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Determinants of equity pension plan flows*

Determinantes de los flujos monetarios en los planes de pensiones

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Abstract

The aim of this study is to analyze investor response to different measures of pension plan performance. To do this, we implement a fixed effects panel data methodology corrected by heteroskedasticity, serial correlation and cross-sectional dependence, as proposed by Vogelsang (2012). The results obtained show that investors make their decision to invest in a specific pension plan depending on past returns and the type of management company administering the plan. On analyzing the flow-performance relationship for each type of management company we find that both types of companies can differ in the information provided to investors and in their marketing strategies and services for attracting clients.

Key words: *Return, Jensen's Alpha, investor behavior, pension plan flows, panel data models*

JEL Classification: *C23, G23.*

Resumen

El objetivo del presente trabajo es analizar el comportamiento del inversor ante diferentes medidas de performance de los planes de pensiones. Para ello, implementamos la metodología de datos de panel de efectos fijos, corrigiendo la heterocedasticidad, correlaciones serial, dependencia cross-sectional*, propuesta por Vogelsang (2012). Los resultados indican que los inversores toman la decisión de invertir en un plan de pensiones concreto en función de la rentabilidad pasada y esta ajustada por el riesgo obtenidas por el gestor, así como en función del tipo de entidad gestora que administra el plan. Al analizar*

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la relación entre flujos monetarios y performance *en función del tipo de entidad gestora encontramos que ambos tipos de entidades podrían suministrar diferente información a los clientes e implantar diferentes estrategias de* marketing *y proporcionar diferentes servicios adicionales relacionados con la inversión en planes de pensiones para atraer clientes.*

Palabras clave: *Rentabilidad, alfa de Jensen, comportamiento del inversor, flujos monetarios de los planes de pensiones, datos de panel.*

Clasificación JEL: *C23, G23.*

1. Introduction

Pension fund assets in OECD countries reached 15.6 trillion euros in 2011, a figure close to that of mutual funds (17.1 trillion euros) accumulated in OECD countries in 2011, as stated by the Organization for Economic Co-operation and Development (OECD) and the Investment Company Institute, respectively. Thus, the pension plans and mutual fund industries have undergone considerable development, which has aroused major interest among the financial community in determining the factors that induce investors to select a specific mutual fund.

In this respect, most authors (for instance, Ippolito (1992), Sirri and Tufano (1998), Chevalier and Ellison (1997), Fant and O'Neal (2000), and Goriaev *et al.* (2008)) coincide in stating that U.S. investors channel their savings into funds with better past performance, possibly in the hope of this performance being maintained in the future, considering the empirical evidence of persistence provided by Brown and Goetzmann (1995) and Goetzmann and Ibbotson (1994).

However, monetary input is not proportional to the outflow occurring in the funds with the poorest performance, indicating an asymmetrical relationship that Lynch and Musto (2003) explain through the theory relating to the expected about-turn of investment policy, which Goetzmann and Peles (1997) justify through the theory of investor cognitive dissonance, and Huang *et al.* (2007), Barber *et al.* (2005) and Del Guercio and Tkac (2002) attribute to load costs incurred by the investor in making transfers between mutual funds, acting as an exit barrier for the fund.

This relationship is maintained using different measures of performance (raw return and Jensen's Alpha) as shown by Sirri and Tufano (1998), Fant and O'Neal (2000) and Del Guercio and Tkac (2002), and its level of convexity is higher in smaller, younger mutual funds that demonstrate higher participation costs, according to Chevalier and Ellison (1997), Goriaev *et al.* (2008) and Huang *et al.* (2007). In these cases, fund managers could have incentives to take higher levels of risk in order to gain significant flow if they manage the fund well and to avoid significant losses if they perform poorly, which may have implications for the risk and return that participants experience, as shown by Chevalier and Ellison (1997) and Lynch and Musto (2003).

However, US findings concerning the behavior of US investors cannot be applied universally, as shown by Ferreira *et al.* (2012). For example, Ferruz *et al.* (2009) show that investors in Spanish mutual funds do purchase poorly

performing funds, but in smaller proportions than they purchase good performing funds, while Alves and Mendes (2011) and Fiotakis and Philippas (2004) find that investors do not react to the past performance of Portuguese and Greek mutual funds, respectively, despite the persistently poor performance of Greek funds, which could be due to the existence of (1) an agency problem between large financial intermediaries and participants and/or (2) unsophisticated investors, as suggested by Ferreira *et al.* (2012).

While the mutual fund industry has received major attention from academics, the pension fund industry has been left in the background. Thus, Andonov *et al.* (2013) examine the probability of Canadian, European, U.S. and Australian/New Zealand pension funds investing in real estate, using a binary response logit model. Their findings show that smaller pension funds are less likely to invest in real estate internally, and have higher costs and lower returns than larger funds.

While Andonov *et al.* (2013) focus on different types of pension plans (public, corporate and others), Franzen (2010) focuses on examining the investment risk management of defined benefit occupational and state pension plans in Germany, the Netherlands, the United Kingdom and the United States, concluding that changes in accounting rules based on the implementation of fair value criteria erode the risk-taking capacity of the plan sponsor. Brown *et al.* (2012) analyze the investment behavior of US defined benefit state pension plans that actively manage their equity portfolios implementing ordinary least square (OLS) regression. Their results show that states are able to generate excess returns through their in-state investment activities.

While the above-mentioned literature focuses on examining the investment behavior of pension plans, other authors: Krasnokutskaya and Todd (2009) and Del Guercio and Tkac (2002), analyze the behavior of pension plan investors. With regard to these, Krasnokutskaya and Todd (2009) analyze the determinants of investors' choices of Chilean pension fund and of pension fund characteristics, adopting a demand and supply model of the pension fund market for the period 2002-2004. Their findings indicate that the existing regulations increase the level of risk in the market and reduce investors' incentives to invest in pension funds.

Del Guercio and Tkac (2002) find empirical evidence of a linear relationship between the flows and performance of US pension funds, in which Jensen's alpha was particularly significant as a measure of performance. However, as occurs with the mutual fund industry, investors in US pension funds might behave differently to investors from less developed financial markets. This study therefore seeks to provide empirical evidence of investor behavior using different measures of performance in the Spanish market, an area that has not been extensively studied.

