

# Mutual Fund Voluntary Portfolio Disclosure

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## Abstract

A growing fraction of individual investors delegate their portfolio management to professional managers. As a result, the importance of transparency and investor protections have increased in financial markets. In Spain, management companies must report their mutual fund portfolios quarterly to investors. However, this information may be disclosed on a monthly basis to private information providers. In this study, we examine the influence of performance on voluntary portfolio disclosure from 2003 to 2013. The transparency and reporting strategies may differ from fund industries with different level of development, we will discuss the implications of the results for emerging markets. We find a positive significant relationship between the probability of fund portfolio disclosure and fund performance, and this effect is more significant when we consider risk-adjusted performance measures. The addition of some control variables in the model shows that the probability of the fund portfolio to be reported is positively related to fund age, management company size and fees and is negatively related to fund size.

**Keywords:** Mutual fund. Information disclosure. Fund portfolio. Fund performance.

# Mutual Fund Voluntary Portfolio Disclosure

## 1. Introduction and literature review

The mutual fund industry has experienced striking growth over the last decades, which was encouraged by the decrease in the interest rates of bank deposits and the increase in investors' confidence in professional investment advice. There is now growing attention focused on transparency and investor protection in the financial markets. Regulation on investor protection and public information have become hot topics.

There are several studies that analyze the effects of changes in regulations, especially, since 2004 when the SEC increases the portfolio disclosure frequency from semi-annually to quarterly. Several papers discussed then the advantages and disadvantages of more frequent disclosure. Among the latter, Wermers 2001; Frank et al. 2004; Coval and Stafford 2007; Verbeek and Wang 2013; or Parida and Teo 2018 argue that more frequent portfolio disclosure has a negative impact on performance, since it reduces the possibility of using private information and allows opportunistic behavior on the part of competitors. Despite these results, some funds report portfolio holdings to private data providers even on a higher frequency than the regulation establishes. The understanding of the variables that may influence a fund on his voluntary portfolio holding disclosure is important because these funds are not afraid of potential investors that mimic their portfolios. The funds are not afraid therefore of the potential costs of disclosure. To fill this gap in the literature, this paper analyzes the determinants of the probability of a fund to voluntarily disclose its portfolio.

Specifically, we focus on the Spanish equity mutual funds. The national regulation<sup>1</sup> requires funds to disclose holdings to investors on a quarterly basis. The mandatory reports of the fund's portfolio are March, June, September and December, corresponding to calendar quarters because fiscal year-end is always December.<sup>2</sup> However, in practice, many funds report their portfolio holdings more frequently to private information providers. In this study, we observe that, in recent years, the percentage of funds reporting the composition of their portfolio every month has increased in Spain, and therefore, the willingness of management companies to publish it voluntarily has intensified.

Analyzing 118 Spanish domestic equity mutual funds, we find a positive relationship between prior fund performance and the probability of voluntary fund portfolio holding disclosure. This positive relationship is stronger and highly significant during the last years of our sample. This result could be a sign that despite the growing concern about transparency and investor protections, in the financial markets, managers have greater willingness to voluntarily disclose information when higher results are obtained. Regarding additional variables included in the analysis; in general terms, the results indicate that fund portfolio voluntary disclosure is more probable when the age of the fund, the size of the management company and the fees are higher.

Bellver and Kaufmann (2005) argue that for information to be transparent, it must be accessible, relevant, reliable and of high quality. Higher levels of transparency may have potential benefits from different perspectives. For instance, transparent markets can retain higher levels of investment by international portfolio holdings (Gelos and Wei

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<sup>1</sup>The Royal Decree (RD) 1087/2012 of 13<sup>th</sup> July collects the Regulations concerning the information obligations of Investment Funds.

<sup>2</sup>This is a substantial difference with the United States, where only 27% of funds choose a fiscal year ending in December (Elton et al. 2010).

2006). In the context of mutual funds, the transparency in the disclosure of information implies that management companies provide investors, regulators and the general public all relevant information about the investment decision making, the management strategy, the portfolio composition, the evolution of performance, the expenses and the risk with an adequate frequency as discussed in Haslem (2007).

The Morningstar Global Fund Investor Experience Study, GFIE (2017) provides an international comparative analysis of the treatment to mutual fund investors and provide scores to the countries according to good practices in terms of regulation and taxation, disclosure, fees and expenses and sales practices. Within the disclosure section, the frequency portfolio holdings reports receives special attention. According to this survey, the most common frequency of regulated disclosures is semiannually (Table 1).

Table 1: Frequency of regulated portfolio holdings disclosures

	Number of countries	Portion of sample
Monthly	1	4%
Quarterly	7	28%
Semiannually	15	60%
Annually	1	4%
None	1	4%

Source: Morningstar Global Fund Investor Experience Study (GFIE, 2017)

The United States and India earn top grades in the global area of disclosure of GFIE (2017); however, as of the end the study, only India requires compulsory monthly portfolio disclosures to investors. Conversely, Australia is now the only market in this study without any form of regulated disclosure in operation (the legislation exists, but the regulation is still to be finalized and implemented). It is worth noting that India and Thailand have significantly improved their information dissemination practices in recent years. Additionally, South Africa has recently experienced noteworthy improvements. Thus, although some authors find that emerging markets operate with imperfect

efficiency due to asymmetric information (e.g., see the literature review in Kearney 2012), these data reflect that the transparency and investor protections in emerging markets follow similar trends as in developed markets. Kim (2016) considers that transparency is a tool to protect an emerging market from spillovers and contagion from other markets. This author argues that policymakers seem to have different perceptions about the need to protect investors between an emerging market economy and an advanced economy.

