Measuring market power in the Spanish mutual funds industry for retail investors*

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Abstract

The mutual fund industry is characterized by high concentration and a high number of offered funds. During last years, it can be figured out from their accounting information that the Spanish management companies have enjoyed a margin for the whole market, measured by the Lerner index, of between 23 and 25 per cent. By using an econometric structural model of competition among management companies, it is shown how mutual fund elasticities are low in the retail market. This result casts doubts about the effectiveness of the fee-caps at work. Moreover, by assuming for this market a simple model of monopolistic competition pricing, the estimations of their actual margins are above 40 per cent. This lack of competition suggests thtat there is room for public intervention.

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1 Introduction

According to the OECD: *"Market power refers to the ability of a firm (or group of firms) to raise and maintain price above the level that would prevail under competition."* Economic theory shows the social welfare gains of perfect competitive markets over markets where firms enjoy market power. In the latter, there is a net loss of social welfare as the exercise of market power leads to a reduced output. This is the reason why economic authorities have always been aware of the importance of reducing the levels of market power in industries as utilities where their structures make possible its presence.

The mutual fund industry is characterized by high concentration, agile introduction and exit of new funds, and an aggressive brokering from credit institution branches when placing them among retail investors. In principle, the type of competition in this industry may be approximated by what is known as monopolistic competition.[1] However, competing in this framework is not sufficient to consider this market as one where management companies enjoy market power.

In the classic description of monopolistic competition, there are many firms and many consumers in the market, and each firm faces a downward sloping demand. This means that they are not price takers and have certain degree of control over price. The other two important features of this model are consumers' perfect information on the products offered in the market and low barriers to exit and to entry. Under these assumptions, although there may be firms which enjoy high profits at a certain point in time, these profits cannot be maintained in the long run as new firms would enter to close the gap. So, this type of competitive environment ends up in competitive outcomes very close to perfect competition.

However, although it is easy to observe that the barriers to entry and exit in the mutual fund industry are low, it is also straightforward to notice that investors do not enjoy perfect information on the offered mutual funds. They face searching costs, and derived from those searching costs, switching costs. They are usually loyal to a single credit institution when deciding to invest their savings. These frictions open the door for management companies to enjoy market power. In this vein, one of the main characteristics of this markets is that there exists a huge number of funds. Gavazza (2011) and

[1] Monopolistic competition is a type of imperfect competition where many producers sell products that are differentiated from one another, usually by branding and/or quality, and hence are not perfect substitutes, see Chamberlain (1933).

Cambon and Losada (2014) found that this wide offer is neither neutral nor positive. It affects negatively to competition conditions. This mechanism may be a clue on how management companies enjoy market power.

Thus, the aim of this paper is to study, through a structural econometric model, whether in the mutual funds industry management companies enjoy market power and if so, to what extend.

The paper is structured as follows. In section 2, the mutual fund industry for retail investors is described. In section 3, the data used to study the Spanish mutual fund market is presented. Section 4 explains the empirical analysis carried out in this paper, in which the market power of management companies is measured. In section 5, the results of the empirical analysis are presented and analyzed. Finally, the last section lays out the conclusions.

2 The mutual fund industry for retail investors

A mutual fund is a type of professionally managed collective investment scheme that pools money from many investors to purchase securities.[2] Mutual funds provide investors with advantages compared to direct investing in individual securities. Among others, the main advantages are increased diversification, daily liquidity and professional investment management. In exchange for these advantages, investors must pay fees, mainly to the management companies which administer mutual funds.

These collective investment vehicles are sold to the general public. This is the main reason why mutual funds are regulated.[3] One of the main goals of these regulations is to try to overcome any possible asymmetric information between investors and the funds investments and outcomes, including the possibility of fraud. So, the main target of this regulation is the retail investors market. It is more likely that asymmetric information exists in the retail market rather than in the wholesale market, where it is supposed investors are more sophisticated. These differences in the participants of both

[2]U.S. Securities and Exchange Commission definition, available at http://www.sec.gov/answers/mutfund.htm.

[3]The main current Spanish regulations on mutual funds are Law 31/2011 of the 4th of October, which modifies Law 35/2003 of the 4th of November on collective investment schemes and the Royal Decree 1082/2012 which expands on the Law 35/2003 of the 4th of October on collective investment schemes.

markets make natural to consider them as two different markets.[4] In Spain, as in most of the countries, mutual funds and management companies must be registered with the securities supervisory authority, the CNMV.

Unlike what happens in the United States and the United Kingdom, where there is a different system of brokering, in most of the European countries, mutual funds are mainly brokered through the branches of the credit institution their management company belongs to. This characteristic makes the mutual fund industry to be mainly vertically integrated.[5] As it will be shown, this characteristic may be one of the reasons why the management companies enjoy high margins.

Focusing on the Spanish market, the number and assets of mutual funds grew significantly in the period 1995-2011. This increase was mainly related to the popularisation of this type of financial vehicles among retail investors. One important feature was that most of the mutual funds assets were managed by management companies belonging to credit institutions. Specifically, this type of management companies administered between 92 and 95 per cent of the assets invested in mutual funds. Independent management companies only had a significant presence in the segment of equity and mixed funds aimed at wholesale investors.[6,7] As it was stated in Gavazza (2011) and Cambon and Losada (2014), the presence of a wide variety of funds is a key variable to explain why competition conditions in the mutual fund industry is far from the perfect competition paradigm. As it is shown in figure 1, the total and the average number of funds administrated by management companies in the retail market was more than twice the number of funds offered

[4]In Gavazza (2011) and Cambon and Losada (2014), the authors found different demand and supply patterns in the retail and wholesale mutual fund markets.