This study therefore diverges from that by Del Guercio and Tkac (2002) and Krasnokutskaya and Todd (2009) in terms of different aspects relating to the market studied, the data and the methodology used. Previous works on pensions have focused on the US and Chilean markets, respectively. Thus, while the Chilean pension system obliges all workers to contribute a pre-specified part of their wages to their pension account, with the government serving as a last-resort guarantor who supplements pension income in case of unfavorable returns on investment or low income, as commented by Krasnokutskaya and Todd (2009), the US and Spanish governments have adopted a pay-as-you-go social security system. Specifically, the Spanish pay-as-you-go social security system guarantees a minimum retirement pension that can be voluntarily complemented

with a private pension plan promoted by the firm where the employee works (occupational pension plans), financial entities (individual pension plans) or syndicates/labor unions/associations (associate pension plans).With regard to private pension systems, the Spanish government (1) promotes transparency of fees charged by management companies for their services, establishing a maximum limit of 2% and 0.5% of the assets under management for management and custodial fees, respectively, and (2) establishes minimum and maximum limits of investments depending on assets' characteristics. However, Spanish regulations do not require managers to reach a minimum return and the Spanish government does not compensate losses obtained by private pension plans.

The extended social coverage provided by the social security system and the lack of government guarantees in case of unfavorable returns on private pension plan investment could be the reason why Spanish occupational pension plans accumulate a moderate volume of assets compared to occupational pension plans in other European countries and Spanish individual pension plans. Given that Spanish individual pension plans receive more contributions than occupational pension plans and have more participants, our proposal here is to focus on individual pension plans[1], unlike Del Guercio and Tkac (2002) and Krasnokutskaya and Todd (2009), who use occupational pension fund data.

This could have major implications on the results, because the two types of pension plan operate differently and require different management strategies, with individual pension plans being similar to mutual funds. Del Guercio and Tkac (2002) used a pooled methodology and Krasnokutskaya and Todd (2009) adopt a standard panel data method, while this study uses the panel data method proposed by Vogelsang (2012), which takes into account unobservable characteristics of pension plans and is robust in the presence of serial correlation, cross-sectional dependency and heteroskedasticity of distribution of the residuals present in our case.

This study's findings could be of major interest to supervisory and regulatory bodies, as well as management and custodial companies. Knowledge of investor reaction to different measures of performance can provide information about the level of investor sophistication, thus encouraging (1) supervisory bodies to provide tools to improve the level of financial education by, for example, creating a website where they offer basic information on pension plans to unqualified investors and (2) regulators to propose legal changes to increase the transparency of the information provided by management companies to participants.

From the management companies' perspective, knowledge of investors' reactions to measures of performance will tell them about the existing incentives to modify negotiation strategies in order to increase participants' contributions and transfers, which could lead to an increase in the remuneration received. For custodial companies, it may be important to know which factors influence the decision to invest in a specific pension plan in order to design and implement commercial policy.

The paper is structured as follows: in Section 2 we describe the data sources and define the variables to be analyzed. We then outline the methodology

[1] Spanish regulations establish that personal pension plans must be Defined Contribution Schemes (the promoters' and/or participants' contributions are defined).

employed and the results obtained. Finally, we report our main conclusions and provide references.

2. Data and Variables

To analyze the behavior of investors in pension plans, we took monthly liquidation values, assets and participants for the period between January 31, 2006 and May 30, 2011, corresponding to 101 equity personal pension plans provided by the Spanish Association of Collective Investment Institutions and Pension Plans (INVERCO). The Directorate-General of Insurance and Pension Funds (DGSFP) provided quarterly information on the names of management and custodial companies, custodial and management fees and the dates that plans were established. Additionally, we used the monthly returns of the Ibex-35 index and the Morgan Stanley Capital International type indexes for the Spanish market obtained from the Madrid Stock Exchange and Morgan Stanley Capital International (MSCI), respectively. Morningstar provided the geographical market category in which pension plans mainly invest.

We omitted plans created after January 31, 2006, those with missing data for any of the months considered, and those dissolved during the period. Therefore, our data might be vulnerable to survivorship bias (Brown *et al.*1997) and look-ahead bias (Carhart, 1997), as Elton *et al.* (1996) and Malkiel (1995) have confirmed in equity mutual fund performance studies. However, these biases do not affect inference on the relationship between flow and performance, as pointed out by Chevalier and Ellison (1997), Goetzmann and Peles (1997) and Sirri and Tufano (1998). In the Spanish pension fund market, Andreu *et al.* (2009) repeat their analysis on samples free of survivorship and look-ahead biases, reporting no significant changes in their inferences on equity pension plans. Given that we use the same database as Andreu *et al.* (2009), we think that our sample does not suffer from the above-mentioned biases.

We now present the dependent variable and the explanatory variables that were considered potential determinants of the behavior of investors in pension plans. These are briefly defined in Table 1.

Following Del Guercio and Tkac (2002), Sirri and Tufano (1998), Patel *et al.* (1994) and Chevalier and Ellison (1997), we use asset flows as a dependent variable, defined as the net growth in pension plan assets beyond reinvested dividends. Flows for plan i in month t are thus calculated as:

$$Flow_{i,t} = \frac{TNA_{i,t} - TNA_{i,t-1}\left(1+R_{i,t}\right)}{TNA_{i,t-1}}. \quad (1)$$

Where $TNA_{i,t}$ is plan i's total net asset at time t, $TNA_{i,t-1}$ is plan i's total net asset at time t-1 and $R_{i,t}$ is the plan's return over the prior month.

We considered it important to include the return factor in the analysis, since it is the most important service provided to participants in pension plans. Effective active management might thus be expected to foster a positive relationship between flows and Jensen's alpha obtained by a plan. To measure this relationship, following previous studies, such as Sirriand Tufano (1998), Fantand O'Neal

TABLE 1
GLOSSARY OF VARIABLES

Variable	Description
HRETURN	Annual return of each pension plan, as a proportion of assets, belongs to top quintile return, 0 otherwise.
MRETURN	Annual return of each pension plan, as a proportion of assets, belongs to middle quintile return, 0 otherwise.
LRETURN	Annual return of each pension plan, as a proportion of assets, belongs to low quintile return, 0 otherwise.
HALPHA	Annual risk-adjusted return of each pension plan belongs to top quintile alpha, 0 otherwise.
MALPHA	Annual risk-adjusted return of each pension plan belongs to middle quintiles alpha, 0 otherwise.
LALPHA	Annual risk-adjusted return of each pension plan belongs to low quintile alpha, 0 otherwise.
RISK	The standard deviation of the past twelve month plan i returns at moment t.
FLOWSPAIN	Growth of the plans' asset invested in Spanish stocks in month t.
FLOWEUROPE	Growth of the plans' asset invested in European stocks in month t.
FLOWINTER	Growth of the plans' asset invested in International stocks in month t.
LSIZE	Natural log of assets of each pension plan.
LAGE	Natural log of number of years since pension plan was setup.
LINVEST	Natural log of assets of each plan minus natural log of number of participants in plan.
MGFEE	Annual management fee as a proportion of pension plan assets.
CUSTFEE	Annual custodial fee as a proportion of pension plan assets.
INSURANCE	Dummy variable = 1 if management company is also an insurance company, 0 otherwise.
MANAGEMENT	Dummy variable = 1 if management company only manages pension funds, 0 otherwise.
DECEMBER	Dummy variable = 1 if the asset flows take place in December, 0 otherwise.
FLOW	Growth of the fund due to monetary inflows from outside.