The good news of the GFIE (2017) is that many funds report their portfolio holdings more frequently than required by regulators. In 10 of the countries analyzed more than two thirds of mutual funds provide to Morningstar monthly portfolio holdings. Spain holds the 9<sup>th</sup> position within the funds included in the survey, almost 80% of the open-end funds domiciled in the Spanish market report monthly portfolios. The sample of this study focuses on Spanish domestic equity mutual funds, and during the year 2013, 55% of the sample reported portfolio holdings every month, an additional 15% of funds reported some months apart from quarter-ends. The willingness of management companies to voluntarily publish their portfolios has intensified as the Spanish mutual fund industry becomes more developed and mature. In fact, since 1991 to the end of our sample period in 2013, the compound annual growth rate of the assets under management of the domestic equity category is around 19%. This past growing rate is similar to the existing growth in emerging economies mutual fund industry reported in Lemeshko and Rejnuš (2015). Countries of BRIC, of the Central and Easter Europe, of the South Eastern Asia and of the Middle East and North Africa display a 21% compound annual growth rate against an average 6% for developed economies. Conclusions obtained in this paper may have implications for emerging markets.

The availability of fund portfolio holdings provides useful information to investors for evaluating fund investment styles, risk-taking, abilities and performance. In fact, there are numerous studies that analyze assorted lines of financial research with fund portfolio holdings. Some examples are Grinblatt and Titman (1989) who employ quarterly holdings of a sample of mutual funds to construct and estimate of their performance. Cohen et al. (2005), Kacperczyk and Seru (2007) and Wermers et al. (2012) have used disclosed portfolio holdings to measure fund managers' skills in investment decisions. Specifically, Daniel et al. (1997), Jiang et al. (2007) and Baker et al. (2010) use disclosed portfolio holdings to measure market timing ability and stock-picking ability of managers. Herding behavior in financial market is also studied with fund portfolio (Wermers 1999).

Some studies provide evidence of the advantages of more frequent disclosure for investors, since they can make better investment decisions (Ge and Zheng 2006) or for promoting the functioning of financial markets (George and Hwang 2015; Agarwal et al. 2015).

Being aware of the advantages and disadvantages of frequent portfolio disclosure, this study contributes to the literature answering the question about the variables that may have influence on the probability of reporting a portfolio beyond the regulation on publicity requirements. The results of the paper may be of interest for regulators in terms of transparency. Specifically, a determinant of that voluntary decision seems to be the prior performance. The Spanish mutual fund industry appears as an appropriate market to test this premise. On the one hand, the Spanish mutual fund industry have been in the top ten in the Euro Zone fund industry for several years. In this situation, the level of efficiency in mutual fund management will have a significant impact on the financial system and, therefore, on the general economy. Secondly, the Spanish mutual fund

industry is a very concentrated market because the top 10 of the 81 fund companies control 75% of the total fund assets (Association of Collective Investment Institutions and pension funds, INVERCO). Thus, the bigger ten companies have a high market power in this sector, a higher level of transparency is, therefore, important for reducing agency costs. In fact, the size of the funds' management company is included in the analysis and shows a positive and significant relationship with the probability of voluntary portfolio holdings disclosure.

The remainder of the paper proceeds as follows. Section 2 introduces our mutual fund database and describes the methodology. Section 3 includes the results of the empirical tests. Section 4 concludes.

## **2. Data and Methodology**

### **2.1. Data**

The empirical study is conducted using a sample of Spanish mutual funds. At the end of 2013, the Spanish mutual fund industry was positioned in the tenth position in terms of assets (European Fund and Asset Management Association).

The data analyzed in this study have been obtained from the Spanish Securities Exchange Commission and Morningstar. We collect from the Spanish Securities Exchange Commission the fund's inception date and monthly information about the category according to the investment profile, the total net assets, the name and size of fund management company. We also collect monthly net returns and the fees on a quarterly basis (we make the assumption of constant fees for three months). From the monthly net returns, we add the monthly fees (deposit fees and management fees) and obtain the monthly gross returns.

Mutual funds report to the Spanish Securities Exchange Commission every month the composition of the portfolio as the control mechanism. However, as we have already mentioned, investors only received four mandatory quarterly reports during the year. Morningstar is a private data provider, thus, a portfolio reported on a month that does not correspond to the mandatory months would imply that it has been reported on a voluntary basis. We observe the months in which the portfolio has been voluntarily reported in Morningstar database during the period of study.

Our sample includes 118 domestic equity mutual funds managed by 71 management companies of collective investments. In every fund included in the sample, within the period of analysis, we have only considered the time period in which they are classified in the domestic equity category. We also control for mergers and acquisitions within the sample of funds.

The final database comprises the period from 2003 to 2013. This study is free of survivorship bias since we consider the funds that have already disappeared. In fact, only 30% of the total sample of 118 mutual funds is alive throughout the entire time horizon of the study.

In Table 2, we can see how both the number of funds and the amount of management companies in the sample have evolved. We note that the number of funds in the sample has a downward trend. This observation may be related to mutual funds and asset management companies' mergers that have occurred in recent years. As a result of the strong restructuring of the Spanish financial sector in recent years, there have been multiple takeovers and mergers of financial entities that have involved the subsequent mergers and acquisitions of their mutual funds' management companies (Climent 2013).

