The Competitiveness of Banking Industry in Argentina.[1]

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Abstract

Over the last decade the Argentine banking industry has been subject to important regulatory changes, increased internationalization and restructuring. The way in which this process has affected the degree of competition is subject to discussion in Argentina, and it has been argued, along the lines of the structure–conduct–performance paradigm (SCP), that increased concentration could have undermined competition in banking markets. But, while according to the former approach concentration is necessarily related to poor competition, the new industrial organization (NIO) approach, that relies on firms profit maximization behavior, has emphasized the weaknesses of relying on concentration measures to draw conclusions about market structure.

This paper evaluates the competitiveness of Argentine banking markets by extending the Conjectural Variations (CV) approach to the case of multi-product firms. More specifically we model Argentine banks as multi–output firms, operating in two distinct markets: corporate and retail, which is a natural classification because it adequately describes the characteristics of the argentine banking system, where some banks are more retail oriented and have a broad network of branches, mainly offering liquidity services while others have very few branches and are more specialized in giving credit to firms. We evaluate market structure in both segments by estimating a conjectural variations model for a panel of banks from 1997 to 1999. Specifically, we construct a market power index for each market and find that the Argentine banking industry is reasonably competitive (in the sense that prices are very close to marginal costs). These results are confronted with the predictions that could be drawn from concentration measures, according to the SCP approach.

1 Introduction

Over the last decade the Argentine banking industry has been subject to important regulatory changes, increased internationalization and restructuring. The way in which this process has affected the degree of competition is subject to discussion in Argentina, and it has been argued, along the lines of the Structure–Conduct–Performance paradigm (SCP), that increased concentration could have undermined competition in banking markets. But, while according to the SCP approach concentration is necessarily related to poor competition, the New Industrial Organization (NIO) approach that relies on firms profit maximization behavior, has emphasized the shortcomings of relying on concentration measures to draw conclusions about market structure.

More specifically, the NIO literature has usually relied on the concept of Conjectural Variations (CV) to model and measure market power. The basic idea, developed by Bowley (1924), is that firms acting in oligopolistic markets choose their output as to maximize profits according to their expectations about other firms' reaction. As stressed by Tirole (1997) and Shapiro (1989), the CV is as an attempt to introduce dynamics into a static context (Cournot's model) that suffers of theoretical weaknesses, since reaction to others strategies are introduced in a model in which firms cannot react, because of the timing of the game. However, Cabrál (1995) has shown that for a linear oligopoly, the CV solution has an exact correspondence with a quantity -setting dynamic game with minimax punishments.

On the other hand, Tirole (1997) emphasizes that CV are a useful tool to test market power due to the lack of alternative tools to empirically test dynamic models. Bresnahan (1989) emphasizes two main advantages of the CV. The first one is that empirical estimations are based on a theoretical model, contrary to the more traditional empirical methodology, based on the structure-conduct-performance paradigm that consisted in general on the estimation of the reduced form of a profit equation. The second one is that the estimated parameters, which describe the expected reaction of competitors can vary in a continuum between competition and monopoly, thus not restricting the data to fit to a particular non-competitive model.

With regards to the empirical banking literature, although studies which deal with the technological and efficiency aspects of the banking industry usually incorporate the multi–output character of banks, most studies on market structure and competition neglect this important characteristic of banks. The existence of more than one product in the production function of banks complicates the analysis of market structure. The reason is that even if one assumes independence on the demand side (meaning that customers are not able to substitute among different bank products) there is still room for cross–market effects, since firms can move resources from one market to the other. Notable exceptions are Gelfand and Spiller (1987) and more recently Berg and Kim (1998), who have studied the Norwegian banking industry considering them as multi-output oligopolistic firms offering two services or products: retail and corporate loans.

This paper evaluates the competitiveness of Argentine banking markets by extending the CV approach to the case of multi–product firms. More specifically, we follow Berg and Kim (1998) and model Argentine banks as multi–output firms, operating in two distinct markets: corporate and retail. We believe this is a natural classification because it adequately describes the characteristics of the Argentine banking system, where some banks are more retail oriented and have a broad network of branches, mainly offering liquidity services while others have very few branches and are more specialized in giving credit to firms. We evaluate market structure in both segments by estimating a conjectural variations model for a panel of banks from 1997 to 1999. Specifically, we construct market power index for each market and find that the Argentine banking industry is reasonably competitive (in the sense that prices are very close to marginal costs). These results are confronted with the predictions that could be drawn from concentration measures, according to the SCP approach.

