -Vol. LI, Nº 1, March. -pp. 85-110.
3. Brown S. J., W. N. Goetzmann. Mutual fund styles // Journal of Financial Economics, 1997. – Nº. 43. -pp. 373-399.
4. Burr B. Mutual funds are misclassified: errors may help equity marketing // *Pensions & Investments*, 1994. -Nº 17, October. -p. 2.
5. Gruber M. J. Another puzzle: the growth in actively managed mutual funds // Journal of Finance, 1996. -Vol. 51. -pp. 783-810.
6. Capon N., G. J. Fitzsimons, R. A. Prince. An individual level analysis of the mutual fund investment decision // Journal of Financial Services Research, 1996. –Nº 10. -pp. 59-82.
7. Chevalier J. A., G. D. Ellison. Risk taking by mutual funds as a response to incentives // Journal of Political Economy, 1997. -Nº 105. -pp. 1167-1200.
8. Dibartolomeo D., E. Witkowski. Mutual fund misclassification: evidence based on style analysis // Financial Analysts Journal, 1997. -September-October. -pp. 32-43.
9. Elton E. J., M. J. Gruber, C. R. Blake. Incentive fees and mutual funds // Working Paper of SSRN Electronic Library (http://papers.com), 2001. -49 pp.
10. Gallo J.G., L.J. Lockwood. Benefits of proper style classification of equity portfolio managers // The Journal of Portfolio Management, 1997. –spring. -pp. 47-55.
11. Goetzmann W. N., N. Peles. Cognitive dissonance and mutual fund investors // The Journal of Financial Research, 1997. -Vol. 20, Nº 2. -pp.145-158.
12. Goetzmann W., B. Greenwald, G. Huberman. Market response to mutual fund performance // Working Paper of Columbia University, 1992.
13. Gruber M. J. Another puzzle: the growth in actively managed mutual funds // Journal of Finance, 1996. -Vol. 51. -pp. 783-810.
14. Hector G. The mutual fund shell game // Worth, 1995. -Vol. 4, Nº 2, March. -pp. 108-112.
15. Herzfeld T. Better returns: some funds seek it via leverage // Barron's, 1991. -pp. 71-50.
16. Ippolito R. A. Consumer reaction to measures of poor quality: evidence from the mutual fund industry // Journal of Law and Economics, 1992. -Vol. 35. -pp. 45-70.
17. Kane A., D.L. Satini, J.W. Aber. Lessons from the growth history of mutual funds // Working Paper of Boston University, 1991.

18. Kim M., R. Shukla, M. Tomas. Wolf in sheep's clothing: do mutual fund objectives tell the truth? // Working Paper of Syracuse University, 1995.
19. Kim M., R. Shukla, M. Tomas. Mutual fund objective misclassification, // Working Paper of Syracuse University, 1999.
20. Lakonishok J., A. Shleifer, R. Thaler, R. Vishny. Window dressing by pension fund managers // American Economic Review, 1991. -Vol. 81, Nº2. -pp. 227-231.
21. Leclair R.T. Discriminant analysis and the classification of mutual funds // Journal of Economics and Business, 1974. -Vol. 26, Nº 3, spring. -pp. 220-224.
22. Najand M., L.J. Prather. The risk level discriminatory power of mutual fund investment objectives: additional evidence // Journal of Financial Markets, 1999. -Nº 2. -pp. 307-328.
23. Orphanides A. Compensation incentives and risk taking behaviour: evidence from mutual funds // Finance and economics Discussion Series of Federal Reserve Board 1996. -Nº 96-21.
24. Otten R., D. Bams. Statistical test for return-based style analysis // Working Paper of Social Science Research National Electronic Paper Collection (http://papers.ssrn.com), 2001. –32 pp.
25. Patel J., R.J. Zeckhauser, D. Hendricks. Investment flows and performance evidence from mutual funds, cross-border investments, and new issues. In Sato R., R. Levich, R.V. Ramachanday (ed.). In Japan, Europe, and International Financial Markets: Analytical and Empirical Perspective. -Cambridge: Cambridge University Press, 1992. -pp. 34-48.
26. Schwimmer A. Mutual fund group releases study on derivative use. // Investment Dealers Digest, 1994. -Vol. 60. -pp. 6-7.
27. Sharpe W. F. Determining a fund's effective asset mix // Investment Management Review, 1988. -December. -pp. 59-69.
28. Sharpe W. F. Asset allocation: management style and performance measurement // Journal of Portfolio Management, 1992. -Vol. 18, Nº 2, winter. -pp. 7-19.
29. Simon R. Risky Securities can turn a pet fund into a killer // *Money*, 1994. -pp. 49-51.
30. Sirri E. R., P. Tufano. The demand for mutual fund services by individual investors // Working Paper of Harvard University, 1992.
31. Sirri E. R., P. Tufano. Buying and selling mutual funds: flows, performance, fees and services // Working Paper of Harvard Business School, 1993.
32. Sirri E. R., P. Tufano. Costly search and mutual fund flows // Journal of Finance, 1998. -Vol. 53. -pp. 1589-1622.
33. Stone A. Equity-income funds: how much safety // Business Week, 1994. - pp. 92-93.
34. Tierney D. E., K. Winston. Using generic benchmarks to present manager styles // The Journal of Portfolio Management, 1991. -Summer. -pp. 34-36.
35. Torre B., M. García. Manager's incentives to mutual funds performance: an empirical investigation in the Spanish market // Working Paper of Social Science Research National Electronic Paper Collection (http://papers.ssrn.com), 2001a. -May. 32 pp.
36. Torre B., M. García. Investment companies as alternative institutions to traditional banks: an empirical analysis of Spanish reaction to the mutual funds markets // Working Paper of Social Science Research National Electronic Paper Collection (http://papers.ssrn.com), 2001b. -April. -40 pp.
37. Vallejo B. Management and performance of equity and balance Spanish mutual funds: strategic asset allocation // no-published Dissertation of Basque Country University, 2003.
38. Witkowsky E. Mutual fund misclassification: evidence based on style analysis // Dissertation of Harvard University, 1994.