Heterogeneous demand and market segmentation: the Argentine pension funds system

Ignacio Apella

The purpose of this article is to assess and formalize the capacity of retirement and pension fund management companies (AFJPs) to segment the market by the income level of demand during 1995 and 2001. By taking a profit maximization model whose specifications include a non-linear price and a level of demand that is heterogeneous in terms of income level, and by then corroborating this empirically, we confirm the hypothesis that the market was segmented by the management companies and we identify two groups of firms. The first comprised companies that established a high fixed commission and a low variable one with a view to capturing high-income affiliates, while the second group consisted of firms that used the opposite pricing policy to attract low- and medium-income affiliates. The effect was to reduce direct competition between the two groups of firms.

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I

Introduction

In July 1994, the Integrated Pensions System (Sistema Integrado de Jubilaciones y Pensiones (SIJP)) came into operation in Argentina. It consisted of two regimes: the old public regime, based on a pay-as-you-go system managed by the National Social Security Administration (ANSES), and a new regime based on individual capitalization and managed by private-sector companies: the retirement and pension fund management companies (AFJPs), supervised and regulated by the Superintendency of Retirement and Pension Fund Management Companies (SAFJP). By December 2002, some 80% of potential contributors had opted to switch to the private-sector regime.

The main objective of the SIJP is to cover the contingencies of old age, disability and death. In pursuit of this common objective, the function of the private-sector capitalization system is to provide the working active population with mechanisms for choosing between fund management companies. In addition, each AFJP manages its affiliates' contributions and receives payment in return. Until December 2001 this payment (commission) consisted of a set fee in pesos plus a variable component proportional to the affiliate's taxable income; in that month, however, the set fee was abolished.

The legislation under which the new system was established places certain constraints on private-sector service providers. The organizations owning the capital of AFJPs in Argentina fall into four broad categories: public-sector banks, foreign-owned companies (banks and enterprises), insurance companies, and companies created by trade unions. To trade actively, AFJPs have to have initial capital of at least 3 million pesos and maintain a reserve investment equivalent to 1.5 million pesos or 1% of the total pension funds under their management.

Potential system demand encompasses everyone over the age of 18, whether employees or self-employed. The rules require workers to choose between the two systems available, the pay-as-you-go system or the private-sector capitalization system, automatically transferring to the latter anyone who fails to state a preference. Those choosing the pay-as-you-go regime are entitled to change their minds and join the private individual capitalization regime. However, those opting for individual capitalization have not had an equivalent right, although they are entitled to switch AFJP.

In all cases, once the choice has been stated, membership is compulsory and the affiliate has to pay in a monthly amount calculated as a percentage of his or her regular monthly salary.

The concern for both regulators and researchers in this type of market is to understand the competition mechanisms operating there and develop incentive structures to minimize market failures. The ultimate aim is to reconcile social interests (the generation of savings and the provision of funds for retirees and pensioners) with the objectives of the firms supplying the sector. For this, it is necessary to identify the factors that determine pricing in the market, the behaviour of companies, and the strategic interaction among them and between them and the supervisor.

In particular, the objective of this study is to ascertain the degree, trend and causes of market concentration. Another aim is to gauge the ability of companies to segment the market by the characteristics of demand in order to reduce competition between them. To this end, section II discusses the theoretical framework of analysis, Section III looks at the size of the market and the concentration ratio, Section IV develops a model for maximizing a firm's profits through price selection in a market with heterogeneous demand, Section V presents the empirical results and section VI, lastly, sets out the main conclusions reached.

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II

The theoretical framework

Oligopolistic markets are characterized by the presence of a small number of interdependent firms. Companies have to be alert for both aggressive moves and defensive responses by their rivals. In this environment, the partial equilibrium solution can take two forms, one of collusion, with the participants reaching explicit or implicit agreement on pricing and/or quantities, and one of non-collusion, in which firms lack significant information on their rivals' behaviour and reactions and act competitively, employing a dominant strategy (pricing or quantities) that leads towards a Nash equilibrium in each of the subgames.

Companies participating in a highly concentrated industry have incentives to set prices higher than their marginal cost of production, with a view to appropriating profits that are greater than they would be in a situation of perfect competition. The relationship between the concentration ratio and company behaviour is not one-way, however. Given the underlying market conditions and a particular concentration ratio, companies act strategically and their decisions affect the structure of the market.

Pricing policies and strategies may prove to be the main tool available to a company in its efforts to expand, weather a crisis or even survive. Again, each company's pricing power, and the desirability of using it, will depend on the degree of competition, the characteristics of the goods and services it provides, the ability of consumers to keep abreast of the immediately available alternatives, and the cost structure.

If companies are dealing with consumers who have differing characteristics in terms of tastes, income level, willingness to pay, location, etc., they will have incentives to behave in different ways that reflect these characteristics. For example, if companies see that there are two groups of consumers who differ in their willingness to pay, they might set differentiated prices, charging more for consumption carried out by those individuals who have greater spending power.

In situations where consumers can be differentiated by income level and/or willingness to pay, setting non-linear prices[1] can be a tool for price discrimination between them. Firms operating in a highly concentrated market, with groups of consumers differentiated by income level, might find alternative mechanisms to allow them to stay in the market and achieve extraordinary profits. These mechanisms might include the use of price discrimination to segment markets by the characteristics of demand, and product differentiation of both a vertical and a horizontal nature. Thus, diversity (in both the product and the type of consumer) weakens competition and is a major factor in the creation of non-competitive trading environments.

The ability of firms to segment the market or differentiate their product depends on the degree of dispersion in the characteristics of demand. According to Shaked and Sutton (1987), the more dispersed consumer incomes or tastes are, the greater the scope for competing firms to identify market niches and specialize. When demand is more homogeneous, on the other hand, preferences and the ability to pay vary less, so the supply becomes relatively standardized.

In markets with strong oligopolistic characteristics, therefore, participating firms could differentiate the demand bracket they supply in order to head off commercial or price wars.

[1] A non-linear price is the sum of a fixed price (independent of the amount consumed) and a variable price proportional to the amount consumed.

III

Market size and concentration

When studying the structure of a market and the competitive strategies of the companies involved in it, the first requirement is to define the market concerned. There are two stages to this. The first is to identify the market for the product, encompassing the different goods or services that compete or could compete with one another, and to establish where substitution might take place. The second concerns the geographical aspect, since the geographical scale of the market will determine the strategies of the companies operating there.

What AFJPs do is to manage a pension fund by creating a portfolio of assets. To this end, they receive a sum of money from their affiliates during their working years. The main objective of the management companies is to maximize the return on these funds by constructing a portfolio of different assets, which may include bonds issued by the country's government, negotiable instruments, term deposits, the shares of privatized enterprises and limited-liability companies, common investment funds, etc. At retirement, the worker will receive a monthly income from the individual fund built up plus the returns obtained by investing these savings.

Geographically, the relevant market will be considered to consist of the entire territory of the country, since most AFJPs compete nationally, the exceptions being a handful that operate in particular provinces.[2]

Table 1 shows the number of affiliates and contributors for each firm as of December 1995 and March 2004, and the percentage change between the two periods. Companies are ranked by the fifth column (percentage change in the number of affiliates). The information shown reveals an increase of 119% in the total number of affiliates between 1995 and 2004, while the number of contributors increased by only 54%. The large rise in the number of affiliates is due to the transfer of workers from the old public-sector system.

Because the two variables did not grow at the same rate over the period studied, the contributor/affiliate ratio fell. This ratio can be treated as an indicator of operational sustainability in that, while a firm only receives income from those paying in, it has to incur costs for all its affiliates, so that a better contributor/affiliate ratio will mean better performance in relation to its peers.[3]

Figure 1 presents quarterly changes in this ratio for the system as a whole. The number of affiliates grew by more than the number of contributors. In March 2004, 3.6 million affiliates actually paid their contributions, giving a contributor/affiliate ratio of 37%. The gap can be put down to both personal reasons (evasion by affiliates) and the nature of the labour market (informal working): contributors stop paying into the system once they cease to be active or formal workers.

