Determinants of the fees paid by equity pension plans in Spain

Received: 1st June, 2006

Carmen Pilar Martí Ballester

is a graduate in business administration at the Jaume I University. She is currently pursuing doctoral studies in business management at Jaume I University. She is also Professor of Cost Accounting at the Jaume I University.

Juan Carlos Matallín Sáez

is a graduate in business administration at the University of Valencia and has a PhD in financial economics from the University Jaume I. He is currently a professor of finance in the Financial Economics and Accounting Department of the University Jaume I in Castellón, Spain. Prior to taking this position, he worked as consultant in the internet industry. He was visiting researcher at the University of Valencia and University Carlos III of Madrid. He has published in various journals, including *Spanish Review of Finance and Accounting*, *Economía Aplicada*, *Análisis Financiero*, *Applied Economics Letters*, *Journal of Asset Management*, *Applied Financial Economics*, *Applied Economics* and *The International Journal of Finance* among others. His research interest is asset pricing and mutual funds performance. He has participated in projects on financial economics and investment analysis that have received government competitive research grants.

Maria Ángeles Fernández Izquierdo

is a Bachelor in Economics (1981, Universidad de Valencia), and has a PhD in Financial Economics and Accountancy (1991, Universidad de Valencia). She has been a full professor in finance and accountancy since 2002. From 1981 to 1987 she held a position as an economist at the Valencia Stock Exchange and since then has focused her research on financial markets and published scientific papers in international journals. She is currently a faculty member in a number of master and postgraduate courses related to finance and financial markets. Outside the academic world she contributes actively with the NGO Economists Without Borders in sensitising and research projects and with the Observatory for Social Responsibility.

Abstract The main objective of this paper is to analyse the variables determining the fees incurred by pension plans. The study uses individualised data from the management and custodial fees for individual equity pension plans in Spain. The Spanish pension funds and pension plans market establishes maximum limits for both types of fee due to legal restrictions and the fact that its trade and management is mostly carried out by financial entities, which may in turn create a conflict of interests. The results show how the nature of the management company and the assets managed are relevant to the management fee. The influence of the number of participants in a pension plan on the custodial fee is of note.

Keywords: *pension fund, pension plan, custodial fees, management fees, law caps*

Carmen Pilar Martí Ballester
Departamento de Finanzas
y Contabilidad
Facultad Ciencias Jurídicas
y Económicas
Universitat Jaume I
Campus de Riu Sec
12080-Castellón
Spain
Tel: +34 964 72 85 69
Fax +34 964 72 85 65
(department)
Email: cmarti@cofin.uji.es

Introduction

The rapid growth of pension plans and funds in recent years is expected to continue, and will have a major impact on the workings of the financial system and the general economy due to the contribution of these financial products to the growth of saving and the capitalisation of the economy. The social

dimension of the funds as a means of social provision to provide contingency cover for retirement, survivorship, widowhood, orphanhood or disability, complementary to and not a substitute for cover from the public social security system, differentiates them from other sectors and has led to increased public interest in these funds.

The growth of pension plans and funds has aroused great interest in the financial community in general, and among scholars in particular. The study of diverse aspects of these financial products has resulted in several streams of research, which this paper classifies as actuarial, from the industrial economy perspective, and economic-financial.

Within the literature based on actuarial methodologies, two lines of research can be identified. In the first of these, several authors have studied the financing of pension plans. Some examine the optimal strategy for financing pension plans in stochastic environments through the use of control theory.¹⁻⁷ Most of these studies conclude that more than one optimum financing strategy exists. In addition, deterministic methods of financing pension plans are also analysed.^{8,9}