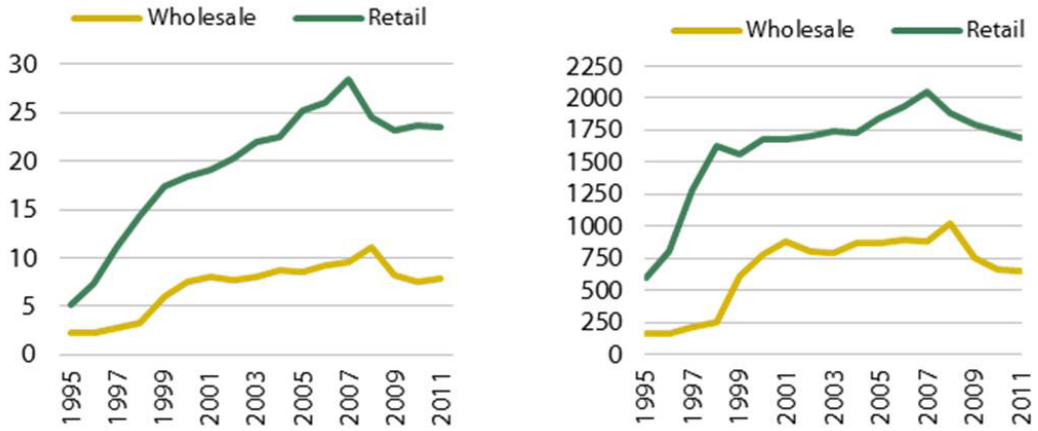
[5]A vertical integrated industry can be defined as one where firms own the whole supply chain. In most of the cases, this means that the same firm produces and sells a product.

[6]Conservative funds are money market funds, all fixed-income funds and guaranteed funds. Equity funds and mixed funds also include global funds.

[7]Mutual funds have been divided into wholesale and retail funds. Wholesale funds are those with a percentage greater than 50 per cent of assets in the hands of investors with a minimum holding of 180,000 euros. From 1999 to 2011, as a result of the change in the circular of the reserved statements which management companies must fill out for supervisory purposes, the criteria for separating wholesale and retail funds changed. In this period, money market funds and short-term fixed-income funds are considered as wholesale if more than 50 per cent of their assets are in the hands of investors with a minimum of 300,000 euros. The other types of funds are considered as wholesale when more than 50 per cent of their assets are held by investors with a minimum holding of 150,000 euros.

to wholesale investors. Moreover, the retail market accounts in average the 76.9 per cent of the total assets under management in the considered period.[8]

Figure 1: Average and total number of funds managed by management companies in the wholesale and retail markets



Source: CNMV

The finance industry is characterised by the fact that investors, particularly retail investors, tend to concentrate their purchases of financial products in a single supplier. This behaviour may be due to the high cost of searching for financial products among a number of different suppliers. As it is argued in Klemperer and Padilla (1997), in industries which share this characteristic, such as, for example, retail sale in supermarkets, variety is a strategic variable for companies in order to ease competition. So, it may be interesting to study competition in the mutual fund market.

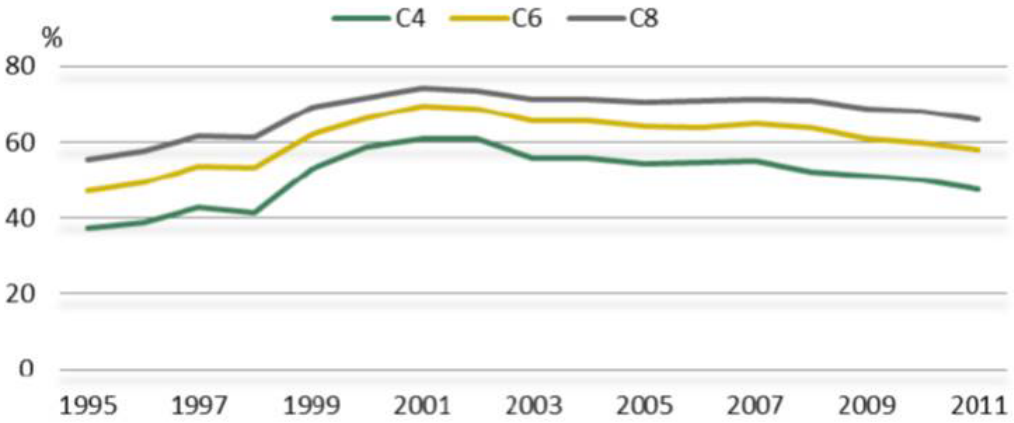
Figure 2 shows the volume market shares (assets under management) of the four, six and eight largest management companies in the retail market from 1995 to 2011. It can be observed that this market is served by a concentrated industry, specially since 2000. This raise of concentration was partly due to a wave of mergers and acquisitions among credit institutions ocurred in the late 90's.[9] Anyhow, concentration of a industry may be troublesome

[8]For further details about the supply of mutual funds in Spain over the period 1995-2010, see Cambon and Losada (2012).

[9]For example, in 1999 Banco Santander and Banco Central Hispano merged. Banco

because the industry leaders are very often earning high profits consistently.

Figure 2: Volume Market Shares in the Retail Market



Source: CNMV

One important remark is that market power management companies may enjoy is not a exclusive characteristic of the Spanish industry. Gruber (1996) and Korkeamaki and Smythe (2004) found evidence for the Finish and U.S. industries of the existence of economies of scale which final investors did not enjoy. Ferreira and Ramos (2004) figured out a Herfindahl index for the fund industry in Spain of 0.1 in 2006, what was very close to the average index in a sample of Eurozone countries (0.12), composed by Austria, Belgium, Finland, France, Germany, Italy, the Netherlands and Portugal. Although there are important differences among these countries with regard to their retail markets, the concentration levels suggest that these markets are also far from the perfect competition paradigm.

3 Data description

The model is estimated for the Spanish mutual fund market. The original sources of the data set for this market are the Spanish Securities and Exchange Commission (CNMV), the Spanish Banking Association (AEB), the

Bilbao Vizcaya and Argentaria also merged in 1999.

Spanish Confederation of Savings Banks (CECA) and the National Union of Credit Cooperatives (UNACC). The main source of the data set is the CNMV. This institution periodically collets information due to its supervision tasks on collective investment schemes. CNMV provided data, on a yearly basis from 1995 to 2011 (17 years), on all the existing mutual funds and management companies, including those defunct. The other sources of data provided information regarding the characteristics of the credit institutions non independent management companies belonged to. As it will be shown, this last source of information is important in order to gather good instruments for the estimation.

Although the CNMV provides data on all mutual funds registered in Spain, this paper only considers mutual funds purchased by retail investors.[10] By treating a mutual fund/year as an observation, the total sample size is 24397 observations and the total number of considered funds is 3504. The information obtained for each mutual fund includes:

1. Market share (s_{jt}): defined as the ratio between the assets of each fund and the total amount of retail investor financial holdings.