It is possible, however, to identify two periods in which the trend of the contributor/affiliate ratio altered marginally. The first shift was in March 1999, when the ratio fell. This was associated, however, with information processing problems at the SAFJP. The second shift can be identified in December 2001, when the Argentine economy abandoned its currency's fixed parity against the dollar in the midst of an economic, political and social crisis.

Following the introduction of the new system in July 1994, 26 AFJPs were authorized to start operations. This number then fell substantially, however: 17 firm were operating in the market in December 1997 and just 12 remained in the system by December 2002.

The reduction in the number of management companies does not necessarily mean greater concentration in the market; rather, it points to changes in each firm's participation in the industry. To give an idea of the degree of concentration in the industry, figure 2 presents the index of concentration to the fourth firm[4] for the "affiliates" and "contributors" variables.

[2] This is the case with Unidos, which basically operates in the province of Córdoba, and Met, which chose to concentrate on major urban areas, chiefly the City of Buenos Aires, when it entered the market.

[3] Although AFJPs provide significantly fewer services to non-contributors than to contributors, the former are included in these companies' cost function.

[4] The indicator to the fourth firm is produced by taking the four firms with the most affiliates at a given point in time. An alternative indicator of concentration is the Herfindahl-Hirschman index, which fulfils the axioms referred to. This indicator yields similar results, in terms of both levels and tendency, to those obtained by calculating the ratio of concentration to the fourth firm. This suggests that there is no bias in the choice of $N = 4$, while revealing the significant weight of the top four firms in the structure of the market.

TABLE 1

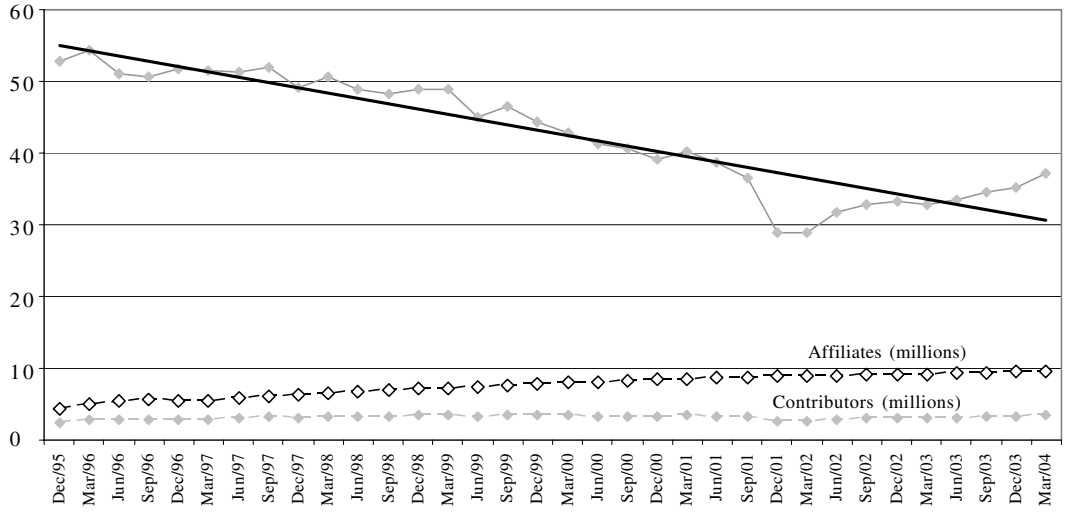
Argentina: Number of affiliates and contributors and percentage change

AFJP	Affiliates Dec. 1995	Contributors Dec. 1995	Affiliates Mar. 2004	Contributors Mar. 2004	Change affiliates %	Change contributors %
Profesión	16 978	10 090	212 321	73 318	1 151	627
Unidos	18 919	13 390	208 787	73 485	1 004	449
Arauca Bit	82 050	42 684	673 350	300 062	721	603
Orígenes	501 922	247 871	2 323 659	820 287	363	231
Prorenta	98 912	46 461	437 739	134 010	343	188
Futura	43 368	33 563	162 160	47 279	274	41
Previsol	130 605	68 008	322 545	105 178	147	55
Consolidar	651 750	352 484	1 520 665	602 703	133	71
Siembra	593 709	302 949	1 342 857	491 305	126	62
Máxima	620 516	310 350	1 335 087	487 457	115	57
Nación	471 755	215 885	828 319	316 351	76	47
Activa	131 975	61 702	0	0	–100	–100
Afianzar	21 516	10 209	0	0	–100	–100
Activa–Anticipar	141 125	63 936	0	0	–100	–100
Banat	462	0	0	0	–100	0
Claridad	257 381	114 862	0	0	–100	–100
Ethika	2 048	1 117	0	0	–100	–100
Ethika–Jacarandá	60 594	23 105	0	0	–100	–100
Fecunda	146 519	67 174	0	0	–100	–100
Generar	36 450	22 745	0	0	–100	–100
Más Vida	66 649	16 103	0	0	–100	–100
Patrimonio	127 117	56 390	0	0	–100	–100
Previnter	370 022	199 552	0	0	–100	–100
San José	27 462	15 284	0	0	–100	–100
Savia	46 688	11 562	0	0	–100	–100
Met		0	211 435	106 240		
Total affiliates	*4 371 876*	*2 307 476*	*9 578 924*	*3 557 675*	*119*	*54*

Source: Superintendency of Retirement and Pension Fund Management Companies (SAFJP).

FIGURE 1

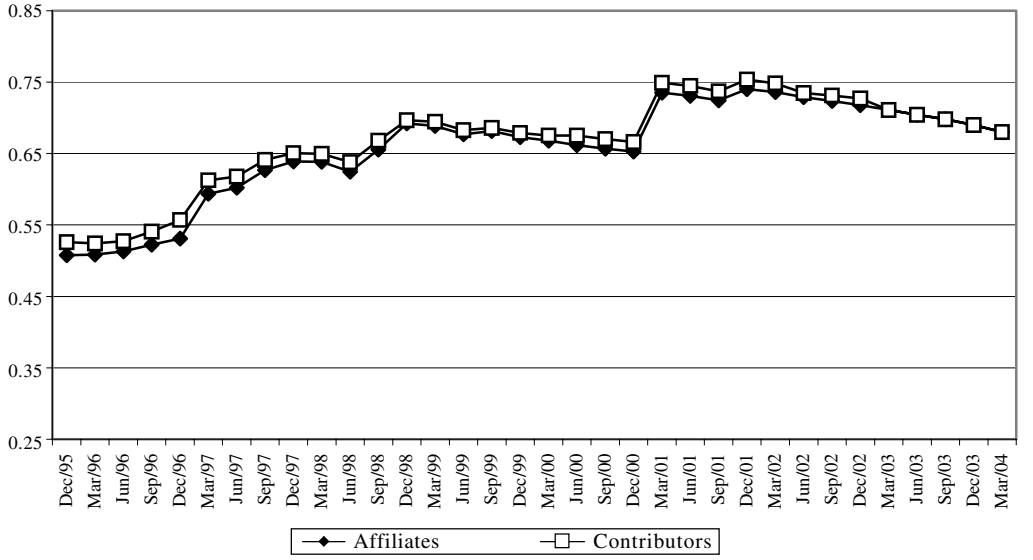
Argentina: System-wide contributor/affiliate ratio, December 1995 to March 2004



Source: Prepared by the author using data from the Superintendency of Retirement and Pension Fund Management Companies (SAFJP).

FIGURE 2

Argentina: Index of concentration to the fourth firm, December 1995 to March 2004



Source: Prepared by the author using data from the Superintendency of Retirement and Pension Fund Management Companies (SAFJP).