In Spain, this research stream has been furthered by, among others, Josa and Rincon,^{10,11} who provide empirical evidence on the optimal strategy for financing pension plans, concluding that the most appropriate method is differences financing. Devesa *et al.*¹² carry out a technical evaluation of how reformed Latin American pension systems function by examining their most characteristic features, and provide empirical evidence of positive effects deriving from these reforms, as compared with the old system. These authors conclude that for Latin American pension funds, systems based on individual capitalisation involve higher costs for participants than other capitalisation account options. Vidal *et al.* provide empirical evidence on the retirement pensions system based on notional accounts, and conclude that these contribute to increasing transparency and actuarial equity.¹³ Pelaez and García find that a positive economic result on valuing a pension plan will lead to lower annual costs,¹⁴ and determine the level of

service the plan will cover according to the evolution of certain variables.¹⁵

Secondly, other studies employ actuarial techniques in an attempt to determine the impact of tax reforms on pension plans and funds, in some cases by comparing them with other financial instruments. This type of analysis has been variously explored.¹⁶⁻²⁰

Within the economic-financial field, the evaluation of pension fund performance has aroused great interest in the scientific community. Various international studies, such as that of Gregory and Tonks,²¹ aim to determine whether actively managed portfolios obtain better results than passively managed portfolios. Three techniques have been established that managers can use to introduce an active strategy, and it has been found that the variations in returns on the portfolio are largely due to managers' decisions on the strategic allocation of assets.^{22,23} Coggin *et al.* provide empirical evidence to show that the selection of securities contributes to obtaining better results,²⁴ although conflicting evidence on selection of securities and market timing has also been found.^{25,26}

In addition, other studies have examined managers' abilities to maintain result continuity. Research has found evidence of persistence in the results obtained by pension fund managers.²⁷⁻³⁰ Lakonishok and Vishny, however, find little consistency over long-term time horizons.³¹ From the industrial economy perspective, empirical evidence of variable endogenous costs in the Argentine pension fund market has been found.^{32,33}

Within the economic-financial context, the main objective of the present study is to discover which variables determine the fees paid by pension plans, as these account for a significant proportion of the total costs

Source: Directorate General for Insurance and Pension Funds

Figure 1: Growth in the number of pension funds

incurred. However, the paper first analyses the current situation of pension plans and funds in Spain in order to place them within a Spanish financial context. Then, given the similarities derived from capital belonging to a large number of investors, the study on mutual funds by Gil-Bazo and Martínez³⁴ is adapted to pension plans and funds. Similar variables are also considered and the same methodology introduced, as the two financial products are governed by specific legal restrictions. Finally, the findings of the research will enable a comparative study of mutual funds and pension plans and funds.

The importance of this analysis is strengthened by the absence, to the authors' knowledge, of any similar studies on pension plans and funds from this perspective, especially in the Spanish case. At an international level, Ippolito and Turner analyse the effect of fees on the results obtained by a pension plan, and provide empirical evidence that pension plans with high fees do not obtain worse results than those managed

with a passive strategy.³⁵ In addition, in a case from an actuarial perspective, Devesa *et al.* determine that the level of fees charged to Spanish individual pension plan participants appears to be high.³⁶

This paper begins with a brief description of the present situation of pension plans and funds in Spain. The following section then comments on data sources and defines the study variables. The methodology employed and the results obtained are then discussed, followed by the conclusions drawn.

Evolution and current situation of pension plans and funds in Spain

Pension plans and funds have experienced major growth in central European and Anglo-Saxon countries, such as the UK, Ireland, The Netherlands and Sweden, to reach a high level of maturity. In Spain, the evolution of pension plans and funds is currently at the developmental stage, showing a sharp increase in recent years.

Source: INVERCO

Figure 2: Growth in number of Pension Plans: 1989–2003

Source: INVERCO

*Data in thousands of participants

Figure 3: Growth in the number of pension plan participants: 1989–2003*

Greater awareness among the population of the need to supplement pensions provided by the social security system, and the tax advantages applicable to pension plans and funds have

contributed to the increasing rate of development of these financial instruments, as shown in Figures 1–4, and Tables 1 and 2.

The first pension plans were

Source: INVERCO

*Data in thousands of euros

Figure 4: Growth in pension fund capital during the period 1988–2003*

introduced in 1988, recognised under Law 8/1987, dated 8th June, which distinguished, depending on the constituent parties, between: (a) occupational pension systems, which are sponsored by any entity, corporation, company or enterprise, and the participants are the employees of these organisations, (b) associated pension systems, sponsored by any association, trade union or trade association, the participants of which are its members or affiliates, and (c) the individual system, which are sponsored by one or various financial entities and the participants are individual members of the public.