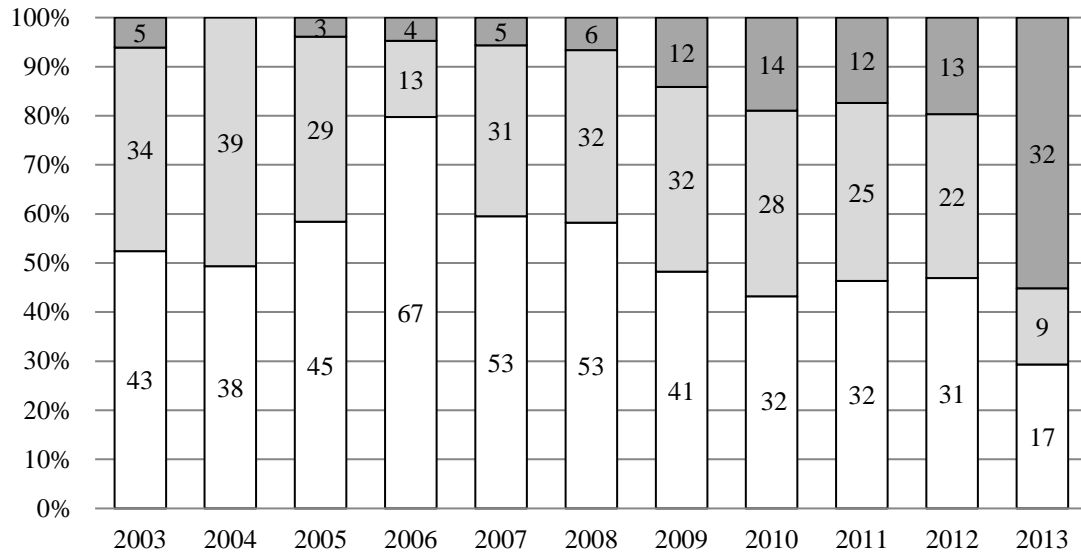
Table 2: Number of mutual funds and management companies in the sample.

Date	Number of funds	Number of management companies
2003	82	56
2004	77	53
2005	77	49
2006	84	50
2007	89	49
2008	91	53
2009	85	52
2010	74	52
2011	69	41
2012	66	47
2013	58	42

Figure 1 shows the evolution of the number of funds that reported the composition of its portfolio every month, the number of funds that reported voluntarily only some months, and the number of funds that only reported on mandatory quarter-ends. Specifically, the number of funds reporting the composition of its portfolio every month has increased from 6% of the total funds the sample in 2003 to 55% in 2013. In contrast, funds that do not voluntarily report the composition of their portfolio voluntarily and those who published in some months have diminished. In conclusion, the willingness to report their monthly composition has increased in more recent periods. In addition, based on these results, we can foresee that, in the same fund, the frequency with which the composition of the portfolio is reported does not always keep constant over the years. Therefore, we must also consider the time effect in our analysis.

Figure 1: Evolution of the numbers and percentages of funds according to the frequency of voluntary portfolio reports

The columns are graphically distributed according to the following percentages. From up to bottom: percentage of funds that voluntarily report each month, percentage of funds that voluntarily report the portfolio some months, and percentage of funds that do not voluntarily report the portfolio. The numbers inside the bars reflect the number of funds in the corresponding group.



We evaluate the behaviour of the portfolio through five performance measures, from the least sophisticated (gross return) to the most sophisticated (the four-factor model alpha of Carhart 1997).

1. *Gross return*

We firstly consider the gross return that represents the management performance and taking into account that the decision of the frequency of portfolio disclosure is taken by the management company.

2. *Excess return*

We get a more accurate value when fund return is compared with the market return. This measure is more informative and appropriate when comparing performance between mutual funds. We have considered as benchmark the Ibex35 total return index.

3. *The capital asset pricing model alpha of Sharpe (1964): $\alpha_1$*

In the capital asset pricing model, alpha is used to determine how well the portfolio is doing in relation to their expected return.

4. *The three-factor model alpha of Fama-French (1993): $\alpha_3$*

The capital asset pricing model alpha includes the market risk. This model also includes the risk due to the characteristic size small minus big (SMB)<sup>3</sup> and the risk related to the ratio between the book value and market value factor (high minus low (HML)).<sup>4</sup>

5. *The four-factor model alpha of Carhart (1997): $\alpha_4$*

The four-factor model is an extension of the three-factor model, including a momentum factor (winners minus losers, UMD).<sup>5</sup>

We have considered as the benchmark the Ibex35 total return index and Analistas Financieros Internacionales (AFI) provides the return of one-day Treasury bill repos, which serves as a proxy for computing excess return over fixed income. The performance of the benchmark, the repos and factors<sup>6</sup> (size, book to market and momentum) are reported on a monthly basis. To estimate  $\alpha_1$ ,  $\alpha_3$  and  $\alpha_4$ , we use the data of the prior 36 months. Although, our portfolio analysis begins in January 2003 we collect as well net asset value of the funds from December 1999 to calculate performance measures homogenously.

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<sup>3</sup>Small minus big (SMB): This factor is referred to as the "small firm effect", as smaller firms tend to outperform larger ones.

<sup>4</sup>High minus low (HML): This factor is referred to as the "book to market effect", as companies with high book-to-market ratios (value stocks), outperform those with lower book-to-market values (growth stocks).

<sup>5</sup>Winners minus losers (UMD): This factor is referred to as the strategy of buying past winners and selling past losers.