2. Fees (p_{jt}): defined as the sum of the management fees, the deposit fee, 1/7 of the subscription fee and 1/7 of the redemption fee of each fund in each of the periods making up the sample.[11]

3. Return ($return_{jt}$): defined as the percentage change in the net asset value of a unit of each fund between the close of one year and the close of the previous year.

4. Volatility ($volat_{jt}$): defined as the typical annualised deviation of the

[10]Mutual funds have been divided into wholesale and retail funds. Wholesale funds are those with a percentage greater than 50 per cent of assets in the hands of investors with a minimum holding of 180,000 euros. From 1999 to 2011, as a result of the change in the circular of the reserved statements which management companies must fill out for supervisory purposes, the criteria for separating wholesale and retail funds changed. In this period, money market funds and short-term fixed-income funds are considered as wholesale if more than 50 per cent of their assets are in the hands of investors with a minimum of 300,000 euros. The other types of funds are considered as wholesale when more than 50 per cent of their assets are held by investors with a minimum holding of 150,000 euros.

[11]This variable has been defined as in Gavazza(2011) and Cambon and Losada (2014). It is assumed that investors make the investment at a time horizon of seven years.

fund monthly returns over the last 12 months. This is a standard risk measure to assess the profile of mutual funds.

5. Type of fund ($equity_{jt}$): This is a dummy variable which takes 1 when the fund is within the equity class and 0 when it is conservative. Equity funds type include equity and mixed funds as well as global funds. Non-equity type funds are money market funds, all fixed-income funds and guaranteed funds.

Regarding the information on the management companies mutual funds belong to:

1. Variety ($NumVoc_{jt}$): defined as the ratio between the number of vocations offered by management company and the total number of vocations available in the market in a year.

2. Type of management company (CI_{jt}): This is a dummy variable which takes 1 when the management company belongs to credit institutions and 0 when the management company is independent.

In addition to the variables that characterize the mutual funds and the management companies, other variables are used as instruments in the estimation of the model:

1. Return of the other funds belonging to the same category as fund j in period t ($reti_{jt}$)).

2. Number of branches of the financial group the management company belongs to ($numofi_{jt}$).

3. Number of employees of the financial group the management company belongs to ($numemploy_{jt}$).

4. Marketing expenses which the management companies pay in order to place their mutual funds ($maktexp_{jt}$).

Other sources of information used are the INE and the Bank of Spain.[12] The INE provided the distribution of the Spanish income per capita (annual

[12]INE is the Spanish Statistical Office.

mean and standard deviation).[13] The Bank of Spain provided information on household deposits, which has been considered as the alternative investment to mutual funds.

As it is stated in Ispierto and Villanueva (2010), the characteristic that better describes the Spanish retail investors behaviour is their net wealth. Investors with different net wealth decide to hold different portfolios of financial assets. However, due to lack of annual data availability on this variable, a second best proxy should be used. This is to consider income as the variable that describes the heterogeneity in the behaviour of the Spanish retail investors. With regard to the definition of the alternative investment as deposits, one may think that this definition is too restrictive. However, although the Spanish retail investors may hold equity in their portfolios, there are three reasons why only deposits are taken as the alternative investment. Firstly, according also to Ispierto and Villanueva (2010), the average Spanish retail investors is very conservative, most of these retail investors only considers deposits as an alternative to mutual funds. Secondly, Bank of Spain only supplies aggregate data on the investment of retail investors on public and private equity. As most of the equity held by retail investors is private and correspond to property rights on business run by the holders so that this equity should not be considered as pure financial investments. Lastly, other possible investment instruments, as pension funds, are chosen to a different time horizon, which makes them not suitable as close substitutes for mutual funds.

Table 1 shows a summary of the main descriptive statistics of the main variables considered in the empirical analysis. With regard to the variables that characterize the mutual funds, the average market share of the funds and the alternative investment in the period under consideration are 0.015 and 76.32 per cent respectively. The average return of the funds was 3.18 per cent, whereas the fee paid by the retail investors was 1.61 per cent. It is also important to point out that the average volatility was high, this means that the number of equity funds in sample is high. Regarding the variables that characterize management companies, the average percentage of vocations offered by them is 68.31. This means that Spanish management companies cover a high percentage of vocations and, by extension, they offer

[13]The income distribution is assumed to be lognormal and its parameters are estimated from INE data. Particularly, the estimated standard deviation is $\widehat{\sigma}_y$ and the mean m_t is the sample mean for each year.

a large number of funds to retail investors.

Table 1: Descriptive statistics of the data set

	Average	Standard deviation
Market share (mutual funds)	0.015	0.045
Market share (alternative investment)	76.32	8.1997
Fee	1.6083	0.5863
NumVoc	0.6831	0.2386
Return	3.1764	13.442
Volatility	6.0414	7.383
Marketing expenses (thousand euros)	9,352	15,241
Number of branches	116	143
Number of employees	819	999
Return (instrument)	3.3964	11.5478
Number of observations	24397	
Number of funds	3504	

Source: CNMV, AEB, CECA and UNACC.

4 The empirical framework

The empirical strategy follows Nevo (2001) and considers different models of supply conduct. For each model of supply, the pricing decision depends on mutual fund demand, which is modeled as a function of mutual fund characteristics and investor preferences.[14] Demand parameters are estimated and, afterwards, used to compute price-cost margins (PCM) implied by the different models of management companies conduct.

4.1 Demand model

The management companies' problem proposed in the supply side description above will allow to estimate PCM and split them up into different components. However, this relies heavily on the ability to estimate consistently funds own and cross-fee elasticities. This is not an easy task in an industry

[14]This empirical framework is further explained in Nevo (2000) and Rasmusen (2007).

as the mutual funds where there are many funds that may be considered as very close substitutes. So, the dimensionality problem is circumvent by projecting the different mutual funds onto a characteristics space. This allows the dimension of the space characteristics of the mutual funds, and not the number of mutual funds in the market, to became relevant.