The following years saw a moderate development due to: (a) the marked appearance in 1990 of the first occupational pension plans, (b) the inclusion in 1993 of data referring to voluntary social welfare entities in the Basque Country that sponsor pension plans for local government employees, and (c) the creation of individual pension plans by financial entities.

The development of pension plans had an effect on the evolution of pension funds, whose managed capital, primarily made up of contributions from occupational pension schemes, increased steadily. At the same time, a large part of this capital was invested in fixed income assets which, according to Serrats and Rodn was essentially due to: (a) the development of a monetary policy that favoured high interest rates, (b) the existence of a financial system that strengthened banking mediation, (c) the limited size of the Spanish stock market, (d) high legal protectionism of pension fund investments, and (e) the lack of any pension plan and fund tradition in Spain.³⁷

At the same time, the novelty of the product and the broad cover provided by the Spanish public system may also have led to low investor participation. Participation was initially characterised by the scant representation of occupational and associated pension system participants and the predominance of individual

Table 1: Growth in pension fund capital 1988-2003*

Year	Individual system	Occupational system	Associated system	Total
31/12/88	153.837	—	—	152.937
31/12/89	511.425	—	—	511.425
31/12/90	1,022.370	2,096.565	95.537	3,214.472
31/12/91	1,728.679	3,025.086	137.055	4,890.820
31/12/92	2,560.696	3,863.564	180.003	6,604.263
31/12/93	3,786.022	4,570.385	252.551	8,608.958
31/12/94	4,740.501	5,362.524	304.485	10,407.510
31/12/95	6,306.312	6,135.733	380.236	12,822.281
31/12/96	9,091.426	7,842.974	506.912	17,441.312
31/12/97	12,292.152	8,983.268	634.753	21,910.173
31/12/98	16,310.224	10,083.835	766.982	27,161.041
31/12/99	18,925.286	11,834.360	840.184	31,599.830
31/12/00	21,494.220	15,553.271	812.290	37,859.781
31/12/01	24,214.318	18,837.398	777.444	43,829.160
31/12/02	26,216.399	21,213.025	732.653	48,162.077
31/12/03	31,329.674	23,597.354	837.739	55,764.767

Source: INVERCO.

* Data in millions of euros

Table 2: Growth of individual pension plans

Year	Number of institutions	Number of participants	Capital*
31/12/89	56	317,777	511.425
31/12/90	164	530,551	1,022.370
31/12/91	170	710,677	1,728.679
31/12/92	196	875,041	2,560.696
31/12/93	196	1,066,872	3,786.022
31/12/94	198	1,301,712	4,740.501
31/12/95	229	1,490,255	6,306.312
31/12/96	265	1,838,804	9,091.426
31/12/97	339	2,352,239	12,292.152
31/12/98	422	2,953,750	16,310.224
31/12/99	511	3,623,507	18,925.286
31/12/00	557	4,402,708	21,494.220
31/12/01	649	5,168,114	24,214.318
31/12/02	739	5,819,914	26,216.399
31/12/03	860	6,577,056	31,329.674

Source: INVERCO.

* Data in millions of euros

system participants during the first years following the introduction of pension plans and funds in Spain.

The first surge in the growth of pension plans and funds came in 1996, when the volume of participants and managed capital notably increased, due to increased awareness in the population of the need to supplement public pensions following the signing in 1995 of the Toledo Pact,³⁸ and to improvements

introduced in Law 30/1995, that brought better guarantees and flexibility to these financial instruments.

During subsequent years, the number of participants grew steadily, and the figures for 1996 had tripled by 2003. However, the degree of participation in the occupational and associated systems³⁹ is still small, while the proportion of those participating in the individual system⁴⁰ is more heavily weighted as a

consequence of: (a) successive tax improvements that in some cases aimed to stimulate and foster pension plan participation among specific groups of people, such as the disabled or housewives, (b) greater social awareness of the need for a system to complement social security cover, and (c) the process of investment diversification.