This indicator of concentration was constructed for the two key market variables: the number of affiliates and the number of contributors. It was chosen because: (i) the data needed to construct it were accessible; (ii) the result was independent of the size of the industry; (iii) the result was influenced by mergers and takeovers in the market; and (iv) the entry or exit of one firm of significant size had a negative or positive effect on the concentration index (Curry and George, 1983).

The results obtained reveal that the AFJP market has gone through a significant process of concentration. As a result, the top four firms have come to dominate its development. Thus, the index of concentration to the fourth firm for affiliates and contributors increased by 26% and 28%, respectively, between 1995 and March 2004. The rise was not even, however, throughout the period studied. During the market's first four years of existence, the degree of concentration increased gradually as a consequence of mergers and acquisitions plus the effects of the mechanism used to allocate "undecideds".

The subsequent decline in concentration, which took place between September 1998 and December 2000, was linked to the change in the system for distributing "undecideds" and a drop in the number of takeovers. Up to June 1998, the contributions of people who were obliged as employees to pay into a pension fund but had not chosen their system or AFJP were distributed in proportion to the market shares of the different management companies. From that month onward, these contributions began to be allocated by lot among all the companies. This is indicative of how important the regulator is in the structure of the market, as it is able to generate a kind of "derived demand".

The trend began to change again in 2001, however, when Orígenes took over the whole of the Previnter customer portfolio. This operation was highly significant, as the firm acquired had a large share of the market (8%), while Orígenes had 19%.

Another major shift was caused by the entry of Met into the market in March 2001. The importance of this event is that it shows that any barrier to entry erected in the face of a credible "threat" of potential new entrants can be overcome.

The way the contributions of "undecideds" were distributed between firms changed again in December 2001, when they began to be shared out between the two firms with the lowest prices. This did not have a significant effect on market concentration.

Table 2 lists takeovers and new entries by company and date. The AFJP market in Argentina has gone through a significant process of concentration, in which the top four firms have taken 72% of the market. This can be put down both to the number of mergers and acquisitions in the industry and to the rules adopted for choosing management firms for

TABLE 2

Argentina: Takeovers and new entrants in the market

AFJP acquiring	AFJP acquired	Merger date
Siembra	Dignitas	31-05-95
Anticipar[a]	Activa	29-12-95
Activa-Anticipar	Savia	29-12-95
Profesión[b]	Auge	01-07-96
Jacarandá[c]	Ethika	01-08-96
Orígenes	Activa-Anticipar	01-01-97
Máxima	Patrimonio	01-07-97
Orígenes	Más Vida	01-09-97
Consolidar	Fecunda	10-06-98
Orígenes	Claridad	01-09-98
Prorenta	Afianzar	01-12-98
Siembra	Ethika-Jacarandá	01-07-99
Prorenta	San José	01-10-99
Orígenes	Previnter	01-01-01
Met		21-03-01
Siembra	Generar	01-10-01

Source: Superintendency of Retirement and Pension Fund Management Companies (SAFJP).

[a] The merged firm was named Activa-Anticipar.

[b] The merged firm was named Profesión+Auge.

[c] The merged firm was named Ethika-Jacarandá, changing to Ethika on 25/6/97.

"undecideds". The entry of Met in March 2001, however, raised the potential threat of new competitors.

It is often observed that as concentration in an industry increases, the profits of the companies operating there steadily rise. Again, underlying market conditions, such as size, the income distribution of potential customers or the regulatory framework in place, influence the structure of supply and the strategies which companies follow. In this respect, the main thrust of debate has followed a deterministic approach whereby this positive relationship between concentration and profits is explained through the "structure-conduct-performance" paradigm (Scherer and Ross, 1990). A highly concentrated structure gives participants greater pricing power in the market, leading to monopolistic solutions.

However, the new theory of industrial organization (Bresnahan, 1989, among others) argues that this deterministic relationship is debatable, since a high concentration ratio does not necessarily result from the use of firms' market power, but could arise as a consequence of economic efficiency-seeking. This efficiency hypothesis states that the advantage achieved by firms operating in more concentrated markets derives from their ability to operate at lower costs. These, in turn, are the outcome of market strategies built upon a broad range of options (price, differentiation, targeting) which reformulate the original structure.

The following section will look at the behaviour of a firm at the point where it establishes the price that maximizes its profits, taking into account the potential heterogeneity of demand.

IV

The model

This section will develop a profit maximization model for firms participating in the Argentine AFJP market, whereby companies set prices in accordance with the characteristics of demand, given the degree of product differentiation they have previously decided upon. According to Tirole (1990), prices can adjust more quickly than product characteristics. With a view to formalizing this idea, it will be assumed that companies consider these characteristics when setting their prices.

Suppose there are N firms offering a single good or service j. Each product has characteristics of its own denoted by V_j and H_j. The vector V_j represents the special characteristics of a vertical product differentiation strategy, essentially the quality of the product supplied and the advertising effort made. The vector H_j, meanwhile, represents characteristics of the good that relate to a horizontal product differentiation strategy.

Firms also use a two-part structure to set non-linear prices,[5] namely a fixed commission in pesos and a variable commission proportional to the consumer's taxable income, of the type:

$$p_j = p_{fj} + p_{vj} \cdot y_i \qquad (1)$$

where p_{fj} represents the fixed commission in pesos, p_{vj} is the variable commission (which can range from zero to one) and y_i is the taxable income of the consumer i.

[5] Two-part pricing was used from the start of the capitalization system until December 2001.

The price signals sent out by management companies to the market can be viewed from two different perspectives: as a percentage of the affiliate's taxable income or as the total amount payable in pesos. From the first of these perspectives, the existence of a fixed commission means that the price decreases as the taxable base income rises, while from the second, the existence of a variable commission means that the final price rises with income.

Let us also take two groups of consumers differentiated by their taxable income levels: one group with a high income level defined as y_A and a second group with a medium or low income denoted by y_B. Each group of consumers has a different (fixed- and variable-) price elasticity of demand.

Given the establishment of a non-linear two-part price, therefore, firms can opt, in accordance with their target function, to set whichever combination of fixed and variable prices is most likely to capture the largest number of affiliates from one of the groups.

Given the difference in elasticities between consumers, firms have two pricing strategies open to them: charging a fixed commission that is higher than the market average and a variable commission that is below the average or, conversely, charging a fixed commission that is lower than the system average but a variable commission that is higher. The decision will depend on the type of potential affiliates the management company wishes to attract to maximize its profits.

It is understood that the service offered by management companies is a normal good whose price elasticity of demand is negative for both the fixed and the variable price. It is also established that high-income consumers would prefer a price composed of a high fixed commission and a low variable commission, since this adds up to a smaller proportion of their income. Medium- and low-income consumers, for their part, would prefer the opposite pricing structure, as this represents a smaller proportion of their income.

It is therefore assumed that the variable-price elasticity of the demand from high-income affiliates is higher than the variable-price elasticity of the demand from medium- and low-income consumers, while the opposite holds for the fixed component of the price. Accordingly, it is established that:

$$\frac{\partial s_{jA}}{\partial p_{fj}}.\frac{p_{fj}}{s_{jA}} < \frac{\partial s_{jB}}{\partial p_{fj}}.\frac{p_{fj}}{s_{jB}} \quad \text{and} \quad \frac{\partial s_{jA}}{\partial p_{vj}}.\frac{p_{vj}}{s_{jA}} > \frac{\partial s_{jB}}{\partial p_{vj}}.\frac{p_{vj}}{s_{jB}} \quad (2)$$

where S_{jA} and S_{jB} are the shares of firm j in the high-income consumer market and the medium/low-income consumer market, respectively.

Given this, and assuming that marginal costs are equal and constant (and thus equal to average costs),[6] the profit of firm j is given by:

$$p_j = p_j \cdot q_j - c_j \cdot q_j \quad (3)$$

where:
p_j is the profit of firm j
p_j is the price of firm j
q_j is the quantity sold by firm j
c_j is the marginal cost of firm j.

