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Management company size influence on fund flows *

Influencia del tamaño de la compañía gestora sobre los flujos en fondos de inversión

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ABSTRACT This paper tests the degree of the relationship between the fund management company size and the subsequent flows of money and investors. We intend to provide detailed evidence with a non-parametric methodology by improving the statistics to gather specific situations. There is clear evidence of the different attitudes of investors towards the branch image of the management company whether we analyze money market or domestic equity funds in the Spanish market. Furthermore, the weight investors give to the fund family is conditioned to past performance.

KEYWORDS Mutual funds; Management company; Size effect; Contingency tables.

RESUMEN Este artículo analiza la relación existente entre el tamaño de las compañías gestoras de fondos de inversión y los flujos de dinero y partícipes posteriores. El objetivo es proporcionar evidencia empírica exhaustiva a través de metodología no paramétrica que incluye algunas modificaciones en los estadísticos para recoger situaciones específicas. Se encuentra evidencia de las diferentes actitudes de los inversores hacia la imagen de marca de las compañías gestoras en función de la consideración de fondos del mercado monetario o fondos de renta variable nacional del mercado español. No obstante, la importancia en las decisiones de inversión que toma la compañía gestora está siempre supeditada a los resultados previos de gestión.

PALABRAS CLAVE Fondos de inversión; Compañía gestora de fondos; Efecto tamaño; Tablas de Contingencia.

1. INTRODUCTION

The way individuals take investment decisions has attracted major attention in the financial literature during the last years. A better knowledge about this procedure would provide interesting information to portfolio managers.

Most of the academic research measuring and explaining the movements of money into and out mutual funds has focussed on U.S. mutual funds. The vast majority of these studies suggest that consumers' mutual fund purchase decision is based on its prior performance. The first studies on this issue were carried out by Spitz (1970), Smith (1978) and Patel,

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Zeckhauser and Hendricks (1991), who find a positive lineal relationship between flows into funds and past returns.

A possible explanation to this positive performance-flow relationship is that investors may rely on performance to be, to some extent, persistent (1). Therefore, investors would be interested in investment strategies based on chasing funds with best past performance.

Further research on the performance-flow relationship is developed by Gruber (1996), Chevalier and Ellison (1997) and Sirri and Tufano (1998) who show that investors respond asymmetrically to past performance. They flock into funds with superior performance while fail to withdraw from funds with inferior performance.

A large attention of researchers has been drawn to the determinants of investment, in short, identifying what drives investors to select a fund or another. Apart from the performance influence, specific studies have been carried out in relation with fees (Barber, Odean and Zheng, 2005) or the advertising effect (Sirri and Tufano, 1998; and Jain and Wu, 2000). Either included in the calculation of the fund flow measures or as an individual determinant, the size of the fund has also been considered in most of the studies in the field, i.e. Gruber (1996), Del Guercio and Tkac (2002).

However, we find a lack of empirical studies on the specific influence of the complex size of the management company on the subsequent inflows to individual funds. Larger fund families may present advantages regarding economies of scale, distribution channels, and advertising. Therefore, these families would be expected to attract larger inflows. Regarding the study of fund families, Nanda, Wang and Zheng, (2004) discuss the existence of an intrafamily spillover effect that would drive larger funds into a family if it has a star performer fund. Khorana and Servaes (2004) relate individual fund performance to the fund family performance, and the effects of fees, the industry-adjusted returns of the family or the existence of a top fund on the market share of the management company. Particularly, they are concerned with the possible existing conflicts of interest between the investors and the mutual fund management companies.

The Spanish mutual fund market has some particularities that justify its specific analysis. At the end of 2004, the ten biggest management companies have a 76.01% share of the total net assets invested in mutual funds, whilst the rest of the assets are divided up among other 106 companies. Additionally, the two main management companies, Santander Gestión and BBVA Gestión manage 45.75%. This effect may suppose an especial importance of the mutual fund management company.

Sirri and Tufano (1998) include complex size within search costs. They hypothesise that investors can be more prone to invest in funds that can easily identify. It is found that complex size is an important determinant of fund flows. With a similar argument, Jain and Wu

(1) There are several pieces of research in the literature that aim at identifying the existence of skills based on prior performance. Assorted results are found: Grinblatt and Titman (1992), Hendricks, Patel, and Zeckhasuser (1993) or Elton, Gruber and Blake (1996), among others, find persistence in mutual fund performance. On the contrary, Brown *et al.* (1992), and Malkiel (1995) claim that the persistence phenomenon might be spurious in survivorship bias appears. For the Spanish market, several studies have tested for performance persistence (Menéndez and Álvarez, 2000; Ferruz and Vargas, 2005; Ciriaco and Santamaría, 2005; Toledo and Marco, 2006, and Ferruz *et al.,* 2007).