2 Conjectural Variations in a multi–output setting

The industry is composed of I firms indexed by i. We will assume that we can aggregate the different types of banking services offered by each firm i into two products: corporate and retail loans, referred as Y_1^i and Y_2^i respectively[1].The empirical definition of these markets is presented in Section 3.

[1] We will use subscripts to denote markets and superscripts to denote individuals (banks).

2.1 Demand

Following our discussion in the introduction, we will assume that the corporate and retail markets are separate in the sense that the cross elasticities of demand are nil. On the other hand, we will assume that in each market the (representative) consumer views firms as perfect substitutes. Consequently, we can write the inverse demand function in each market as:

$$P_k = P\left(Y_k\right) \quad k = 1, 2 \tag{1}$$

where:

$$Y_k \equiv \sum_{i=1}^{I} Y_k^i \tag{2}$$

is aggregate supply of banking services in market k.

2.2 Production Technology

The technology of the industry can be described by a cost function of the form

$$C^i = C(Y^i, W^i)$$

where $Y^i = (Y_1^i, Y_2^i)'$ is the output vector, $W^i = (W_1^i, W_2^i, ..., W_M^i)'$ is the vector of factor prices. In order for the problem to be well defined the cost function $C\left(\cdot\right)$ must be homogeneous of degree one and concave in factor prices.[2]

2.3 Profit maximization

The main objective of the present paper is to understand the degree of strategic interaction among firms. We capture this interaction by introducing conjectural variation parameters. Specifically, we will assume that all banks face the same expectations about his competitors reaction to changes in its own output and that these expectations can be captured by the conjectural variations parameter θ_{kl}:

$$\theta_{kl} \equiv \frac{\partial \log \sum_{j \neq i} Y_k^j}{\partial \log \left(Y_l^i\right)} \quad \forall k \neq l \in (1, 2) \text{ and } i = 1, 2, ..., I \tag{3}$$

[2] For a discussion of the properties of the multi–product cost and profit functions see, for example, Lau (1972), Hall (1973), and Brown, Cave and Christensen (1979).

which is the relative aggregate response of the rest of the participants in market k to a unit percent increase in the production of good l by producer i.

Consequently, the profit maximization problem faced by firm i can be expressed as:

$$\max_{y_1^i, y_2^i} \pi^i = P_1 \cdot Y_1^i + P_2 \cdot Y_2^i - C\left(Y^i, W^i\right) \tag{4}$$

subject to (1) and (3).

Profit maximization yields the familiar relationship between marginal revenue and marginal cost:

$$MR_k^i\left(Y^i, W^i\right) = MC_k^i\left(Y^i, W^i\right) \tag{5}$$

where:

$$\begin{aligned}
MR_k^i\left(Y^i, W^i\right) &\equiv P_k\left[1 - \frac{1}{\eta_k}\left(\frac{Y_k^i}{Y_k}\left(1 - \frac{Y_k^i}{Y_k}\right)\theta_{kk}\right)\right] - P_l\frac{1}{\eta_l}\frac{Y_l^i}{Y_k^i}\left(1 - \frac{Y_l^i}{Y_l}\right)\theta_{lk} \quad (6)\\
MC_k^i\left(Y^i, W^i\right) &\equiv \frac{\partial C^i\left(Y^i, W^i\right)}{\partial Y^i}\\
\forall k &\neq l \in (1,2)\ ,\ \ i = 1, ...I
\end{aligned}$$

are marginal revenue and marginal cost of firm i in market k and $\eta_k \equiv -\frac{\partial \log P_k(y_k)}{\partial \log Y_k}$ is the elasticity of demand in market k respectively.

