Academic Article

Performance persistence of Spanish pension plans

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ABSTRACT Pension plans and funds represent a substantial part of the welfare systems in both Europe and Spain. One of the most important factors in the choice of a plan or fund is its performance, because if high returns are obtained, the participant will receive higher payments when the contingency covered by the plan or fund occurs. The main objective of this paper is therefore to analyse the performance persistence of individual pension plans. To this end, we use two methods: contingency tables and transition matrixes. The results obtained show that the performance persists over time.

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INTRODUCTION

The significant development of collective investment institutions has aroused great interest in the financial community in general and among scholars in particular. This has given rise to numerous studies, which set out to explain the role of collective investment institutions in the financial market and in the economy in general. In addition to these issues, others related to portfolio management in which fund performance has a more prominent role have been dealt with.

Specifically, when analysing the US market, Coggin¹ uses Jensen's model to examine the performance of 229 equity pension funds. The results obtained show that, overall, managers obtain positive returns. In this line, Collins and

Fabozzi² obtain similar results when they implement several models, among them the traditional model put forward by Jensen (1968)³, on a sample of 37 pension fund managers.

In the UK market, Thomas and Tonks⁴ apply Treynor and Mazuy's models⁵ and Henriksson and Merton's model⁶ to evaluate the management of 2175 equity pension funds. Their results show that, as in the US market, managers possess stock selection skills. However, Blake *et al.*⁷ analyse a sample of 306 pension funds, and conclude that, in general, manager efficiency is low.

The above-mentioned literature demonstrates the importance of establishing whether managers are capable of generating wealth for the participant over time, that is to say, of checking whether the objective for which the fund is set up is accomplished. The accomplishment of this objective is particularly relevant in the case of pension plans, as achieving high returns will generate wealth for the participant's retirement, disability and death benefits. For this reason, we

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will analyse the performance persistence of Spanish pension plans in this paper. To this end, we use an extension of the model put forward by Jensen.³

Thus, various authors, including Blake and Timmerman⁸ and Goetzmann and Ibbotson,⁹ demonstrate that historically better-performing funds continue to generate good results in the future. However, Malkiel¹⁰ finds that the persistence of results may depend on the sample period considered. Brown *et al*¹¹ and Carpenter and Lynch¹² point out that the persistence of results could appear in samples that evidence a survivorship bias. In contrast, Brown and Goetzmann¹³ and Hendricks *et al*¹⁴ find empirical evidence of persistence when survivorship bias is taken into account.

In the pension fund industry, Brown *et al*¹⁵ and Blake *et al*¹⁶ provide empirical evidence of limited persistence in the results obtained by pension fund managers. However, these authors only analyse funds that retain the same manager, which may generate survivorship bias. To solve this problem, Tonks¹⁷ considers all the pension funds on the market, regardless of whether managers changed during the sample period. His results point to the existence of persistence in short-term time horizons, and less significant persistence in the long term.

This proposal essentially differs from the above-mentioned research in various aspects. First, our study is undertaken in the Spanish market, with a limited volume and growing demand. The private pensions industry in Spain is a relatively recent phenomenon, appearing for the first time in 1988, whereas previous studies analyse data on consolidated markets with a long tradition in the private pensions industry. Hence, the particular life cycle stage of the various geographical pension fund markets may influence the efficiency of the management companies. For this reason, this paper allows us to compare the results obtained by management companies trading in a market at the development stage with those obtained in mature markets.

Second, our study covers pension plans with different management styles, which allows us to compare results in terms of the types of assets

making up the portfolios, and to analyse the skills of the management entity according to the type of asset administered. In contrast, much of the existing empirical evidence (Thomas and Tonks⁴ and Coggin *et al*¹⁸ examines funds with portfolios comprising, for the main part, equity securities.

Third, this study also varies in terms of frequency of observations. Previous research uses monthly, quarterly and yearly returns, whereas in this study we obtained daily liquidating values for each pension plan studied, which provides us with the daily return for the plan.

This paper is structured as follows: in the next section we describe the data sources used and define the variables to be analysed. We then outline the methodology employed and the results obtained. Finally, we report our main conclusions.

DATA

To evaluate the performance persistence of pension plan management companies, we take daily liquidating values for the period between 1 January 2000 and 31 December 2004, corresponding to 252 individual pension plans of various types. Following the classification criterion of the Spanish Association of Collective Investment Institutions and Pension Plans (INVERCO), our sample is made up of 17 short-term fixed income plans, 20 long-term fixed income plans, 100 mixed fixed income plans, 72 mixed equity plans and 43 equity plans, with liquidating value throughout the sampling period. Additionally, we use the daily returns of the Ibex-35 index, the AFI Treasury bond index and the Morgan Stanley Capital International style indexes for the Spanish market obtained from the Spanish Securities and Investments Board (CNMV), MSCI and AFI, respectively.

We thereby omit plans created after 1 January 2000, those dissolved during the period, or those with missing data for any of the months considered. From these data, provided by the Grupo AFI, we calculated the plans' daily return according to the standard procedure in the literature.