(2000), Del Guercio and Tkac (2002) and Jain and Wu (2000), we used the return and Jensen's alpha as measures of performance. So, we calculated the plans' annual return (RETURN) in accordance with the standard procedure described in the literature. In order to run the risk-adjusted annual return (ALPHA), as in Elton *et al.* (1996), model (2) incorporates various benchmarks that represent the types of asset in which the sample plans could invest.

$$r_{pt} = \alpha_p + \beta_{ibex} r_{ibext} + \beta_{world} r_{worldt} + \beta_{eur} r_{eurt} + \beta_{em} r_{emt} + \beta_{tb} r_{tbt} + \beta_{bond} r_{bondt} + \beta_{deb} r_{debt} + \mu_{pt}. \quad (2)$$

where r_{pt} represents the excess return of plan p at moment t over the one-day Repos index, which is taken as the risk-free asset. α_p represents the skill of a fund manager, which is measured as the expected return that a pension plan manager earns in relation to a multi-index performance benchmark based on the CAPM model. A positive alpha indicates that the pension plan manager is able to add value to the pension plan, while a negative alpha shows that the manager's decisions subtract value from the pension plan.

We adopt as benchmarks the following indexes.The Ibex-35 index represents the benchmark for the Spanish stock market (IBEX). We also take into account the Morgan Stanley Capital International (MSCI) indexes for the Spanish market: the world ex Europe index (world), the Europe index (eur), and the emerging markets index (em). Given that the Spanish Association of Collective Investment and Pension Funds (INVERCO) allows equity personal pension plans to invest up to a maximum of 25% of their portfolios in fixed-income equities, we include in our model the Financial International Analysts (AFI) type indexes for the Spanish fixed-income market: the AFI treasury bills Index (tb), the AFI Bond Index (bond) and the AFI debenture Index (deb)[2].

This allows us to overcome the shortcomings of the traditional single-index model proposed by Jensen (1968), derived from the omission of benchmarks (the traditional Jensen's alpha only uses one benchmark), which could produce biases in the performance evaluation, as commented by Elton *et al.* (1993) and Gruber (1996), when the manager invests in different types of asset and different geographical markets. Thus, our multi-index model uses a set of benchmarks, which represent different types of assets and different geographical stock markets in which a plan might invest, for evaluating financial performance.

Taking these data, return and Jensen's alpha, we considered various measures of the fractional performance rank (RANK) of pension plan i in the previous month in order to examine the asymmetry of the performance-flow relationship. The performance ranks are divided into three unequal groups. We rank pension plans by month to form quintiles according to the measures of performance, either one-month lagged annual return or lagged Jensen's alpha. Thus, HRETURN and HALPHA are the highest quintiles of performance, measured as return and Jensen's alpha respectively, defined as $\text{Min}(\text{RANK}_{i,t-1}\text{-Q5RANK}_{i,t-1}\text{-Q4RANK}_{i,t-1}\text{- Q3RANK}_{i,t-1}\text{- Q2RANK}_{i,t-1}, 0.2)$, MRETURN and MALPHA combine the middle three performance quintiles, measured as return and Jensen's alpha respectively, which are defined as $\text{Min}(\text{RANK}_{i,t-1}\text{-Q5RANK}_{i,t-1}, 0.6)$ and LRETURN and LALPHA are the bottom performance quintiles, measured as return and Jensen's alpha, which are defined as $\text{Min}(\text{RANK}_{i,t-1}, 0.2)$.

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[2] We examine the multicollinearity between the benchmarks to ensure that our proposed model does not generate results that reflect the actual investment style of the pension plan inappropriately. We find significant multicollinearity problems between the Ibex35 index and the Europe index. To overcome the problem of multicollinearity, the Europe index variable is regressed against the ibex35 index variable (Europe index=dependent variable and Ibex35 index= independent variable), the residual of this regression being substituted for the original Europe index variable in the model [2] as in Park and Kerr (1990). Then, we analyze the correlation between the independent variables, not finding significant multicollinearity problems. These findings are available upon request to the author.

Given that Sirri and Tufano (1998), Huang *et al.* (2007) and Shu *et al.* (2002) find a marginal influence of risk on pension plan flows, we follow their approach and include the total risk of each plan measured by the annualized standard deviation of monthly plan returns over the past twelve months (RISK).

The investors could have preferences for pension plans that invest in domestic stocks, with domestic pension plans receiving more money entries than pension plans whose assetsare invested in international stocks, as shown by Brown *et al.* (2012). For this reason, we introduce the FLOWSPAIN variable in our model, which represents the growth of plans whose assets are mainly invested in domestic stocks in month t. The FLOWEUROPE variable represents the growth of plans whose assets are mainly invested in European stocks in month t and the FLOWINTER variable represents the growth of plans whose assets are mainly invested in international stocks in month t.

As in international empirical studies, Chevalier and Ellison (1997) found important differences in the flow-performance relationship incurred by mutual funds depending on their asset size, we measured this factor in terms of the natural log of the one-month lagged asset of each pension plan, LSIZE. Thus, according to Del Guercio and Tkac (2002), the coefficient associated with this variable will reveal the importance of agency relationships and/or client servicing, while Jain and Wu (2000), Sapp and Tiwari (2004) and Alves and Mendes (2011) suggest that the size of a fund could be a reflection of its reputation and visibility.

A further factor that may affect the behavior of investors in pension plans is the age of the plan, as shown by Goriaev *et al.* (2008), Chevalier and Ellison (1997), Del Guercio and Tkac (2002), Kempf and Ruenzi (2008) and Benson *et al.* (2010). Plans that have remained on the market for longer periods may have greater potential to attract inflows of money than newer plans. Therefore the age of the plan, measured as the logarithm of the number of years since it started, with operations computed at the end of each month, is included in the proposed model (LAGE).

Several international authors, such as Shu *et al.* (2002), demonstrate that investors behave differently depending on whether they invest small or large amounts. We therefore include the average investment per participant (LINVEST), measured as the natural log of the assets of each plan minus the natural log of the number of participants in the plan.

Given that Barber *et al.* (2005) and Sirri and Tufano (1998) present evidence of a negative relation between fees and monetary flow, and Goriaev *et al.* (2008) and Alves and Mendes (2011) show a positive effect of fees on mutual fund flows, we include in the proposed model the variables MANFEE and CUSTFEE, defined as a proportion of pension plan assets under management and custody, respectively, corresponding to each pension plan.