2.4 Measuring market power in a multi-output setting

In the single output case, the value of the conjectural variations parameter, assuming equal responses for all individual firms:

$$\theta = \frac{\partial \log \sum_{j \neq i} Y^j}{\partial \log\left(Y^i\right)}$$

can be used as a sufficient statistic for the degree of competition. Specifically, $\theta = \frac{-1}{I-1}$ represents Bertrand conjectures (i.e. perfect competition), $\theta = 0$ are Cournot conjectures and $\theta = 1$ represents perfect collusion.[3]

[3] See Iwata (1974) for a detailed interpretation of the θ parameter in the case of single output firms.

In the case of multi–product firms, the existence of the θ_{kl}'s, (i.e. the cross conjectural variation parameters) makes it harder to asses the degree of competition. Suppose, for example, that we observe $\theta_{11} = -1$. Does this imply that there exists perfect competition in market 1? The answer is not necessarily. For example, if we simultaneously observe $\theta_{21} > 0$, inspection of equation (6) would indicate that $P_1 > MC_1^i(\cdot)$ for any i which would imply that market 1 is not perfectly competitive.

In order to motivate our market power measure, notice that in the case in which a single firm competes in each market, marginal revenue would be given by $P_k\left[1 - \frac{1}{\eta_k}\right]$ which implies that $\eta_k\left(1 - \frac{MR_k(\cdot)}{P_k}\right) = 1$. Furthermore, in the case in which the representative firm conjectures takes product prices as given, we have $P_k = MR_k(Y, W)$ so that $\eta_k\left(1 - \frac{MR_k(\cdot)}{P_k}\right) = 0$. Finally, notice that from a welfare point of view what is important is how much do prices deviate from marginal cost and not the way prices are determined.

Consequently, we suggest using:

$$m_k \equiv \eta_k\left(1 - \frac{MR_k(\cdot)}{P_k}\right) \tag{7}$$

as a sufficient statistic for the degree of market power in market k. The case in which $m_k = 1/I$ corresponds to Cournot conjectures.

3 Empirical Results

3.1 Specification

For estimation purposes we adopt a translog specification for the cost function:

$$\begin{aligned}\log\left(C\left(y^i, w^i\right)\right) &= c\left(y^i, w^i\right) = \alpha_0 + \sum_{k=1}^{2}\alpha_k y_k^i + \sum_{m=1}^{M}\beta_m w_m^i + \frac{1}{2}\sum_{k=1}^{2}\sum_{l=1}^{2}\delta_{kl} y_l^i y_k^i \\ &+\frac{1}{2}\sum_{m=1}^{M}\sum_{n=1}^{M}\gamma_{mn} w_m^i w_n^i + \sum_{k=1}^{2}\sum_{m=1}^{M}\rho_{km} y_k^i w_m^i. \end{aligned} \tag{8}$$

where we adopt the notation that lower case variables denote natural logs of the corresponding upper–case variables (e.g. $y_k^i = \log(Y_k^i)$). Note that the existence of cross order terms in outputs (i.e. the δ's) allows for jointness in production.

In addition, we impose homogeneity of degree one in factor prices as well as symmetry on the cost function,

$$\begin{aligned}
\sum_{m=1}^{M} \beta_m &= 1, \\
\sum_{n=1}^{M} \gamma_{mn} &= 0, \;\; m = 1, 2, ...M, \\
\sum_{m=1}^{M} \rho_{km} &= 0, \;\; k = 1, 2 \\
\delta_{kl} &= \delta_{lk} \,, \forall\, k, l, \\
\gamma_{mn} &= \gamma_{nm}, \; \forall m, n.
\end{aligned}$$

Given the nature of the maximization problem faced by banks it is convenient to estimate this model using a system of simultaneous equations. The system includes:

1. Banks's first order condition for profit maximization in each market (5) which, using equation (8), can be re–expressed as:

$$\begin{aligned}
& P_k \left[1 - \frac{1}{\eta_k} (\frac{Y_k^i}{Y_k} (1 - \frac{Y_k^i}{Y_k}) \theta_{kk}) \right] - P_l \frac{1}{\eta_l} \frac{Y_l^i}{Y_k^i} (1 - \frac{Y_l^i}{Y_l}) \theta_{lk} \\
= \; & \frac{C^i}{Y_k^i} (\alpha_k + \sum_{l=1}^{2} \delta_{kl} y_l^i + \sum_{m=1}^{M} \rho_{km} w_m^i) \qquad k = 1, 2 \,, \;\; i = 1, .., I. \quad (9)
\end{aligned}$$