In the light of the comments made in the previous paragraph, and according to Brown *et al*,¹⁵

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. Carhart¹⁹ differentiates between the two and refers to the latter as the *look-ahead bias*. As we do not consider dissolved pension plans in our study, and eliminate those operating for fewer than 5 years, our sample may show a slight bias.

METHODOLOGY AND RESULTS

Efficient pension fund management implies that the beneficiary will receive higher payments when the contingency covered by this financial product occurs. Consequently, good or bad management of the accumulated capital may have important social repercussions. In this section, we therefore evaluate the efficiency with which Spanish pension plans are managed, using the multi-index model that includes an extension of the model put forward by Tonks³:

$$r_{pt} = \alpha_p + \beta_m r_{mt} + \beta_d r_{dt} + \beta_l r_{lt} + \beta_s r_{st} + \beta_g r_{gt} + \beta_v r_{vt} + \mu_{pt} \quad (1)$$

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 at 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 risky mutual funds with the Spanish Stock Market.

The AFI index (d) and (l), which represents the return of the portfolio made up of Treasury bonds and debentures, as well as the return of a portfolio made up of Treasury bills with a one-year maturity. To extend the number of benchmarks, we used the Morgan Stanley Capital International (MSCI) style indexes for the Spanish market: the small-cap index (s), the growth index (g) and the value index (v). To determine the daily excess return, both for the plans and for the benchmarks, the one-day AFI Repos index was

used as risk-free asset. These data were obtained from AFI and MSCI.

We regress this model in each of the consecutive annual and six-monthly periods considered, running from January 2000 to December 2004. After that we use two methods to examine the relation between historical risk-adjusted return and plan's performance: the first method, also used by Tonks,¹⁷ Goetzmann and Ibbotson⁹ and Malkiel,¹⁰ is based on the construction of contingency tables and the second, adopted by Brown *et al.*,¹⁵ on transition matrixes. We first create a contingency table in which plans are classified as winners or losers in each of the consecutive annual and six-monthly periods considered.

Pension plans are classified as winners if they obtained a risk-adjusted return above their category median by means of model (1). In contrast, plans that obtained a risk-adjusted return below their investment category median in any of the two periods are classified as losers. We carry out a conventional χ^2 test on these data. Tables 1 and 2 show the proportion of pension plans that obtained the best and the worst results in consecutive annual and six-monthly periods, and those that achieved good results in one of the two periods and bad results in the other period.

The results obtained reveal the existence of persistence, both in annual and six-monthly periods, in the results for Spanish pension plans, for each of the management styles that make up the individual classification. This result implies that the results obtained by pension plans during the second period are dependent on those obtained in the previous period.

As an alternative measure, we analyse persistence using methodology based on transition matrixes. Thus, we arrange the pension plans according to the alpha obtained for each of the periods considered. We then group these plans by return quartiles, in such a way that the plans with the highest risk-adjusted return appear in quartile Q4 and those with the worst results are included in quartile Q1. Thus, in order to indicate that a pension plan obtained the worst results over two consecutive periods, it is placed in cell Q1Q1. In contrast, to indicate that a pension plan

Table 1: Test of persistence based on annualized risk-adjusted return using contingency table

<i>Contingency table</i>		
RFM	Winners $t+1$ (%)	Losers $t+1$ (%)
Winners	65.5	34.5
Losers	34.5	65.5
$\chi^2=38.440^{***}$		
RFLP	Winners $t+1$	Losers $t+1$
Winners	60	40
Losers	40	60
$\chi^2=3.200^*$		
RV	Winners $t+1$	Losers $t+1$
Winners	61.4	38.6
Losers	40.5	59.5
$\chi^2=7.504^{***}$		
RVM	Winners $t+1$	Losers $t+1$
Winners	62.5	37.5
Losers	37.5	62.5
$\chi^2=18.000^{***}$		
RFCP	Winners $t+1$	Losers $t+1$
Winners	63.9	36.1
Losers	40.6	59.4
$\chi^2=3.680^*$		

***, **, *significant at a level of 1, 5 and 10 per cent, respectively.

This is the contingency table in which we classify the plans as winners or losers for each of the consecutive annual time references. Thus, pension plans that obtained an above the median risk-adjusted return from model (1) are classified as winners. In contrast, plans whose risk-adjusted return obtained in any of the two periods falls below the sample median are classified as losers.

obtained the best results over two consecutive periods, it is placed in cell Q4Q4. A conventional χ^2 test of independence is carried out on these data, as used by Ciriaco and Santamaria.²⁰

Tables 3 and 4 show the results of the transition matrixes of the plans grouped by categories for each of the consecutive annual and six-monthly periods. Both tables include a higher percentage of plans in the cells along the diagonal of the matrix of each of the investment categories considered, which indicates that managers' results are persistent. Similarly, the conventional χ^2 test confirms these results as it allows us to reject the null hypothesis of independence between the alphas with significance levels of 1, 5 and 10 per cent.