<sup>6</sup>The factors are calculated by us using the Fama and French methodology. We appreciate the collaboration of Carlos Forner in the process of this calculation.

We include other four variables: fund age, fund size, fund management company size and fees.

### *1. Fund age*

Prior studies have analyzed the influence that age has on the frequency of portfolio reports with assorted evidence. Ge and Zheng (2006) find a positive relationship between fund age and the frequency of information disclosures, probably because older funds may have incentives to voluntarily disclose their portfolio with the aim of show loyalty and proximity to investors. Contrarily, Wermers (2001), Frank et al. (2004), and Parida and Teo (2018) find that older funds may be not interested in disclosing information to prevent opportunistic behaviors by competitors.

### *2. Fund size*

Ge and Zheng (2006) find that larger funds tend to report information less frequently; additionally, considering that some investors may provide substantial value to frequent disclosures, this divulgation could attract more money and participants. In this setting, we can deduce that smaller funds have more incentives to disclose information in order to attract flows of money and investors.

### *3. Fund management company size*

Our intuition relies on the idea that the largest management companies may have more resources to enable them to take better control of information and thus publish more frequently in order to show more commitment and loyalty to investors.

The smaller management companies can report information more frequently with the aim of showing efficient portfolio management, thus attracting a larger number of participants and further increasing its strength in the industry. However, Ding and

Wermers (2012) find that the smallest management companies may not have incentives to inform, thereby preventing investors from being aware whether their money is being mismanaged without respecting the investment style that was initially promised or supporting excessive risks. Additionally, Ding and Wermers (2012) conclude that smaller management companies are more likely to skip certain operations that do not benefit investors.

#### 4. Fees

The underlying idea is focused on the assumption that funds that charge higher fees should be more likely to give additional services since the frequency of portfolio disclosure is an example of this potential added value. However, Gil and Martínez (2004) suggest that investors are not compensated with higher performance and additional services by paying higher fees. In spite of this conclusion, we consider fees as a control variable given the importance of this variable in mutual fund management. We include management and deposit fees of the fund.

Table 3: Descriptive statistics of the independent variables

Fund\_GrossReturn: the fund's gross returns. Fund\_ExcessReturn: the fund's excess returns. We have considered Ibex35 Total Return Index as the benchmark. Fund\_α<sub>1</sub>: the capital asset pricing model's alpha. Fund\_α<sub>3</sub>: the Fama-French three-factor model's alpha. Fund\_α<sub>4</sub>: the Carhart four-factor model's alpha. Fund\_Age: the age of the fund in years. Fund\_Size: the log of total net assets of the fund. Management Company\_Size: the log of the total net assets of the corresponding fund's management. Fund\_Fees: the fund's management and deposit fees.

	Minimum	Maximum	Average	Standard Deviation
Fund_GrossReturn	-25.92%	26.50%	7.44%	5.40%
Fund_ExcessReturn	-21.35%	9.72%	-0.04%	1.60%
Fund_α <sub>1</sub>	-2.71%	1.84%	0.03%	0.31%
Fund_α <sub>3</sub>	-2.73%	1.42%	0.01%	0.27%
Fund_α <sub>4</sub>	-2.31%	1.61%	0.02%	0.27%
Fund_Age (years)	2	26	11.44	4.627
Fund_Size (thousand euro)	96	1,166,664	58,405	94,455
Management Company_Size (thousand euro)	2,616	62,321,011	7,438,352	12,854,133
Fund_Fees	0.00%	0.48%	0.16%	0.04%

Table 3 presents the descriptive statistics of the variables of the model. The funds in our sample have an average age of 11 years and an average size of 58,405 thousand Euros. Regarding the performance measures, the average excess returns are negative, unlike the average gross returns. The average of the three alphas is positive, thus implying that fund managers are adding overall value.

## 2.2. Methodology

The purpose of this study is to model the probability of mutual fund portfolio disclosure as a function of a group of independent variables that do not follow a normal distribution.<sup>7</sup> Concretely, we examine the relationship between the probability of reporting the composition of the fund's portfolio and its performance. The performance is measured by the gross returns, excess returns, the CAPM model, the Fama and French's three-factor model, and the Carhart four-factor model. We consider other variables such as age, the size of the fund, the size of the management company and the fees.

A logit model is used to find those variables that can better explain a binary dependent variable. This technique allows the estimation of the unknown parameters'  $\beta$  matrix by determining the statistical dependence relationship between the matrix of explanatory variables  $X$  and the probability that the binary dependent variable  $Y$  takes the value 1 (Hosmer and Lemeshow 2000). The dependent variable is dichotomous since it takes a value of 1 or 0, depending on the existence of a fund portfolio report on a non-quarter month.

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<sup>7</sup>The Kolmogorov-Smirnov test is applied to test the hypothesis of the normality of the population. The null hypothesis of this test is that the set of data follows a normal distribution. For all independent variables, the null hypothesis is rejected, and thus the normality of the independent variables is rejected.