The legal status of the management company can also influence investor behavior. Management companies authorized to operate in the area of life insurance could provide additional services related to investment in pension plans. For this reason, we include in the model the dummy variable INSURANCE, which takes the value 1 if the company administering the plan is authorized to operate in the insurance area and 0 if not.

Meanwhile, Greene and Hodges (2002) advise caution with December data due to the high frequency of distributions in this month for the mutual fund industry. For this reason, we include a dummy variable DECEMBER that

takes the value 1 if an observation is from December and otherwise is 0, to test whether the participants invest more frequently during this month in order to exploit tax benefits or promotional gifts.

3. Methodology and Results

The final sample includes data corresponding to 101 equity personal pension plans for the period between January 31, 2006 and May 30, 2011. In Table 1, we briefly define the variables built, taking these data into account, while in Table 2 we show their descriptive statistics.To verify that there are no multicollinearity problems between the variables proposed, a matrix indicating correlation coefficients between independent variables has been created. The results, which are summarized in Table 3, indicate that there are no multicollinearity

TABLE 2
DESCRIPTIVE STATISTICS OF THE SAMPLE OF PENSION PLANS

The sample period runs from March 31 2007 to May 31 2011. Each asset is measured in millions of euros, the average investment per participant in thousands of euros, age in years and fees as percentages of assets.

TABLE 2a

Variable	Mean	Standard Deviation	Max	Min
ALFA	–0.0008	0.0140	0.3775	–0.0601
RETURN	0.0146	0.2133	0.8313	–0.5289
$RISK_{t-1}$	0.1623	0.0729	2.5309	0.0261
FLOWSPAIN	0.0028	0.0427	0.5461	–0.4234
FLOWEUROPE	0.0339	0.6473	3.5663	–2.4834
FLOWINTER	0.0351	0.3358	1.6130	–1.8448
$SIZE_{t-1}$	27.2000	45.2000	307.00	0.0050
AGE	8.7696	3.0354	22.6900	1.4300
$INVEST_{t-1}$	7.0489	26.6936	1.8900	0.2546
MANFEE	0.0171	0.0045	0.0200	0.0000
CUSTFEE	0.0022	0.0017	0.0060	0.0000
R^2	0.8705	0.1238	0.9959	0.2031

TABLE 2b

Variable	Number	Percentage (%)
INSURANCE	2630	51.06
MANAGEMENT	2521	48.94
Observations	5150	

TABLE 3
CORRELATION COEFFICIENTS

	VIF	$FLOW_{i,t}$	$LALFA_{i,t-1}$	$MALFA_{i,t-1}$	$HALFA_{i,t-1}$	$LRETURN_{i,t-1}$	$MRETURN_{i,t-1}$	$HRETURN_{i,t-1}$	$RISK_{i,t-1}$
$LALFA_{i,t-1}$	1.05	0.0449							
$MALFA_{i,t-1}$	1.09	0.0600	–0.0426						
$HALFA_{i,t-1}$	1.10	0.0530	0.0745	0.0266					
$LRETURN_{i,t-1}$	1.16	0.0553	0.0505	0.0972	0.0010				
$MRETURN_{i,t-1}$	1.31	0.0690	0.0701	0.1971	0.0907	–0.0169			
$HRETURN_{i,t-1}$	1.08	0.1112	0.0097	0.0929	0.0288	0.0295	0.0129		
$RISK_{i,t-1}$	1.43	0.0162	–0.0820	–0.0891	0.1845	–0.2465	–0.2478	–0.0410	
$FLOWSPAIN_i$	1.07	0.1285	–0.0058	0.0313	–0.0002	0.0136	0.0405	0.0769	0.0509
$FLOWEUROPE_i$	1.48	0.2508	0.0631	0.1543	0.0230	0.0932	0.2043	0.1036	0.0236
$FLOWINTER_i$	1.36	0.1823	0.0400	0.0710	0.0088	0.0547	0.0888	0.0591	0.1103
$LSIZE_{i,t-1}$	1.34	0.0242	0.0128	0.0395	–0.0023	–0.0331	0.0509	0.1267	–0.0208
$LAGE_{i,t}$	1.12	–0.0817	0.0164	–0.0049	–0.0778	–0.0346	0.0164	0.0066	0.2105
$LINVEST_{i,t-1}$	1.31	–0.0091	0.0737	0.0563	0.0358	0.1055	0.1453	0.1590	–0.1988
$MANFEE_{i,t}$	1.23	0.0611	–0.0907	–0.0172	0.0137	–0.0037	–0.0976	0.0102	0.0227
$CUSTFEE_{i,t}$	1.12	–0.0012	0.0877	–0.0016	–0.0265	0.0259	–0.0116	–0.0138	–0.0066
$INSURANCE_{i,t}$	1.03	0.0269	0.0043	0.0463	0.0679	–0.0720	0.1145	0.0002	0.0060
$DECEMBER_{i,t}$	1.63	0.1904	0.0190	0.0080	–0.0244	–0.0195	–0.0145	0.0063	–0.0147

* Significant at 10%.

	FLOWSPAIN	FLOWEUROPE	FLOWINTER	$LSIZE_{i,t-1}$	$LAGE_{i,t}$	$LINVEST_{i,t-1}$	$MANFEE_{i,t}$	$CUSTFEE_{i,t}$	$INSURANCE_{i,t}$
$FLOWEUROPE_i$	–0.0034								
$FLOWINTER_i$	–0.0068	–0.0055							
$LSIZE_{i,t-1}$	0.0179	0.0031	–0.0210						
$LAGE_{i,t}$	0.0560	0.0299	0.0691	0.1758					
$LINVEST_{i,t-1}$	0.0110	0.0230	–0.0290	0.2229	–0.0259				
$MANFEE_{i,t}$	0.0152	–0.0160	–0.0037	0.2724	0.0588	–0.2286			
$CUSTFEE_{i,t}$	0.0113	–0.0149	0.0024	0.2274	0.1199	–0.1249	0.0615		
$INSURANCE_{i,t}$	0.0158	0.0488	–0.0102	0.0118	0.0010	0.0050	–0.0746	0.0233	
$DECEMBER_{i,t}$	0.1528	0.4037	0.3717	–0.0054	0.0144	–0.0113	0.0235	–0.0040	0.0033

* Significant at 10%.

problems, which agrees with Sharma and James (1981). Furthermore, the variance inflation factor (VIF) for each regressor, presented in Table 3, is calculated and examined. The results are lower than ten, thereby confirming the absence of multicollinearity problems.