(2000) focus on advertising, and conclude that advertised funds are able to attract larger flows. In this study there are not advertising expenses or media covering available, therefore, we identify search costs with funds' complex size. Given the characteristics of the Spanish market shown above, both features are probably highly related. Larger fund families benefit from the media coverage, not only from the advertising of the fund themselves, but also, from general advertising of the popular financial institutions they belong to. In fact, the most important management companies form part of holdings of banking institutions. Therefore, investors are familiar with these fund families. Under these circumstances one might hypothesise that larger fund families are expected to attract larger fund flows than their competitors, even becoming the first decision variable for investors.

The present study gathers an important part of the Spanish mutual fund industry because it analyses money market funds and domestic equity funds. There is evidence of the different influence of the family market share for both categories; for money market funds we find a branch image effect, funds that belong to large fund families has a percentage growth more than proportional to what expected according to the market share. Additionally, the consideration of the past return of the funds provides new evidence because the relationship of the fund flows is conditioned to the level of return.

Contrarily to what it might be thought, the fund family is not essential in fund investment decisions. The results confirm that the most important feature to take investment decisions is past return, and the fund family has different influence whether the funds have been good or bad performers.

Previous research about the determinants of fund flows in the Spanish market includes Martínez (2001), Torre and García (2002) who show the importance of emotional factors; Ciriaco, Del Río and Santamaría (2005) and Toledo and Marco (2006). These last two studies find an asymmetric performance-flow relationship. Martí, Matallín and Fernández (2008) analysed the influence of return on the selection of pension plans.

This study offers a new approach, because previous methodologies were related with pooled regressions that consider several determinants at a time. Here, the focus is only on the complex size and on the conditional influence to prior performance. Non-parametric methodology is used to analyse the relationship between the size of the fund family and fund flows. Furthermore, we also include a modification in the calculation of the Z-test of Malkiel (1995) in the empirical application. In this manner, we intend to minimise any possible inconsistency with other statistics when evaluating the relationship between two variables.

The paper is organised as follows. Section 2 provides the definition of the flow measures and Section 3 describes the data. The definition of the contingency table methodology and preliminary results are set forth in Section 4. Section 5 explains complimentary statistics and the empirical analysis. A final section concludes.

2. DETERMINANTS OF FUND FLOWS

This study applies a cross-section analysis with non-parametric methodology based on contingency tables to detect the importance of the complex size of the management com-

pany each fund belongs to, on the subsequent flows of money and investors. The statistics applied on the contingency tables will determine whether we can reject or not the hypothesis of independence of the two variables considered; complex size and fund flows.

In order to evaluate the effect of the management company complex size, we compute the family market share (FMS) as follows:

$$FMS_{i,t} = \frac{TNA_{ifamily,t}}{TNA_{industry,t}} \tag{1}$$

where $TNA_{ifamily,t}$ is the total net assets of fund *i*'s family at moment *t*. Every month, it is checked for the membership to the family to correct for mergers and acquisitions. $TNA_{industry,t}$ is the total net assets of the mutual fund industry, in particular, the category fund *i*'s belongs to, at moment *t*.

The second variable is the subsequent fund flows. The growth of a fund is evaluated by the growth in terms of money and investors. On the one hand, quarterly net percentage money flow, $PMF_{i,t+3}$, is formally calculated as:

$$FMF3_{i,t+3} = \frac{TNA_{i,t+3} - TNA_{i,t}(1 + R_{i,3})}{TNA_{i,t}} \tag{2}$$

where $PMF3_{i,t+3}$ is the net percentage money flow into fund *i* in the 3 following months after moment *t*; $TNA_{i,t+3}$ is the total net assets of fund *i* in period $t+3$; $TNA_{i,t}$ is the total net assets of fund *i* in period *t*, and $R_{i,3}$ is the return of fund *i* during the 3 following periods after moment *t*.

On the other hand, the variation experienced in a fund in terms of investors corresponds to the following expression:

$$PIF3_{i,t+3} = \frac{I_{i,t+3} - I_{i,t}}{I_{i,t}} \tag{3}$$

where $PIF3_{i,t+3}$ is the net percentage investor flow and represents the change in the number of investors in fund *i* during the 3 following months after moment *t*; $I_{i,t+3}$ and $I_{i,t}$ represent the number of investors in fund *i* in period $t+3$ and *t*, respectively.