The increase in the number of participants has led to an increase in the total volume of contributions. In turn, this has resulted in an increasing volume of capital being managed by pension funds. This offsets the high volume of benefits made for capital contributions following retirement corresponding to the year 2000 and the drop in general profitability with the entry of monetary flows from the individual and occupational systems following Royal Decree 1588/1999 in November 1999. This Decree regulates the process of externalising companies' pension commitments to its employees, and according to Ruiz and Carbajo,⁴¹ covers companies from various sectors, including the financial, telecommunications and energy, electricity, petrochemicals and gas sectors.

The capital accumulated by pension funds is essentially invested in fixed-income securities. However, as a consequence of the downward trend in interest rates and the emergence of a broader, more competitive financial market, this type of investment as a proportion of total investments has fallen, and has been offset by investments in other financial assets, such as securities and money market mutual funds.

At the same time, the number of pension plans rose moderately as a result of: (a) the abovementioned obligation to transform internally constituted funds so that companies would fulfil their pension commitments to their employees, (b) the joint promotion of occupational pension

schemes in small and medium-sized businesses following the approval of Royal Decree 1588/1999, (c) the change in savings investment tendencies that would lead investors to assume greater risk and diversify in various assets and markets, and (d) the incorporation of new associations into this complementary provision system.

The increase in the number of pension plans has led to a corresponding increase in pension funds, which on 31st December, 2003 totalled 1,054, thus confirming their steady growth. According to Directorate General for Insurance and Pension Funds figures, these represented 5.37 per cent of Spanish household savings at the end of 2003.

Spanish household investment has however been higher in another type of collective investment institution, namely mutual funds, which manage a higher volume of capital. Since the beginning of the 1990s, mutual funds have experienced an important growth, to reach a total of €197,857m on 31st December, 2003, a figure that reflects the market's maturity. Nonetheless, as previously mentioned, pension plans and funds are presently at the developmental stage and have experienced steady growth over the same period to reach a capital volume of €55,765m on 31st December, 2003, as shown in Table 1.

The capital volume managed by pension plans and funds represents 28.18 per cent of that managed by mutual funds. While this figure may be due to the relatively recent introduction of pension plans and funds in Spain, at an international level, the capital managed by these instruments was €11,831bn at the end of 2001 according to INVERCO, the Spanish Association of Investment and Pension Funds. This figure falls close to the €13,070bn managed worldwide by mutual funds on

31st December, 2001, according to data from the European Federation of Investment Funds and Companies, which demonstrates the significant volume of managed capital that these financial products are attaining at a global level.

Data

Given the importance that individual system pension plans are acquiring, both in the number of participants and the capital they manage, a sample of 82 equity plans was analysed. For the empirical study, a cross-section of specific characteristics of the plans analysed was made on 29th February, 2004. In this way, a complete sample was available for analysis, consisting of only the individual pension plans that contained all the information on this date. For each plan, therefore, information was available on the number of participants, assets, annual return, the fund to which the plan belongs and the financial group, all of which was provided by INVERCO. In addition, information was obtained on the date of constitution, the management fee, custodial fee, management company and custodial company for each pension plan from Net Pensiones.

Pension plans that had been operating for less than one year were excluded from the sample in order to be able to include the plan's annual return as an explanatory variable. One may thus expect a certain survival bias, as only individual pension plans in existence on 29th February, 2004 were considered, and consequently the effects of dissolved pension plan fees were not considered.

The explanatory variables considered as potentially determinant for fees charged to pension plans are now presented. Appendix A summarises the definition of each variable.

Because international empirical studies have found major differences in fees

incurred by pension plans depending on their size, the size variable is considered by taking the logarithm of the capital corresponding to each pension plan, which is termed LPAT. The total capital administered by each management company is also considered as an explanatory variable, termed LPEG. The coefficient associated with this variable indicates whether or not economies of scope exist.

To evaluate the differences in costs associated with the number of participants, the mean investment made by each participant (LTAM) is used, measured as the natural logarithm of the capital corresponding to each plan, minus the natural logarithm of the number of participants in the plan. The corresponding variable for the management company is termed LPPG.