In order to analyze the behavior of participants in pension plans, we propose the following model, where the dependent variable is the monthly asset flow of each plan:

$$\begin{aligned}\text{Flow}_{i,t} &= \alpha + \beta_1 \text{LReturn}_{i,t-1} + \beta_2 \text{MReturn}_{i,t-1} + \beta_3 \text{HReturn}_{i,t-1} + \beta_4 \text{LAlpha}_{i,t-1} + \\ &+ \beta_5 \text{MAlpha}_{i,t-1} + \beta_6 \text{HAlpha}_{i,t-1} + \beta_7 \text{Lsize}_{i,t-1} + \beta_8 \text{Lage}_{i,t} + \beta_9 \text{Insurance}_{i,t} + \\ &+ \beta_{10} \text{FlowSpain}_{i,t} + \beta_{11} \text{FlowEurope}_{i,t} + \beta_{12} \text{FlowInter}_{i,t} + \beta_{13} \text{December}_{i,t} + \\ &+ \beta_{14} \text{Risk}_{i,t-1} + \beta_{15} \text{Manfee}_{i,t} + \beta_{16} \text{Custfee}_{i,t} + \beta_{17} \text{Linvest}_{i,t-1} + \varepsilon_{i,t},\end{aligned} \tag{3}$$

where $\varepsilon_{i,t}$ is the error term.

We used different approaches to estimate the above model, in order to ensure the robustness of the empirical results, including pooled OLS regression, and the fixed and random effects models. Wefirst ran the pooled OLS regression, the results of which are presented in Table 4. However, this technique may give biased and inconsistent estimates when there are unobserved characteristics.

Taking into account the problem of unobserved heterogeneity, we propose the use of the random effects and the fixed effects models to deal with the afore mentioned problem, summarizing the results in Table 4, and then we apply the adjusted Lagrangian multiplier test for random effects, as proposed by Bera *et al.* (2001), to test whether the variance of the random error is 0. This test (chi-squared (1):375.13; P-value: 0.000) shows that the null hypothesis of no random individual effects cannot be accepted. This evidence supports the results of the random effects estimation.

In order to test for the presence of plan-specific fixed effects, we performed the Wooldridge modified version of the Hausman test, which is robust to the heteroskedasticity of disturbance terms. The modified Hausman test statistics are highly significant (chi-squared (15): 68.59; p-value: 0.000), which rejects the null hypothesis of random effects in favor of the fixed effects specification.

This fixed effects model assumes that the errors are homoskedastic and spatially and temporally independent, obtaining biases estimators when there is dependence and heteroskedasticity problems in the term errors as shown by Beck (2001) and O'Connell (1998). Thus, like Horgos (2011) and Martí *et al.* (2013), we implement the modified Wald test for group wise for testing the hypotheses of homoskedasticity. The results obtained (chi-squared (101):45,498.77, p-value: 0.000) fail to accept the null hypothesis of homoskedasticity.

We also adopt the Wooldridge test (2002) to verify the existence of first-order autocorrelation in the residual, so the presence of serial correlation might underestimate the estimators (Fama and French, 2002 and Petersen, 2009). Our findings (F(1,100): 53.06; p-value: 0.000) fail to reject the null hypotheses of no serial correlation.

For testing the existence of cross-sectional independence we adopt Pesaran's CD test (2004), which is asymptotically consistent (Hsiao *et al.*, 2007). The result obtained (CD = 4.558; p-value 0.000) fails to accept the null hypotheses

TABLE 4
REGRESSION ANALYSIS OF DETERMINANTS OF PENSION PLAN FLOWS

Variables	Pooled coefficients	Random effects coefficients	Fixed effects coefficients	Fama-MacBeth's coefficients	Petersen's coefficients	Vogelsang's coefficients
$LALFA_{i,t-1}$	0.0164 **	0.0071	–0.0016	–0.0062	0.0164 **	–0.0016
$MALFA_{i,t-1}$	–0.0014	0.0025	–0.0044	0.0117	–0.0014	–0.0044
$HALFA_{i,t-1}$	0.0112 **	0.0109 **	0.0127 **	–0.0301	0.0112 **	0.0127 *
$LRETURN_{i,t-1}$	0.0099	0.0084	0.0128 *	0.0359	0.0099 *	0.0128
$MRETURN_{i,t-1}$	0.0008	0.0014	0.0042	0.1113 ***	0.0008	0.0042
$HRETURN_{i,t-1}$	0.0291 ***	0.0282 ***	0.0308 ***	0.1047 ***	0.0291 **	0.0308 **
$RISK_{i,t-1}$	0.0062	0.0073	–0.0279 *	0.0086	0.0062	–0.0279
$FLOWSPAIN_{i}$	0.1416 ***	0.1383 ***	0.1362 ***	0.0267 ***	0.1416 ***	0.1362 ***
FLOWEUROPE	0.0175 ***	0.0172 ***	0.0168 ***	–0.0041	0.0175 ***	0.0168 ***
FLOWINTER	0.0256 ***	0.0249 ***	0.0242 ***	–0.0025	0.0256 ***	0.0242 ***
$LSIZE_{i,t-1}$	0.0007	0.0002	–0.0049 *	0.0013 **	0.0007	–0.0049
$LAGE_{i,t}$	–0.0142 ***	–0.0102 ***	–0.0036	–0.0160 ***	–0.0142 ***	–0.0036
$LINVEST_{i,t-1}$	–0.0012	–0.0030 *	–0.0098 **	–0.0020	–0.0012	–0.0098
$MANFEE_{i,t}$	0.6425 ***	0.4500 **	0.2064	0.5452 **	0.6425 *	0.2064
$CUSTFEE_{i,t}$	0.0307	–0.4297	–3.9334 *	–0.0019	0.0307	–3.9334
$INSURANCE_{i,t}$	0.0017	0.0063 ***	0.0151 ***	0.0008	0.0017	0.0151 **
$DECEMBER_{i,t}$	0.0008	0.0014	0.0016	–	0.0008	0.0016
Constant	0.0164 *	0.0328 **	0.1707 ***	0.0207	0.0164	0.1707
Observations	5150	5150	5150	5150	5150	5150
Number plans	101	101	101	101	101	101
R-squared	0.1380	0.1322	0.0649	0.2222	0.1380	0.1383

*, **, *** Significant at 10%, 5% and 1%, respectively.

of cross-sectional independence. In addition, we apply the Pesaran panel unit root test (2007), which is robust to cross-sectional dependence. The CIPS test results, summarized in Table 5, show that for all variables analyzed the unit root hypothesis is rejected when we take into account the trend and use the constant. Then, we proceed by taking all variables as I(0) variables.