The firm's profit is given by the difference between its revenues and costs. The revenue of an AFJP is the product of the non-linear two-part price it sets and the number of affiliates (actually contributors) whose pension funds it manages:

$$I_j = (p_{fj} + p_{vj} \cdot y_i) \cdot M \cdot s_j \cdot (1-m_j) \quad (4)$$

where:
M is the size of the whole market (total affiliates)
y_i is the average taxable income of affiliates of type i
s_j is the market share accounted for by affiliates of firm j
m_j is the evasion rate of firm j affiliates.

Firms' revenue depends not only on the number of affiliates but also on these individuals' income level and evasion rate. This evasion rate is the percentage of affiliates failing to pay their compulsory contributions. Thus, the expression $(1-m_j)$ is the contributor/affiliate ratio examined in the previous section. A high average income level among affiliates and a low evasion rate would imply high revenues, and vice versa.

Considering that the total costs of firm j are the product of the firm's average cost and total membership, the profit function for the firm is given by:

$$p_j = (p_{fj} + p_{vj} \cdot y_i) \cdot M \cdot s_j \cdot (1-m_j) - c_j \cdot M \cdot s_j \quad (5)$$

The exercise of selecting profit-maximizing prices yields the following combinations of fixed and variable prices:

$$p_{fj}\left[1+\frac{1}{h_{fj}}\right] = \frac{c_j}{1-m_j} - p_{vj}y_{ij} \quad (6)$$

$$p_{vj}\left[1+\frac{1}{h_{vj}}\right] = \frac{c_j}{(1-m_j)y_{ij}} - \frac{p_{fj}}{y_{ij}} \quad (7)$$

[6] This is far from being the case, but the assumption will serve for present purposes.

Expressions (6) and (7) give the combination of fixed and variable prices, these being equal to the difference between the marginal cost and the revenues from the other type of price, plus a profit margin which depends negatively on the price elasticity of demand. The expressions given above show what the price combinations will be depending on the customer base the firm is seeking to attract.

Beginning with the expression arrived at for the fixed price, it should be noted that this depends negatively on the variable price (the one that is proportional to income). The smaller the difference between the variable price and the marginal cost, the lower the fixed price.

Setting out from this, we assume that there are two types of management companies, firm *j* and firm *r* (for the sake of analytical simplicity, both have the same contributor/affiliate ratio).[7] The first of these firms seeks to capture high-income demand, while company *r* sets out to meet low-income demand. Given this, the fixed-price functions of each of the firms are:

$$p_{fj}\left[1+\frac{1}{\eta_{fj}}\right]=\frac{c_i}{(1-\mu_j)}-p_{vj}.y_A \;>$$

$$p_{fr}\left[1+\frac{1}{\eta_{fr}}\right]=\frac{c_r}{(1-\mu_r)}-p_{vr}.y_B$$

The fixed price established by company *j* is higher than the fixed price established by firm *r*, since the fixed-price elasticity of low-income demand is higher than the fixed-price elasticity of high-income demand.

Again, the variable price depends negatively on the level of the fixed price set. It might be suggested at this point that firm *j* will set a variable price lower than the one established by firm *r*. Both prices are given by:

$$p_{vj}\left[1+\frac{1}{\eta_{vj}}\right]=\frac{c_j}{(1-\mu_j).y_A}-\frac{p_{fj}}{y_A} <$$

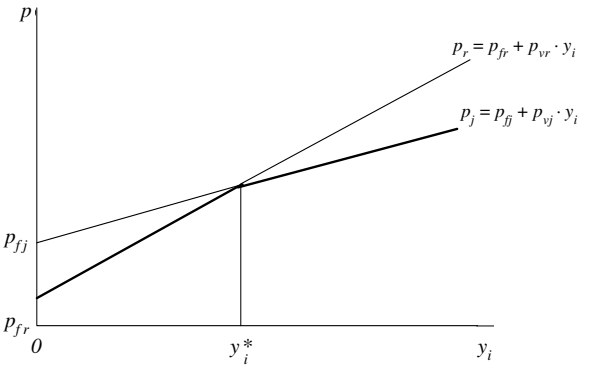
$$p_{vr}\left[1+\frac{1}{\eta_{vr}}\right]=\frac{c_r}{(1-\mu_r).y_B}-\frac{p_{fr}}{y_B}$$

Given that the variable-price elasticity of high-income demand is higher than the variable-price elasticity of medium- and low-income demand, the variable price set by firm *j* is lower than the one set by firm *r*. In other words, the freedom to set prices, both fixed and variable, is limited by the sensitivity of target demand to these prices.

With these two possible combinations of (fixed and variable) prices, the total price offered by the firm to the market in relation to the incomes of consumers will be as shown in figure 3.

FIGURE 3

Argentina: Prices charged at different affiliate income levels, by company demand strategy



Source: Prepared by the author.

In cases where taxable income is lower than y_i^*, the final price charged by firms setting out to meet high-income demand is significantly higher than the price charged by firms aiming at medium- and low-income customers. The opposite is true for the body of demand represented by people with incomes higher than y_i^*.

These differences in behaviour arise in pursuit of the main objective, the effort to maximize profits, for which the two groups of firms find alternative routes. The first set of companies does this by capturing high-income affiliates irrespective of market share, while the second set pursues the objective by trying to sign up as many affiliates as possible, most of them with medium or low incomes. The competition between the two groups of management companies is eased because they are targeting different segments of demand, although this is not true of competition between firms belonging to the same group.

[7] This assumption is made for analytical purposes only. In practice, differences are observed between groups of firms, the standard deviation from the average for this indicator (0.35) being 0.06. Pursuant to the discussion in section III, heterogeneity in this indicator allows financial differences to be identified between firms, since while AFJPs receive revenue only from contributors, they incur costs for their entire customer portfolio.

V

The empirical evidence

The price signals sent to the market by each of the management companies are the "commissions" they charge their affiliates. From the start of the system until November 2001, the price charged by each firm had a two-part structure: a fixed price in pesos and a variable commission calculated as a percentage of taxable income. Under this pricing scheme, average commission in the system fell as taxable income rose.

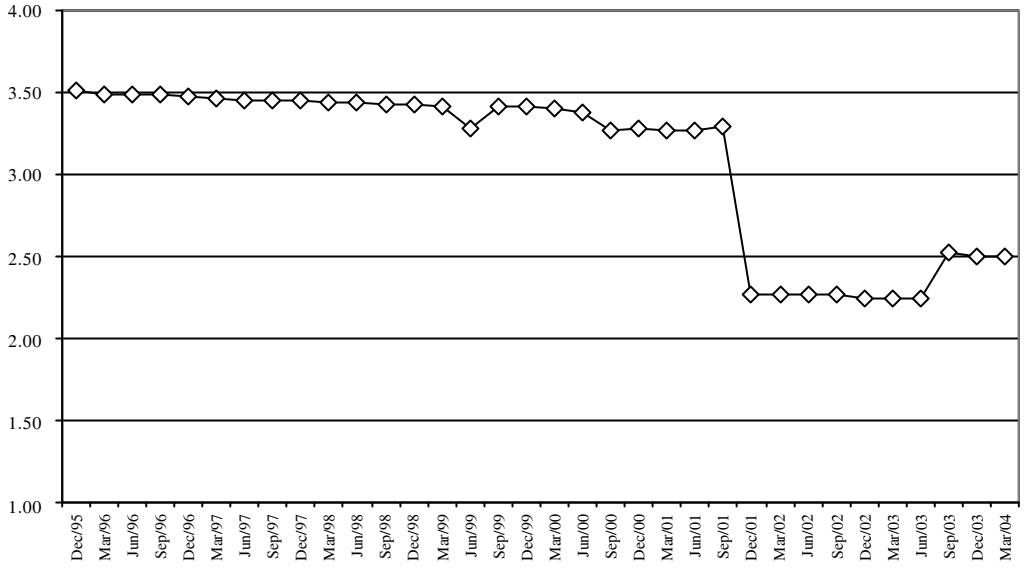
Figure 4 shows the evolution of effective average commissions as a percentage of taxable income in the system. It can be seen that the effective average commission for the system as a whole held steady over time until December 2001, when the average market price fell sharply to 2.24% of taxable income.

