Evolution in the market power of financial intermediation services in Argentina: A structural analysis

Otero, Karina V.

University of San Andres

March 2008

Evolution in the market power of financial intermediation services in Argentina: A structural analysis (2005:q1 – 2007:q1) [Θ]

Karina Otero[♦]

September 2009

Abstract

The low depth of the Argentine financial system raises concerns about its potential for development, even under favorable macroeconomic expectations. Contributing to the analysis of this key industry, this paper develops a methodology to measure the evolution of market power of financial intermediaries in the Argentine market. The proposed alternative framework models the industry production, and takes into account the duality of the financial intermediation business.

The structural model follows the guidelines of the *New Empirical Industrial Organization* (NEIO) and the *discrete choice* literature, adapting the analysis to the local industry. The paper finds evidence supporting the presence of market power in the financial intermediation industry, but also finds signs of increase in the level of competition.

Key Words: *Bank Services, Financial Services, Discrete Choice, Bank Competition, Argentina's Banking, Financial Entities, Market Power.*

JEL Classification**:** G21, L11, L13, C8, C33.

[Θ] I am especially grateful to the Central Bank of Argentina (BCRA) for providing the data and to Laura D'amato for her valuable comments in earlier stages of this paper. I also gratefully acknowledge the valuable comments of Germán Coloma, Daniel Heymann, Enrique Kawamura and Alessandro Rebucci. I am responsible for any error or omission. Comments are welcome at otero_k@yahoo.com.ar.

[♦] Research Department, Inter-American Development Bank (IDB); kotero@iadb.org.

I. Introduction

Financial intermediation services have been scarcely developed in Argentina, which can be attributed to different structural factors, such us the persistent uncertainty about the sustainability of growth. Furthermore, the low depth of the Argentine financial system has raised doubts about its potential development, even under relatively favorable macroeconomic expectations. Contributing to the analysis of such key industry[1], the current paper uses balance sheets of the financial intermediary institutions of Argentina to measure the evolution of their market power during the period 2005:q1-2007:q1. This period showed relatively stable financial conditions and favorable macroeconomic perspectives. Therefore, studying the evolution of Lerner indexes, price-cost margins, as indicators of the degree of competition in the industry, is interesting in terms of its potential of development.

This study contributes to the existing literature of "New Empirical Industrial Organization" (NEIO) applied to financial intermediation industry in two ways. This is the first paper to estimate Lerner indexes for the financial intermediary industry of Argentina using structural demand models, and also this study proposes a model that has some differences compared with other models in the literature.

The framework to calculate Lerner indexes considers that market shares are not an accurate measure to evaluate the market power when firms offer differentiated products[2]. That is, degrees of substitution among relevant products also affect the market power. Then I calculate price-cost margins as percentages of the prices (Lerner indexes) in the loans and investment services. Regarding the first contribution, I followed a methodology prevalent in the "discrete choice" literature to estimate demand systems of differentiated products (See McFadden, 1973, 1978, 1981; Berry, 1994; Berry, Levinsohn and Pakes, 1995; Bresnahan et al., 1997; and Nevo, 2001), jointly with a model of firm conduct. This structural model of the financial industry considers an oligopolistic price setting competition where firms reach a pure strategy Nash-Bertrand equilibrium. Moreover, the model in this paper follows the spirit of the economic value-added approach that classifies not only loans but deposits as outputs (rather than inputs), based on the service of safe storage value, record keeping and means of payments that entities provide. Furthermore, deposits and other services of financial investment may also be considered outputs because investors who face restrictions to operate in financial markets demand them. As a result, the existence of these services requires a differential between the passive interest rates received by consumers and the interest rates paid by low risk assets in the financial market. A rationale for this is provided by the theory of FISIM ("financial intermediation services indirectly measured") in the System of National Accounts of 1993. Under this framework, the proposed model

[1] A broad literature relates this industry with the growth and development capabilities of a country. For instance see Demirguc-Kunt and Levine (2001).

[2] Se table 4 in appendix C

uses two different rates of references whose conceptual framework come from the user cost theory of prices of financial services. (See Wang, 2003; and Fixler, Reinsdorf and Smith, 2008)

On the demand side, theoretical preferences are aggregated into market-level demand systems whose parameters are estimated through log transformations of two different models: the multinomial and the nested logit. I use a multinomial logit modified to consider some persistence in the individual choice and a nested logit approach to relax the assumption of independence from irrelevant alternatives (IIA). In the nested logit specification, entities are classified according to whether their main business is targeted toward individual or institutional customers. The estimation strategy of the demand functions involves Generalized Method of Moments (GMM) methodologies and instrumental variables to avoid the simultaneity problem, given that the interest rates, the benefits and the market concentration are determined all together. GMM is useful for obtaining instruments for predetermined variables correlated to contemporaneous unobserved demand shocks while additional instrumental variables are used for endogenous demand characteristics like prices (see Anderson and Hsiao 1982; Blundell and Bond 1998; and Arellano and Honoré 2001). Then two different groups of demands are estimated; on one hand the demands for services of financial investments and, on the other hand, the demands for loans.

On the supply side, the model has a functional form for the profits of the entities and their balance sheet constraints. The former considers the opportunity cost of the funds obtained directly from their customers. Thus, incomes coming from the services of financial investments take into account two different interest rates: the interest rate of the bonds issued by the Central Bank and the interbank rate, depending on the opportunity cost of the funds.

Subsequently, it is assumed that the observed data comes from market equilibriums where firms and consumers optimize their objective functions, profits and utilities. A Nash-Bertrand equilibrium gives the pricing rules for the financial institution, where each institution considers the consequences of changing its price assuming that its competitors do not modify their own prices. Under the existence of an interior equilibrium of pure strategy and prices strictly positive, constant marginal costs are calculated and then all the necessary information to construct the Lerner Index of each entity becomes available.