Given that Vogelsang (2012) shows that in the presence of heteroskedasticity, serial correlation, spatial correlation and stationarity in the time dimension it is better to use the standard errors on the basis of the heteroskedasticity autocorrelation covariance matrix estimators (HAC) of cross-section averages proposed by Driscoll and Kraay (1998) than the cluster standard errors analyzed by Arellano (1987) and Petersen (2009), we estimate the model by taking into account the Vogelsang modified version of the Driscoll and Kraay standard errors. This approach provides consistent estimators when the individual fixed effects are correlated with the regressors, unlike Fama-MacBeth'sapproach (1973) and Robinson's semiparametric method (1988). However, Vogelsang's method assumes a linear relationship between dependent and independent variables obtaining biased estimators when this assumption is violated. Thus, we implement a modified Wald test proposed by Vogelsang (2012) that allows us to test the linear hypothesis (H_0: $R\beta = r$). Our finding (Chi-squared:1.20; fixed-b p-value: 0.30) fails to reject the mentioned null hypothesis.

Table 4 summarizes the results obtained using different regression techniques: pooled time-series cross-sectional regression analysis, random effect model, fixed effect regression model, Fama-MacBeth'sapproach, Petersen's methodology and Vogelsang's methodology. The estimations performed on these regression models present differences in level of significance and size. Therefore,the presence of unobservable characteristics and the existence of heteroskedasticity, serial correlation and cross-sectional dependence in the errors in the panel data models might lead us to overestimate or underestimate the effect of performance, investment risk, age of the plan, size of the plan, investment by participants, fees paid and type of the management company on the behavior of investors in pension plans.

TABLE 5
PESARAN'S CIPS PANEL UNIT ROOT TEST RESULTS

Variables	With an intercept	With an intercept and a linear trend
FLOW	–4.043 ***	–4.300 ***
LRISK	–1.303	–2.711 ***
LINVEST	–1.583	–2.759 ***
LSIZE	–1.188	–2.541 **
LAGE	–3.279 ***	–4.952 ***
ALFA	–2.754 ***	–2.828 ***
RETURN	–2.424 ****	–2.889 ***

The reported values are CIPS statistics, which are cross section averages of cross-sectionally augmented Dickey-Fuller test statistics (Pesaran (2007)). Significance at 1%, 5%, and 10% is denoted as ***, **, and *, respectively.

Taking into account the results obtained applying the approach proposed by Vogelsang (2012), the evidence found suggests that investors in pension plans use returnsand risk-adjusted returns to evaluate managers. So, we find that the relation between pension plan flow and return (risk-adjusted return) is positive and highly statistically significant among high performers. Specifically, an additional 1% of return (risk-adjusted return) approximately implies an additional 0.03% (0.013%) growth rate for the top pension plans, ranked according to one-lagged annual return (risk-adjusted return). However, we find a positive (negative) and non significant relationship between return (risk-adjusted return) and flows of pension plans for other quintile returns (risk-adjusted return).

Thus, as in previous studies, such as Sirri and Tufano (1998), Huang *et al.* (2007), Barber *et al.* (2005) and Ferruz *et al.* (2009), the results show that participants do not punish poorly performing managers by with drawing assets from under their management and flocking instead to recent good performers. This absence of a strong link between performance and flows for the poorest performers could be attributable to (1) the presence of cautious clients in the pension plan industry who may invest in consideration of other factors such as fiscal benefits and promotional gifts, among others, (2) the existence of a disposition effect whereby investors do not sell funds that perform poorly, staying invested in the hope that the fund price returns to the original purchase price (Shefrin and Statman (1985)) or in the belief that mutual fund perceived past performance is above actual past performance, from which investors tend to adjust their beliefs to justify their past purchase in order to resolve the discrepancy between performance and past purchase (Goetzmann and Peles, 1997 and Chen and Lai, 2010) and/or (3) the existence of *familiarity* bias as found by Brown *et al.* (2012), from which investors tend to invest in pension plans that invest in sectors or stocks from Spain, without taking into account their risk-return binomial.

This finding contrasts with Del Guercio and Tkac (2002), who find a linear relationship between occupational pension plan flows and performance that they attribute to the favorable tax treatment of pension plans. However, Spanish investors in pension plans also transfer consolidated rights from one individual plan to another without paying any taxes, so the different results for the shape of the relationship between flows and performance obtained are due to other causes.

In this vein, the differences in the behavior of participants in occupational and individual pension plans may be due to the different ways in which the two institutions operate, as in the former the transfer of consolidated rights occurs when (1) employment terminates and this is established in the specifications of the pension plan and (2) the pension scheme's supervisory committee makes that decision.

When this occurs, the pension scheme's supervisory commission must inform and respond to participants. This can create incentives within the supervisory committee to transfer the most poorly performing assets of pension funds to those that have obtained the best performance, because otherwise they could be accused of poor judgment. In contrast, participants in individual pension plans and investors in mutual funds do not have to defend their choices to anyone and may not wish to withdraw all of their assets from one fund or plan and put them in another.

The existence of *familiarity* bias is congruent with the positive and significant relationship found between the FLOWSPAIN, FLOWEUROPE and FLOWINTER variables and the dependent variable FLOW. The results indicate that participants make more contributions or transfers to pension plans that invest their assets in Spanish stocks than to pension plans that invest their assets in European stocks or in stocks from other foreign countries.

Table 4 also shows that pension plans managed by insurance companies obtain significantly higher inflows than those managed by companies that only administer pension funds (management companies). This finding could be due to the fact that insurance companies (1) provide additional services related to their investment in pension plans and/or (2) use different management strategies for capturing a specific type of investor assuming different risk in relation to management companies. Thus, managers could implement an active or passive management strategy to manage their portfolios. A passive management strategy consistsof investing most pension plans' assets byreplicating the composition of one or several indexes or investingin index/es, while an active management strategy consistsof selecting individual stocks that outperform any passive index investing (Amihud and Goyenko, 2013).

3.1. Analyzing management strategies implemented by insurance and management companies

To analyze active management strategies implemented by mutual fund managers, Amihud and Goyenko (2013) propose using the 1-R2 measure, which they define as the weight of the variance of the tracking error with respect to a multiple-factor benchmark in the total return variance. This measure is more suitable than the Active Shares (AS) measure for analyzing the active management strategies when the fund's manager invests in more than one asset class, so it allows us to detect funds which implement a passive multi-index investing, unlike the Active Shares (AS) measure proposed by Cremers and Petajisto (2009). Given that Amihud and Goyenko (2013) find that R2 is related to fund characteristics, we examine the existence of differences between management strategies adopted by management companies and insurance companies, controlling for age of the plan, size of the plan, investment by participant, management fee and custodial fee. Thus, we propose the following model which is similar to that proposed by Amihud and Goyenko (2013):

$$1-R_i^2=\alpha_i+\beta_1+\text{Insurance}_i+\beta_2\text{Lage}_i+\beta_3\text{Lsize}_i+\beta_4\text{Linvest}_i+ \\ +\beta_5\text{Manfee}_i+\beta_6\text{Custfee}_i+\varepsilon_{i,t}, \tag{4}$$

where $\varepsilon_{i,t}$ is the error term.