It is worth noting that within studies of determinants of fund flows the variable money flows has traditionally been considered as dependent variable. Del Guercio and Tkac (2002) include an investor flow measure when evaluating pension fund purchase decisions, but to our best knowledge it has not been used to check for the robustness of the results encountered in empirical analysis of mutual funds.

3. DATA DESCRIPTION

Our data set is collected from the Spanish Securities and Exchange Commission (CNMV) database. It spans the period from June 1994 to December 2004. The monthly data avail-

able covers all existing funds during that period; it is, therefore, free of survivorship bias. We analyse and compare two significant categories, such as domestic equity funds and money market funds. Money market funds are easily identified by the denomination of the fund [(2)]. The classification of domestic equity funds is based on the *Collective Investment Management Association* (Inverco), in total; our data set comprises 164 domestic equity funds and 235 money market funds.

TABLE 1

CROSS-SECTIONAL STATISTICS FOR DOMESTIC EQUITY AND MONEY MARKET FUNDS

This table shows cross-sectional information about Spanish money market (right part) and domestic equity funds (left part). «Number of funds» reflects the number of listed funds as of the date indicated in each category. «Number of fund families» is the total number of management companies in operation. The bottom part reports some statistics of the sample of funds analysed in study, specifically, the mean and the standard deviation (S.D.). «Fund 1-month flow ratio» represents the monthly growth rate of net new money in the fund, which is defined as $[TNA_{i,t} - TNA_{i,t-1} \cdot (1 + R_{i,t})]/TNA_{i,t-1}$, where $TNA_{i,t}$ is fund *i*'s total net assets at month *t*, and $R_{i,t}$ is the net return of fund *i* in month *t*.

		Domestic equity fund industry			*Money market fund industry*		
		Jun-1994	*Dec*-1999	*Dec*-2004	*Jun*-1994	*Dec*-1999	*Dec*-2004
Number of funds		78	160	139	137	203	165
Total fund assets (€ thousands)		1,779,166	15,453,784	9,882,851	32,833,285	42,598,008	57,988,791
Number of investors		140,477	634,640	469,363	1,258,306	1,689,118	1,910,626
Number of fund families		54	76	63	73	76	63
Funds assets (€ thousands)	Mean	22,809.8	96,586.2	71,596.7	244,980.7	210,151.7	402,822.0
	S.D.	32,390.5	159,222.6	102,342.1	426,032.9	411,431.9	1,024,203.0
Number of investors	Mean S.D.	1,848.4 3,106.4	3,991.4 7,229.5	3,376.7 5,900.5	9,388.9 18,394.3	8,326.6 16,888.7	15,390.6 39,471.7
Past 1 month-return	Mean S.D.	-4.3787% 1.9351%	4.7013% 3.9023%	3.1792% 1.1836%	0.4575% 0.2362%	0.1517% 0.0556%	0.1011% 0.0257%
Fund 1 month flow ratio	Mean S.D.	1.5763% 10.1744%	-2.3459% 4.4478%	0.2355% 7.3503%	2.3150% 6.2928%	-3.4242% 3.9839%	-1.0323% 5.9672%

Table 1 reports interesting features of the two categories of funds analysed. Both have experienced an important growth during the horizon of study, but the growth of money market funds is much more moderate. Domestic equity funds have almost doubled the number of funds in operation in one decade and their total net assets increase more than five fold within this period. If we focus on the number of fund families that manage listed funds at a particular moment, Table 1 shows an increasing number of fund families until 1999 due to the expansion of the fund industry and a subsequent decrease due to a generalised financial institution merging process starting in 2000.

(2) Since specific regulation of 2005, delimitation within the denomination of the fund (money market or equity fund; under the Spanish acronym of FIAMM or FIM) is no longer used.

Regarding the descriptive statistics of the sample, we can observe that money market funds have a larger average size and the average number of investors is also higher. As expected, there are important differences in the distribution of returns. Even if, occasionally, monthly return is higher for domestic equity funds, investment in these financial instruments implies a higher volatility as shown by the standard deviation of returns.

4. CONTINGENCY TABLE ANALYSIS

The non-parametric analysis based on contingency tables is a widespread technique in financial research. Contingency tables classify funds as winners or losers in each of two consecutive time periods and examines de the distribution of winner-loser combinations.

We rank funds each quarter according to their family market share and divide the sample in two groups. Funds above the median in *FMS* are labelled as *Winners* and funds with lower *FMS* are *Losers*. The same procedure is followed to rank subsequent quarterly money and investor flows.