Thus, we build a model where the dichotomous dependent variable equals 0 in the case of absence of portfolio disclosure and 1 if there is portfolio.

$$Y_i = 1 \quad \text{Probability } (Y_i = 1) = P_i \quad [1]$$

$$Y_i = 0 \quad \text{Probability } (Y_i = 0) = 1 - P_i = q_i \quad [2]$$

The model is represented as a logistic function which takes values from 0 to 1.

$$p = \frac{e^y}{1 + e^y} \quad \text{or} \quad p = \frac{1}{1 + e^{-y}} \quad [3]$$

$$q = 1 - p = 1 - \frac{e^y}{1 + e^y} \quad [4]$$

Where:  $p$  = the probability of success (voluntary disclosure of portfolio holding)

$q$  = is the probability of failure (not voluntary disclosure of portfolio holding)

$e$  = is the base of the natural logarithm

$y$  = dependent variable

Also, the dichotomous dependent variable is a combination of independent variables:

$$Y = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + B_kX_k \quad [5]$$

Where:  $B_0, B_1, \dots, B_k$  are the coefficients to estimate.

$X_1, X_2, \dots, X_k$  are the independent variables.

We estimate the dependent variable in five models using the five measures of performance proposed:

$$\begin{aligned} \text{Model 1: } Y = & B_0 + B_1\text{Fund\_GrossReturn} + B_2\text{Fund\_Age} + B_3\text{Fund\_Size} + \\ & B_4\text{Management Company\_Size} + B_5\text{Fund\_Fees} \end{aligned} \quad [6]$$

$$\begin{aligned} \text{Model 2: } Y = & B_0 + B_1\text{Fund\_ExcessReturn} + B_2\text{Fund\_Age} + B_3\text{Fund\_Size} + \dots \\ & B_4\text{Management Company\_Size} + B_5\text{Fund\_Fees} \end{aligned} \quad [7]$$

$$\begin{aligned} \text{Model 3: } Y = & B_0 + B_1\text{Fund\_}\alpha_1 + B_2\text{Fund\_Age} + B_3\text{Fund\_Size} + \dots \\ & B_4\text{Management Company\_Size} + B_5\text{Fund\_Fees} \end{aligned} \quad [8]$$

$$\begin{aligned} \text{Model 4: } Y = & B_0 + B_1\text{Fund\_}\alpha_3 + B_2\text{Fund\_Age} + B_3\text{Fund\_Size} + \dots \\ & B_4\text{Management Company\_Size} + B_5\text{Fund\_Fees} \end{aligned} \quad [9]$$

$$\begin{aligned} \text{Model 5: } Y = & B_0 + B_1\text{Fund\_}\alpha_4 + B_2\text{Fund\_Age} + B_3\text{Fund\_Size} + \dots \\ & B_4\text{Management Company\_Size} + B_5\text{Fund\_Fees} \end{aligned} \quad [10]$$

We use the Wald statistic for testing whether an independent variable makes a statistically significant contribution to explaining the dependent variable. The null hypothesis to test in the Wald statistic is as follows:

$$H_0: B_0 = B_1 = B_2 = \dots = B_5 = 0 \quad [11]$$

Where:  $B_0, B_1, \dots, B_5$  are the estimated coefficients.

The efficiency of each model is tested with the Omnibus Test of Model Coefficients. The null hypothesis of this test is that the model does not explain reality. We have also carried out the multicollinearity analyses with the analysis of tolerance level and variance inflation factors (VIF). According to Kleinbaum et al. (2007), multicollinearity problems exist when the VIF is greater than 10 or if the tolerance level is less than 0.1.

First, we have analyzed the whole period of the sample. Subsequently, a yearly analysis is conducted in order to support whether the relationship that was identified in the previous analysis remains over time.

### **3. Influence of performance on the voluntary fund portfolio disclosure**

#### **3.1. Empirical analysis: the whole period**

On a first step of the analysis, we study the multicollinearity and the significance of the models. On the one hand, both the VIF and the tolerance level are within the limits considered appropriate by Kleinbaum et al. (2007). None of the models proposed show multicollinearity. On the other hand, we test the null hypothesis of non-significance of any of the parameters. As shown in Table 4, this hypothesis is rejected by the Omnibus Test of Model Coefficients; our models present, therefore, at least one significant parameter.

Regarding to the results, we find that the frequency of portfolio disclosure is positively and significantly related to fund performance being this relationship more marked when more sophisticated performance measures are considered ( $\alpha_1$ ,  $\alpha_3$  and  $\alpha_4$ ). Hence, we can observe in Table 4 that the best performing funds are more prone to disclose portfolio information more frequently. Our result is consistent with Meier and Schaumburg's (2006) conclusions. These authors find that the information reported by the funds with worse performance is more likely to be manipulated or altered. In addition, they find that funds with worse performance report information less frequently.

A further look at the results may arise interesting conclusions, the funds in our sample may benefit from a double effect to attract new flows. On one hand, existing literature documents an asymmetry in the performance-flow relationship (Sirri and Tufano 1998). Investors put their money into mutual funds with past positive performance but fail to withdraw from funds with poorer performance. For the Spanish market, some aspects of the performance-flow relationship in mutual funds are studied in Ferruz et al. (2009). Furthermore, as shown in Ge and Zheng (2006), frequent disclosures have a