Given this approach taken from the discrete-choice literature, let be considered that $t = 1, ..., T$ markets are observed, each with $i = 1, ..., I$ investors. In this case, it is assumed that each of the considered years is a market. The conditional indirect utility of investor i from fund j at market t is:

$$u_{ijt} = x_{jt}\beta_1 - \alpha^i p_{jt} + \xi_j + \epsilon_{ijt}, \tag{1}$$

where x_j is a K-dimensional vector of observable mutual fund characteristics, p_{jt} is the total fee of fund j in market t, ξ_j is the mean valuation of the unobserved (by the econometrician) mutual fund characteristics and ϵ_{ijt} is a zero mean stochastic term. Finally, $\beta^i = (\alpha^i, \beta_1)$ are $K + 1$ individual coefficients.[15]

The considered observed characteristic of funds are the following: the variety which the management company of a given mutual fund belongs offers, return, volatility, whether or not the management company belongs to a credit institution and whether the mutual funds is an equity fund. It is assumed that management companies as well as investors observe all the product characteristics and take them into consideration when making decisions. The distribution of the consumers' fee parameter is normal (conditional on demographics) with a mean that is a function of a demographic variable (this will be individual income) and parameters to be estimated. Let

$$\alpha^i = \alpha + \theta_1\nu_i + \theta_2 d_i,\ \nu_i \sim N(0, 1), \tag{2}$$

where d_i is the demographic variable, in this case income, θ_2 is a coefficient that measures how the taste characteristics vary with the demographic variable. θ_1 is a coefficient and measures how the consumer reacts to any change in his characteristics, for example education, that are picked up by his income. Thus, this model specification allows the individual character-

[15]The total fee paid by the investors of a mutual fund in each period/market is the sum of the management fee, the deposit fee, 1/7 of the subscription fee and 1/7 of the redemption fee. This variable has been defined in a similar manner to that of Gavazza (2011) and Cambon y Losada (2014).

istic to be composed by the observed characteristics, d_i and the unobserved characteristics, ν_i.[16]

The specification of the demand system is completed with the introduction of an *alternative investment* (deposits), this allows investors to decide not to put their money in any of the available mutual funds. Without this alternative, an homogeneous price increase of all products would not change quantities purchased. The indirect utility from the alternative investment is kept as simple as possible:

$$u_{i0t} = 0. \tag{3}$$

Let be $\Gamma = (\beta, \theta)$ as the vector which contains all parameters of the model, $\beta = (\alpha, \beta_1)$ and $\theta = (\theta_1, \theta_2)$; then, combining equation (1) and (2), the following reduced form equations can be written:

$$u_{ijt} = \delta_{jt}(x_j, p_{jt}, \xi_j; \beta) + \mu_{ijt}(x_j, p_i, \nu_i, d_i; \theta) + \epsilon_{ijt}, \tag{4}$$

$$\delta_{jt} = x_j\beta_1 - \alpha p_{jt} + \xi_j,\ \mu_{ijt} = p_{jt}(\theta_1\nu_i + \theta_2 d_i), \tag{5}$$

By using equation (4), investors' utility is expressed as the mean utility, δ_{jt} and a deviation from that mean, $\mu_{ijt} + \epsilon_{ijt}$ which captures the effect of the random coefficient.

An important assumption of this model, although very common in discrete choice literature, is that investors only purchase a fixed amount (normalized to 1) of the mutual fund that provides the highest utility.[17] This defines the set of the unobserved variable that makes possible the choice of mutual fund j:

$$A_{jt}(x, p_{.t}, \delta_{.t}; \theta) = \{(d_i, \nu_i, \epsilon_{it}) \mid u_{ijt} \geq u_{ilt},\ \forall l = 0, ..., J\} \tag{6}$$

where x are the characteristics of all available mutual funds in the market, $p_{.t} = (p_{1t}, ..., p_{Jt})'$ and $\delta_{.t} = (\delta_{1t}, ...\delta_{Jt})'$. Under the assumption that ties occur

[16]The distinction between observed and unobserved individual characteristics make references to use of the auxiliary data sets. The distribution of observed characteristics are estimated from these additional sources, in this case, the data from INE.

[17]A portion of retail investors may choose to invest in more than one mutual fund, however most of retail investors decide to invest only in a single mutual fund, which is the relevant fact for this modeling assumption. Nevertheless, if one is still unwilling to accept this is not a main driver of this market, then this model can be viewed as a good approximation to the true choice model.

with zero probability, the market share of the j^{th} mutual fund as a function of the mean utility levels of all mutual funds, given the parameters, is

$$s_{jt}(x, p_{.t}, \delta_{.t}; \theta) = \int_{A_{jt}} dP^*(d, \nu, \epsilon) = \int_{A_{jt}} dP^*(\epsilon) dP^*(\nu) dP^*(d), \qquad (7)$$

where $P^*(.)$ is the population distribution functions. The second equality comes out from the assumption of independence between d, ν and ϵ. The assumptions on the distributions of the individual attributes $(d_i, \nu_i, \epsilon_{i.t})$ are needed in order to compute the previous integral analytically or numerically. Given that fees and market shares are known, a natural estimation strategy is to try to search for the parameters that minimize the distance between the actual market shares and those predicted by the model. Bearing this idea in mind, the actual estimation adds a higher degree of complexity as it has to cope with correlation between fees and demand shocks, which enter in the integral nonlinearly. It also has to take into account that, as it is shown in Gavazza (2011) and Cambon and Losada (2014), an important mutual funds demand driver is the variety that their management companies offer (proxied by the number of funds and/or number vocations) which are also correlated with demand shocks.

The most common assumption to try to solve the integral is that consumers heterogeneity enters the model only through ϵ_{ijt}, and these shocks are i.i.d. and distributed according to a Type I extreme-value distribution. This assumption reduces the model to a well-known Logit model. This type of model is very tractable, although by assumption, it restricts own and cross fee elasticities.[18] Logit models assumptions imply that cross-price elasticities are a direct function of the market shares. This implies that if two funds with very different characteristics have the same market shares, the substitution from a third fund towards any of the two former funds will be the same. This result always arises independently of how close the characteristics of the third mutual funds are to the other two funds. However, in general and intuitively, if the latter mutual fund fee raises, one would expect that the fund with close characteristics is going to gain a higher market shares than the one with not so close characteristics. However, the Logit model restricts investors to substitutes towards other mutual funds in proportion to market shares and regardless of the mutual fund characteristics. Moreover, when

[18] See for example MacFadden (1981) or Berry, Levinsohn and Pakes (1995).

the market share of the alternative investment is very large, the substitution with respect to mutual funds will be downward biased on average. These results could lead to wrong conclusions with regard to analyzed industry when using the Logit model.