1. The cost function (8), and,

2. $M - 1$ share equations, which are the derivatives of the cost function with respect to input prices,

$$S_m = \beta_m + \sum_{n=1}^{M} \gamma_{mn} w_n^i + \sum_{k=1}^{2} \rho_{km} y_k^i \qquad m = 1, ..., M-1 \,, \quad i = 1, .., I. \quad (10)$$

We estimate $M-1$ share equations to avoid linear dependency. More specifically, since we consider three inputs: labor, capital and deposits, we drop the share equation for capital.

To sum up, the system consists of five equations: two first order conditions, the cost function and two share equations.

The simultaneous estimation of the profit maximizing first order condition for banks together with the cost function is an interesting exercise, since it provides information about both, the production and the revenue side of the firm.

3.2 Estimation Methodology

The system of equations developed in Section 3.1 is a system of Seemingly Unrelated Regression Equations ($SURE$). It was estimated using the Full Information Maximum Likelihood Method ($FIML$). This estimation methodology seems to be adequate for the problem we are solving here for two main reasons. First, the error terms of the equation composing the system described above cannot be assumed to be non-correlated. While limited information methods, consisting in the estimation of one equation by time, neglect this problem, full information methods, that consist on the simultaneous estimation of all the equations in the structural model, allow for the error terms of the different equations in the system to be correlated, yielding more efficient estimators. Second, within the full information methods, maximum likelihood methods are invariant to different reparametrizations. The system we are estimating here is subject to this problem, since different parametrizations of the model can be obtained depending on the election of a particular share equation to drop or an input price to be used as numeraire.

Given that our system is nonlinear, the most effective way to solve the maximization problem is to use an iterative algorithm. The most commonly used algorithms are gradient methods. We used here the Berndt, Hall, Hall and Hausman ($BHHH$) algorithm. [4] One of the advantages of this method is that it only requires to calculate the first derivatives.

[4]Although we tried with other gradient methods, like the Newton and the Davidon, Fletcher and Powell (DFP), the BHHH proved to be the most accurate to our problem. For more details see Greene (1993)

3.3 The Data

The system described above was estimated for a panel of annual data that covers the period 1997-1999. It was a period of restructuring for the Argentine banking sector. After the banking crisis that followed the Mexican devaluation of December 1994, many of the financial institutions that were in trouble during this episode merged or were acquired by other financial institutions. Later on, a considerable number of foreign banks entered the system. The number of financial institutions decreased during these years, from 147 in 1996 to 117 in 1999, while their average size (measured by their assets) increased significantly, from $737 million in 1996 to $1308 million in 1999.

The data set consists on a sample 70 financial institutions. It was restricted to those banks that operate in both markets, corporate and retail. For reasons of comparability we considered the same banks for the three years of analysis. Retail loans include financing to households and small enterprises, including mortgages, personal loans and pledges. Corporate consists basically on financing to large enterprises, including overdrafts, interbank loans and promissory notes. We assumed that banks use three inputs to produce these two outputs: labor, capital and deposits. Labor prices were calculated as the ratio of labor expenses to total employees. The price of capital is the ratio of capital expenses to net worth and the price of funds is the implicit interest rate on deposits calculated as the ratio of interest payments to total deposits.

3.4 Results

Before we discuss the results of our main estimation exercise it should be noted that the market demand elasticities for the two products, retail and corporate (5), cannot be estimated jointly with the conjectural variation parameters. We obtained the elasticities by estimating a supply and demand simultaneous system using time series of aggregate monthly data on interest rates charged on retail and corporate loans as well as quantities for the period 1996-1999. The estimated demand elasticity are 1.4903 with a P–value of 0.000 for the retail market and 1.8402 (P–value of 0.0547) for the corporate market. Details about the estimation of these parameters are given in Appendix A.1.