We estimate this model using robust ordinary least square technique. Table 6 shows the results obtained indicating that there are no significant differences, on average, between management strategies adopted by insurance companies and management companies. We also conduct a test of robustness based on a mean comparison test of two groups, whose results (Student –t = –0.4784; *p-value* = 0.63) are congruent with the previous result. Therefore, the highest

TABLE 6
DETERMINANTS OF ACTIVE MANAGEMENT STRATEGY

Variables	Coefficients	
INSURANCE	–0.0037	
$LSIZE_{i,t-1}$	–0.0225	
$LAGE_{i,t}$	–0.0081	
$LINVEST_{i,t-1}$	0.0064	
$MANFEE_{i,t}$	0.3812	
$CUSTFEE_{i,t}$	–6.4081	**
Constant	0.3350	***
Number plans	101	
R-squared	0.0482	

*, **, *** significant at 10%, 5% and 1%, respectively.

inflows received by insurance companies could be the result of differences in the service provided to investors with respect to management companies.

3.2. Analyzing the flow-performance relationship by type of management company

In previous sections, we control for the influence of the management company by including as a dummy variable the type of management company (insurance company vs management company), which significantly affects the relationship between performance and flow. Management companies belonging to these groups could differ in their after-sales service, advertising policies, or information policies, among other ways of attracting investors,which could cause their clients to react differently to return, risk-adjusted return andportfolio risk. To examine this, we propose the following model, which focuses on the subsample composed of plans managed by insurance companies and on the subsample composed by plans administered by management companies.

$$\begin{aligned}\text{Flow}_{i,t} &= \alpha + \beta_1 \text{LReturn}_{i,t-1} + \beta_2 \text{MReturn}_{i,t-1} + \beta_3 \text{HReturn}_{i,t-1} + \beta_4 \text{LAlpha}_{i,t-1} + \\ &+ \beta_5 \text{MAlpha}_{i,t-1} + \beta_6 \text{HAlpha}_{i,t-1} + \beta_7 \text{Lsize}_{i,t-1} + \beta_8 \text{Lage}_{i,t} + \beta_9 \text{FlowSpain}_{i,t} + \\ &+ \beta_{10} \text{FlowEurope}_{i,t} + \beta_{11} \text{FlowInter}_{i,t} + \beta_{12} \text{December}_{i,t} + \beta_{13} \text{Risk}_{i,t-1} + \beta_{14} \text{Manfee}_{i,t} + \\ &+ \beta_{15} \text{Custfee}_{i,t} + \beta_{16} \text{Linvest}_{i,t-1} + \varepsilon_{i,t},\end{aligned} \tag{5}$$

where $\varepsilon_{i,t}$ is the error term.

This model is estimated using the methodology proposed by Vogelsang, which allows us to correct heteroskedasticity, serial correlation and cross-sectional dependence problems. The results obtained are summarized in Table 7, showing that investors in pension plans managed by insurance companies use returns to evaluate managers while investors in pension plans managed by specialized or pure management companies employ risk-adjusted return to evaluate them. This

TABLE 7
REGRESSION ANALYSIS OF DETERMINANTS OF PENSION PLAN FLOWS BY TYPE OF MANAGEMENT COMPANY

Variables	Insurance Companies		Management Companies	
	Vogelsang's coefficients		Vogelsang's coefficients	
$LALFA_{i,t-1}$	0.0017		0.0009	
$MALFA_{i,t-1}$	–0.0080		–0.0004	
$HALFA_{i,t-1}$	0.0105		0.0797	**
$LRETURN_{i,t-1}$	0.0069		0.0192	
$MRETURN_{i,t-1}$	0.0059		0.0016	
$HRETURN_{i,t-1}$	0.0280	**	0.0203	
$RISK_{i,t-1}$	–0.0353		0.0037	
$FLOWSPAIN_{i}$	0.1129	***	0.1595	***
FLOWEUROPE	0.0141	***	0.0201	***
FLOWINTER	0.0263	***	0.0247	***
$LSIZE_{i,t-1}$	–0.0225		0.0189	
$LAGE_{i,t}$	–0.0081		–0.0160	*
$LINVEST_{i,t-1}$	0.0064		–0.0258	
$MANFEE_{i,t}$	0.3812		0.1037	
$CUSTFEE_{i,t}$	–6.4081	*	–0.5875	
$DECEMBER_{i,t}$	0.0070	**	–0.0038	
Constant	0.3350	*	–0.0496	
Observations	5150		5150	
Number plans	101		101	
R-squared	0.1569		0.1234	

*, **, *** Significant at 10%, 5% and 1%, respectively.

could indicate that, although Spanish Law does not mandate managers to inform investors about pension plans' risk-adjusted return, management companies (specializing only in managing pension plans) could be doing so, unlike insurance companies, which could be providing only mandatory information (percentages of custodial and management fees and return).

Thus, higher performers (according to return measure in the case of insurance companies and risk-adjusted return measure in the case of pure management companies) receive significantly more inflows than other pension plans for other performance quintiles. On the other hand, poor performers plans do not experience significant outflows in their portfolios, which could be due to (1) the presence of cautious clients in the pension plans industry, (2) the existence of a disposition effect and (3) the existence of *familiarity* bias from which investors prefer to invest in stocks from the domestic market. Congruently with the above-mentioned *familiarity* bias, our results show that pension plans that invest in Spanish stocks receive significantly more inflows than pension plans that invest in European or International stocks, as in Brown *et al.* (2012).

Our findings also show that younger pension plans managed by specialized (pure) management companies are preferred by investors. This could be due to specialized management companies promoting advertising in young plans,

which have not acquired the reputation of the old plans, more actively than insurance companies. This result is consistent with Alves and Mendes (2011) and Goriaev *et al.* (2008).

The contributions of investors to pension plans managed by insurance companies increase significantly in December, which could be explained by (1) insurance companies promoting their pension plans (for example, by giving promotional gifts) more actively in December than specialized management companies, or (2) insurance companies providing a tax advice service to their clients, who could make contributions to their pension plans at the end of the year in order to exploit tax benefits.

Investors of pension plans managed by insurance companies are significantly more sensitive about the custodial fees paid to the custodial company than investors of pension plans managed by specialized management companies. Thus, pension plans managed by insurance companies which are charged higher custodial fees receive significantly fewer capital inflows than those charged lower custodial fees.