The expression *WW (LL)* denotes the number of funds that are *winners (losers)* in the two categories; whereas *WL (LW)* indicates funds that are *winners (losers)* according to the family market share and then *losers (winners)* in the following measure of flow considered. According to this classification, we obtain 2×2 contingency tables. The application of the Chi-square test defined in Equation 4 allows the detection of a potential relationship between the variables.

$$\chi^2 = \sum_{i=1}^{n} \sum_{j=1}^{n} \frac{(O_{it} - E_{ij})^2}{E_{i,j}} \tag{4}$$

where O_{ij} (E_{ij}) is the actual (expected) frequency in the ith row and the jth column in the contingency table. The distribution presents one degree of freedom. The Chi-square test is very useful applied in every quarterly contingency table, but for the overall effect, the Cochran's test (1954) is more accurate. The statistic is calculated following.

$$Y = \frac{\chi^2 = \sum_{i=1}^{g} w_i d_i}{\left(\sum_{i=1}^{g} w_i P_i Q_i \right)^{1/2}} \tag{5}$$

where Y follows N (0, 1) and g is the number of 2×2 tables analysed.

$$P_i = \frac{n_{i1} p_{i1} + n_{i2} p_{i2}}{(n_{i1} + n_{i2})} \tag{6}$$

$$Q_i = (1 - P_i) \tag{7}$$

$$d_i = (p_{i1} - p_{i2}) \tag{8}$$

$$w_i = \frac{n_{i1} n_{i2}}{(n_{i1} + n_{i2})} \tag{9}$$

where n_{i1} and n_{i2} are the sample sizes in the two groups, ($WW + WL$) and ($LL + LW$) respectively; and p_{i1} (p_{i2}) is the relationship between *WW (LW)* and n_{i1} (n_{i2}).

The above defined statistics provide evidence of a significant relationship between the variables. However, in order to define properly how this relationship is, we calculate the Cross-Product Ratio *(CPR)* ratio. If *CPR* is < (>) than 1 indicates inverse (direct) relationship between family market share and subsequent flows.

$$CPR = \frac{(WW \cdot LL)}{(WL \cdot LW)} \tag{10}$$

We test the null hypothesis that funds attract flows to a greater extent when they belong to funds with large complex size. Large fund families benefit from economies of scale and bigger media coverage. The variables that compose the contingency table are the market share and the fund flows, non-significant tests would mean that funds are able to attract flows at the same proportion of the market share of the management company. Significant tests with inverse relationship between the variables would mean that flows are not related with the family size. Finally, significant tests with direct relationship would indicate that the percentage growth of the funds increases potentially upon the market share of the management company.

Table 2

Family market share influence on domestic equity fund flows

This table reports the results of the non-parametric analysis of the relationship between family market share defined as the ratio between the size of the family fund *i* belongs to and the size of fund i's whole category ($FMS_{i,t} = TNA_{ifamily,t} / TNA_{industry,t}$) and the flow measures into a fund (quarterly percentage money and investor flow: *PMF*3 and *PIF*3). *Panel A* shows the results for the total sample of domestic equity funds, *Panel B (Panel C)* presents results of the subsample of winner (loser) funds, including funds with annual return above (below) the median at every quarter. In order to establish a direct or inverse relationship, we have computed the number of contingency tables with positive or negative *CPR* ratio. 5% significance level considered.

Panel A: Total sample						
	PMF3			*PIF3*		
	1994-2004	1994-1999	2000-2004	1994-2004	1994-1999	2000-2004
Number of contingency tables	41	23	18	41	23	18
Number of periods with significant χ^2 test	9	5	4	15	10	5
Direct relationship	4	4	0	8	8	0
Inverse relationship	5	1	4	7	2	5
Y-Cochran	-0.036	0.252	-0.278	-0.004	0.402	-0.340
p-value (Y)	0.486	0.600	0.391	0.499	0.656	0.367

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Table 2 (cont.)

Family market share influence on domestic equity fund flows

This table reports the results of the non-parametric analysis of the relationship between family market share defined as the ratio between the size of the family fund *i* belongs to and the size of fund i's whole category ($FMS_{i,t} = TNA_{ifamily,t} / TNA_{industry,t}$) and the flow measures into a fund (quarterly percentage money and investor flow: *PMF*3 and *PIF*3). *Panel A* shows the results for the total sample of domestic equity funds, *Panel B (Panel C)* presents results of the subsample of winner (loser) funds, including funds with annual return above (below) the median at every quarter. In order to establish a direct or inverse relationship, we have computed the number of contingency tables with positive or negative *CPR* ratio. 5% significance level considered.