The results of the estimation of the system described in Section 3.1 are

|TABLE 1
MAXIMUM LIKELIHOOD PARAMETER ESTIMATES

Parameter	1997	1999
Constant	1.155**	2.242***
α_1 (retail output)	0.123***	-0.489***
α_2 (corporate output)	0.440***	0.919***
β_1 (Implicit cost of funds)	0.740***	0.480***
β_2 (wages)	0.047	-0.136
θ_{11}	0.575***	0.049
θ_{21}	0.025***	-0.110***
θ_{12}	0.014***	-0.033
θ_{22}	-0.818***	-0.019

For the sake of brevity we omit second order terms.
θ_{kl} is the percentage response in market k to a one percent increase in production in market l.
The superscripts *,** and *** denote rejection of significance at 10, 5 or 1% respectively.

presented in Table 1. We do not present the estimates for 1998, which are not satisfactory and will be reestimated for a next version of the paper.

The cost function provides information banks' technology. In particular, scale economies can be evaluated from the estimated parameters.[5] The empirical results presented in Table 2 indicate that there are economies of scale in the industry. They are consistent with previous estimation (see, for example Streb and D'amato (1995), Dick (1996), Burdisso (1997) and Burdisso, D'Amato and Molinari (1998)), using different output definitions and estimation methods.

3.4.1 Jointness in Production

The presence of joint production between the two outputs, could affect banks' strategic behavior, since in this case costs in both markets will be interre-

[5]In the case of multiproduct firms, scale economies measure the percentage increase in total cost due to a simultaneous and equal precentage increase in each output. For more details see Clark (1988).

TABLE 2
PROPERTIES OF THE COST FUNCTION

Parameter	Year	Estimate	H_0	P-value
Scale Elasticity	1997	0.670	1	0.000
	1999	0.740	1	0.000
Jointness in Production	1997	0.097	0	0.000
	1999	0.178	0	0.000

Standard Errors in parenthesis. Calculated using delta method.

lated.[6] Thus, shocks in one of the markets, changing profit maximizing quantities, could induce reallocation of resources from one market to the other as shown in (5), although jointness in production is not the only possible source of interaction between markets. Bulow, Geanakoplos and Klemperer (1985) show that interactions between markets can also appear if competitors regard products as strategic complements or substitutes, even when demand is assumed to be independent across markets.

Jointness in production can be evaluated from the cost function parameters. A test of jointness in production is a test of

$$JP = \frac{\partial^2 C^i}{\partial Y_k Y_l} = \frac{C^i}{Y_k Y_l} \left(\alpha_k \alpha_l + \delta_{kl} \right) < 0.$$

Since C^i, Y_k and Y_l are positive, the test consists on evaluating[7]

$$\alpha_k \alpha_l + \delta_{kl} \leq 0.$$

The results, presented in Table 2 indicate no evidence of jointness in production. The value of the parameter is 0.0969 and we cannot reject the hypothesis that the parameter is positive.

3.4.2 Market Power

We used two strategies to evaluate market power. The first was the conventional one of testing restriction on the θ_{kl} parameters. The null is $\theta_{kk} =$

[6] Jointness in production exists between two outputs when the marginal cost of producing one of them is decreasing in the other output.

[7] Since this restriction is non–linear in the parameters, we used the Delta Method which allows such non–linarities. For more details about the Delta Method, see Greene (1993).

TABLE 3
TESTING FOR ALTERNATIVE MARKET STRUCTURE[a]

Retail Market

Market Structure	Hypothesis	χ^2	$P - value$
Perfect Competition	$\theta_{11}(1997)=\frac{-1}{I-1}$ and $\theta_{21}(1997)=0$	97.8	0.000
	$\theta_{11}(1999)=\frac{-1}{I-1}$ and $\theta_{21}(1999)=0$	0.5	0.788
Cournot	$\theta_{11}(1997)=0$ and $\theta_{21}(1997)=0$	96.3	0.000
	$\theta_{11}(1999)=0$ and $\theta_{21}(1999)=0$	0.41	.82
Perfect Collusion	$\theta_{11}(1997)=1$ and $\theta_{21}(1997)=0$	83.7	0.000
	$\theta_{11}(1999)=1$ and $\theta_{21}(1999)=0$	49.16	0.000

