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Determinants of Equity Pension Plan Flows

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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 (Heteroskedasticity, autocorrelation, and spatial correlation robust inference in linear panel models with fixed-effects, 2011). 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. However, participants do not react to risk measures, which may be because they consider all plans making up the equity category to entail the same risk.

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Keywords Return; Jensen's Alpha; pension plan flows; panel data models

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Introduction

Pension plans and pension funds have undergone major development in recent years, at both international and national levels. At the end of 2009, the value of the world's total assets managed by pension funds was 12,740 billion euros, a figure that comes close to the 15,933 billion euros managed by mutual funds worldwide in the same year, according to data from INVERCO, the Spanish Association of Collective Investment and Pension Funds and EFAMA, the European Fund and Asset Management Association.

The significant development of collective investment institutions has aroused major interest among the financial community in general and scholars in particular in determining the factors inducing 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. We only know of the existence of one study, by Del Guercio and Tkac's (2002), which found 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) in terms of different aspects relating to the market studied, the data and the methodology used. Previous work on pensions has focused on the US market, which is a characteristically large and complex market with experience in the sector going back to 1800, as opposed to the much more recently-created Spanish market, with its moderate volume of assets. Del Guercio and Tkac (2002) use occupational pension fund data, but the proposal here is to focus on individual pension plans. 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, while this study uses the panel data method proposed by Vogelsang (2011), 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 employed and the results obtained. Finally, we report our main conclusions and provide references.

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 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. We omitted plans created after January 31, 2006, those dissolved during the period, and those with missing data for any of the months considered.

In light of the comments made in the previous paragraph, and in accordance with Brown et al. (1997), survival bias may appear as a result of excluding dissolved portfolios from the sample, or omitting, for methodological reasons, certain funds that existed in the period. Carhart (1997) differentiates between the two and refers to the latter as *look-ahead bias*. Since we do not consider dissolved pension plans in our study, and eliminate those operating for less than five years, our sample may show slight bias.

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 Patel et al (1994), Chevalier and Ellison (1997), Sirri and Tufano (1998) and Del Guercio and Tkac (2002), 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:

$$Flow_{i,t} = \frac{TNA_{i,t} - TNA_{i,t-1} * (1 + R_{i,t})}{TNA_{i,t-1}} \qquad [1]$$

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 Sirri and Tufano (1998), Fant and O'Neal (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.

$$r_{pt}=\alpha_p + \beta_m r_{mt} + \beta_s r_{st} + \beta_g r_{gt} + \beta_v r_{vt} + \mu_{pt} \qquad [2]$$

where r_{pt} is the excess performance of fund p at moment t over the risk-free asset. The benchmarks used are as follows. First, the Ibex-35 index was used as a proxy for investment in the Spanish stock market (m). This index is the best-known and most widespread reference for the Spanish market on an international level; it is taken as the main underlying asset in the Spanish futures and options market and is used as a reference by the financial press and other media to compare high-risk pension plans with the Spanish Stock Market.

To extend the number of benchmarks, we used the Morgan Stanley Capital International (MSCI) type indexes for the Spanish market: the world index ex EMU (s), the Europe index ex EMU (g) and the EMU index (v). To determine the monthly excess return, both for the plans and for the benchmarks, the one-day AFI Repos index was used as a risk-free asset. These data were obtained from AFI and MSCI.

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 Min($RANK_{i,t-1}$-$Q5RANK_{i,t-1}$-$Q4RANK_{i,t-1}$- $Q3RANK_{i,t-1}$- $Q2RANK_{i,t-1}$, 0.2), MRETURN and MALPHA combine the middle three performance quintiles, measured as return and Jensen's alpha respectively, which are defined as Min($RANK_{i,t-1}$-$Q5RANK_{i,t-1}$, 0.6) and LRETURN and LALPHA are the bottom performance quintiles, measured as return and Jensen's alpha, which are defined as Min($RANK_{i,t-1}$, 0.2).

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). To control for category-level flows, we include in the analysis the variable FLOWOBJ to represent the growth of the plan's objective category in month t as in Sirri and Tufano (1998).

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 size 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.

These variables are summarized in Table 2. 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 problems, which agrees with Sharma and James (1981). Furthermore, the variance inflation factor (VIF) for each regressor, presented in Table 2, is calculated and examined. The results are lower than ten, thereby confirming the absence of multicollinearity problems.