Panel B: Winner funds (in return)						
	PMF3			PIF3		
	1995-2004	1995-1999	2000-2004	1995-2004	1995-1999	2000-2004
Number of contingency tables	37	19	18	37	19	18
Number of periods with significant χ^2 test	31	14	17	30	14	16
Direct relationship	9	6	3	15	12	3
Inverse relationship	22	8	14	15	2	13
Y-Cochran	-0.342	0.052	-0.589	-0.260	0.266	-0.590
p-value (Y)	0.366	0.521	0.278	0.398	0.605	0.278
Panel C: Loser funds (in return)						
	PMF3			PIF3		
	1995-2004	1995-1999	2000-2004	1995-2004	1995-1999	2000-2004
Number of contingency tables	37	19	18	37	19	18
Number of periods with significant χ^2 test	27	14	13	24	14	10
Direct relationship	14	9	5	12	11	1
Inverse relationship	13	5	8	12	3	9
Y-Cochran	-0.057	0.243	-0.247	-0.025	0.643	-0.441
p-value (Y)	0.477	0.596	0.403	0.490	0.740	0.330

Table 2, *Panel A*, shows the results of the analysis of the effect of the family market share on the subsequent quarterly net fund flows. Contrarily to what might be expected, for the whole sample of domestic equity funds, little evidence is found on a significant relationship between family market share and consequent flows of money and investors. Similar results are found in Table 3, *Panel A*, for money market funds. According to this result, within the two categories of funds analysed, the percentage growth of the funds is not significantly different of the market share of the fund family.

As shown in the introduction, previous research concludes about the relevance of past return when taking domestic equity fund investment decisions. In this sense, we try to include this important determinant of decisions in our non-parametric study. We split the sample at every quarter in winner *(Panel B)* and loser *(Panel C)* funds according to the past twelve-month return. In doing so, we can conclude whether family market share is considered by investors independently or not of the past return attained. In Table 1, for domestic equity funds, the Cochran's test is non-significant either for the whole period or for the two

subsamples; which maintains the conclusions of *Panel A*. However, during 22 quarters, especially at the end of the sample, the growth of the funds is less than proportional to the market share. This result leads us to conclude that investors are influenced by the size of the management company but their first concerned is past return.

Results for money market funds are gathered in Table 3. In this case, consistently with the inherent characteristics of this type of funds, the classification of funds according to their return is based on whether their past 3-month return is above (winner-*Panel B*) or below (loser-*Panel C*) the median [(3)]. For money market funds it seems also clear that this effect is conditioned to past return of the fund. *Panels B* and *C* present again non-significant Cochran's tests which evaluate several quarters as a whole. Once isolated the effect of past return, the number of significant quarterly contingency tables increases considerably. In this case, the growth of winner funds is even above the market share of the family.

Table 3
Family market share influence on flows of money market funds

This table reports the results of the non-parametric analysis of the relationship between family market share defined as the ratio between the size of the family fund *i* belongs to and the size of fund *i*'s whole category ($FMS_{i,t} = TNA_{ifamily,t}/TNA_{industry,t}$) and the flow measures into a fund (quarterly percentage money and investor flow: *PMF*3 and *PIF*3). *Panel A* shows the results for the total sample of money market funds, *Panel B (Panel C)* presents results of the subsample of winner (loser) funds, including funds with annual return above (below) the median at every quarter. In order to establish a direct or inverse relationship, we have computed the number of contingency tables with positive or negative *CPR* ratio. 5% significance level considered.

Panel A: Total sample						
	*PMF*3			*PIF*3		
	1994-2004	1994-1999	2000-2004	1994-2004	1994-1999	2000-2004
Number of contingency tables	41	23	18	41	23	18
Number of periods with significant χ^2 test	8	7	1	1	1	0
Direct relationship	6	6	0	1	1	0
Inverse relationship	2	1	1	0	0	0
Y-Cochran	0.170	0.253	0.074	0.088	0.142	0.026
p-value (Y)	0.568	0.600	0.530	0.535	0.557	0.510
Panel B: Winner funds (in return)						
	*PMF*3			*PIF*3		
	1995-2004	1995-1999	2000-2004	1995-2004	1995-1999	2000-2004
Number of contingency tables	40	22	18	40	22	18
Number of periods with significant χ^2 test	31	16	15	30	16	14
Direct relationship	24	11	13	19	9	10
Inverse relationship	7	5	2	11	7	4
Y-Cochran	0.269	0.308	0.225	0.172	0.187	0.154
p-value (Y)	0.606	0.621	0.589	0.568	0.574	0.561

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(3) Preliminary analyses of the determinants of flows for domestic equity funds and money market funds provide evidence of the different time periods investors consider when making investing decisions.