Regarding the second contribution, this study proposes a model that has some differences compared with other models in the literature. Following, there is a comparative analysis of the related literature.

The papers of Fernández de Guevara et. al. (2005), Maudos and Fernández de Guevara (2003), Richards, Acharya and Kagan (2008), Dick (2007) and Adams, Brevoort and Kiser (2007)[3] make

[3] For further references about the literature of industrial organization applied to banking see Degryse and Ongena (2007).

significant contributions to the relevant literature, using similar methodologies to study financial intermediation industries.

On one hand, some papers consider a theoretical model, but the Lerner indexes are empirically calculated and the marginal costs come from a translogarithmic cost function. For instance, Fernández de Guevara et. al. (2005) derive the theoretical determinants of the Lerner Index using the model of Corvoisier and Gropp (2001). In this model, the banks are assumed to be price takers for their liabilities and to fix prices in the loan market. Additionally, the model does not provide a method to calculate Lerner indexes, which are obtained through an empirical approximation. I propose a broader model, not only applicable to banks but also to other financial institutions, with two different rates of references and where financial institutions are not price takers in either market. Moreover, Lerner indexes can be calculated directly from this model, which allows the existence of market power not only in the pricing of loans, but also in the pricing of deposits.

Among these papers also are Maudos and Fernández de Guevara (2003), which follow the model of Ho and Saunders (1981) and incorporate the criticism of Lerner (1981) to derive determinants of the interest margins. Using an empirical approach, they calculate Lerner indexes for the European banking sector and use them among the explanatory variables of the net interest margins. The theoretical model considers one reference rate, the money market interest rate, and assumes that the wealth of banks is based on incomes from financial intermediation and money market assets. In this framework, the banks are risk-averse and maximize their expected utility of the level of wealth. Alternatively, my approach does not attempt to model the wealth of institutions or their risk aversion; it models a portion of the business[4], making abstraction of those funds that institutions can obtain independently of their financial obligations. It also assumes that the credits and interest rates risks are given for each institution and that they are part of the costs of financial intermediation services. Furthermore, this model uses two different rates of references, considering a more suitable assumption for developing countries, where it is likely that entities do not have access to a perfectly competitive wholesale fund market.

On the other hand, there are papers that use structural demand models to study financial intermediation industries. For instance, Richards, Acharya and Kagan (2008) use a multinomial logit model of discrete choice with spatial differentiation of banking demand and pricing behavior. They compute a spatial likelihood function to estimate the degree of market power exercised by banks in non-metropolitan areas of the United States in 2005. Their model considers that the outputs of the banks are only the total loans outstanding and finds that geography has a relatively small role in the total market power exercised. Another one is Dick (2007), which estimates a structural demand model for commercial bank deposit services to measure the effects on consumer welfare in the U.S. banking industry in the '90s. The characteristic-based demand systems for deposit services are estimated

[4] The relevant portion of the business is related to the productive nature of the financial intermediary services.

through OLS and two-stage least squares, and the results suggest that consumers on average have gained from the observed branching expansion process. Besides Adams, Brevoort and Kiser (2007) use the non-nested, discrete-choice random utility model developed by Bresnahan et al. (1997) to model a consumer's choice of depository institution using a panel data set covering the U.S. from 1990–2001. They assume that each institution has access to a perfectly competitive wholesale fund market, where the firms can borrow or lend funds at the prevailing interest rate. Their paper measures the degree of substitutability across specific groupings of institutions; it finds that substitution is greater within a given group than among groups.

The rest of the paper is organized as follows: Section II describes the specification of the structural demands. The estimation strategy and instruments are presented in Section III. Then the database is discussed in Section IV and the results of the parameters of the demand systems are in Section V. The model of firm conduct is described in sections VI and VII, where the obtained results are used to calculate price elasticities and Lerner indexes. Some further details and tables can be found in the appendixes. Finally, Section VIII summarizes conclusions.

II. Structural demands of financial intermediation services

The model assumes that financial intermediaries offer two kinds of services: services of deposits[5] and services of loans. Note that deposits are considered services because the firms of the industry make financial investments more accessible than do capital markets. The firms also give loans to targeted populations that find other sources of financing more restrictive. Therefore, passive interest rates paid for services of deposits have a discount for this service and active interest rates charged for loans include an additional charge for the financing service.

This paper will develop two different models for the demands of the financial intermediaries following the "discrete choice" literature (McFadden, 1973, 1978, 1981; Berry, 1994; Berry, Levinsohn and Pakes, 1995; Nevo, 2001). The first approach is based on a multinomial logit while the second is based on a nested logit model. Both of them define consumer preferences over product characteristics (to avoid the estimation of numerous parameters) and assume that consumers have solved their intertemporal saving problem and that they only need to choose a firm to consume financial services.

Multinomial Logit approach

[5] Here deposits are making reference to a broader definition that is not only bank accounts that represent a liability for financial intermediaries, but also other funds that represent amounts owed by financial intermediaries to customers.

Each consumer n is assumed to have already solved his dynamic long-term savings-indebtedness problem before choosing financial institutions j to contract investment or loan services. Assuming that $t = 1, 2, ..., T$ markets are observed, equation (1) is the conditional indirect utility of consumer n from choosing firm j's services of deposits (supra-index d) in the market t. Likewise, equation (1) may be written for the conditional indirect utility of consumer n from choosing firm j's services of loans (supra-index l) in the market t[6]. The term $\in_{njt}$ represents consumer heterogeneity, idiosyncratic deviations respect to the mean utility, which is assumed to have an IID extreme value distribution.