CONCLUSIONS

Efficient management performance by management companies will have a major impact

Table 2: Test of persistence based on risk-adjusted return over 6-month period using contingency table

<i>Contingency table</i>		
RFM	Winners $t+1$ (%)	Losers $t+1$ (%)
Winners	68.4	31.6
Losers	42.7	57.3
$\chi^2=60.552^{***}$		
RFLP	Winners $t+1$	Losers $t+1$
Winners	64.4	35.6
Losers	46.7	53.3
$\chi^2=5.760^{**}$		
RV	Winners $t+1$	Losers $t+1$
Winners	66.7	33.3
Losers	34.9	65.1
$\chi^2=39.002^{***}$		
RVM	Winners $t+1$	Losers $t+1$
Winners	67.3	32.7
Losers	32.7	67.3
$\chi^2=77.432^{***}$		
RFCP	Winners $t+1$	Losers $t+1$
Winners	67.9	32.1
Losers	36.1	63.9
$\chi^2=15.462^{***}$		

***, **, *significant at a level of 1, 5 and 10 per cent, respectively.

This is the contingency table in which we classify the plans as winners or losers for each of the consecutive six-monthly time references. Thus, pension plans that obtained an above the median risk-adjusted return from model (1) are classified as winners. In contrast, plans whose risk-adjusted return obtained in any of the two periods falls below the sample median are classified as losers.

on the payments received by pension plan beneficiaries. This hypothesis led us to evaluate pension plan performance persistence in the Spanish market. To this end, the daily net returns of 252 individualised pension plans were analysed for the period 1 January 2000 to 31 December 2004. An extended model of Jensen's alpha³ was applied to these data in an attempt to minimise the bias deriving from the omission of portfolios in measuring the results.

When we analysed the persistence of pension plan performance through contingency tables and transition matrixes, the results appear to indicate that historical risk-adjusted returns are a good reference of future returns in the Spanish market.

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Table 3: Test of persistence based on annualized risk-adjusted return using transition matrixes*Table of probability transition matrixes of performance in pension plans*

<i>RFM</i>					
	Q1	38	22	19	21
	Q2	32	39	22	7
	Q3	17	21	35	27
	Q4	13	18	24	45
$\chi^2=63.440^{***}$					
<i>RFLP</i>					
	Q1	55	20	5	20
	Q2	20	25	50	5
	Q3	5	35	40	20
	Q4	20	20	5	55
$\chi^2=36.000^{***}$					
<i>RV</i>					
	Q1	40.9	20.5	9.1	29.5
	Q2	34.1	27.3	29.5	9.1
	Q3	15.0	37.5	25.0	22.5
	Q4	11.4	18.2	29.5	40.9
$\chi^2=28.661^{***}$					
<i>RVM</i>					
	Q1	48.6	19.4	6.9	25.0
	Q2	23.6	33.3	29.2	13.9
	Q3	13.9	23.6	36.1	26.4
	Q4	13.9	23.6	27.8	34.7
$\chi^2=46.222^{***}$					
<i>RFCP</i>					
	Q1	40	25	25	10
	Q2	25	31.3	25	18.8
	Q3	25	25	37.5	12.5
	Q4	25	12.5	6.3	56.3
$\chi^2=15.555^*$					

***, **, *significant at a level of 1, 5 and 10 per cent, respectively.

Here we present a transition matrix where we classify the plans in quartiles according to the risk-adjusted return obtained by means of model (1) for each of the consecutive annual time references.

Table 4: Test of persistence based on risk-adjusted return over 6-month period using transition matrixes*Table of probability transition matrixes of performance in pension plans*

<i>RFM</i>					
	Q1	36.4	31.1	16.0	16.4
	Q2	26.7	36.9	22.7	13.8
	Q3	17.8	18.2	34.7	29.3
	Q4	19.1	13.8	26.7	40.4
$\chi^2=108.924^{***}$					
<i>RFLP</i>					
	Q1	42.2	13.3	22.2	22.2
	Q2	28.9	31.1	28.9	11.1
	Q3	20.0	33.3	22.2	24.4
	Q4	8.9	22.2	26.7	42.2
$\chi^2=24.800^{***}$					
<i>RV</i>					
	Q1	29.3	34.3	21.2	15.2
	Q2	33.3	37.4	14.1	15.2
	Q3	26.7	17.8	27.8	27.8
	Q4	13.1	12.1	30.3	44.4
$\chi^2=55.385^{***}$					
<i>RVM</i>					
	Q1	42	32.1	13	13
	Q2	30.9	30.2	29.6	9.3
	Q3	11.7	25.9	32.7	29.6
	Q4	15.4	11.7	24.7	48.1
$\chi^2=130.963^{***}$					
<i>RFCP</i>					
	Q1	53.3	24.4	15.6	6.7
	Q2	19.4	33.3	33.3	13.9
	Q3	22.2	25.0	30.6	22.2
	Q4	16.7	11.1	16.7	55.6
$\chi^2=43.213^{***}$					

***, **, *significant at a level of 1, 5 and 10 per cent, respectively.

Here we present a transition matrix where we classify the plans in quartiles according to the risk-adjusted return obtained by means of model (1) for each of the consecutive six-monthly time references.

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