Table 4: Empirical analysis results: the whole period

Model	Constant	Fund_GrossReturn	Fund_ExcessReturn	Fund_α <sub>1</sub>	Fund_α <sub>3</sub>	Fund_α <sub>4</sub>	Fund_Age	Fund_Size	Management Company_Size	Fund_Fees	Omnibus Test Chi-Square	Cox and Snell R <sup>2</sup>	Nagelkerke R <sup>2</sup>
	<i>B</i> <sub>0</sub>	<i>B</i> <sub>1</sub>	<i>B</i> <sub>1</sub>	<i>B</i> <sub>1</sub>	<i>B</i> <sub>1</sub>	<i>B</i> <sub>1</sub>	<i>B</i> <sub>2</sub>	<i>B</i> <sub>3</sub>	<i>B</i> <sub>4</sub>	<i>B</i> <sub>5</sub>			
1	-4.118***	0.199					0.07***	-0.21***	0.273***	199.87***	455.269***	6.7%	9.3%
2	-4.126***		0.972				0.07***	-0.209***	0.273***	200.69***	455.387***	6.7%	9.3%
3	-4.06***			25.186***			0.071***	-0.229***	0.284***	219.64***	461.652***	6.8%	9.4%
4	-4.022***				62.883***		0.068***	-0.242***	0.293***	240.78***	487.493***	7.1%	10%
5	-4.064***					62.158***	0.069***	-0.242***	0.294***	235.11***	487.489***	7%	9.9%

This table reports the results of a logit regression that aims to find the variables that affect the voluntary reporting of portfolios. Fund\_GrossReturn: the fund's gross returns. Fund\_ExcessReturn: the fund's excess returns. We have considered Ibex35 Total Return Index as the benchmark. Fund\_α<sub>1</sub>: the capital asset pricing model's alpha. Fund\_α<sub>3</sub>: the Fama-French three-factor model's alpha. Fund\_α<sub>4</sub>: the Carhart four-factor model's alpha. Fund\_Age: the age of the fund in years. Fund\_Size: the log of total net assets of the fund. Management Company\_Size: the log of the total net assets of the corresponding fund's management. Fund\_Fees: the fund's management and deposit fees.

Model 1: P (Voluntary portfolio report) = f (Constant, Fund\_GrossReturn, Fund\_Age, Fund\_Size, Management Company\_Size, Fund\_Fees)

Model 2: P (Voluntary portfolio report) = f (Constant, Fund\_ExcessReturn, Fund\_Age, Fund\_Size, Management Company\_Size, Fund\_Fees)

Model 3: P (Voluntary portfolio report) = f (Constant, Fund\_α<sub>1</sub>, Fund\_Age, Fund\_Size, Management Company\_Size, Fund\_Fees)

Model 4: P (Voluntary portfolio report) = f (Constant, Fund\_α<sub>3</sub>, Fund\_Age, Fund\_Size, Management Company\_Size, Fund\_Fees)

Model 5: P (Voluntary portfolio report) = f (Constant, Fund\_α<sub>4</sub>, Fund\_Age, Fund\_Size, Management Company\_Size, Fund\_Fees)

\*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10% level, respectively.

positive impact on new money flows although the relation is nonlinear with respect to past performance. More frequent disclosure of information has stronger positive effects on new money flows for funds with poorer past performance. Altogether, we find evidence that voluntary portfolio disclosure may have an impact on the capacity of attracting flows especially for funds with worse past performance. This result seems particularly interesting for fund management companies.

Regarding the rest of variables, we find a significant positive relationship between age and the probability that the composition of the portfolio is reported. Again, the conclusion is robust regardless of the performance measure considered. As shown in Table 4, older mutual funds have higher probability to voluntarily report their portfolios. This is consistent with Ge and Zheng (2006), among other studies.

Additionally, we find a significant positive relationship between the size of the management company and the probability of portfolio disclosure. This conclusion can be explained by the higher amount of resources of the larger management companies.

However, fund size has a negative influence on the frequency of portfolio disclosure. Additionally, in their study, Ge and Zheng (2006) find that the larger funds tend to report information to investors less frequently. This different effect with fund size and management company size might be explained by the lack of interest of management companies in giving information about their larger funds, regardless of the management company's size. Management companies may consider that the information of those larger funds is valuable, and its disclosure may facilitate opportunistic behaviors by competitors, thus altering expectations and consequently reducing the fund's performance (Wermers 2001; Frank et al. 2004; Parida and Teo 2018).

Finally, the results show that funds that charge higher fees tend to disclose their portfolio more frequently, confirming the intuition based on the idea that these funds provide additional services to investors. Although, this result contradicts Ge and Zheng (2006) who find that the funds with higher expense ratio report information to investors less frequently, it may have subsequent implications in line with Frank et al. (2004) that demonstrate that, after expenses, copycat funds earn higher returns than the original active funds that reported higher level of information. That is, if a fund with higher expenses has a higher probability to disclose its portfolio, copycat fund may benefit from that information mimicking their portfolios at a lower price.

### **3.2. Empirical analysis: yearly approach**

In this section, we show the results of the analysis per year. When we divide the analysis by year, we find that the results of global analysis do not always remain the same over time. In this annual perspective, we must realize the evolution of the number and percentage of funds according to the frequency of the mutual fund portfolio (Figure 1). The number of funds that report the composition of its portfolio every non-quarter month has increased considerably from 2003 to 2013. We can state that there is a new behavior of improving the transparency of the industry's information.

We consider the standard performance measures of the alphas. Among these measures, for brevity, we have selected the CAPM model alpha and the four-factor model's Carhart alpha (Tables 5 and 6, respectively). We observe that during the early years of analysis, until 2009, the relationship between the probability of voluntary report and fund performance is unclear. From 2011, the relationship between the probability of voluntarily reporting portfolio and fund performance becomes positive and very

significant during the last years. Thus, the funds with the best results are more likely to publish their portfolios monthly.