$$u^d_{njt} = \delta^d_{jt} + \in^d_{njt} \qquad with \ \in^d_{njt} \sim \exp(-\in_{ijt}) \ \exp(-\exp(-\in_{ijt})) \tag{1}$$

$$\delta^d_{jt} = \beta_1 p^d_{jt} + \alpha_1 \ r^d_{jt} + \lambda_1 \ln\left(s^d_{jt-1}\right) + \gamma_1 x^d_{jt} + \zeta^d_j + \xi^d_{jt} \qquad where \begin{cases} n = 1, 2, ..., N \\ j = 0, 1, ..., J \\ t = 1, 2, ..., T \end{cases} \tag{2}$$

Where r^d_{jt} is the implicit passive interest rate of firm j in period t and in the case of utility for a consumer of financing services it is replaced for r^l_{jt}, the implicit active interest rate of firm j. With p^d_{jt} and p^l_{jt} as proxies for the implicit price charged by commissions related to deposits and loans respectively; x^d_{jt} and x^l_{jt} as a row vector of relevant characteristics for investment or loan services; ζ_j as the unobserved characteristics of the product that remained constant; a mean zero random disturbance ξ_{jt} that represents changes in unobservables that affects consumers equally and the taste parameters $\theta = (\beta, \alpha, \lambda, \gamma)$. Additionally, and modifying the standard specification, we will include as a relevant variable the log of the market share in the precedent period, s^d_{jt-1} or s^l_{jt-1}, that is a proxy for the inertial component of certain financial operations (for instance, term deposits and loans with several disbursements). The lags may also be a proxy for characteristics that are used by customers for solving the informational problem that they face. That is, customers face costs in screening and choosing an institution and they might interpret an observed lagged higher market share as good signal.

The observed characteristics are control variables that should capture differences in the quality or kind of offered products. Some characteristics are fixed assets per branch, workers per branch, business development expenses per branch, density of branches in the provinces, number of provinces where the entity operates, number of ATMs, personal loans as percentage of total loans and number of

[6] Assuming that there is a considerable number of consumers of financing services that accomplish the necessary prerequisites to get a loan approved.

branches in relatively small provinces[7]. Besides, some characteristics related to indicators of vulnerability of the portfolio of loans and deposits are also included such us loan loss as percentage of assets and fixed term deposits as percentage of deposits. For further details about the control variables included in each specification see table 1 and appendix B.

The model has two outside goods, one for the loan and other for the deposit market, and their consumer $n's$ utility is given by the equation (3) where $j=0$. The mean utility of the outside good is not identified and it is supposed that $\zeta_0 = 0$ (from here on, the supra-indexes is omitted because the following explanation is the same for both markets).

$$u_{n0t} = \zeta_0 + \xi_{0t} + \in_{n0t} \qquad (3)$$

Consumers choose a firm-product according to its relative utility. Thus, the market share is the joint probability of obtaining higher consumers' utilities of the product j and it is given by the equation (4).

$$s_{jt}(\cdot) = \text{Prob}\left[\delta_{jt} + \in_{njt} > \delta_{rt} + \in_{nrt} \mid \forall (r \neq j) \in l\right] \text{ where } \in_{\text{njt}} \sim iid \qquad (4)$$

Assuming that $\in_{\text{njt}}$ are independent and identically distributed with a Gumbel distribution, the integral (5) has an analytical solution (see McFadden, 1973) that is equation (6).

$$s_{jt}(\cdot) = \int \prod_{r \neq j \neq 0} \text{Prob}\left(\in_{irt} < \in_{ijt} + \delta_{jt} - \delta_{rt} \mid \in_{ijt}\right) f(\in_{ijt})\, d \in_{ijt} \qquad (5)$$

As a result, market shares s_{jt} do not depend on consumers' characteristics, they depend only on options' characteristics, where $\delta_{njt} = \delta_{jt} \; \forall j$. Note that if two product-firms have the same observable characteristics, the model predicts the same market share for both.

$$s_{jt}(\delta_{jt}) = \frac{\exp(\delta_{jt})}{\sum_{r=0}^{J} \exp(\delta_{rt})} \qquad con \;\; s_{jt}(\cdot) = \begin{cases} \dfrac{\exp(\delta_{jt})}{1 + \sum_{r=1}^{J} \exp(\delta_{rt})} & \forall j \neq 0 \\ \dfrac{1}{1 + \sum_{r=1}^{J} \exp(\delta_{rt})} & j = 0 \end{cases} \qquad (6)$$

Equation (7) is the normalization of (6) respect to the outside option.

$$\frac{s_{jt}(\cdot)}{s_{0t}(\cdot)} = \exp(\delta_{jt}) \quad \forall j \qquad (7)$$

The standard definition of the share of a firm in the market is its amount of operations over the total amount of operations of the industry. However, in this paper the definition of the shares must

[7] In addition there are several dummy variables included: dummy for large entities, dummy for entities that provided more than 20% of their loans to individuals, dummy for entities that provided more than 25% of their loans as pledge loans, dummy for entities that provided more than 18% of their loans as credit card loans, dummy for non-banking entity, dummy for changes in the ownership of the institution and dummy for public institution.

include the outside options for investment or loans (depending on the relevant market) which represent the alternative of not consuming these services from the financial institutions in the sample. These variables depend on the definition of the potential size of the markets and therefore on the definition of a relevant unit of operations[8]. The shares of the firms can be recalculated based on the potential size of the market, M_t, that is the product of the relevant unit of operations and the relevant population. Thus, the unit of operations is the weighted average across entities of the amount of operations over the quantity of operations, and the relevant population is calculated based on the country population over the poverty line (See appendix B for further details).