Methodology and results

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:

$$Flow_{i,t}=\alpha+\beta_1*LReturn_{i,t-1}+\ \beta_2*MReturn_{i,t-1}+\ \beta_3*HReturn_{i,t-1}+\ \beta_4*LAlpha_{i,t-1}+\ \beta_5*MAlpha_{i,t-1}+\ \beta_6*HAlpha_{i,t-1}+\ \beta_7*Lsize_{i,t-1}+\ \beta_8*Lage_{i,t}+\ \beta_9*Insurance_{i,t}+\ \beta_{10}*FlowObj_{i,t}+\ \beta_{11}*December_{i,t}+\ \beta_{12}*Risk_{i,t-1}+\ \beta_{13}*Manfee_{i,t}+\ \beta_{14}*Custfee_{i,t}+\ \beta_{15}*Linvest_{i,t-1}+\varepsilon_{i,t} \quad [3]$$

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. We first 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 aforementioned 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):355.27; 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 (13): 58.08; 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. However, O'Connell (1998) and Beck (2001) show that the panel tests are considerably disturbed when the independence and homoskedasticity assumptions are violated. For this reason, like Horgos (2011), we test the hypotheses of homoskedasticity in the fixed effects model using the modified Wald test for groupwise. This statistic is asymptotically distributed as chi-squared with 101 degrees of freedom. The sample value (chi-squared (101):110,841, p-value: 0.000) was higher than the critical value at 1% of significance; the null hypothesis of homoskedasticity is therefore rejected.

According to Petersen (2009) and Fama and French (2002), the presence of serial correlation could underestimate the standard errors of the coefficients. We therefore also apply the serial correlation test to verify whether the residuals have first-order autocorrelation using the Wooldridge test (2002). The results of the aforementioned statistic (F(1,100): 54.45; p-value: 0.000) show that we cannot reject the null hypotheses of no serial correlation. To test for the existence of cross-sectional independence we implement Pesaran's CD test of (2004), which is asymptotically consistent as shown Hsiao et al (2007).

The result of Pesaran's test is: CD= 6.218 (p-value 0.000), so we cannot accept the null hypotheses 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 (2011) 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's approach (1973). Table 4 summarizes the results.

We can therefore compare the results obtained using different regression techniques: pooled time-series cross-sectional regression analysis, random effect model, fixed effect regression model, Fama-MacBeth's approach, Petersen's methodology and Vogelsang's methodology. The estimations performed on these regression models present differences in size and level of significance. This tells us that the non-compliance with the assumptions of independent and identically distributed (i.i.d.) errors in the traditional panel model and the existence of unobservable characteristics could lead us to either underestimate or overestimate the effect of certain variables on the behavior of investors in pension plans.

Taking into account the results obtained applying the approach proposed by Vogelsang (2011), the evidence found suggests that investors in pension plans use returns to evaluate managers. So, we find that the relation between pension plan flow and return is positive and highly statistically significant among high performers. Specifically, an additional 1% of return approximately implies an additional 0.03% growth rate for the top pension plans, ranked according to one-lagged annual return. However, we find a positive and non significant relationship between return and flows of pension plans for other quintile returns.

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 withdrawing 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 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.

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.

In addition, participants do not use risk-adjusted return to evaluate pension plan managers. This could indicate that Spanish investors are less sophisticated and do not understand the significance of this measure. Thus, participants could be investing in plans that take more risks than their benchmarks in order to obtain the same return, showing that participants are not aware of the existence of an asset's systematic risk. This finding is consistent with the result obtained for the variable risk, which is not statistically significant, and which may be due to investors (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. Thereby, investors might behave irrationally, if we consider that the aim of a rational investor consists of maximizing the portfolio return and minimizing its risk (variance), according to the modern portfolio theory described by Markowitz (1958). This irrational behavior by investors with regard to risk and return may encourage managers to take more risks with their portfolios as they seek to achieve gains that might enable them to gain more money and thereby increase their remuneration, as in Chevalier and Ellison (1997).

The FLOWOBJ variable, as expected, shows a positive and statistically significant relationship with the dependent variable FLOW. So, when a participant makes contributions or transfers to a specific pension plan, *ceteris paribus*, the assets of equity pension plans, as a whole, increase.

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. This finding could due to the fact that insurance companies provide additional services related to their investment in pension plans.