To measure the relative participation of the pension plan in the market, the variable CONC is defined, the value of which represents the ratio of the capital of each pension plan to the total capital managed by equity individual pension plans. Thus, the plan with the highest participation in the market share may have a competitive advantage that would allow it to negotiate lower custodial and management fees.

It may also be expected that the effect of experience and learning would contribute to reducing pension plan fees. These effects are evaluated with the variable ANT, defined as the natural logarithm of the number of years since the plan was created.

The inclusion of the RENT (return) variable is considered relevant in the analysis, as it is the most important service that pension plan participants receive. A positive relation between the fees charged and the return obtained from the plan is expected. The RENT variable, representing the net annual returns from each individual pension

plan, is included to measure this relation.

Dummy variables are also included in the analysis. These introduce the factor of belonging to a specific type of management or custodial company. Hence, it may logically be expected that managing entities belonging to a financial entity would enjoy the advantages derived from economies of scope, and therefore set lower management fees. However, the case may arise that financial entities have 'captive' clients, and the fees they charge are higher. The GESBA, GESCA and GESO variables are used to determine this effect. Furthermore, the legal nature of the financial entity may be decisive when setting the custodial fee. Two dummy variables, DEPBA and DEPCA, are included to measure this relation. The other type of fee is used as the control variable.

Methodology and results

Prior to the analysis that will enable evaluation of the decision on commission fees, a descriptive analysis of the study variables is carried out, as the results obtained will depend to a large extent on the distribution of the sample observations.

The sample includes significant differences in the variables considered, such as the size of the various pension plans, which are measured by both the number of participants and the capital managed. The number of participants oscillates from 1 to 64,664 participants, with a ratio of participants per plan of 6,662.36 on 29th February, 2004. The capital corresponding to each pension plan also varies considerably: on the same date, the asset for the smallest pension plan was €9,000, while that of the largest reached €213m, thus giving an average asset of €21,901,720 per pension plan on that date.

In turn, the variable that measures the number of years the plan has been operating ranges from approximately 1.25 to 14.64 years in the sample. While 58.54 per cent of the plans had been in operation for less than five years, only 8.53 per cent were over ten years old.

All the sample pension plans charge a management fee, which in 79.27 per cent of the cases studied was set at the maximum legally permitted amount. In addition, 90.25 per cent also levy a custodial fee, charged at the maximum legally permitted rate in 29.27 per cent of the cases studied.

Following this brief description of the sample component variables, the analysis to determine which variables influence the percentage charged in fees will now be carried out.

Management fee

Of the charges made to pension funds, the management fee is one of the most important, as it is proportionally greater than other costs involved. This fee represents the remuneration received by the management company for managing and administering the fund's capital. The amount charged for these services can reach a maximum of 2 per cent of the annual value of the pension plan's assets, to which they must be attributed.

As in previous studies on mutual funds such as that by Gil-Bazo and Martínez,⁴² a linear function of the explanatory variables for these fees is established. Because the dependent variable is censored due to the maximum and minimum legal limits established, the ordinary least squares technique is not appropriate, as demonstrated elsewhere,⁴³⁻⁴⁶ as this would obtain inconsistent estimates. The Tobit model is therefore adopted, which is estimated using the maximum likelihood method. Within the field of Spanish pension plan

fee analysis, this is a pioneering study in that it adopts the Tobit model, where the dependent variable represented by the decision on the management fee takes values of between 0 and 0.02. The model proposed to explain the decision on the management fee is presented in regression (1):

$$\begin{aligned} \gamma_i &= \alpha + \beta'x_i + u_i && \text{if } \gamma < \gamma_i < \bar{\gamma} \\ \gamma_i &= \bar{\gamma} && \text{if } \gamma_i > \bar{\gamma} \\ \gamma_i &= \gamma && \text{if } \gamma_i < \gamma \end{aligned} \quad (1)$$

where γ_i is the decision on the management fee; $\bar{\gamma}$ is the maximum legal fee (2 per cent of the annual value of the asset); γ is the minimum fee (0 per cent of the annual value of the asset); β' is a vector of unknown parameters of dimension k ; x_i is a vector containing all the explanatory variables for the decision on the management fee; u_i are the residuals characterised by following a normal distribution.