Finally, equation (8) is one of the equations to be estimated. That is the logarithmic difference between market shares which is equal to the mean utility.

$$\ln\left(s_{jt}^{d}(\cdot)\right)-\ln\left(s_{0t}^{d}(\cdot)\right)=\delta_{jt}^{d} \qquad \text{donde: } \delta_{jt}^{d}=\beta_1 p_{jt}^{d}+\alpha_1\ r_{jt}^{d}+\lambda_1\ln\left(s_{jt-1}^{d}\right)+\gamma_1 x_{jt}^{d}+\zeta_j^{d}+\xi_{jt}^{d} \tag{8}$$

Active interest rates are expected to hold a negative relationship with mean utilities in equation (8), contrarily to passive rates in equation (9).

$$\ln\left(s_{jt}^{L}(\cdot)\right)-\ln\left(s_{0t}^{L}(\cdot)\right)=\delta_{jt}^{L} \qquad \text{donde: } \delta_{jt}^{L}=\beta_2 p_{jt}^{L}+\alpha_2\ r_{jt}^{L}+\lambda_2\ln\left(s_{jt-1}^{L}\right)+\gamma_2 x_{jt}^{L}+\zeta_j^{L}+\xi_{jt}^{L} \tag{9}$$

The linear specification of (8) and (9) make possible to apply OLS methods to estimate the values of its parameters. Nevertheless, OLS is not a consistent estimator mostly due to the endogeneity of the prices. Thus, section III proposes consistent estimators for this specification.

Nested logit approach

In a logit model the probabilities for all the different alternatives change by the same proportion when an attribute of another particular alternative changes. This structure of substitution among alternatives may not be appropriate for the industry of financial intermediary services.

To capture implicit sources of correlation among the unobserved portions of utility, an alternative approach to model consumer decision-making assumes that the vector of unobserved utility $\in_n$ has a cumulative distribution generalized extreme value distribution (GEV) of the equation (10).

$$\exp\left(-\sum_{k=1}^{K}\left(\sum_{j\in B_k} e^{-\in_{nj}/\tau}\right)^{\tau}\right) \tag{10}$$

Where $k=1,\ \dots\ K$ denote the different non-overlapping subsets of products (nests) and τ is a measure of the degree of independence in unobserved utility among the alternatives in nest k[9]. A nested logit model is appropriate when the set of alternatives faced by a consumer can be partitioned

[8] See the details in the data section and appendix B variables Pares_cred y Pares_obl.

[9] Note that when $\tau = 1$ the nested logit model becomes a standard logit.

into *nests*. In this case the nests are defined based on whether the products are mainly oriented to institutional customers or individual customers[10].

The nested logit model reduces the inconvenience of independence from irrelevant alternatives (IIA), that is equality among the cross-elasticities[11], by allowing consumer preferences to be correlated within product categories. Under this model the IIA holds within each nest but it is not valid among nests. That is, for any two alternatives in *different* nests, the ratio of probabilities can depend on the attributes of other alternatives in the two nests. Therefore, if an alternative were removed, the probabilities of choosing any alternative in the same nest increase equally, but this increase would be different in case of alternatives of other nests. It is intuitive that if an institution oriented to offer financial products to firms (in nest $k=1$) would be removed, the increase in the probabilities of choosing an institution oriented to individual customers (in nest $k=2$) would be less than the one among products of nest $k=1$.

Then under the nested logit model expression, equation (11) is the logarithmic difference between market shares. Where $s_{jt|B_k}$ is the market share of institution j, which belongs to nest B_k, as a fraction of the total nest share. See Berry (1994) for further references.

$$\ln(s_{jt}) - \ln(s_{0t}) = \delta_{jt} + (1-\tau)\ln(s_{jt|B_k}) \tag{11}$$

Where $\delta_{jt} = \beta p_{jt} + \alpha\, r_{jt} + \gamma x_{jt} + \zeta_j + \xi_{jt}$. Thus the estimation of the parameters in (11) requires more instruments, given that the $s_{jt|B_k}$ are endogenous. Thus, section III also proposes consistent estimators for this specification.

III. Methodology of estimation and instruments

The models in equations (8) (9) and (11) include idiosyncratic constants to consider factors that differ among entities but remain constant during the period. Nevertheless, the estimation of the parameters of the demand functions cannot be recovered by fixed effects methodologies, given that characteristics like prices and shares of the products in their nest are endogenous (that is, correlated with unobserved factors). As a result, the demand equations are differentiated to be estimated using instruments in place of their endogenous variables.

Despite the different specifications of the demand of loan and investment services, the instruments can be classified as supply side variables, or cost shifters, exogenous characteristics, predetermined characteristics and characteristics of the competitor firms (BLP instruments, see Berry, Levinsohn and Pakes, 1995). Cost shifter variables affect the marginal cost and only have an impact

---

[10] Note that the outside option is the only alternative of its nest.
[11] See appendix A.

on the demand quantities through the market prices. Then labor costs per worker and general costs per branch are the available cost shifter instruments in the sample[12]. Additionally, we assume that demand unobservables are mean independent of some firm characteristics and then they are taken as exogenous. For instance, the decision to open a branch is determined by strategies to attract new customers, and not by the number of existing customers. Then shocks that affect the demand of the firm in previous periods must not have an impact on these characteristics. This is the case of variables such as the number of ATMs, branches, provinces with branches, branch density, employee per branch and dummy variables that identify whether the firm is public and the main type of loans offered.

Nevertheless, we cannot assume all the observable characteristics are exogenous. Other characteristics might be determined contemporaneously with the share of the entity in the market and they may be instrumented by their lags. Among these characteristics are those related to indicators of risks of firms (such as non-performing loans and loan loss provisions), organizational and development expenses and market participations in previous periods.

Finally, BLP instruments are competitors' characteristics such as branches per firm, workers per branch, non-performing loans, branch density and organizational and development expenses. Given that products with close substitutes tend to have lower markups, competitors' characteristics are expected to be correlated with their prices, while the demand of the product only depends on its own characteristics. Likewise, in the nested logit specification, the characteristics of other firms in their nest are also instruments for the market share of one firm in its nest (see Berry, 1994) that is the additional term in this model. The instruments used in each specification are in table3 in appendix C.