Corporate Market

Market Structure	Hypothesis	χ^2	$P - value$
Perfect Competition	$\theta_{22}(1997)= \frac{-1}{I-1}$ and $\theta_{12}(1997)=0$	52.4	0.000
	$\theta_{22}(1999)= \frac{-1}{I-1}$ and $\theta_{12}(1999)=0$	36.4	0.000
Cournot	$\theta_{22}(1997)=0$ and $\theta_{12}(1997)=0$	53.8	0.000
	$\theta_{22}(1999)=0$ and $\theta_{12}(1999)=0$	36.6	0.000
Perfect Collusion	$\theta_{22}(1997)=1$ and $\theta_{12}(1997)=0$	215.0	0.000
	$\theta_{22}(1999)=1$ and $\theta_{12}(1999)=0$	74.3	0.000

The standard errors necessary for calculation of χ^2statistic were calculated using the Delta Method.

$\theta_{kl} = 0$ for the Cournot solution, $\theta_{kk} = -\frac{1}{I-1}$ and $\theta_{kl} = 0$ for the competitive solution, and $\theta_{kk} = 1$ and $\theta_{kl} = 0$ for the monopoly solution. In this case we conducted Wald tests, which are presented in Table 3.

The results are mixed for the retail market. We find that while for 1997 we can reject the three hypotheses, for 1999 the Cournot and competition cannot be rejected. However, it must be noticed that the distinction between the Cournot solution and competition is in a way trivial here, given the fact that the number of financial institutions is enough large as to yield a competitive solution. In the case of the corporate market, we find that the three hypotheses are rejected for both years.

We believe that this way of evaluating market structure is not satisfactory for the following reasons. The empirical CV approach literature explicitly tests for market power rather than market structure. In the case of independent markets, testing for market power and for market structure are equivalent since there is a one to one correspondence between these two concepts. In the case of multiple markets however, as explained in Section 2.4 there are many combinations of θ's which are consistent with, say, perfect competition (i.e. marginal cost pricing) in addition to $(\theta_{kk}, \theta_{kl}) = \left(-\frac{1}{I-1}, 0\right)$. Since it would be impossible to test for all such market structures, the second strategy is to employ the market power index developed in section 2.4. In addition this latter strategy is consistent with the empirical CV approach that allows market power to lie in a continuous interval.

The results from this strategy are shown in Table 4. With regards to the retail market, for 1997 we reject the three hypothesis, but the bilateral tests allow us to determine that the index lies in the interval $(1/I - 1, 1)$,that is, between Cournot and perfect collusion. The results for 1999 indicate that we can reject the monopoly but that it is not possible to distinguish between Cournot and competition. For the corporate market we reject the three hypotheses for 1997 and we cannot reject that the index is lower than cero. For 1999 the results indicate that we can reject the monopoly solution but we cannot reject neither competition nor Cournot.

Thus, we can conclude that the corporate market is close to competition. In the case of the retail market the results are not conclusive, although a possible interpretation, given the fact that the industry experienced a restructuring process during these years, is that the retail market became more competitive .

We can compare the obtained results with those of the SCP approach. Table 5 shows the Herfindahl index for both markets. For the corporate market the index is low and nearly the same for both years, which is consistent with the results obtained from the CV approach. For the retail market the Herfindahl decreases between both years, suggesting that the market became less concentrated.

4 Conclusion

We evaluate here the competitiveness of the banking industry in Argentina in a multi–output setting. We model banks as firms which operate in two markets, retail and corporate. These firms choose output in each market as to maximize total profits, subject to their expectations about other firms' responses. Contrary to the standard practice in the literature we estimate

Table 4
Market Power Indices[a]

Retail Market

Structure	Index	(m_0)	z–ratio	P-value Null Hypothesis $\widehat{m}_r \leq m_0$	$\widehat{m}_r \geq m_0$	$\widehat{m}_r \neq m_0$
Perfect	$\widehat{m}_r(1997)=0.57$	0	5.51	0	1	0
Competition	$\widehat{m}_r(1999)=0.06$	0	0.061	.33	.67	.66
Cournot	$\widehat{m}_r(1997)=0.57$	$\frac{1}{I-1}=0.014$	5.37	0	1	0
	$\widehat{m}_r(1999)=0.06$	$\frac{1}{I-1}=0.014$	0.34	0.37	.63	.73
Perfect	$\widehat{m}_r(1997)=0.57$	1	-4.08	1	0	0
Collusion	$\widehat{m}_r(1999)=0.06$	1	-6.88	1	0	0