The literature has tried to close this gap by using less restrictive models. In them, the i.i.d. assumption is replaced by a more complex structure. Within this category of models, the Nested Logit model and the principles of differentiation generalized extreme value model (McFadden (1978) and Bresnahan et al. (1997)) were the first attempts to try to overcome the Logit model restrictions. However, although they are less restrictive, both models generate substitution patterns that only overcome the problem of Logit models partly, as they are conditional on apriori assumptions over how products in a market are related.

The model presented in this section, which follows Nevo (2001) and Berry et al. (1995), nests all the previous models and has a main advantage over them. This model allows for flexible own-fee elasticities, which is driven by the different sensitivity to fees of the retail investors who participate in the mutual fund market. This flexibility can attain outcomes closer to reality. [19]

4.2 Supply model

Although there are fee caps in place in the Spanish mutual fund market, the results from demand estimation will show how using the standard monopolist competition pricing model is a good approximation in order to assess market power in this market. So, suppose there are F management companies, each of which offers some subset, $\Im_f$, of the $j = 1, ..., J$ of mutual funds. The profits of firm f are:

$$\Pi_f = \sum_{j \in \Im_f} (p_j - mc_j) M s_j(p) - C_f \tag{8}$$

where $s_j(p)$ is the market share of mutual fund j, which is a function of the fees of all mutual funds, M is size of the market that year, and C_f is the fixed cost of the management company. Assuming the existence of a pure strategy Bertrand-Nash equilibrium fees, and that the fees that support it

[19] McFadden and Train (1998) showed that the type of model used in this paper can approximate arbitrarily any choice model. In particular, the multinomial probit model (Hausmand and Wise (1978)) and the universal Logit (McFadden (1981)).

are strictly positive, the fee p_j of any mutual fund j placed by management company f must satisfy the following first-order condition:

$$s_j(p) + \sum_{r \in \Im_f} (p_r - mc_r) \frac{\partial s_r(p)}{\partial p_j} = 0 \tag{9}$$

This set of J equations implies fee-costs margins for each fund. The margins can be solved explicitly by defining $S_{jr} = -\partial s_r / \partial p_j$, $j, r = 1, ..., J$,

$$\Omega^*_{jr} = \begin{cases} 1 & if \quad \exists f : r, j \subset \Im_f \\ 0 & otherwise. \end{cases}$$

Let Ω be a $J \times J$ matrix with $\Omega_{jr} = \Omega^*_{jr} * S_{jr}$. In vector notation, the first-order conditions become:

$$s(p) - \Omega(p - mc) = 0, \tag{10}$$

where $s(.)$, p, and mc are $J \times 1$ vectors of market shares, fees, and marginal costs, respectively. This implies a margin equation:

$$p - mc = \Omega^{-1} s(p) \tag{11}$$

Using estimates of the demand parameters, PCM without observing actual costs can be estimated. Given so, three different causes of the margins can be distinguished: the effect due to differentiation among the mutual funds, the portfolio effect and the effect of price collusion. This is done by evaluating the PCM in three hypothetical industry conduct models. The first structure is that of a single fund management companies, in which the fee of a mutual fund is set by a profit-maximizing management company that considers only the profits from that mutual fund. The second is the current structure, where multi-mutual funds management companies set the fee of all their funds jointly. The final structure is the joint profit-maximization of all mutual funds in the market, which corresponds to monopoly or perfect fee collusion. Each of these structures is estimated by defining the proper ownership structure, $\Im_f$ and matrix, Ω^*.

The PCM of the first structure only arises from how different investors perceive the mutual funds in the market. The difference between the margins in the first two considered market structures is due to the portfolio effect. The last structure measures the increase in the margins due to fee collusion. Once these margins are computed, it can be usually chosen the model that

better defines this market by comparing the outcomes of the models with the actual PCM.

4.3 Estimation of the demand model

The demand equation is estimated by means of the following algorithm:

1. In order to start the algorithm, select arbitrary values for δ and $\theta = (\theta_1, \theta_2)$ and for β. It is important to remind that δ is the vector of the mean utility from each of the funds, that θ is the matrix of parameters showing how observed and unobserved investors characteristics and product characteristics interact and generate utility, and that β is the average value of the parameters across investors.

2. Random values for (ν_i, d_i) for $i = 1, ..., n_s$ are drawn from the distributions functions $P_\nu(\nu)$ and $P_D(D)$ for a sample size n_s, where the bigger you pick n_s the more accurate your estimate will be.

3. By means of the starting values and the random values, and also the assumption that the ϵ_{ijt} follow the extreme-value distribution, the integral for market share that results from aggregating across i is approximated by

$$s_{jt} = (\frac{1}{n_s}) s_{ijt} \tag{12}$$

$$s_{ijt} = \sum_{i=1}^{n_s} \frac{e^{\delta_{jt} + p_{jt}(\theta_1 \nu_i + \theta_2 d_i)}}{1 + \sum_{m=1}^{J} e^{\delta_{jt} + p_{jt}(\theta_1 \nu_i + \theta_2 d_i)}} \tag{13}$$

   where ν_i and d_i for $i = 1, ..., n_s$ are the random draws from the previous step. From this step, predicted markets shares for given values of the individual investor parameters $\theta = (\theta_1, \theta_2)$ and for given values of the mean utilities, δ, are obtained

4. $\theta = (\theta_1, \theta_2)$ are kept fixed at their starting points, values of δ are found by means of the following iterative process:

$$\delta_{.t}^{h+1} = \delta_{.t}^{h} + (ln(S_{.t}) - ln(s_{.t})) \tag{14}$$

where $S_{.t}$ is the observed market share and $s_{.t}$ is the predictive market share from the previous step. This contraction mapping starts with an arbitrary δ^0 which comes from step 1. If the observed and predicted market shares are equal, then $\delta_{.t}^{h+1} = \delta_{.t}^{h}$ and the series converge. In practice, the algorithm is kept iterating until $ln(S_{.t}) - ln(s_{.t})$ is small enough given a set accuracy. From this step the values of δ come out.

5. The value of the moment expression is figured out, using the alternative values for $\beta = (\alpha, \beta_1)$ from step 2 and the δ estimated from the previous step. Next, calculate the error term ω_{jt}

$$\omega_{jt} = \delta_{jt} - (\alpha p_{jt} + x_{jt}\beta_1) \tag{15}$$

and the value of the moment expression

$$\omega' Z \Phi^{-1} Z' \omega \tag{16}$$

where $\Phi = E(Z'\omega\omega' Z)$ and Z is the matrix of instruments. As usual, the procedure starts with a consistent estimator of $\Phi = Z'Z$.