Assuming that some of the endogenous variables are predetermined in levels, the demand equations are estimated with (?) differences by generalized method of moments (GMM), using their lags as instruments (Arellano and Honoré, 2001). Besides, the models are also estimated by system GMM using additional conditions proposed by Blundell and Bond (1998) [13]. Then the set of instruments are[14] $Z_j = \left[Z_{1j} \ \ldots \ Z_{\tau j} \ \ldots \right]$, and the orthogonality conditions are given by equations (12) and (13)[15].

$$E\left[g_j^d \left(\theta^d \right) \right] = E\left[Z_j' \Delta\xi_j^d \left(\delta^d \right) \right] = \mathbf{0} \ con \ \theta^d = \theta_0^d \tag{12}$$

$$E\left[g_j^L \left(\theta^L \right) \right] = E\left[Z_j' \Delta\xi_j^L \left(\delta^L \right) \right] = \mathbf{0} \ con \ \theta^L = \theta_0^L \tag{13}$$

Equation (14) represents a set of consistent estimators of the models, where W is a symmetric positive definite square matrix (mxm, with m being the quantity of instruments in Z_j) and

[12] These instruments can fail if cost variables reveal components of quality of the products that are not constant in the time and are not captured by the demand specification. In this sense, it is expected that the demand functions are properly specified.

[13] See appendix B.

[14] Where $Z_{\tau j} = \left[z_{\tau j1} \ z_{\tau j2} \ \ldots \ z_{\tau j(T-2)} \right]'$

[15] See Robert et. al. (2002) for a further analysis of the independency between these markets.

converges in probability to a non-stochastic matrix. In this case, the estimator in (14) is linear in the parameters.

$$\hat{\theta} = \arg\min_{\theta \in \Theta} \left[J \sum_{j}^{J} \frac{g_j(\theta)'}{J} \hat{W}_{mxm} \sum_{j}^{J} \frac{g_j(\theta)}{J} \right] \quad (14)$$

Where the optimal weighted matrix is $W^* = \left\{ E\left[\sum_{j=1}^{J} Z_j' \Delta\xi_j \Delta\xi_j' Z_j \Big/ J \right] \right\}^{-1}$ and it is used to calculate the estimations, the tests and the standard deviations. Table 1 shows the results for the estimations of the parameters. The Hansen tests of joint validity of the instruments, under the proposed specification, reject the hypothesis of endogenous instruments, and the tests of correlation of the residuals in levels do not reject the proposed specifications.

IV. Identification and construction of the variables

Sources of data

The coverage of the sample is the first quarter of 2005 to the first quarter of 2007. This period is relevant due to its relative financial and macroeconomics stability. The aftermath of Argentina's economic crisis of 2001 showed important distortions in the balance sheets of the financial firms. Therefore, the selection of a period of relative favorable macroeconomic expectations is a key for understanding the potential trends of competence in the Argentina's financial market.

Most of the data is obtained from the monthly balance sheets that the financial institutions report to the Central Bank of Argentina, and some of the variables related to the characteristics of the firms are compiled quarterly. The variables related to indicators of service quality such as expenses in development and fixed goods are deflated by the price indexes from the National Institution of Statistics (Indec).

The disaggregated information of the monthly balance sheets gives the input to calculate the implicit interest rates. The implicit active (or passive) interest rate is the ratio of the financial incomes (expenses) to the quarterly average of the relevant assets (passives). The denominator of the active interest rate includes loan accounts and other loans for financial intermediation, while in the case of passive interest rates, it includes deposits and other obligations. These definitions are similar to the criteria used to calculate the implicit interest rates published by the Central Bank. However, they are not used because they are mobile averages of the last twelve months and because they include only some loans and obligations. According to the Manual of Accounts of the Superintendence of Financial Entities, the accounts of financial incomes and expenses are reported accumulatively. Thus these accounts must be differentiated to obtain their monthly flows and calculate the average quarterly interest rates.

The implicit monthly rates of reference are the rate of the BCRA bills (Lebacs) and the interbank rate Buenos Aires Interbank Offered Rate (Baibor), both annualized. The Baibor rate is the average of the interbank interest rates that were offered by 22 financial institutions selected by the BCRA for their quality. The monthly Lecac rates are not available monthly due to gaps in the emissions of BCRA bills. Therefore, the two quarterly gaps were filled with the average of the predictions obtained with three samples with data from the third quarterly of 2003 to the first quarterly 2007. The samples are the interest rates of emissions of Lebacs to 30-90 days, 90-180 days, 180-270 days[16]. These samples were used in different ARMAX[17] models to obtain predictions for the non-available Lebac monthly rates.

Finally, the total population and the percentage of population below the poverty line, which are used to calculate the potential size of the market, come from the Indec and the Ministery of Economy of Argentina (for further details see annex B).

General characteristics of the database

The sample excludes entities that show inconsistencies or outliers in their data. In this stage, the sample becomes two different samples according to the criteria of selection for financing or investment services. The former considers inconsistencies or outliers in financial incomes and implicit active interest rates while the latter is defined on financial outcomes and implicit passive interest rates.

Therefore, four entities were eliminated for having negative flows of financial incomes or outcomes,[18] and six entities were excluded because they reported at least two consecutive quarterlies without flows for loans or deposits, while reporting a positive amount of loans or deposits (after excluding current accounts that yield no interest). Also, the data does not include firms that showed a standard deviation of the interest rates larger than three times the mean of the deviations. The sample for investment (or financing) services also left out firms with zero deposits (or loans). Finally, an entity was excluded for having negative flows of general expenses for more than two consecutive quarters and three financial companies also were excluded because their passive rates exceeded the active ones.