Table 5. Empirical annual analysis ( $\alpha_1$ )

Year	Constant	Fund_ $\alpha_1$	Fund_ Age	Fund_ Size	Management Company_ Size	Fund_ Fees	Omnibus Test	Cox and Snell R <sup>2</sup>	Nagelkerke R <sup>2</sup>
	$B_0$	$B_1$	$B_2$	$B_3$	$B_4$	$B_5$			
2003	-14.95***	-30.41	-0.01	-0.12	0.77***	301.72	195.52***	26.8%	36.8%
2004	-11.59***	-91.98**	0.09**	-0.34***	0.76***	-172.44	177.00***	25.3%	35.7%
2005	-7.68***	-100.52**	0.05	-0.28***	0.49***	340.10	87.64**	13.6%	19.9%
2006	-3.90**	3.57	0.01	-0.08	0.06	1095.34***	113.22***	21%	24%
2007	-0.65	53.92	0.05**	-0.09	-0.01	413.74*	113.10***	19%	30%
2008	-12.92***	-110.92*	0.07***	-0.08	0.54***	532.41**	133.27***	17.7%	24.6%
2009	-1.64	-16.85	0.01	-0.13	0.11**	313.98	79.73**	12%	18%
2010	-2.25	77.90**	0.06***	-0.26***	0.27***	-190.05	131.54***	25.2%	27.2%
2011	-0.42	127.66***	0.04**	-0.29***	0.24***	-415.54	125.88***	24.5%	26.1%
2012	-3.04**	151.93***	0.02	-0.04	0.16***	-95.92	117.82***	23.3%	24.5%
2013	-0.47	162.48***	0.10***	-0.27***	0.15**	306.23	36.03***	7.5%	10.3%

This table reports the results of a logit regression that aims to find the variables that affect the voluntary reporting of portfolios. Fund\_ $\alpha_1$ : the capital asset pricing model's alpha. Fund\_Age: the age of the fund in years. Fund\_Size: the log of total net assets of the fund. Management Company\_Size: the log of the total net assets of the corresponding fund's management. Fund\_Fees: the fund's management and deposit fees. \*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10% level, respectively.

On the other hand, we observe that the results for the rest of the control variables are generally robust to Table 4. Thus, this annual analysis confirms the robustness of the significant relationship between the probability of reporting and the independent variables as well as the sign of the relationship.

Table 6. Empirical annual analysis ( $\alpha_4$ )

Year	Constant	Fund_ $\alpha_4$	Fund_ Age	Fund_ Size	Manag. Company Size	Fund_ Fees	Omnibus Test Chi-Square	Cox and Snell R <sup>2</sup>	Nagelkerke R <sup>2</sup>
	$B_0$	$B_1$	$B_2$	$B_3$	$B_4$	$B_5$			
2003	- 14.84***	-7.96	-0.01	-0.14	0.78***	337.76	177.00***	26.66%	36.6%
2004	- 11.35***	-3.11	0.11***	-0.43***	0.80***	-20.12	171.60***	24.7%	34.8%
2005	- 7.384***	15.06	0.06*	-0.38***	0.54***	493.61	81.41**	12.7%	18.6%
2006	-4.16**	-44.29	0.01	-0.04	0.05	1083.86** *	113.66***	22%	24.1%
2007	-0.55	-81.92	0.05 <sup>†</sup>	-0.03	-0.06	407.24	113.36***	20%	31%
2008	- 13.43***	- 256.59***	0.08***	-0.05	0.53***	515.65**	146.87***	19.3%	26.8%
2009	-1.68	-37.12	0.01	-0.13	0.10**	314.18	87.13**	14%	20%
2010	-2.44	33.81	0.06***	-0.26	0.27***	-257.44	129.92***	25%	26.8%
2011	-0.49	118.03***	0.05**	-0.29***	0.24***	-449.50	126.08***	24.6%	26.1%
2012	-3.54**	161.93***	0.03	-0.06	0.18***	-122.77	124.49***	24.2%	26%
2013	-0.79	195.87***	0.10***	-0.29***	0.17**	282.45	42.11***	8.8%	11.9%

This table reports the results of a logit regression that aims to find the variables that affect the voluntary reporting of portfolios. Fund\_  $\alpha_4$ : the Carhart four-factor model's alpha. Fund\_Age: the age of the fund in years. Fund\_Size: the log of total net assets of the fund. Management Company\_Size: the log of the total net assets of the corresponding fund's management. Fund\_Fees: the fund's management and deposit fees. \*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10% level, respectively.

### 3.3. Control over time effect

We have mentioned that, in recent years, financial markets have adopted a greater commitment to transparency. The increase in the percentage of funds that report the composition of their portfolio every month demonstrates the trend of further protection for investors. On the other hand, as time goes by, funds and management companies are older and generally larger. Thus, implicitly, an effect derived from the passage of time predominates.

Table 7: Empirical analysis result: the whole period  
(Cross-sectionally normalized values of the control variables)

Model	Constant	Fund_GrossReturn	Fund_ExcessReturn	Fund_α <sub>1</sub>	Fund_α <sub>3</sub>	Fund_α <sub>4</sub>	Fund_Age	Fund_Size	Management Company_Size	Fund_Fees	Omnibus Test Chi-Square	Cox and Snell R <sup>2</sup>	Nagelkerke R <sup>2</sup>
	<i>B</i> <sub>0</sub>	<i>B</i> <sub>1</sub>	<i>B</i> <sub>1</sub>	<i>B</i> <sub>1</sub>	<i>B</i> <sub>1</sub>	<i>B</i> <sub>1</sub>	<i>B</i> <sub>2</sub>	<i>B</i> <sub>3</sub>	<i>B</i> <sub>4</sub>	<i>B</i> <sub>5</sub>			
1	-1.508***	-0.635					0.280***	-0.034	0.202***	0.337***	195.116***	2.9%	4.1%
2	-1.509***		1.628				0.280***	-0.035 <sup>t</sup>	0.202***	0.336***	194.136***	2.9%	4.1%
3	-1.498***			-9.165			0.278***	-0.030	0.199***	0.326***	194.301***	3%	4.2%
4	-1.555***				44.188***		0.295***	-0.055**	0.213***	0.369***	210.807***	3.2%	4.4%
5	-1.552***					38.815***	0.294***	-0.053**	0.212***	0.362***	202.423***	3.1%	4.3%