The DECEMBER variable shows a positive and statistically significant relationship with the dependent variable FLOW. Thus, participants may invest more frequently in December in order to exploit tax benefits, as shown by Dominguez and Lopez (2007), or promotional gifts. This might indicate the existence of two types of client: (1) those who make periodical contributions to their retirement plans because they are aware of the need to complement the public pension system, and (2) those who make contributions to their retirement plans once a year in order to reduce the tax payable on their income tax or to benefit from promotional gifts.

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 (2011) 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 (2011) 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, the type of management company and the flows experienced by the equity category.

Thus, we find that the relationship between pension plan flows and 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 in the past, while the contributions and transfers to plans with poorer returns are smaller and less significant. This finding could indicate that there are unsophisticated investors in Spain who do not sell poorly performing pension plans despite their consistently poor performance, as shown by Ferruz et al (2007) and Martí (2009).

Strikingly, we found no relationship between risk and pension plan flows. Therefore, a large number of clients of management companies use a plan's return as a measure to evaluate said management, ignoring the risks. This finding could indicate that investors in pension plans behave irrationally, in consideration of the modern portfolio theory proposed by Markowitz (1958), which may be because investors treat all plans in a certain style of investment as if they were of equal risk, as shown by Fant and O'Neal (2000). Thus, pension fund managers could have an incentive to take additional risks if there is a chance that by doing so they will rise up the performance scale.

To overcome this, regulators may increase the transparency of information in the Spanish legal framework on funds and pension plans, forcing management companies to inform participants about the financial risks they are assuming. Nowadays, Spanish legislation establishes that it is 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, so informative leaflets might not include it, meaning that investors are unaware of the effect of their investment decisions in terms of equity, and thus might take different levels of risk.

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. On the other hand, participants may invest more frequently in December in order to obtain tax deductions or receive promotional gifts.

In conclusion, the findings obtained show that participants do take into account the return when making their investment decisions. However, they do not seek to minimize the risk of their investments, which is likely to be because they assume that all pension plans in that equity category entail the same risk. This suggests that Spanish investors should improve their understanding of the pension fund industry and be better informed.

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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
FLOWOBJ	Growth of the plan's objective category in month t
LSIZE	Natural log of assets of each pension plan.
LAGE	Natural log of number of years since pension plan was set up.
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 nominal value of assets under custody corresponding to each pension plan.
BANK	Dummy variable = 1 if promoter of plan belongs to bank, 0 otherwise.
SAVBANK	Dummy variable = 1 if promoter of plan belongs to savings bank, 0 otherwise.
OTHER	Dummy variable = 1 if promoter of plan does not belong to bank or savings bank, 0 otherwise.
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.

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	0.0022	0.0735	1.2957	-0.5099
RETURN	0.0146	0.2133	0.8313	-0.5289
$RISK_{t-1}$	0.1623	0.0729	2.5309	0.0261
FLOWOBJ	0.1873	1.4450	5.2600	-4.7500
$SIZE_{t-1}$	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

Table 2b

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

Table 3: Correlation Coefficients

	VIF	$FLOW_{i,t}$	$LALFA_{i,t-1}$	$MALFA_{i,t-1}$	$HALFA_{i,t-1}$	$LRETURN_{i,t-1}$	$MRETURN_{i,t-1}$	$HRETURN_{i,t-1}$	$RISK_{i,t-1}$
$LALFA_{i,t-1}$	1.06	-0.0008							
$MALFA_{i,t-1}$	1.02	0.0204	0.0214						
$HALFA_{i,t-1}$	1.11	**0.0608***	**0.1318***	-0.0179					
$LRETURN_{i,t-1}$	1.17	**0.0544***	**0.0771***	-0.0011	0.0139				
$MRETURN_{i,t-1}$	1.32	**0.0691***	-0.0097	**-0.0577***	**0.0316***	-0.0148			
$HRETURN_{i,t-1}$	1.08	**0.1089***	0.0223	0.0215	**0.0597***	**0.0301***	0.0119		
$RISK_{i,t-1}$	1.45	0.0135	**-0.0554***	**0.0689***	**0.1647***	**-0.2027***	**-0.1905***	**-0.0251***	
$FLOWOBJ_{i}$	2.12	**0.3072***	-0.0044	**0.0255***	0.0167	**0.1122***	**0.2279***	**0.1389***	**0.0856***
$LSIZE_{i,t-1}$	1.34	0.0191	-0.0187	**-0.0387***	0.0121	**-0.0322***	**0.0509***	**0.1267***	-0.0120
$LAGE_{i,t}$	1.12	**-0.0840***	-0.0040	-0.0074	**-0.0736***	**-0.0379***	0.0093	-0.0003	**0.1516***
$LINVEST_{i,t-1}$	1.31	-0.0152	**0.1013***	-0.0010	**0.0556***	**0.1049***	**0.1454***	**0.1601***	**-0.1557***
$MANFEE_{i,t}$	1.23	**0.0585***	**-0.1251***	**-0.0279***	0.0049	-0.0033	**-0.0966***	0.0102	0.0192
$CUSTFEE_{i,t}$	1.12	-0.0025	**0.0535***	**0.0279***	**-0.0367***	**0.0256***	-0.0126	-0.0097	-0.0052
$INSURANCE_{i,t}$	1.03	**0.0279***	**-0.0342***	**-0.0241***	**0.0508***	**-0.0704***	**0.1155***	-0.0009	0.0149
$DECEMBER_{i,t}$	1.83	**0.1891***	-0.0066	**-0.0268***	-0.0191	-0.0208	-0.0173	0.0049	**-0.0238***