As a result, the samples attain different sizes. The sample for financing services has 69 firms (accounting for approximately 98 percent of the funds devoted to financing services) and the sample for investment services has 64 firms (accounting for approximately 97 percent of the funds collected by investment services). The nests were built based on the main target customers: individual

[16] With 18, 17 y 12 observations correspondingly.
[17] ARMAX(2, 2) with the series of 30-90 days and 90-180 days and ARMAX(1,4) with the series of 180-270 days.
[18] Having into account that financial flows of incomes or outcomes are not explicitly available in the balance sheets and they were calculated from differentiating the accounts of results. These accounts record accumulated balances from the corresponding balance sheet date.

customers or institutional customers. The non-overlapping nests have 12 entities for institutional customers of financing services and eight entities for institutional customers of investment services.

V. Results for the demand systems

The table 1 shows the estimations of the parameter in equations (8), (9) and (11) for financial and investment services. Columns (1), (2), (4) and (5) are derived from a multinomial logit specification and are estimated by two step robust system GMM. Columns (1) and (2) share the same explanatory variables as well as columns (4) and (5) share the same specification. They only differ regarding their instruments, given that columns (2) and (5) do not include the BLP's ones (for further details of the instruments see table 3 in appendix C). Columns (3) and (6) are derived from a nested logit specification and the transformed model is estimated by two step robust system GMM with BLP's instruments. Note that even when all the estimations include GMM Arellano-Honoré and Blundell-Bond orthogonality conditions, they also include variables taken as exogenous and explanatory variables instrumented by others than their own lags.

Table 1: Estimation Results

Dependent variable: $\ln\left(s_{jt}^{l}(\cdot)\right)-\ln\left(s_{0t}^{l}(\cdot)\right)$	**GMM sys (1)**	**GMM sys excl. BLP (2)**	**GMM sys Nested (3)**	**Dependent variable:** $\ln\left(s_{jt}^{d}(\cdot)\right)-\ln\left(s_{0t}^{d}(\cdot)\right)$	**GMM sys (4)**	**GMM sys excl. BLP (5)**	**GMM sys Nested (6)**
ra_trim_anlz	-12.1135***	-11.8069***	-32.5110***	rd_trim_anlz	63.2727***	61.5157***	78.4147***
	(4.1176)	(4.4270)	(7.8964)		(17.3243)	(17.8812)	(22.3486)
l.ln_Sh_credit	0.8716***	0.8605**		l.ln_Sh_Inv	0.8770***	0.8373***	
	(0.3188)	(0.3998)			(0.1917)	(0.2647)	
ln_Shjk_credit			0.4881***	ln_Shjk_Inv			0.7184***
			(0.1586)				(0.2727)
ln_Ing_serv_over_prest_anlz	-4.5939	-4.2862	-3.7562	ln_Ing_serv_over_dep_anlz	-12.4364	-9.3169	-15.7043*
	(5.0653)	(5.6997)	(14.4564)		(14.4589)	(13.0498)	(8.6239)
ln_cred_irrec_s_act	3.9080	4.3424		ln_cgos_incob_s_act_cens			-40.1957
	(3.5785)	(3.6767)					(29.8720)
ln_fil_Resto_t	1.4050**	1.4121*		bs_uso_s_filyDep			-0.0001***
	(0.5532)	(0.7561)					(0.0000)
log(l.num_Pcias_t)	-2.0865**	-2.0811**		L_x_fil_t			-0.0031
	(0.9242)	(0.9795)					(0.0025)
depcia_hab_t	0.0109**	0.0109*		l.ln_ATM_s_Pcias_t			-0.1098
	(0.0052)	(0.0059)					(0.0760)
log(L_x_fil_t)	-0.1889	-0.2149		l.Gtos_des_s_filyDep			0.0009***
	(0.2311)	(0.2889)					(0.0003)
ATM_t	0.0040**	0.0040*	0.0025***	dummy_big			1.2670*
	(0.0019)	(0.0020)	(0.0007)				(0.6915)
log(l.Gtos_des_s_fil)	0.0392	0.0365		dummy_person			0.6812
	(0.0563)	(0.0587)					(0.5032)
Ind_person	0.2722	0.2496		Ind_noBank			-3.9817***
	(0.5920)	(0.6550)					(1.2915)
Ind_cons	-0.2216	-0.2456		dens_fil	0.0233	0.0143	
	(0.4335)	(0.6072)			(0.0268)	(0.0468)	
fil_ext_t	-0.1794	-0.1912		l.num_Pcias_t	0.0483*	0.0487**	
	(0.1847)	(0.2094)			(0.0276)	(0.0228)	
log(l2.pl_fijo_s_rec_fin_compl_t)	-0.0900	-0.0938		ATM_t	-0.0026*	-0.0029*	
	(0.0880)	(0.0949)			(0.0015)	(0.0016)	
l.dummy_prend	0.4780**	0.4745*		log(l.Gtos_des_s_fil)	-0.4435**	-0.4257**	
	(0.1935)	(0.2488)			(0.1752)	(0.1936)	
log(Prest_Card_s_cred_t)	-0.1121	-0.1370		publicbank	1.4611*	1.6328	
	(0.1875)	(0.2984)			(0.8513)	(1.1415)	
hand_chge_t	0.2754	0.2938		Person_s_cred_t	0.0378*	0.0354*	
	(0.4435)	(0.4316)			(0.0205)	(0.0208)	
publicbank			-1.2542***				
			(0.4837)				
dummy_person			-2.0303				
			(2.9437)				
Person_s_cred_t			0.1428				
			(0.0926)				
Gtos_des_s_filyDep			-0.0030				
			(0.0020)				
dummy_Card			4.0673				
			(2.6371)				
Observations	467	467	604	Observations	505	505	504
Number of entities	68	68	69	Number of entities	64	64	64
Number of instruments	32	30	26	Number of instruments	24	22	27
Hansen test	5.029	4.730	7.172	Hansen test	1.992	1.108	3.113
Prob > chi2	0.754	0.579	0.619	Prob > chi2	0.960	0.953	0.927
Sargan test	6.700	5.056	75.72	Sargan test	2.92	1.511	8.023
Prob > chi2	0.569	0.537	0	Prob > chi2	0.892	0.912	0.431
Wald	5964	2840	2146	Wald	2093	1643	1514
Prob > chi2	0	0	0	Prob > chi2	0	0	0
Ar(2) in diff. test	-1.186	-1.169	0.954	Ar(2) in diff. test	1.128	1.164	-0.509
Pr > z	0.236	0.243	0.340	Pr > z	0.259	0.245	0.610
Ar(1) in diff. test	-1.926671	-1.8003	-1.7610	Ar(1) in diff. test	-2.239	-2.162	-1.749
Pr > z	0.0540	0.0718	0.0782	Pr > z	0.0252	0.0306	0.0803