TABLE 3 (cont.)

FAMILY MARKET SHARE INFLUENCE ON FLOWS OF MONEY MARKET FUNDS

This table reports the results of the non-parametric analysis of the relationship between family market share defined as the ratio between the size of the family fund *i* belongs to and the size of fund *i*'s whole category ($FMS_{i,t} = TNA_{ifamily,t} / TNA_{industry,t}$) and the flow measures into a fund (quarterly percentage money and investor flow: *PMF*3 and *PIF*3). *Panel A* shows the results for the total sample of money market funds, *Panel B (Panel C)* presents results of the subsample of winner (loser) funds, including funds with annual return above (below) the median at every quarter. In order to establish a direct or inverse relationship, we have computed the number of contingency tables with positive or negative *CPR* ratio. 5% significance level considered.

PANEL C: LOSER FUNDS (IN RETURN)						
	PMF3			PIF3		
	1995-2004	1995-1999	2000-2004	1995-2004	1995-1999	2000-2004
Number of contingency tables	40	22	18	40	22	18
Number of periods with significant χ^2 test	29	14	15	32	16	16
Direct relationship	17	10	7	19	10	9
Inverse relationship	12	4	8	13	6	7
Y-Cochran	0.152	0.245	0.049	0.105	0.145	0.061
p-value (Y)	0.560	0.597	0.519	0.542	0.558	0.524

Regarding the degree of the relationship, there is mixed evidence of direct and inverse relationship (this is observed in the sign of the *CPR* ratio). However, deepening in the results, interesting conclusions are obtained. The statistics that consider the whole sample do not produce significant results because different attitudes towards the market share of the fund family are found depending on the time period considered and on the classification of winner and loser fund regarding past return.

5. IMPROVED METHODOLOGY

This section intends to further investigate on the best methodology to provide useful information about investors attitudes towards the size of the fund management company. We propose the application of the statistic Z-test of Malkiel (1995). Its expression is described below:

$$Z - test = \frac{Y - np}{\sqrt{np(1-p)}} \tag{11}$$

Many authors have used it to test performance persistence; therefore, it is also useful to test the relationship of two variables from the contingency table approach. In Equation 11, *Y* is the number of winner funds in the two categories *(WW)*; *n* is the number of winner funds in the first category *(WW + WL)*, and *p* is the probability assigned to the fact of being winner in this category. Following Malkiel's argument, the value of *p* is 0.5, that is to say, we test whether they have the same probability. If Z-test takes positive values, it indicates that there is a direct trend, whilst if it takes negative values, it shows evidence in favour of an inverse relationship.

This ratio is useful when we work with non-symmetric tables of contingency, where the application of *CPR* ratio and Chi-square test may not be conclusive. However, the definition of the Malkiel test (Equation 11) only analyses the funds classified as winners in the first variable, the family market share. The bias would be especially representative when we split the sample in winner and loser funds in past return, thus the resulting contingency tables are not symmetric.

Table 4 provides an example of a non-symmetric contingency table where, *CPR* ratio provides non-significant results, whilst the chi-square test shows significant relationship between the variables, but we have no information about the sense of this relationship (direct or inverse).

TABLE 4

EXAMPLE OF THE APPLICATION OF STATISTIC TESTS TO A NON-SYMMETRIC CONTINGENCY TABLE

This table shows the results of statistics applied to a contingency table that evaluates the relationship between two variables. *WW (LL)* stands for the number of funds classified as winners (losers) with the median criterion in two variables. *WL (LW)* refers to the number of winner (loser) funds in the first category and loser (winner) funds in the second.

CONTINGENCY TABLE CELLS	*WW* 50	*WL* 32	*LW* 32	*LL* 21
CPR Ratio (p-value del Z-test)		1.025 (0.945)		
$\chi 2$ test (p-value)		12.822 (0.000)		
Z-test (p-value)		1.988 (0.047)		

The application of the Z-test of Malkiel would conclude about a direct significant relationship. However, we intend to deepen the understanding of the influence of the fund family market share by complementing the analysis of Malkiel's Z-test. The original shape of the statistics only focuses on the expected frequency of winner funds in the first category (market share of the family in our study), but fails to detect if there are strong relationships on the loser tail. We propose the calculation of the traditional Malkiel's Z-test and a Modified Z-test focused on the expected frequencies of the cells for funds with family market share below the median (loser).

$$ModifiedZ - Test = \frac{LL - (LL + LW) \cdot p}{\sqrt{(LL + LW) \cdot p \cdot (1 - p)}} \qquad (12)$$

If we apply this Modified Z-test to the example of Table 4, the value of the statistic is -1.511, significant at 1%. This result indicates an inverse relationship between the variables for the loser tail. In short, Z-test and Modified Z-test may provide different results because they focus on a different part of the contingency table. Both analyses are complementary and necessary to approach the influence of the fund company size on the subsequent fund flows.