This fall occurred because of a reduction in the cost of disability and life insurance due to the reserves built up by management companies in 2001. Decree No. 1495/01, which abolished fixed commissions on the grounds that their effect on medium- and low-income consumers was regressive, also came into effect that month.

From the start of the system to December 2001, firms can be divided into two groups by structure and commission level. The first group consists of companies that charged a high fixed peso commission (compared to the system average) but with a low variable component. The second group, conversely, had a low fixed commission but a high variable component. Table 3 shows the dispersion of each company's fixed commission in relation to the system average in the period 1995-2001; the ranking is in descending order by the first column. This table reveals a large dispersion in the fixed price charged by firms, and the groups referred to above can be identified accordingly. In 1995, Generar, Arauca Bit, Claridad and Savia had a fixed commission of 5 pesos, which was 159% above the system average. On the other side, there is a second group of firms with a negative dispersion of some 100%. These management companies, which included Consolidar, Futura, Prorenta, San José, Más Vida and Ethika, either charged no fixed price or had a fixed commission some 55% lower than the average.

FIGURE 4

Argentina: Effective average commission, December 1995 to March 2004
(Percentages)



Source: Superintendency of Retirement and Pension Fund Management Companies (SAFJP).

TABLE 3

Argentina: Percentage dispersion of fixed commission around system average, by firm, 1995-2001

AFJP\Year	31/12/1995	31/12/1996	31/12/1997	31/12/1998	31/12/1999	31/12/2000	30/09/2001
Generar	158.62	290.70	204.76	208.88	237.12	147.03	176.23
Arauca Bit	158.62	144.19	242.86	247.49	279.25	177.91	210.76
Claridad	158.62	144.19	90.48				
Savia	158.62						
Siembra	55.17	46.51	14.29	15.83	26.42	-7.36	3.59
Origenes	29.31	22.09	-4.76	-3.47	5.35	-22.80	-13.68
Unidos	29.31	22.09	-4.76	-3.47	5.35	-22.80	-100.00
Patrimonio	16.38	9.88					
Ethika-Jacarandá	3.45	-2.33	204.76	208.88			
Afianzar	3.45	-2.33	-23.81				
Previsol	3.45	-2.33	-23.81	-22.78	-15.72	-22.80	-13.68
Profesión	3.45	-2.33	-100.00	-100.00	-100.00	-100.00	-100.00
Previnter	0.86	-4.77	-25.71	-24.71	-17.83	-39.79	
Máxima	-1.72	-7.21	-27.62	-26.64	-19.94	-24.35	-15.41
Activa-Anticipar	-22.41	-26.74					
Fecunda	-27.59	-31.63	-46.67				
Activa	-53.45	-100.00					
Nación	-74.14	-100.00	-100.00	-100.00	-100.00	-100.00	-100.00
Consolidar	-100.00	-100.00	-100.00	-100.00	-100.00	-22.80	-13.68
Futura	-100.00	-100.00	-100.00	-100.00	-100.00	60.57	79.55
Prorrenta	-100.00	-100.00	-100.00	-100.00	-100.00	-22.80	-13.68
San José	-100.00	-100.00	-100.00	-100.00			
Mas Vida	-100.00	-100.00					
Ethika	-100.00						
Met							-100.00
System average	*1.93*	*2.05*	*2.63*	*2.59*	*2.37*	*3.24*	*2.90*

Source: Prepared by the author using data from the Superintendency of Retirement and Pension Fund Management Companies (SAFJP).

By September 2001, after a series of mergers and acquisitions, just two firms, Arauca Bit and Generar, remained well above the average, charging fixed commissions that were 200% higher than the system norm. The other companies were still operating, although their market shares had altered as a consequence of the pricing policy changes made by some of them.[8] Similarly, table 4 presents the percentage dispersion of the variable prices set by the firms for the period studied. The ranking is by descending order for the first column. There is a symmetry with table 3: firms whose fixed commission showed a dispersion of more than 100% in relation to the system average had low variable commissions, with a negative dispersion of more than 16% on average. These firms were Generar, Arauca Bit, Savia and Claridad. The dispersion of the remaining firms ranged from a low of -7.29% to a high of 8.2%.

In 2002, the difference between firms was greater. At one extreme were Arauca Bit and Met, whose variable commission had a dispersion of -21% and -13%, respectively, while the other AFJPs had a dispersion of between -1.60% (Nación) and 6.45% (Unidos). In March 2004, again, dispersion ranged from -17.75% to 16.35%.

Figures 5 and 6 present the different peso prices charged by each firm to affiliates by income level in 1999 and 2001. These charts are the real-life version of the situation depicted in figure 3.

The division of firms into two categories by pricing structure is confirmed here. Generar and Arauca Bit had a high fixed commission structure (8.5 pesos on average) and low variable commission (2.1% of taxable income), while the other firms (excluding Met, which began trading in 2001) had the opposite system.[9]

[8] For example, Consolidar, which had not previously had a fixed commission, began to charge one in the third quarter of 2000.

[9] Generar was taken over by Siembra in 2002, so that Arauca Bit and Met were left to represent the first group. The latter, however, did not charge a fixed commission when it began trading, even though its variable commission was always below the system average.

TABLE 4

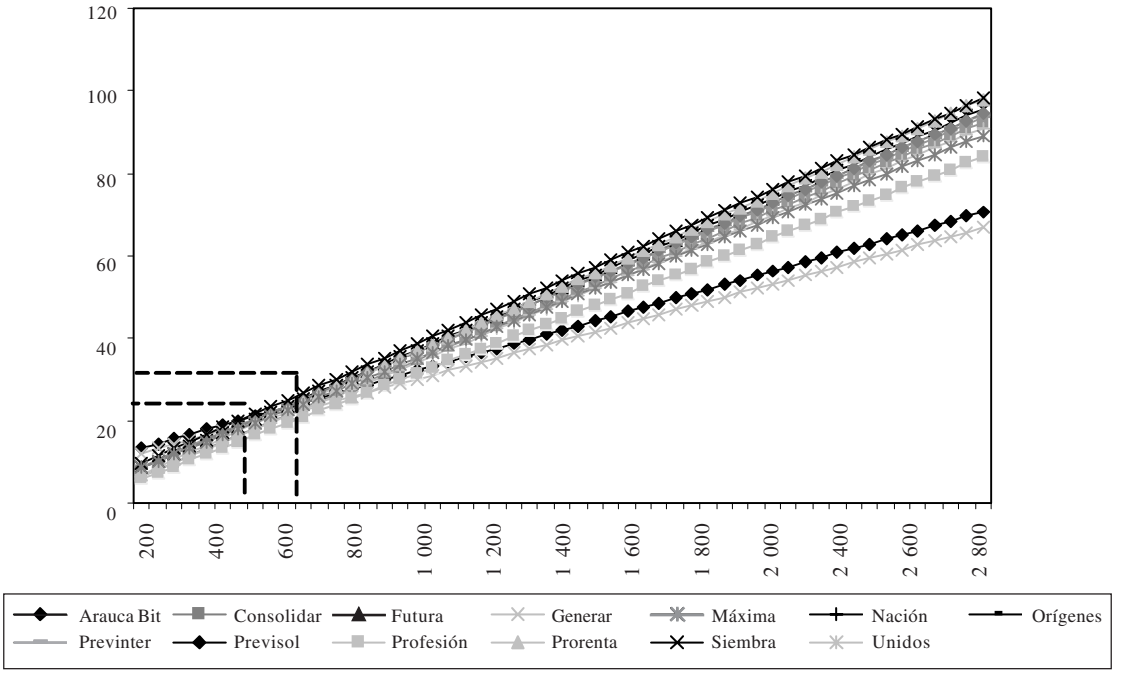
Argentina: Percentage dispersion of variable commission around system average, by firm, 1995-2004