6. Better estimates of all the parameters are computed: the common parameters, $\beta = (\alpha, \beta_1)$, the individual parameters, $\theta = (\theta_1, \theta_2)$ and the weighting matrix Φ.

   An estimate of the common parameters is found by using the GMM method:

$$(\alpha, \beta_1) = (X' Z \Phi^{-1} Z' Z X)^{-1} X' Z' Z' \Phi^{-1} Z' \delta \tag{17}$$

   This is a linear estimator that can be found analytically by multiplying matrices. The parameters that can be linearly estimated are separated out from the parameters that require a search algorithm. This is why all these steps are used instead of simply setting up the moment expression and then using a minimization algorithm to find parameter values that minimize it. Searching takes a computer longer than multiplying matrices and is less reliable in finding the true minimum, or, indeed, in converging to any optimum.

   The value of the error term, $\hat{\omega}$, is estimated, and afterwards, the moment expression, $\omega' Z \Phi^{-1} Z' \omega$, is used to improve the estimates of

$\beta = (\alpha, \beta_1)$ from the last estimation. The value of the weighting matrix $\Phi = Z'\omega\omega'Z$ is estimated by using the $\hat{\omega}$ that has just been calculated:

$$\hat{\omega_{jt}} = \delta_{jt} - (\hat{\alpha}p_{jt} + x_{jt}\hat{\beta}_1) \tag{18}$$

Finally, a search algorithm is used to find new values for $\theta = (\theta_1, \theta_2)$. In this case, the search algorithm used was of a Nelder-Mead type.[20] With the new values taken out from the algorithm result, the procedure starts again from step 3. The iteration procedure keeps searching for parameters β and θ until the value of the function, $\omega' Z\Phi^{-1}Z'\omega$, is close enough to zero.

Given the analyzed industry, it is important to point out that when estimating the model there are two endogenous variables among the characteristics that defined mutual funds: the one related with the fund's management company variety, i.e., the percentage of vocations offered by the management company and, the fee. These are the two main variable that the management company chooses in order to maximize profits. In Gavazza (2011), through a theoretical model that applies the Sutton (1991) model of sunk costs to the mutual fund industry, it is showed that these variable are key when a management company competes in the mutual fund market. Thus, if one decided to estimate the linear parameters of the model without using instruments for these variables, the outcomes of the estimations could be inconsistent.[21]

In this case, the most suitable approach to estimate properly the model is to search for adequate instruments. These have to be related with the variety of the funds supplied by the management company and fees; at the same time, they cannot be related with a demand shock.

For the case of variety, the variables used as instrument are: the number of branches, the number of employees of the parent credit institution and the management companies marketing expenses. The validity of these instruments is based on the fact that any positive demand shock should not be translated into an increase of the variable used as instrument. These variables should meet several conditions that guarantee they are correlated with the original variable, in this case the one that measures variety, and not with

[20] The Nelder-Mead algorithm or simplex search algorithm is one of the best known algorithms for multidimensional unconstrained optimization without derivatives. For further details about this algorithm, see Nelder, J.A. and Mead, R. (1965).

[21] See Khorana and Serveas (2012)

idiosyncratic error of the demand. Therefore, in order to test the validity of the instruments: number of employees and branches in the considered period of analysis, none of them should have increased or decreased due to an unexpected increase in funds demand. This assumption seems reasonable under the assumption that all occurred shocks were not of a high intensity.

With regard to marketing expenses, the validity of this instrument presents more doubts at first sight. It is rather clear that as more funds are placed, independently of the cause, more marketing expenses are generated. However, the marketing incentives system in the Spanish banking market is based on apriori estimates. So, this system makes not so obvious that a demand shock is translated in higher marketing expenses. Within this scheme, the mutual fund sellers have only few incentives to place mutual funds above the target that was set at the beginning of a year. Most of the times, the profits of placing mutual funds above the target do not compensate the costs (higher estimates of placing for the future years). This causes a rachet effect as the one described in Laffont and Tirole (1998).

In the case of fees, the instruments are the same as in previous papers, e.g. Berry (1994) and Nevo (2001). In particular, the average return of all other funds of the data set in a year is taken as the instrument. The suitability of this instrument relies on the assumption that demand errors of each fund are independent.

To conclude this section, a short note on the identification of the model. As Nevo (2000) states, there may be two problems on this issue when a random-coefficient is estimated. The first problem is related with the endogenous variables a model may have. This problem has been just tackled in this section. The second problem arises because a random coefficients model needs a great variety in the data set. In this case, the variety comes from the number of years/markets, principally because in these years, there were two recession and two booms, what made possible a great variation in the mutual fund markets shares.

5 Results

5.1 Demand estimation

In the table 2, the estimations from the logit and the full model (random logit coefficient) are shown. For both types of models, the dependent vari-

able is $ln(S_{ij}) - ln(S_{0t})$. Both estimations consider the instrumental variables already commented and time dummy variables. In order to have good estimates from the full model, predicted market shares from the step 3 of the estimation algorithm were based on the empirical distribution of demographics (Spanish income per capita) from INE, independent normal distribution (for ν) and Type I extreme value (for ϵ) (see equation (1) and (2)).[22] For the cases of the demographic variable and the ν, 7500 individuals were sampled for each year. The first column displays the result from the logit model, whereas the second to fourth columns show the results from the full model. The second column gives the estimations of an average investor demand behaviour to the different characteristics of funds. The other two columns show how different type of investors react to fee changes.

As it can be observed from the estimations, both models results are very close. Although, from the logit model, restrictive and unrealistic substitution patterns among products are usually yielded (therefore, this usually makes it inadequate for measuring market power in an industry), this may not be the case. Point estimations and the significance of them are very similar. Only, the variance coefficient is not significant in the logit model. But what it really makes these two models very close is the result on sensitivity of heterogenous investors to fees, θ_1 and θ_2. Both parameters estimations are very close to zero. In addition, none of them is significant. These results point out that investors sensibility is not different across them, independently of how heterogeneous they are. So, the reaction of all investors after a change in a mutual fund fee is very likely to be the same. They also mean that for this industry, the logit model is a good approximation to assess market power.