This analysis will be carried out on the aggregate contingency tables of the sample to detect asymmetries in the relationship of the variables when funds are initially classified as winners or losers in return. Table 5 presents the values of the cells of the aggregate

contingency tables and the results of the statistical tests Z-test and Modified Z-test for the both samples of funds analysed.

Panels A, B and *C* refer to domestic equity funds. We conclude that for the whole sample of funds *(Panel A)*, there are no significant tests of direct or inverse relationship between the variables either for funds classified as winners or losers in fund family market share. The percentage flow (money or investor flow) of these funds is, therefore, proportional to the market share of the management company. According to these results, the complex size in general terms affects and has influence on the subsequent fund flows. Under this analysis the null hypothesis of the positive relationship between fund complex size and subsequent flows is confirmed. Investors pay greater attention to funds that belong to a large family as a way to decrease their search costs.

Table 5

Asymmetry in the influence of market share on fund flows

The first half of the table shows results for domestic equity funds (*Panels A, B* and *C*) and the second half gathers money market fund data (*Panels D, E* and *F*). The values of the four cells of the contingency table are detailed under the denominations of *WW*, *WL*, *LW*, and *LL*, *WW (LL)* stands for the number of funds classified as winners (losers) with the median criterion in two variables. *WL (LW)* refers to the number of winner (loser) funds in the first category and loser (winner) funds in the second. *Panels A* and *D* show the results for the total sample, *Panels B* and *E* present results of the subsample of winner funds (above the median of past annual return); and *Panels C* and *F* show aggregate data of loser funds (below the median of past annual return).

Domestic equity funds							
Panel A: Total sample							
PMF3				*PIF3*			
WW	*WL*	*LW*	*LL*	*WW*	*WL*	*LW*	*LL*
1347	1381	1410	1394	1334	1342	1386	1389
Z-test (p-value)		-0.651 (0.515)		Z-test (p-value)		-0.155 (0.877)	
Modified Z-test (p-value)		-0.302 (0.763)		Modified Z-test (p-value)		0.057 (0.955)	
Panel B: Winner funds (in return)							
PMF3				*PIF3*			
WW	*WL*	*LW*	*LL*	*WW*	*WL*	*LW*	*LL*
656	649	633	469	659	644	606	496
Z-test (p-value)		0.194 (0.846)		Z-test (p-value)		0.416 (0.678)	
Modified Z-test (p-value)		-4.940 (0.000)		Modified Z-test (p-value)		-3.314 (0.001)	
Panel C: Loser funds (in return)							
PMF3				*PMF3*			
WW	*WL*	*LW*	*LL*	*WW*	*WL*	*LW*	*LL*
442	626	556	785	461	607	556	785
Z-test (p-value)		-5.630 (0.000		Z-test (p-value)		-4.468 (0.000)	
Modified Z-test (p-value)		6.253 (0.000)		Modified Z-test (p-value)		6.253 (0.000)	
Money market funds							

(Continúa pág. sig.)

TABLE 5 (CONT.)

ASYMMETRY IN THE INFLUENCE OF MARKET SHARE ON FUND FLOWS

The first half of the table shows results for domestic equity funds (*Panels A, B* and *C*) and the second half gathers money market fund data (*Panels D, E* and *F*). The values of the four cells of the contingency table are detailed under the denominations of *WW*, *WL*, *LW*, and *LL*, *WW (LL)* stands for the number of funds classified as winners (losers) with the median criterion in two variables. *WL (LW)* refers to the number of winner (loser) funds in the first category and loser (winner) funds in the second. *Panels A* and *D* show the results for the total sample, *Panels B* and *E* present results of the subsample of winner funds (above the median of past annual return); and *Panels C* and *F* show aggregate data of loser funds (below the median of past annual return).