AFJP\Year	31/12/1995	31/12/1996	31/12/1997	31/12/1998	31/12/1999	31/12/2000	31/12/2001	31/12/2002	31/12/2003	31/03/2004
Generar	-19.65	-27.48	-25.54	-31.30	-31.84	-30.41				
Arauca Bit	-16.56	-14.86	-28.78	-28.03	-28.59	-27.10	-21.28	-20.95	-17.75	-17.75
Savia	-11.61									
Claridad	-8.83	-6.98	-4.50							
Futura	-7.29	-5.41	-2.88	-1.85	-2.62	-2.24	5.11	4.95	10.33	10.33
Unidos	-4.20	-2.25	0.36	1.42	0.62	2.73	6.45	6.29	14.34	14.34
Ethika-Jacarandá	-1.11	-11.71	-22.30	-21.48						
Más Vida	0.44	2.48								
Orígenes	0.44	2.48	5.22	6.32	5.49	7.70	5.11	4.95	4.31	4.31
Consolidar	1.98	4.05	6.83	7.96	7.12	7.70	3.76	3.61	3.91	3.91
Ethika	1.98									
Previnter	1.98	4.05	6.83	7.96	7.12	9.36				
Previsol	1.98	4.05	6.83	7.96	7.12	7.70	2.42	2.27	1.50	1.50
Profesión	1.98	4.05	3.60	-1.85	-2.62	-0.59	5.11	1.82	-13.74	-13.74
Activa-Anticipar	3.53	5.63								
Afianzar	3.53	-2.25	0.36							
Máxima	3.53	5.63	8.45	9.60	8.74	7.04	2.42	2.27	4.31	4.31
Patrimonio	5.07	7.21								
San José	5.07	7.21	10.07	11.23						
Siembra	5.07	7.21	10.07	11.23	10.36	7.70	2.87	2.72	16.35	16.35
Activa	8.16									
Fecunda	8.16	4.05	6.83							
Nación	8.16	2.48	5.22	6.32	5.49	-0.59	-1.60	-1.75	-5.72	-5.72
Prorrenta	8.16	10.36	13.31	14.50	13.61	11.01	2.42	6.74	-4.11	-4.11
Met							-12.78	-12.91	-13.74	-13.74
System average	*3.24*	*3.17*	*3.09*	*3.06*	*3.08*	*3.02*	*2.24*	*2.24*	*2.49*	*2.49*

Source: Prepared by the author using data from the Superintendency of Retirement and Pension Fund Management Companies (SAFJP).

FIGURE 5

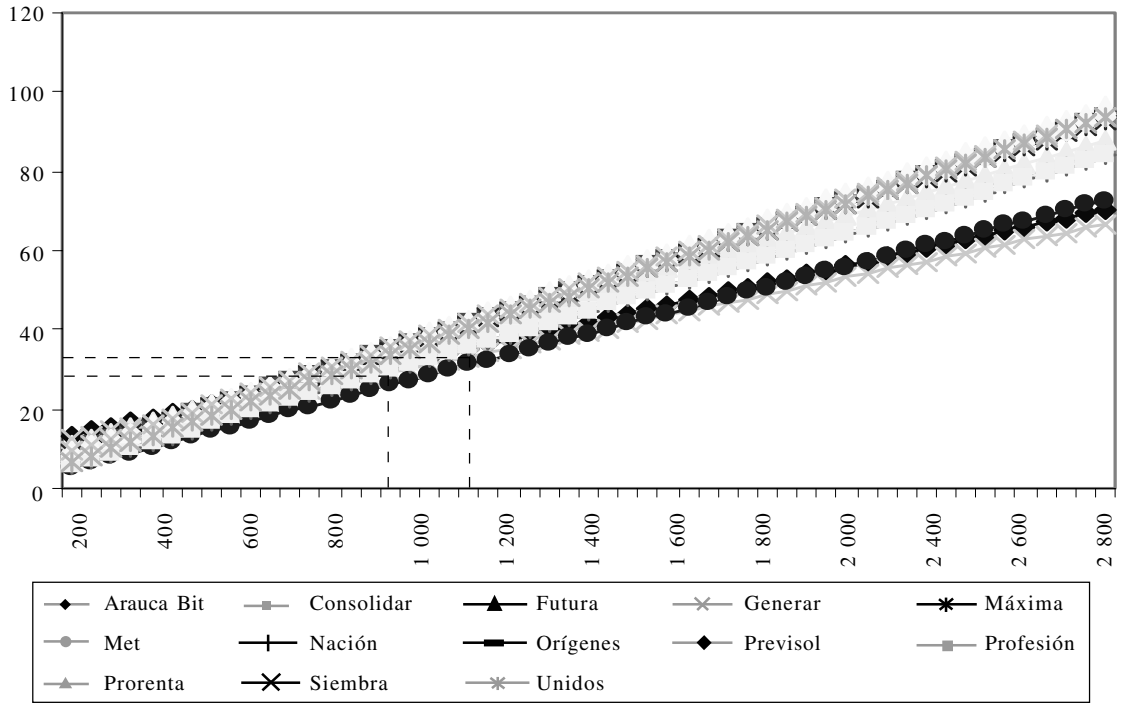
Argentina: Prices charged by firms up the income scale, pesos, 1999



Source: Prepared by the author using data from the Superintendency of Retirement and Pension Fund Management Companies (SAFJP).

FIGURE 6

Argentina: Prices charged by firms up the income scale, pesos, 2001



Source: Prepared by the author using data from the Superintendency of Retirement and Pension Fund Management Companies (SAFJP).

In 1999, marginal individuals were those with a taxable income of 1,200 pesos and 900 pesos, respectively, depending on whether Arauca Bit or Generar is considered. In 2001, the income values were 1,100 pesos and 900 pesos.

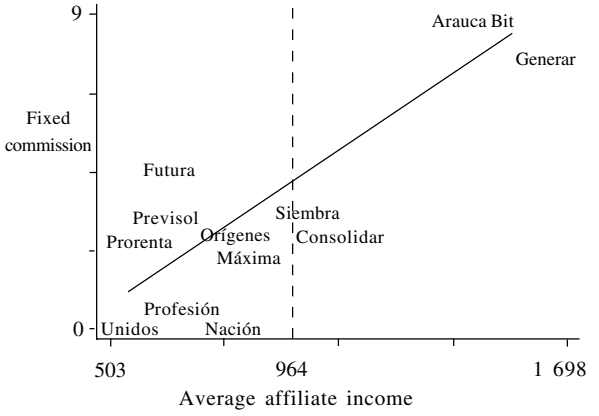
As a preliminary conclusion, two groups of firms can be identified on the basis of their pricing structures: on the one hand, firms that set a high fixed commission and a low variable commission, and on the other, firms with the opposite pricing strategy.

With a view to associating this differentiation in pricing combinations with a strategy of market segmentation by consumer income level, figure 7 shows the relationship between the average taxable income of affiliates and the fixed commission set by each AFJP for 2001.

Figure 7 excludes Met because it had a group of high-income affiliates (with an average salary of 2,391 pesos) but no fixed commission. The linear association between the two variables can be clearly observed, suggesting a positive relationship between fixed commission and affiliates' taxable income. Taking the whole of the period studied, the simple correlation index between the two variables is 0.60.

FIGURE 7

Argentina: Relationship between fixed commission and average affiliate income, 2001

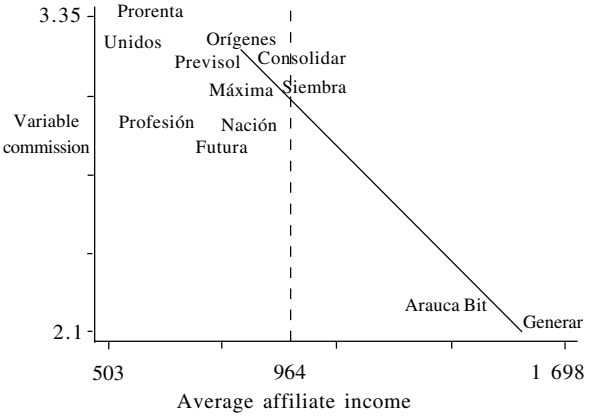


Source: Prepared by the author using data from the Superintendency of Retirement and Pension Fund Management Companies (SAFJP).