This table reports the results of a logit regression that aims to find the variables that affect the voluntary reporting of portfolios. Fund\_GrossReturn: the fund's gross returns. Fund\_ExcessReturn: the fund's excess returns. We have considered Ibex35 Total Return Index as the benchmark. Fund\_α<sub>1</sub>: the capital asset pricing model's alpha. Fund\_α<sub>3</sub>: the Fama-French three-factor model's alpha. Fund\_α<sub>4</sub>: the Carhart four-factor model's alpha. Fund\_Age: the age of the fund in years. Fund\_Size: the log of total net assets of the fund. Management Company\_Size: the log of the total net assets of the corresponding fund's management. Fund\_Fees: the fund's management and deposit fees.

Model 1: P (Voluntary portfolio report) = f (Constant, Fund\_GrossReturn, Fund\_Age, Fund\_Size, Management Company\_Size, Fund\_Fees)

Model 2: P (Voluntary portfolio report) = f (Constant, Fund\_ExcessReturn, Fund\_Age, Fund\_Size, Management Company\_Size, Fund\_Fees)

Model 3: P (Voluntary portfolio report) = f (Constant, Fund\_α<sub>1</sub>, Fund\_Age, Fund\_Size, Management Company\_Size, Fund\_Fees)

Model 4: P (Voluntary portfolio report) = f (Constant, Fund\_α<sub>3</sub>, Fund\_Age, Fund\_Size, Management Company\_Size, Fund\_Fees)

Model 5: P (Voluntary portfolio report) = f (Constant, Fund\_α<sub>4</sub>, Fund\_Age, Fund\_Size, Management Company\_Size, Fund\_Fees)

\*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10% level, respectively.

This effect could be biasing the relationship of the dependent variable and the control variables and, consequently, the results of our analyses. To control this effect, for each fund and month, we have normalized the value of the control variables. This normalization is carried out with a cross-section perspective according to the mean value of every variable in each period. The results reported in Table 7 show that by controlling the potential time bias, the effects of the control variables are robust and remain statistically significant for the probability of reporting the fund portfolio. Regarding the positive influence of performance on the probability of reporting, this relation is especially significant when more accurate performance measures are considered. Therefore, in general terms, the fund is relying on a greater frequency when reporting information to investors. This likelihood is greater when better results are obtained. In conclusion, this robustness analysis allows us to confirm the strong influence of previous performance on the probability of a fund portfolio to be reported and the significant effects of the control variables included in the model.

#### **4. Conclusions**

There is now growing attention focused on transparency and investor protection in the financial markets. Regulation on investor protection and public information have become hot topics. Regarding mutual fund transparency, one of the key elements is the frequency of portfolio disclosure, given that fund portfolio provides useful information to investors about the investment style, risk-taking and fund performance.

Existing literature documents that more frequent portfolio disclosure has a negative impact on performance and yet mutual funds report portfolio holdings to private data providers even on a higher frequency than the regulation establishes.

This paper analyzes the determinants of the probability of a fund to voluntarily disclose its portfolio. We have analyzed the frequency of fund portfolio disclosure in Spain. By the end of 2013, the Spanish fund industry is ranked among the top ten in the Euro Zone fund industry in terms of assets (Europe Fund and Asset Management Association, EFAMA). The growth of the industry was very intense during the two previous decades. We show that the percentage of funds that report the portfolio all non-quarter months has increased considerably over time. Thus, we detect a trend to report it with a higher frequency than the compulsory quarterly portfolio disclosure, reflecting the increasing importance given to investor protection as the Spanish mutual fund industry becomes more developed and mature. The emerging markets, which are experiencing similar levels of growth may follow similar patterns.

This study focuses on the potential causes of more frequent disclosures of fund portfolios. Specifically, we test the potential influence of past performance on the probability of the voluntary disclosure of the portfolio holdings. Using the logit regression methodology, we build five models with different performance measures, including other four variables: fund age, fund size, management company size and fund fees.

In the whole period analysis, in general terms, we find a positive significant relationship between the frequency of portfolio disclosures and fund performance when we consider risk-adjusted performance measures. Considering a yearly analysis, we observe that this relation is remarkable from 2011.

Regarding the rest of variables, we find that the probability of reporting the portfolio is positively related to the fund's age and fees, the management company's size and is negatively related to the fund's size. This different effect with fund size and management company size might be explained by the lack of interest of management

companies in giving information about their larger funds, regardless of the management company's size. Additionally, larger management companies have more resources to provide additional information. Overall results are confirmed by a robustness analysis that considers a cross-sectional normalization of the control variables.

As far as we know, this is the first study that provide comprehensive analysis of the voluntary portfolio disclosures compared to the compulsory portfolio publicity requirements. Further research in other countries with different legal frameworks would be of interest.

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