PANEL D: TOTAL SAMPLE							
PMF3				*PIF3*			
WW	*WL*	*LW*	*LL*	*WW*	*WL*	*LW*	*LL*
1811	1670	1760	1924	1773	1707	1795	1888
Z-test (p-value)		2.390 (0.017)		Z-test (p-value)		1.119 (0.263)	
Modified Z-test (p-value)		2.702 (0.007)		Modified Z-test (p-value)		1.532 (0.125)	
PANEL E: WINNER FUNDS (IN RETURN)							
PMF3				*PIF3*			
WW	*WL*	*LW*	*LL*	*WW*	*WL*	*LW*	*LL*
1040	599	1052	791	1036	603	1095	748
Z-test (p-value)		10.893 (0.000)		Z-test (p-value)		10.695 (0.000)	
Modified Z-test (p-value)		-6.080 (0.000)		Modified Z-test (p-value)		-8.083 (0.000)	
PANEL F: LOSER FUNDS (IN RETURN)							
PMF3				*PIF3*			
WW	*WL*	*LW*	*LL*	*WW*	*WL*	*LW*	*LL*
722	1037	651	1090	688	1071	641	1100
Z-test (p-value)		-7.511 (0.000)		Z-test (p-value)		-9.132 (0.000)	
Modified Z-test (p-value)		10.521 (0.000)		Modified Z-test (p-value)		11.001 (0.000)	

Once we control for the past return of the funds (*Panels B* and *C*); we also find the same behaviour for percentage money and investor flows. However, the relationship between winner and loser funds in market share differs clearly. Initially, we consider funds with good results in terms of return *(Panel B)*. For funds with a family market share above the median, there is no significant result; the fund flows correspond to the expected frequency according to the market share. However, those funds with a family market share below the median are able to attract more flows than expected by the market share. We reinforce the conclusion about the influence of the complex size; the percentage growth of funds with good performance is similar to the size of the fund family, except for the funds that belong to small fund families, that for the fact of being good performer, they grow in a greater proportion than the complex size.

Secondly, *Panel C* provides new information for loser funds in return. The situation differs completely from *Panel B*. Both, funds above and below the median in family market share receive less money and investor flows that they would be expected to. Therefore, the

influence of the complex size is conditioned to the level of past return attained. In other words, investors do not follow necessarily a large complex size, rather, they are primarily concerned with past return and then they are influence by the size of the management company. This result is valid even for the particularities of the Spanish market of important concentration of the management companies that could lead to think in the complex size as a first determinant of decisions.

The results of money market funds are summarised in *Panels D*, *E* and *F* of Table 5. For the whole sample *(Panel D)*, we find a significant direct relationship for the quarterly percentage money flow, both with the Z-test and Modified Z-test. That is to say that fund flows are proportionately bigger (smaller) than the market share for winners (losers) in market share. Therefore, the brand image effect is higher for money market funds than for domestic equity funds. In *Panel E* the results of the Z-test and Modified Z-test for winners and loser funds according to the market share indicate that, independently of the market share of the fund company, funds are able to attract flows in greater proportion that they are expected to. Therefore, the evaluation of the market share is previously conditioned to the level of return obtained. Similar conclusion is obtained when analysing loser funds in return *(Panel F)*. Funds with worst performance are not able to get flows that are expected in proportion to their market share. In a similar way to the results found for domestic equity funds, investors look at past return in a first term, even for money market funds whose complex size has been shown to be more important for investors.

6. CONCLUSIONS

Despite numerous studies in the field of mutual funds, we offer here a new perspective about the importance of the mutual fund family on the investment decisions of investors. We analyse the Spanish market, where a priori we could think of the special importance of the management companies due to the high level of concentration of the market.

The nature of the study makes necessary the use of a cross-sectional analysis and a contingency table approach. In a first approximation we find no significant relationship between the market share and the consequent flows with the Cochran's test. The same result is also obtained if we consider two five-year subsamples. This result implies that the level of growth of the funds is similar to the market share of the fund family.

We enlarge the analysis by splitting the sample of funds according to the past performance to further investigate investors decisions based on the family market share. The most appropriate statistical test for the new contingency tables is Malkiel's test, but it is necessary to complement it to maximise the information provided by the contingency tables. The proposal of a Modified Malkiel test shows interesting results.

For the whole sample, we find differences between domestic equity and money market funds. In the former, the percentage growth of money and investors is similar to the expected according to the family market share. However, in money market funds, money flows are more than proportional for funds belonging to a large complex size and less than proportional for funds belonging to a small complex size. We find evidence that the branch image of money market funds has influence on the fund percentage growth of money.

This result is also confirmed when splitting the sample in winners and losers in past return, because the growth of money market funds above the median in family market share is also more than proportional. In domestic equity funds, this growth is in line with the family market share. From the analysis of funds below the median in family market share, we conclude that these funds are able to attract more flows than expected in the two categories. In short, the relevant information for investors when taking decisions is in a first place the past return of the fund; though there is still a branch image effect for money market funds.

The empirical evidence also shows the importance of the return in investment decisions when analysing the funds that obtained worst results. Funds, independently of the market share, obtained less flows than expected.

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