Similarly, figure 8 presents the relationship between average affiliate income and variable commission in 2001. There is once again a significant relationship, negative in this case, between variable

FIGURE 8

Argentina: Relationship between variable commission and average affiliate income, 2001



Source: Prepared by the author using data from the Superintendency of Retirement and Pension Fund Management Companies (SAFJP).

TABLE 5

Argentina: Estimated natural logarithms of average company revenue

Dependent variable: ln (average revenue)

Variable	Fixed effect	Random effect
ln (variable price)	-0.9144465[a]	-1.258644[a]
	(0.3063558)	(0.2462656)
ln (fixed price)	0.1174472[b]	0.0071327
	(0.0680741)	(0.0536171)
ln (average affiliate income)	0.1490118[a]	0.2384462[a]
	(0.0661792)	(0.0561991)
ln (contributors/affiliates)	1.200626[a]	1.20912[a]
	(0.0652126)	(0.0599254)
Constant	-0.8827486[c]	-1.025611[a]
	(0.5255145)	(0.474381)
No. of observations	269	269
R^2	0.8561	0.8761
F	141.67	
Prob > F	0.000	
Wald Chi^2		736.99
Prob > Ch^2		0.000

Source: Prepared by the author.

[a] Statistically significant at the 1% level.
[b] Statistically significant at the 5% level.
[c] Statistically significant at the 10% level.

commission levels and affiliate incomes. Like the previous one, this chart excludes Met, which, in addition to establishing a low variable commission, took two additional measures to draw in more high-income affiliates. The first was its decision not to charge a fixed commission, and the second was its use of a business model based on branches and salesmen that targeted this group of consumers.

Again, as the last two charts show, there was significant dispersion between AFJP groups in the average income of their affiliates (the system average was 964 pesos). The average income of Arauca Bit, Generar and Met affiliates was 1,833 pesos, while affiliates of all the other system participants had an average income of 703 pesos. Both strategies had one and the same objective: to maximize average revenues. The profit equation (5) shows that the average revenues of each management company depended on the pricing structure established by the firm, the average income of its affiliates and the contributor/affiliate ratio.

On the basis of quarterly panel data for the period between December 1995 and September 2001, the linear average revenue function was estimated in natural logarithms, using least squares with fixed and random effects. The explanatory variables defined are the fixed price, the variable commission, average consumer income for each firm and the contributor/affiliate ratio. Table 5 shows the results.

The estimate arrived at using a fixed-effects intragroup estimator model is the one that fits best with the Hausman test. Nonetheless, and in relation to the material analysed above, the explanatory variables of the model are partially correlated among themselves. This creates a problem of imperfect multicolinearity in the estimate, which means that the effect each of them has upon the dependent variable cannot be separated out. Given that this does not negate the significance of any of the coefficients estimated, however, and that the purpose of the present exercise is to ascertain the sign of these, the estimators are still the "best linear unbiased estimators" (BLUEs).

With a good explanation of total variance (0.85), the results obtained are as expected. Variable commissions have a negative effect on firms' average revenues, while fixed commissions have the opposite effect. Again, affiliate income levels and the contributor/affiliate ratio have a positive effect on the average revenues of management companies. In summary, firms with lower variable commissions and higher fixed commissions obtain the highest revenues per affiliate. The larger the proportion of high-income affiliates in their customer base, and the higher the ratio of actual contributors, the stronger this positive effect is.

This being so, a higher contributor/affiliate ratio should mean higher average revenues and a better

financial performance, giving firms a greater capacity not only to survive in the market, but also to price their services more competitively. And the firms with the highest contributor/affiliate ratio are those that concentrate their efforts on high-income demand: Arauca Bit, Generar and Met.

This can be put down to the greater contribution payment capacity of high-income consumers, as a result of various factors such as a continuous record of formal employment and a greater financial capacity to cope with negative income shocks.[10]

The results obtained bear out the hypothesis of a price discrimination policy operated by two groups of clearly identified companies with a view to segmenting the market by the income level of demand, and to maximizing average revenues.

One group of firms maximizes revenues by increasing total membership irrespective of affiliate income levels, so that average revenues are low, while a second set of firms maximizes its revenues by attracting high-wage affiliates who are very likely to maintain an uninterrupted record of monthly contributions.

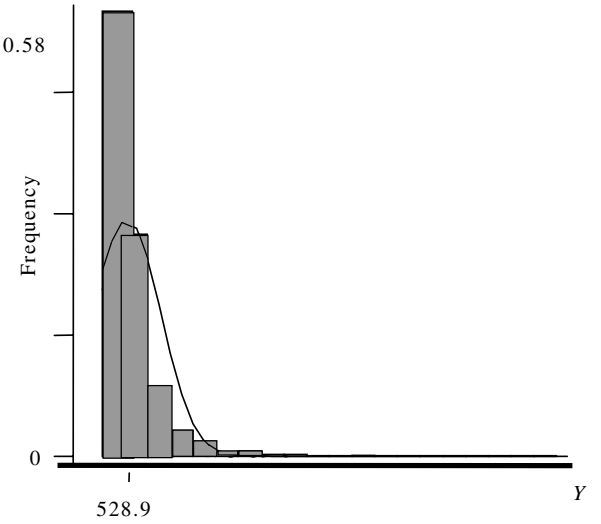
This raises a question: why did those management companies that concentrated on meeting medium- and low-income demand not react and change their business approach, particularly where pricing was concerned, so as to meet the demand from high earners and thus increase their average revenues?

Figure 9 shows the distribution of the employed economically active population by monthly income level in 2000. It can be seen that in 2000 the average income of the employed economically active population was 528.9 pesos, with a dispersion of 639.8 pesos. Thus, the population was concentrated in the lower-income brackets, while higher-income individuals represented the smallest share of the total.

For this reason, it may be suggested that while there is great dispersion in the income level of demand (employed economically active population), high-income consumers account for only a small share of the total market; consequently, the entry of new competitors into this segment would destroy any existing economies of scale, forcing a reduction in the number of management companies targeting it.

FIGURE 9

Argentina: Distribution of the employed economically active population by monthly income level, 2000



Source: Prepared by the author on the basis of the Permanent Household Survey of the National Institute of Statistics and Censuses (INDEC, 2000).