References: Robust standard errors in brackets. * Significant at 10%, ** Significant at 5%, *** Significant at 1%. Temporal dummies were included but they are not reported. Prefix l. indicates a lag of the variable and the prefix 12. indicates two lagged periods of the variable.

Independent of the BLP's instruments, the results are similar for the logit specifications. In case of the demand for loans, the active implicit interest rate, the lags of the market share are significant and show the expected sign. In case of the demand for investment services, the passive implicit interest rate, the lags of the market share are also significant and show the expected sign. Among the control variables, some are also significant though they are used as proxies of unobservable factors. Other more detailed characteristics would be interesting to include, but there is no more detailed information; therefore, the results for these particular control variables are not an aim of this paper[19]. Columns (3) and (6) shows the results for the nested logit specification where also the interest rates and the market shares of the entity in the nest are significant and have the expected signs.

All the specifications are not rejected under the standard tests. The Hansen tests -- consistent in the presence of arbitrary intra-cluster correlation -- do not reject the null hypothesis of joint validity of the instruments given the number of overidentifying restrictions. Additionally, it is important to test for autocorrelation of the residual error because some instruments are lags. That is the AR(2) tests in differences do not reject the null of no serial correlation in levels (while the AR(1) tests in differences do reject the null of no serial correlation in differences as expected at the 10 percent significance level).

Note that the results for the logit and the nested logit specifications cannot be compared directly because they are constants in different equations of price elasticities. The next section compares the results across models.

VI. Elasticities for the entities of the industry

This section proposes a model of the financial intermediation business. The budget restriction of the entity j for each period is determined by the equation (13).

$$B_j + L_j + \rho D_j = D_j \tag{13}$$

Where the obligations for the financial entity j are D_j, the loans L_j and the alternative option of investing the available funds in low risk bonds are $B_j > 0$, or $B_j < 0$ when the entity needs additional funds to operate. To simplify the model and represent the relevant portion of the business, the budgetary restriction assumes proportional bank reserves denoted by ρ, and also assumes that there is no equity. Additionally, the fees charged for financial services are taken as proportional to their respective amounts of loans or entities' obligations[20]. Thus equation (14) is the benefits of entity j.

[19] It is expected that some variables decrease their level of significativity due to the inclusion of a lag of the share of the entity in the logit specification which could be correlating with some observable characteristics.
[20] It is assumed that the coefficients of proportionality are equal to 1.

$$\Pi_j = w\, r^{*d}\left(B_j + \rho D_j\right) + (1-w)\, r^{*l}\left(B_j + \rho\, D_j\right) + p_j^l L_j + p_j^d D_j + r_j^l L_j - r_j^d D_j - C_j\left(L_j, D_j\right) \qquad (14)$$

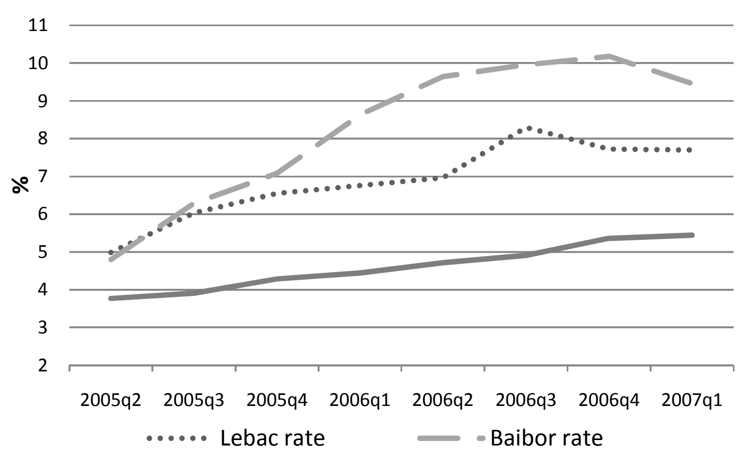
Where the last term is the cost function, p^l and p^d are the implicit fees of the related financial services (loans and investments correspondingly) and w is the binary variable of equations (15).

$$with \begin{cases} w = 1 \; if \; \left(B_j + \rho D_j\right) > 0 \\ w = 0 \; if \; \left(B_j + \rho D_j\right) < 0 \end{cases} \qquad (15)$$

The binary variable w allows equation (14) to model the opportunity cost of the funds with two local interest rates of reference. The implicit rate of the Lebacs to one month, r^{*d}, is taken as the reference rate to invest funds in a capital market asset with a low risk. That is why this is the reference rate for entities that have an excess of loanable funds and then $w=1$. These entities have at least the possibility of obtaining the returns of Lebacs for their exceeding funds. Besides there are entities that need additional funds to finance their granted loans and thus their reference rate is the Baibor rate, r^{*l}. This rate is a proxy for the interest rate effectively paid by each entity in the market, due to the actual rate is not reported and the Baibor is an average of the rate that the main entities have paid during the relevant period.

Figures 1 and 2 show the sample average of the quarterly passive and active rates, and compare them with the reference rates: the monthly Baibor and Lebac rates.