This is an important result and deserves a further explanation. One would expect that the sensibility with respect to prices across investors are different. As most of retail investors are advised by the sellers who place mutual funds at the credit institutions branches, one would expect that investors with lower rent have a more inelastic demand. However, the opposite has been obtained, the sellers who place mutual funds among retail investors can discriminate among them and they can influence them in the same way independently of how different they are. This result may stand for management companies with a high market power in this industry.

Anyhow, the fee coefficient obtained in the full model is negative and significant, what stated that all retail investors face a downward sloping

[22] INE is the Spanish Statistical Office.

demand for mutual funds.

Table 2: Estimation results

	Logit estimation	Full model estimation		
	β	β_1	θ	
Fee	-1.549	-1.612	-0.0005	0.0014
	(0.441)	(0.039)	(1.306)	(0.346)
NumVoc	3.654	3.694		
	(0.306)	(0.018)		
Return	0.008	0.008		
	(0.001)	(0.0001)		
Volat	0.001	0.003		
	(0.009)	(0.0007)		
CI	0.355	0.356		
	(0.046)	(0.0009)		
Equity	-0.388	-0.360		
	(0.192)	(0.014)		
Number of observations	24397		24397	
Number of funds	3504		3504	
Fixed effects test (Hausman)	No			
Hansen test (p-value)	0.3091			
GMM Objective			2.8287	

1.β regressors of both models were estimated by GMM
2.Regressions include time dummy variables
3.Estimates are robust to heteroskedasticity and autocorrelation
4.Estimated standard deviations in brackets

With respect to the other results obtained from the full model, it is important to highlight the importance of all considered characteristics of the mutual funds. All of them appear to be significant. The variety parameter is positive, what states how important is to offer a wide range of funds from different vocations. Even though, an alternative investment has been considered for the analysis, this result is in line with Gavazza (2011) and Cambon and Losada (2014), where the authors did not consider this assumption.

There are other two important results that arise from the estimation. The funds from management companies that belong to credit institutions enjoy higher market shares and retail investors are less keen to invest in equity funds. The first results may demonstrate how funds from management companies of credit institutions show a higher market power. Even when mutual funds characteristics are equal, it is easier for this type of management companies to place their funds in comparison with independent ones. The second result shows the preferences of retail investors. It appears that retail investors are very conservative and risk averse, which is in line with the results in Ispierto and Villanueva (2010).

Given the results from the full model of demand, the mutual fund elasticities can be figured out. As the heterogeneity coefficients, $\theta_1 and \theta_2$, were not significant, the elasticities can be computed by using the following close form:[23].

$$\eta_{ijt} = \frac{\partial s_{jt}}{\partial p_{kt}} \frac{p_{kt}}{s_{jt}} = \begin{cases} -\alpha p_{jt}(1 - s_{jt}) & if \quad \text{j=k} \\ \alpha p_{kt} s_{kt} & otherwise \end{cases}$$

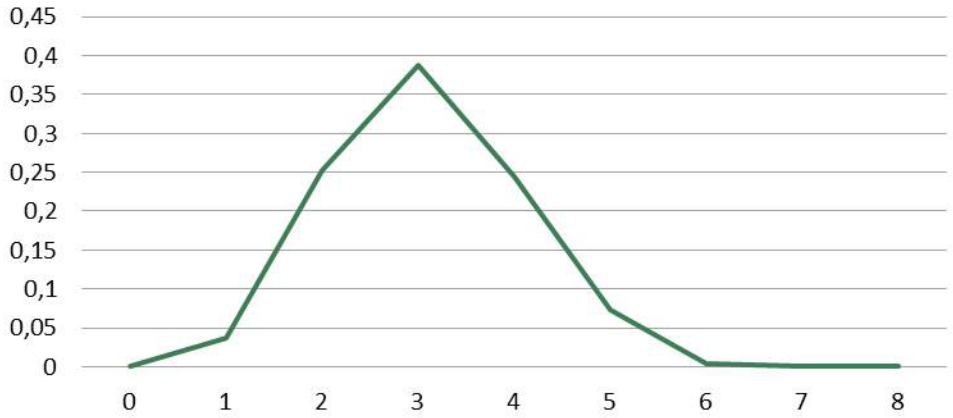
Figure 3 shows the distribution of the elasticities across all the mutual funds of the data set. Most of the mutual fund own elasticities, in absolute values, are between 2 and 4. Only few mutual funds have an elasticity higher than 4. These result means that management companies enjoy a high margin in most of the mutual funds. If the Lerner index is considered as the measure to assess margins, it is well known that management companies would enjoy a margin in each mutual fund at least as:

$$\frac{p - mc}{p} = \frac{1}{own \quad elasticity}$$

So, from the figure it can be derived that in most of funds, management companies enjoy a margin of at least 25 per cent, what is really far from

[23]For further details, see Rasmusen (2007)

Figure 3: Elasticities density function



Source: Own figure

the perfect competition paradigm. This result casts some doubt about the effectiveness of the current fee-cap at work in this market.[24] It seems management companies and, by extension, credit institutions have mechanisms that allows them not to suffer from fee-caps. Management companies and specially, credit institutions, are multiproduct firms that may price discriminate among their consumers/investors. From the figure 3, one may think that they only place mutual funds to retail investors when they cannot place other financial product with a higher margin. So, not considering the fee-caps when analyzing the monopolistic competition of this market may be a good approach for this market, as it seems the fee-caps are not binding constraints for most of the management companies.

5.2 Price-Cost margins

By using the demand parameters estimated and the supply model presented in the previous section, price-cost margins for different conduct models can be computed. Price-cost margins for three hypothetical industry structures are computed, thus bounds are placed on the importance of the different causes

[24]Currently, the main caps for monetary funds are: 1 per cent for management fees and 0.15 per cent for depositary fees. For rest of mutual funds, the main fee caps are: 2.25 per cent for management fees and 0.2 for depositary fees.

for the price-cost margins. The table 3 presents the mean weighted by asset under management price-cost margins for the full model using the demand estimates of table 2. The different rows present the price-cost margins that the three pricing conduct predict. In principal, each year has different average predicted margins.