The results obtained on estimating the model are presented in Appendix B. As can be observed, the number of years the plan has been operating is of little significance; hence greater experience acquired by the management company in the market does not influence the management fee percentage established. This may appear contradictory, as according to the learning curve hypothesis, the longer a plan has been operating, the lower it would be expected to keep its management fees. However, it should be remembered that almost 90 per cent of the plans included in the sample have been active for less than seven years.

The variable that measures the market share is also of relatively little significance. Thus, it is not possible to state that a pension plan with a higher market share will significantly influence the fee charged by the management company. It is therefore possible to

conclude that the negotiating power that pension plans hold over managing entities is low, despite the fact that 82.83 per cent of the capital is concentrated in 21 pension plans.

The three dummy variables GESBA, GESCA and GESO were all found to be significant when management fees were established. Managing entities belonging to savings banks and banks are revealed to charge a significantly higher percentage in management fees, while entities belonging to insurance companies set significantly lower fees. This may be because managing entities belonging to banks and savings banks provide additional services related to their investment in pension plans. However, that 78.05 per cent of managing entities charge the maximum legally permitted percentage should be taken into account.⁴⁷

In addition, the results of the analysis show that when the number of participants remains constant, an increase in the plan's assets or capital has the effect of reducing the management fee. Therefore, there is a significantly negative relation between the two variables. This result coincides with previous studies into mutual funds. In contrast, an increase in the capital managed by the management company has no significant influence on the management fee.

On the other hand, an increase in the average investment per participant has no significant effect on the management fee. Hence, it is not possible to confirm that the differences in management fees charged are linked to the number of participants in the plan. Likewise, the pension plans in the sample with the highest investment per participant incur lower management fees. This may be explained by two factors: (1) an increase in the number of participants may lead to an increase in the costs of the plan,

which would in turn cause an increase in the management fee, or (2) smaller participants are less sensitive to fee variations and therefore tolerate higher charges. Similar conclusions are reached for the corresponding management company variable.

Finally, the results obtained enable us to conclude that the annual return on the pension plans does not influence the percentage established for management fees. Thus, the results suggest that higher management fees cannot be explained by better returns obtained by the pension plan.

Custodial fee

According to current legislation, depository entities are credit entities, essentially banks, savings banks and credit cooperatives whose functions include the custody and deposit of securities and other financial assets included in the pension fund. These entities receive a custodial fee for these services, which is set at a legal maximum of 0.6 per cent of the nominal value of the fund's capital, according to Royal Decree 1307/1988, dated 30th September, under which the Rules governing pension plans and funds are established.⁴⁸ Thus, the variable that needs to be explained is censored between the values of 0 and 0.006, and for this reason the Tobit model in regression (2) is used:

$$\begin{aligned} \gamma_i &= \alpha + \beta'x_i + u_i & \text{if } \gamma < \gamma_i < \bar{\gamma} \\ \gamma_i &= \bar{\gamma} & \text{if } \gamma_i > \bar{\gamma} \\ \gamma_i &= \gamma & \text{if } \gamma_i < \gamma \end{aligned} \quad (2)$$

where γ_i is the established custodial fee; $\bar{\gamma}$ is the maximum legal fee (0.6 per cent of the annual value of the asset); γ is the minimum fee (0 per cent of the annual value of the asset); β' is a vector of unknown parameters of dimension k ; x_i is a vector containing all the explanatory

variables for the decision on the custodial fee; u_i are the residuals characterised by following a normal distribution.

Appendix C presents the results obtained on estimating the model. As in the case of management fees, the length of operation and the market share of the plan do not have a significant impact on the custodial fee established.