Corporate Market

Structure	Index	(m_0)	z–ratio	P-value Null Hypothesis $\widehat{m}_r \leq m_0$	$\widehat{m}_r \geq m_0$	$\widehat{m}_r \neq m_0$
Perfect	$\widehat{m}_c(1997)=-0.74$	0	-5.75	1	0	0
Competition	$\widehat{m}_c(1999)=-0.25$	0	-1.06	0.85	.15	.29
Cournot	$\widehat{m}_c(1997)=-0.74$	$\frac{1}{I-1}=0.014$	-5.86	1	0	0
	$\widehat{m}_c(1999)=-0.25$	$\frac{1}{I-1}=0.014$	-1.12	0.87	0.13	0.26
Perfect	$\widehat{m}_c(1997)=-0.74$	1	-13.52	1	0	0
Collusion	$\widehat{m}_c(1999)=-0.25$	1	-5.25	1	0	0

The standard errors necessary for calculation of the z-statistic were calculated using the Delta Method.

Table 5
Market Concentration Ratios

Market	Year	Herfindahl Index
Retail	1997	1022
Retail	1999	840
Corporate	1997	842
Corporate	1999	845

the firms' first order conditions along with their cost structures.

In order to asses the degree of competition we employ two kind of tests. One is to evaluate for specific forms of market structure: competition, Cournot and perfect collusion. This avenue does not yield conclusive results because it a test of a particular market structure rather than a measure of competitiveness and has an ambiguous interpretation in a multi–output setting. For this reason we develop an index of market power which ranges continuously from a value of 0 (perfect competition) to 1 (perfect collusion).

We find that while the corporate market is reasonably competitive, the retail market has become more competitive from 1997 to 1999. These results are consistent with the predictions drawn from concentration measures, used in the SCP literature.

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A Appendix

A.1 Estimation of Demand elasticities

In order to estimate the demand elasticities we estimated for each market the following system of demand and supply equations:

$$\begin{aligned} y_t &= \sigma r_t + X_t^s \beta + \varepsilon_t^s && \text{(Supply)} \\ y_t &= -\eta r_t + X_t^d \alpha + \varepsilon_t^d && \text{(Demand)} \end{aligned}$$

where y_t is (the log of) seasonally adjusted market–wide production in each sector , r_t is interest rate charged in each sector, σ and η are supply and demand elasticities, X_t^s and X_t^d are, respectively a vector of exogenous variables in the supply and demand equations and ε_t^s and ε_t^d are the corresponding error terms. We used a monthly sample dated from 1996 : 03 to 1999 : 12.

More specifically, in the retail market X_t^s included a constant, the deposit rate, the (log of) amount of deposits in the banking system (used to control for credit constraints), the rate of return on the FRB, seasonally adjusted market wide production lagged one period and two dummies to control for outliers. The X_t^d vector included the same variables except for the (log of) amount of deposits in the banking system and the rate of return on the FRB. For the corporate market we employed the same variables in the demand equations except for the dummies. In addition, since we estimated the system using three stage least squares, we included (in addition to the exogenous variables previously mentioned) the seasonally adjusted monthly estimator of industrial production tracked by the INDEC (EMI).

The results of the estimation are the demand equations are shown in Table $A.1$ and $A.2$.[8]

It should be mentioned that correlograms show the absence of residual serial correlation.

[8] We do not include the supply equation because its parameters are under–identified.

Table A.1

Estimation of demand elasticity in the Retail Market

Dependent variable is seasonally adjusted retail production

Variable	Coefficient	P–Value
Constant	0.623	0.000
Retail Market Interest Rate	1.490	0.000
Seasonally adjusted retail production$_{-1}$	0.967	0.000

Adjusted $R^2 = .99$

Table A.2

Estimation of demand elasticity in the Corporate Market

Dependent variable is seasonally adjusted corporate production

Variable	Coefficient	P–Value
Constant	2.851	.007
Corporate Market Interest Rate	1.840	.055
Seasonally adjusted corporate production$_{-1}$	0.752	.000

Adjusted $R^2 = .99$