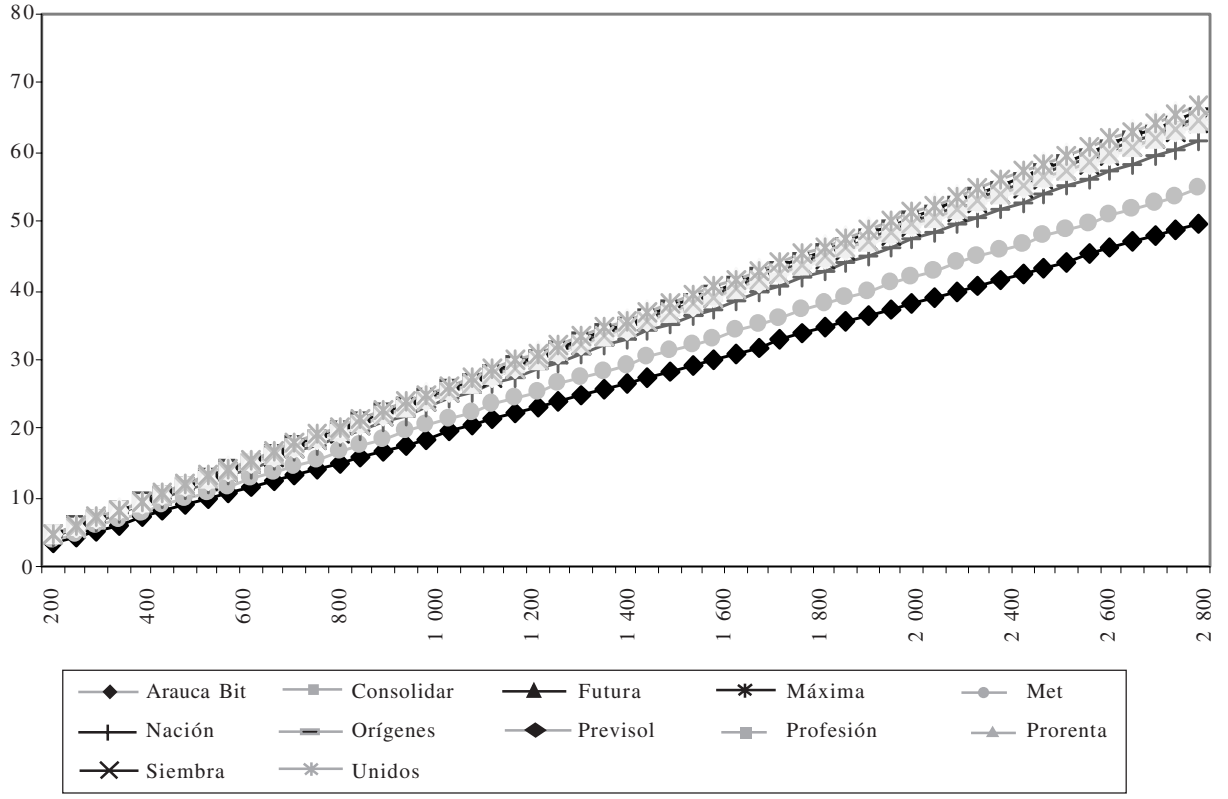
Decree No. 1495/01, which abolished fixed commissions, was approved in November 2001, reducing the potentially regressive effect of commissions on lower-income affiliates. Since then, companies have only been allowed to set a single variable commission calculated as a percentage of the affiliate's taxable income, which limits the scope for segmenting demand and forces them to set a single price (proportion of taxable income).

Figure 10 clearly shows how marginal individuals drop out of the equation, since there is just one type of price, in the form of a proportion of taxable income, and it is therefore technically impossible to segment the market.

[10] An alternative hypothesis is that higher-income workers are those with more information and thus a greater appreciation of the future.

FIGURE 10

Argentina: Prices charged by firms up the income scale, pesos, 2002



Source: Prepared by the author using data from the Superintendency of Retirement and Pension Fund Management Companies (SAFJP).

VI

Conclusions

With the passing of Law No. 24241, in force since July 1994, the Integrated Pensions System (SIJP) came into effect to cover the contingencies of old age, disability and death. This system consisted of two regimes: a public-sector regime of State-provided benefits financed on a pay-as-you-go basis and managed by the National Social Security Administration (ANSES), and a regime based on individual capitalization and operated by private-sector enterprises, namely the pension fund management companies (AFJPs).

The private-sector capitalization system has grown to a significant size since then, as the membership of that system has grown by more than that of the pension system as a whole, rising from a share of 66.7% of the total in 1996 to 79.2% in 2002. Meanwhile, not only did membership of the pay-as-you-go regime decrease as a proportion of total system membership, but it actually fell in numerical terms as affiliates left it for the new private capitalization system, experiencing a negative variation of 13.66% between the two years.

Considering the results set out in section III of this paper, the AFJP market in Argentina has undergone a significant process of concentration, with the top four firms eventually capturing 72% of the market. This is a result both of mergers and acquisitions in the industry and of the regulatory framework governing the allocation of "undecideds" to management companies, chiefly in the early years of the system.

From the creation of the new private-sector capitalization regime to December 2001, management companies used a two-part non-linear charging method: a fixed component in pesos and a variable commission calculated as a percentage of the affiliate's taxable income.

As a consequence of this, two identifiable groups of firms emerged. The first consisted of management companies that set a high fixed commission and a low variable commission (in relation to the system average) with a view to capturing high-income affiliates. These included Arauca Bit, Met and Generar. The second consisted of companies that employed the opposite pricing policy with a view to capturing medium- and low-income affiliates.

This phenomenon is explained by differences in the price elasticities of demand. High-income affiliates have a lower fixed-price elasticity than medium- and low-income affiliates, given the percentage share of the fixed price in total revenue. Conversely, the variable-price elasticity of the former is higher than that of medium- and low-income affiliates.

Both these differentiated strategies were designed for a single objective: to maximize average revenues. One group of firms maximized revenues by increasing total membership irrespective of affiliate pay levels, giving low average revenues; a second set of firms, conversely, maximized their revenues by attracting high-income affiliates who were very likely to sustain a continuous record of monthly contributions.

In accordance with the profits function established in the present study, and on the basis of a quarterly panel of data from December 1995 to September 2001, the linear average revenue function was estimated in natural logarithms using least squares with fixed effects. The explanatory variables defined were the fixed price, the variable price, the affiliate's average wage and the contributor/affiliate ratio.

The results obtained suggest that variable commissions have a negative effect on companies' average revenues, while fixed commissions have the opposite effect. Again, affiliate pay levels and the contributor/affiliate ratio have a positive effect on management companies' average revenues. In summary, firms with lower variable commissions and higher fixed commissions obtain the highest revenues per affiliate. The larger the share of high-income affiliates in their demand, and the higher the proportion of actual contributors, the more powerful this effect is.

This, then, is confirmation of the hypothesis of a price discrimination policy operated by two groups of clearly identified companies with a view to segmenting the market by the income level of demand, and to maximizing average revenues.

Nonetheless, the size of the high-income population meant that it was not economically efficient for new participants to concentrate on this segment of demand, since economies of scale would have been lost and average revenues would consequently have fallen to a point where some firms would have been forced out of the market.

The possibility of segmenting demand enabled participating companies to compete less on price and returns, since each group of AFJPs had some scope for acting in an oligopolistic manner within its own market segment. This entailed the establishment of a non-competitive equilibrium resulting in losses of surplus to consumers.

In 2002, the regulator sought to do away with the regressive effects of fixed commissions by banning the use of two-part tariffs. Since that year, companies have been required to charge a variable commission proportional to individual affiliate incomes. There is thus no technical scope for segmenting the market and a Bertrand game can be expected to ensue. However, there are alternative mechanisms for avoiding price competition in the whole market, such as product differentiation, targeted business approaches and tacit agreements that prevent an efficient market equilibrium from being attained.

What is required is the active involvement of the regulator, including the design of instruments to monitor closely the behaviour not just of supply (price levels, spending, type of advertising, etc.) but of demand as well, and to generate a greater flow of information to improve the decision-making of individuals, all this in a broader context of analysis that includes the cost structure of the industry, product differentiation policies and strategic behaviour.

Bibliography

Bresnahan, T. (1989): Empirical studies of industries with market power, *Handbook of Industrial Organization*, chapter 17, vol. I, Amsterdam, Elsevier Science Publishers.

Curry, B. and K. George (1983): Industrial concentration: a survey, *Journal of Industrial Economics*, vol. 31, No. 4, Oxford, United Kingdom, Blackwell Publishing.

INDEC (National Institute of Statistics and Censuses) (2000): *Encuesta Permanente de Hogares*, Onda Mayo, Buenos Aires.

Scherer, F. and D. Ross (1990): *Industrial Market Structure and Economic Performance*, Boston, Massachusetts, Houghton Mifflin.

Shaked, A. and J. Sutton (1987): Product differentiation and industrial structure, *Journal of Industrial Economics*, vol. 36, No. 2, Oxford, United Kingdom, Blackwell Publishing.

Tirole, J. (1990): *La teoría de la organización industrial*, first edition, Barcelona, Ariel.