Strikingly, while investors of pension plans managed by specialized management companies use systematic risk (controlled by means of Jensen's alpha) for making purchase decisions, investors of pension plans administered by insurance companies do not take into account systematic risk or risk for their purchase decisions, as indicated by the lack of significant relationship between pension plan flow and risk or risk-adjusted return in Table 7.

This finding may be due to investors of pension plans managed by insurance companies (1) treating all plans within an investment style as equally risky, as shown by Fant and O'Neal (2000) or (2) not knowing that they are taking a risk when they invest their wealth in a specific equity pension plan or (3) not having been informed about the risk and systematic risk of their pension plans or (4) suffer from *familiarity* bias as found by Brown *et al.* (2012), tending to invest in pension plans that invest in sectors or stocks from Spain, without taking their risk into accountor (5) tending to prioritize return without taking the risk into account, since the Spanish pay-as-you-go social security system will provide them with a minimum retirement pension when they retire, causing a moral hazard behavior.

This may encourage managers of insurance companies to take more risks with their portfolios as found by Krasnokutskaya and Todd (2009) in the Chilean market. However, the reason why Spanish and Chilean managers might take more risk is different. Thus, while Chilean AFP firms have incentives to invest in riskier portfolios created by Chilean law, which makes firms guarantee minimum returns, the incentives of Spanish insurance companies to take more risk could be due to (1) the lack of available information about risk assumed by the investors in their investment (on the managers' side), (2) the low incidence of penalties when the manager obtains poor returns and the significant benefits when the manager gains the highest returns independently of the risk assumed, which is likely due to moral hazard behavior led by the extended social coverage the social security system provides (on the investors' side) and (3) the lack of rules that mandate managers to inform investors about risk assumed in their investment (on the regulators' side). This situation allows Spanish insurance companies to seek to achieve gains that might enable them to gain more money and thereby increase their remuneration, as in Chevalier and Ellison (1997), while the probable losses

incurred by increasing the portfolio risk are assumed by the investors who might suffer from *familiarity* bias and from moral hazard behavior due to high protection provided by the Spanish social security system, which encourages investors to look for high returns without taking into account risk assumed.

Thus, there could be differences between the risks assumed by insurance companies and specialized management companies in the management of their portfolios. However, when we run the two groups' mean comparison test (*t*: –0.7058; *p-value*: 0.4819), we find that there are no differences between the risks assumed by these two types of companies in the management of their portfolios. We also compare the existence of differences in return obtained by the two types of companies (*t*: 1.5294; *p-value*: 0.1294) and the risk-adjusted return achieved by insurance companies and specialized management companies (*t*: –0.0450; *p-value*: 0.9642), not finding significant differences between results of both types of companies. This could be produced by Spanish law, which establishes limits in the composition of portfolios, which could obstruct the appropriate diversification of the portfolios, limiting their risk. This could be the reason why over 90% of the return variability of most pension plans can be replicated by major indexes as shown Table 2.

Therefore, we conclude that differences in capital inflows between pension plans managed by specialized management companies and pension plans administered by insurance companies could be due to differences in the marketing strategies used and/or differences in post-sales services, such as tax advice, or additional information provided.

Discussion and Conclusions

This study has analyzed the behavior of investors in pension plans using different measures of performance: return and Jensen's alpha, controlling for the legal nature of management companies, age, volatility and size of pension plans, average investment, management fee and custodial fee, as well as for the growth rate of net new money for all plans in the equity investment category and contributions made at the end of the year.

To achieve this, a panel data model has been proposed implementing the methodology outlined by Vogelsang (2012) using a sample consisting of 101 equity pension plans. Unlike other estimation methods (ordinary least square, traditional fixed effects, traditional random effects, Fama and MacBeth's (1973) approach and Petersen's method (2009)) the technique proposed by Vogelsang (2012) provides consistent and robust estimators when the distribution of the residuals presents problems with heteroskedasticity and dependence. The estimators obtained by implementing this technique differ in terms of size and significance from the other models mentioned above, highlighting the importance of adopting the most appropriate method in order to obtain more robust conclusions.

The results obtained show a positive, significant relationship between pension plan flows and return, risk-adjusted return, the type of management company and the flows experienced by pension plans that invest in Spanish, European and International stock markets, respectively.

Thus, we find that the relationship between pension plan flows and return (risk-adjusted return) is convex, as in previous studies of the mutual fund industry

(Sirri and Tufano (1998)). Participants therefore make transfers and significant contributions to plans that have achieved the highest returns (risk-adjusted returns) in the past, while the contributions and transfers to plans with poorer returns (risk-adjusted returns) are smaller and less significant. This finding could indicate that there are investors in Spainw ho do not sell poorly performing pension plans despite their consistently poor performance, as shown by Ferruz *et al.* (2007) and Martí (2009).

This could be attributable to (1) the presence of cautious clients in the pension plan industry who may invest in consideration of other factors such as fiscal benefits and promotional gifts, among others, (2) the existence of a disposition effect (Shefrin and Statman (1985), Goetzmann and Peles (1997) and Chen and Lai (2010)) and/or (3) the existence of *familiarity* bias (Brown *et al.* (2012)). Congruently with the presence of *familiarity* bias, we find that pension plans that invest in Spanish stocks receive significantly higher capital inflows than other pension plans that invest in European or International stocks.

The legal status of management companies also has a significant effect on the monetary input into pension plans. In this regard, companies that are authorized to operate in life insurance receive significantly greater monetary input than pension plans administered by pure management companies, which could be because the former provide investors with additional services related to investment in pension plans (for example, tax advice) and/or implement different marketing strategies that attract more clients, so an analysis based on a mean comparison test of the two groups shows that there are no differences between pure management companies and insurance companies with respect to return reached, risk assumed, risk-adjusted return obtained and management strategy implemented.

Thus, although managers of insurance companies could have an incentive to take more risk, given that (1) their investors do not react to poor risk-adjusted return and risk measures,likely because investors are guaranteed a minimum retirement pension from the social security system, which leads to a moral hazard behavior in which they try to complement this pension by making contributions to private pension plans, considering their high returns independently of the risk assumed, and (2) Spanish legislation[3] does not mandate managers to inform investors about risk measure, pure management companies and insurance companies take a similar risk, in general. This could be due to restrictions in the investment policies of a portfolio imposed by Spanish legislation. These restrictions could prevent appropriate portfolio diversification, limiting the risk, which could be the reason why over 90%, on average, of return variability reached by most pension plans in our sample can be replicated by major indexes.

[3] Nowadays, Spanish legislation makes it compulsory for management companies to inform participants every six months, or every three months if they so request, of the fees and pension plan's return in the previous financial year. However, this rule does not refer to the risk borne by these financial instruments.

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