* significant at 10%.

	FLOWOBJ	$LSIZE_{i,t-1}$	$LAGE_{i,t}$	$LINVEST_{i,t-1}$	$MANFEE_{i,t}$	$CUSTFEE_{i,t}$	$INSURANCE_{i,t}$
$LSIZE_{i,t-1}$	-0.0078						
$LAGE_{i,t}$	**0.0846***	**0.1752***					
$LINVEST_{i,t-1}$	0.0051	**0.2235***	**-0.0276***				
$MANFEE_{i,t}$	-0.0168	**0.2716***	**0.0595***	**-0.2287***			
$CUSTFEE_{i,t}$	-0.0121	**0.2276***	**0.1197***	**-0.1247***	**0.0609***		
$INSURANCE_{i,t}$	**0.0480***	0.0074	-0.0022	0.0041	**-0.0743***	0.0216	
$DECEMBER_{i,t}$	**0.6154***	-0.0061	0.0189	-0.0128	**0.0232***	-0.0039	0.0025

* significant at 10%.

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 $_{i,t-1}$	-0.0012	0.0023	-0.0010	0.0143	-0.0012	-0.0010
MALFA $_{i,t-1}$	0.0269	0.0173	-0.0017	-0.0292	0.0269	-0.0017
HALFA $_{i,t-1}$	0.0322 **	0.0278 **	0.0242 *	0.0141	0.0322 *	0.0242
LRETURN $_{i,t-1}$	0.0099	0.0091	0.0141 *	0.0038	0.0099 *	0.0141
MRETURN $_{i,t-1}$	0.0022	0.0035	0.0064	0.1002 ***	0.0022	0.0064
HRETURN $_{i,t-1}$	0.0301 ***	0.0293 ***	0.0321 ***	0.0849 ***	0.0301 **	0.0321 **
RISK $_{i,t-1}$	0.0030	0.0074	-0.0207	-0.0036	0.0030	-0.0207
FLOWOBJ$_{i,t}$	0.0096 ***	0.0093 ***	0.0089 ***	-------	0.0096 ***	0.0089 ***
LSIZE $_{i,t-1}$	0.0006	0.0002	-0.0041	0.0013 **	0.0006	-0.0041
LAGE$_{i,t}$	-0.0138 ***	-0.0101 ***	-0.0048	-0.0147 ***	-0.0138 ***	-0.0048
LINVEST $_{i,t-1}$	-0.0012	-0.0032 *	-0.0105 **	-0.0018	-0.0012	-0.0105
MANFEE$_{i,t}$	0.6472 ***	0.4684 **	0.2547	0.6596 ***	0.6472 *	0.2547
CUSTFEE$_{i,t}$	0.1595	-0.3647	-3.5237 *	0.1272	0.1595	-3.5237
INSURANCE$_{i,t}$	0.0015	0.0062 ***	0.0154 ***	0.0004	0.0015	0.0154 **
DECEMBER$_{i,t}$	0.0011	0.0020	0.0028	-------	0.0011	0.0028 *
Constant	0.0154	0.0333 **	0.1637 ***	0.0158	0.0154	0.1637
Observations	5150	5150	5150	5150	5150	5150
Number plans	101	101	101	101	101	101
R-squared	0.1173	0.1142	0.1193	0.2065	0.1199	0.1193

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

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	-2.759	***	-2.884	***
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.

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