Table 3: Weighted average margins (per cent)

	Full Model
Single mutual fund management companies	43.06
Actual structure of the industry	43.99
Monopoly/Perfect price collusion	55.70

Source: Own table

1.Margins are defined by means of the Lerner index: $(p - mc)/p$

From these predictions, one can conclude that management companies enjoy a high margin in any of the considered market structures. It is important to point out the small difference in the margins between the actual structure of industry and the one where it is supposed each fund is sold by a different management company. These results imply important features for this industry. First, although the management companies are multiproduct firms, they can almost not profit from that condition. The portfolio effect is negligible for this industry. This may indicate that mutual funds sold by the management companies are seen by retail investors as not very close substitutes. This result points out how credit institutions branches influence the retail investors perception on funds. They perceive all mutual funds as different, when for many of them, their actual characteristics are very close.

Second, although management companies supply mutual funds that are very similar, apart from some specialized independent management companies, it seems that they can differentiate their offer from the ones of the rivals. This result suggests that branding and offering a wide range of funds are key in this industry. These mechanisms are the ones which allow the management companies and by extension, credit institutions, to relax competition and extract rents from retail investors.

It is important to recall that the aggregate price-cost margins derived from the Spanish management companies account statements from 2006 to 2011 for the whole market (retail and wholesale) were between 23.0 and 25.4

per cent.[25] When the predictions are compared with the actual data for the whole market, it is easy to see that the latter figures are much lower. The difference cannot be only explained by the fact that the average margin in the retail market is greater. At least, two alternative explanations should be considered. The first one is that the market structures considered to estimate the weighted average margin are not realistic for this industry. The other possibility is that, due to the vertical integration, the main suppliers of the management companies, the branches that place mutual funds, overcharge them.

If the first alternative of pricing behaviour is further discussed, it should be taken into account that, from a competition perspective, assuming price competition is the toughest scenario. Any other alternative, as it may be quantity competition, is softer from a competition analysis point of view.[26] So, these margins predictions should be taken as a lower bound of the actual margins that management companies actually enjoy.

Regarding the second alternative, it is important to point out that retail fees are a positive function of marginal cost as management companies reflect them on final fees.[27] So, it is easier for management companies to maintain higher fees when marginal costs are high. Moreover, it is not strange that vertically integrated firms may have internal cross subsidies in practice. In this case, marketing fees could be also high because by using this strategy it is easy to charge the same fees to other management companies. There may also be regulatory reasons, if management companies showed margins close to the predicted, public intervention in order to undercut those margin could be more likely.

One interesting issue is how different the margins of management companies that belongs to credit institutions are when comparing them with those from independent companies. If this analysis is made up, it is observed that the former type enjoy a margin a margin of 44.04 per cent whereas the latter

[25] In order to be consistent with the margins of the econometric estimation, these margins were computed subtracting the management companies total income to the fees paid to third parties and the staff costs, and dividing the outcome by management companies and depositaries total income

[26] See for example Tirole (1988).

[27] For example, if perfect competition is considered in an homogeneous market, the price consumers pay is $p = mc$. If in other market, if there are a linear demand $p = a - q$ and a monopoly, the final price is $p = (a + mc)/2$. So, in any market, the final price is always an increasing function of the marginal costs.

type enjoy a margin of 43,34 per cent. At first sight, it seems rare that both type of management companies enjoy almost the same margin. However, one should take into account two important features. The more important one is that equity funds are sold to a wider margin and independent management companies have in those funds their main market niche.

The other feature is that margins are only a part of profits. The other parts are: market share, total size of the market and fixed costs. So, although independent management companies can enjoy similar margins, their profits are far lower from the ones of the management companies which belong to credit institutions. This difference in profits comes from two different sources. As it was observed from the demand estimation, when both type of management companies set similar prices, the mutual funds demand of the management companies that belong to credit institutions is much higher. They enjoy a more preferred brand and a larger loyal investor base. At the same time, independent companies set fees for their funds not much lower than their competitors from the other type of management companies; they do not try to undercut their rivals fees as they know almost no new investor would switch their investment to their cheaper funds. Thus, although there are usually new entries in this markets, they bring a limited new competition. One important conclusion of this analysis is that the structure of the mutual fund industry makes fees not to be an important strategic variable due to the limited competition in the market.

6 Conclusions

The retail mutual fund industry is characterized by a high concentration. During last years, the largest four management companies, all of them owned by a credit institution, accounted more than 50 per cent of the market. Furthermore, due to the existence of high switching and searching costs, retail investors tend to purchase their financial assets in a single supplier. Credit institutions usually sell a wide variety of financial assets, among them, mutual funds. These two characteristics of the market make it a possible candidate for being one where competition is restricted.

According to the estimation of an econometric structural model, the average margin, measured by the Lerner index, of the management companies in this market is at least of 43 per cent. This means that the mutual fund market is far from the perfect competition paradigm. So, the main conclu-

sion of this paper is that management companies enjoy a high market power in the Spanish retail segment of this market.

In Spain, there are fee-caps in place. From the demand estimation, the elasticities of mutual funds are computed. These estimations cast some doubts about the effectiveness of these caps. Management companies enjoy margins in most of the mutual funds of at least 25 per cent. Management companies and specially, credit institutions are multiproduct firms that may discriminate among the retail investors.

When the estimation of margins for the retail market are compared with the actual margins reported by management companies for the whole mutual fund market, it is observed that the latter are much lower. Although, in principle, one may think that the particular characteristics of the retail market make it suitable for higher margins, the difference between the retail margin and the reported margin is too high. This difference may be explained by the vertical structure of most of the participants in the industry. So, the credit institutions administer mutual funds (through their management company) and broker them (through their branches) to retail investors. As credit institutions set broker fees for the placement of mutual funds, they have incentives to set them high as the fees retail investors pay are a positive function of broker fees. This strategic behaviour may help them to maintain higher margins in this market.

Other important result of this paper is that the margins of independent management companies and the ones which are subsidiaries of credit institutions are similar. However, this does not mean that they enjoy similar profits. The latter enjoy higher market shares because they have a more preferred brand and a larger loyal investors base. The independent management companies do not find profitable to undercut their rivals as almost no investors would switch to a cheaper fund. Two important conclusions follow from this result: new entries of management companies bring limited new competition to the market and fees are not a main strategic variable for management companies as competition is limited. Management companies would find more profitable to compete in other dimensions as for example, offering a wide variety of funds.

Given the lack of competition in the mutual fund market and the loss of social welfare that it entails, there is room for public intervention, from the demand and/or supply side of the market, in order to foster competition.

Finally, it is worthy to notice that the empirical evidence shown in this paper may be also applied to other European countries as they share with

the Spanish market the level of concentration and structure in the mutual fund industry.

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