At the same time, there is a positive relation between the plan's capital volume and the custodial fee set. Pension plans managed by large management entities incur significantly higher custodial fees. This may be a result of diseconomies of scope in the custody and deposit of capital. These results coincide with those obtained by Gil-Bazo and Martínez for mutual funds.⁴⁹

On the other hand, increases in average investment, defined as the natural logarithm of the value of the asset per participant, contribute to significant increases in the custodial fee. Thus, larger pension plans will have a higher average investment, and therefore a higher custodial fee. This, in turn, may be a consequence of the existence of diseconomies of scale.

In contrast, an increase in the average investment of the management company measured as the natural logarithm of the capital belonging to each management company for their corresponding participants contributes to a significant reduction in the custodial fee. Therefore, managing entities whose participants have large volumes of investment are able to negotiate lower custodial fees.

Finally, the legal nature of the custodian (bank or savings bank) has little significant impact on the allocation of the custodial fee.

Conclusions

The major growth in pension plans and funds has aroused great interest in the

financial community in general, the social and economic repercussions of which have been studied both at an international level, and within the Spanish context. However, the present authors are unaware of any studies with similar characteristics, in a financial context, that deal with pension plans and funds in Spain. The analysis presented in this paper therefore contributes new conclusions on fees charged to pension plans.

The results obtained in this study reveal significant differences in management fees incurred by pension plans according to the nature of the management company and depending on the capital managed.

It was found that managing entities belonging to a banking or savings bank group set higher management fees, while managing entities that form part of an insurance group maintain lower management fees in the pension plans they administer. However, when interpreting these data, it should be taken into account that approximately 80 per cent of the sample managing entities charge the maximum legally established fee. Moreover, participants whose pension plans possess higher capital incur lower management fees.

The differences in custodial fees charged are explained by the results as deriving from the size of the management company, the number of participants in the plan and in the management company. Consequently, participants in larger plans and those administered and managed by larger managing entities incur significantly higher custodial fees, which suggests the existence of diseconomies of scope.

On the other hand, pension plans with larger numbers of participants pay more in custodial fees, whereas managing entities with larger numbers of participants obtain discounts from

the custodian, which in turn translate into lower custodial fees.

From the abovementioned comments, it is possible to conclude that the level of fees charged to individual equity pension plans is high. Therefore, the maximum limit established by law for these fees does not play a role in forming prices in a perfect competition market.

Acknowledgment

This study forms part of research project SEC 2003-07899, financed by the Spanish Ministry for Science and Technology: Sub-programme Eco; Bancaja programme P1-1.3 2004-32 and the GV04A-708 Generalitat Valenciana programme. The study was also supported by an FPI grant co-financed by the Generalitat Valenciana and the European Social Fund. The authors wish to thank INVERCO, Net.Pensiones and the Directorate General for Insurance and Pension Funds for making their data available.

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- 40 It should be mentioned that duplications exist in the number of individual system participants, as one person may participate in various pension plans of this type, and as a result, the information is biased.
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- 47 It should also be pointed out, however, that of the 82 plans in the total sample, 21 charge both the maximum permitted management and custodial fees, and practically all of these, ie 20 plans, are managed by entities belonging to banks and savings banks.
- 48 It should be pointed out that in the data analysis, on 29th February 2004, the maximum limit established in Royal Decree 1307/1988 of 0.6 per cent of the annual nominal value of the custodial capital is considered. This is because although the current Ruling approved by Royal Decree 304/2004 took effect on 26th February, the data source used by the study maintained the old custodial fees.
- 49 Gil-Bazo and Martínez, ref. 34, above.

Appendix A: Definition of variables

COMGES: Annual management fee expressed as a decimal of the pension plan capital.

COMDE: Annual custodial fee expressed as a decimal of the nominal value of the custodial capital corresponding to each pension plan.

ANT: Natural logarithm of the number of years since the pension plan was created.

LPEG: Natural logarithm of the total capital administered by the management company to which the pension plan belongs.

RENT: Annual return of each pension plan expressed as a decimal.

LPAT: Natural logarithm of the capital corresponding to each pension plan.

LTAM: Natural logarithm of the capital corresponding to each plan minus the natural logarithm of the number of participants in each pension plan.

LPPG: Natural logarithm of the capital administered by each management company minus the natural logarithm of the number of participants corresponding to each management company.

CONC: Ratio of the asset of each pension plan to the total asset of the pension plans.

GESBA: Dummy variable that takes the value one if the management company belongs to a bank and zero otherwise.

GESCA: Dummy variable that takes the value one if the management company belongs to a savings bank, and zero otherwise.

GESO: Dummy variable that takes the value one if the management company belongs to a bank or a savings bank, and zero otherwise.

DEPBA: Dummy variable that takes the value one if the custodian belongs to a bank, and zero otherwise.

DEPCA: Dummy variable that takes the value one if the custodian belongs to a savings bank or credit cooperative, and zero otherwise.

Appendix B: Analysis of the management fee charged in the sample of individual system equity pension plans

The data refer to 29th February 2004. As the maximum management fee is set at 2 per cent, the Tobit model shown in expression (1) was applied:

$$\begin{aligned} \gamma_i &= \alpha + \beta'x_i + u_i && \text{if } \gamma < \gamma_i < \bar{\gamma} \\ \gamma_i &= \bar{\gamma} && \text{if } \gamma_i > \bar{\gamma} \\ \gamma_i &= \underline{\gamma} && \text{if } \gamma_i < \underline{\gamma} \end{aligned} \quad (1)$$

where γ_i is the decision on the management fee; $\bar{\gamma}$ is the maximum legally permitted fee (2 per cent of the annual value of the asset); $\underline{\gamma}$ is the minimum fee (0 per cent of the annual value of the asset); β' is a vector of unknown parameters of dimension k ; x_i is a vector containing all the explanatory variables for the decision on the management fee; u_i are the residuals characterised by following a normal distribution. The first column shows the name of the explanatory variables in x_i , the second and third columns refer to the value of the estimated coefficient and the probability respectively.

Variable	Estimated coefficient	P-value
ANT	0.0013	0.5678
COMDE	1.0158	0.0893*
CONC	0.0666	0.4607
GESBA	0.0779	0.0062*
GESCA	0.0793	0.0042*
GESO	0.0767	0.0054*
LPAT	-0.0031	0.0243*
LPEG	0.0007	0.4845
LPPG	0.0004	0.8857
LTAM	-0.0023	0.1318
RENT	-0.0132	0.3145
Log likelihood	40.4497	
Number of observations	82	
Censored observations	65	

* = significant at 10 per cent level.

Appendix C: Analysis of the custodial fee charged in the sample of individual system equity pension plans

The data refer to 29th February 2004. As the maximum custodial fee is set at 0.6 per cent, the Tobit model shown in expression (2) was applied.

$$\begin{aligned} \gamma_i &= \alpha + \beta'x_i + u_i && \text{if } \gamma < \gamma_i < \bar{\gamma} \\ \gamma_i &= \bar{\gamma} && \text{if } \gamma_i > \bar{\gamma} \\ \gamma_i &= \underline{\gamma} && \text{if } \gamma_i < \underline{\gamma} \end{aligned} \quad (2)$$

where γ_i is the decision on the custodial fee; $\bar{\gamma}$ is the maximum legally permitted fee (0.6 per cent of the annual value of the asset); $\underline{\gamma}$ is the minimum fee (0 per cent of the annual value of the asset); β' is a vector of unknown parameters of dimension k ; x_i is a vector containing all the explanatory variables for the decision on the management fee; u_i are the residuals characterised by following a normal distribution. The first column shows the name of the explanatory variables in x_i , the second and third columns refer to the value of the estimated coefficient and the probability respectively.

Variable	Estimated coefficient	P-value
ANT	0.0013	0.5678
ANT	0.000068	0.9167
COMGES	0.331455	0.0006*
CONC	0.048353	0.0406*
DEPBA	-0.007031	0.4344
DEPCA	-0.006130	0.4785
LPAT	0.000283	0.2807
LPEG	-0.000048	0.8584
LPPG	-0.001388	0.1139
LTAM	0.001427	0.0183*
RENT	-0.003061	0.4264
Log likelihood	201.3239	
Number of observations	82	
Censored observations	32	

* = significant at 10 per cent level.