Figure 1: Comparison of the passive implicit interest rate and the reference rates



Source: own elaboration based on data of Central Bank of Argentina

When $w=1$, the entity gains the differential between the yield obtained from its funds invested in loans and low risk assets, and the interests that it pays for the funds to its customers. And when $w=0$, the entity gains the differential between the yield obtained from its funds invested in loans and it is assumed that it pays the Baibor rate for its additional funds. Therefore, the construction of the passive interest rate paid special attention to including operations that generate expenses by interest and involve funds granted to the entity by its customers. As a result, the entity obtains benefits for the kind of service that it is providing. If it provides investment services, it obtains larger incomes than an entity obtaining funds from other financial institutions. The same also applies if the entity grants loans, comparing to the incomes that it would gain for investing in low risk assets. Thus services provided by financial intermediaries should be oriented to agents or kind of operations that are restricted in capital markets. The ability to provide services to depositors and to match differentials of risk and maturities to provide loans is the foundation of their added value. (See Wang, 2003 and Fixler, Reinsdorf and Smith, 2008)

Figure 2: Comparison of the active implicit interest rate and the reference rates

Source: own elaboration based on data of Central Bank of Argentina

After some algebra using equations (14) and (13), the benefits of entity j are equation (16).

$$\Pi_j = \left[p_j^d - r_j^d + \left(wr^{*d} + (1-w) r^{*L} \right) - mc_j^d \right] s_j^d M^d + \left[p_j^L + r_j^L - \left(wr^{*d} + (1-w) r^{*L} \right) - mc_j^L \right] s_j^L M^L - Cf_j \quad (16)$$

Where M_t is the potential size of the market, and then $D_j \equiv s_j^d M^d$ and $L_j \equiv s_j^L M^L$. The marginal cost by unit of granted loan is mc_{jt}^L, and similarly mc_{jt}^d is the marginal costs by investment services. Finally, Cf_j are time constant fixed costs.

Financing institutions maximize their benefits given by equation (16), where marginal costs vary across entities but are independent of their scale of operations. Assuming that observed prices are the result of an interior, pure strategy Nash equilibrium in prices, then each firm makes the choice of modifying its price assuming that its competitors will keep their prices unchanged. As a result, first order conditions are obtained from equation (16). Under the existence of an internal pure strategy equilibrium and prices strictly positive, each entity maximizes its benefits given its characteristics (attributes) and the prices and characteristics of its competitors. The marginal costs can then be obtained from the first order conditions in equations (17) and (18), replacing with the available data and the estimations of the parameters of the demand functions.

$$\frac{\partial \Pi_j}{\partial r_j^L} = \left(p_j^L + r_j^L - \left(wr^{*d} + (1-w) r^{*L} \right) - \frac{\partial C_j}{\partial s_j^L} \right) \frac{\partial s_j^L}{\partial r_j^L} M^L + s_j^L M^L = 0 \tag{17}$$

$$\frac{\partial \Pi_j}{\partial r_j^d} = \left(p_j^d - r_j^d + \left(wr^{*d} + (1-w) r^{*L} \right) - \frac{\partial C_j}{\partial s_j^d} \right) \frac{\partial s_j^d}{\partial r_j^d} M^d - s_j^d M^d = 0 \tag{18}$$

To compare the results across the different specifications of the demand functions, equation (19) provides the price elasticity for entity j under the multinomial logit specification and equation (20) provides it for the nested logit one (in the same nest). See Appendix A for further details). Notice that the elasticity of the multinomial logit depends on the parameters, the interest rate and the market share of the entity, while in case of the nested logit the elasticity also depends on the share of the entity in its own nest.

$$\frac{\partial s_j}{\partial r_j} \frac{r_j}{s_j} = \frac{\alpha\, r_j}{\left(1-\lambda\left(1-s_j\right)\right)} \tag{19}$$

$$\frac{\partial s_j}{\partial r_j} \frac{r_j}{s_j} = \frac{r_j \alpha}{\lambda} \left(1 + (\tau - 1) s_{j|B_l} - \tau s_j \right) \tag{20}$$

Table 2: Averages of the active interest rate elasticity by deciles

Deciles	GMM sys			GMM sys excl. BLP			GMM sys Nested		
	Elast.*	Elast.**	Std.**	Elast.*	Elast.**	Std**	Elast.*	Elast.**	Std**
	alpha: -12.11			*alpha: -11.81*			*alpha: -32.51*		
1º	-40.20	-39.17	3.87	-36.06	-35.13	3.47	-27.60	-26.86	2.73
2º	-22.58	-21.32	1.83	-20.25	-19.12	1.64	-14.88	-14.29	1.70
3º	-16.93	-16.95	2.69	-15.18	-15.20	2.42	-10.71	-11.27	2.00
4º	-14.13	-13.73	1.70	-12.67	-12.32	1.52	-9.21	-7.92	1.52
5º	-12.63	-13.35	1.38	-11.34	-11.99	1.24	-8.44	-8.95	1.68
6º	-11.74	-12.52	2.79	-10.56	-11.25	2.51	-8.01	-8.59	1.47
7º	-11.13	-11.21	0.75	-10.01	-10.09	0.67	-7.55	-7.62	1.25
8º	-10.50	-10.97	2.09	-9.47	-9.88	1.88	-6.99	-7.50	1.20
9º	-9.56	-9.84	1.27	-8.63	-8.91	1.15	-6.28	-6.54	1.61
10º	-7.24	-7.24	1.47	-6.53	-6.53	1.33	-4.87	-4.89	0.95
Mean	-15.20	-15.20	1.96	-13.66	-13.66	1.76	-10.21	-10.21	1.60

*Deciles of elasticicies by descending order in absolute value. ** Average of elasticities by increasing deciles of Lerner Indexes. These results are obtained from the same composition of entities used for the estimations in table xx, with 69 entities.
Source: Own elaboration based on the results of the models proposed in this paper.

Table 2 shows the mean direct elasticity of the active interest rate in the demand for loans for the entities that are included in the sample. An increase of 1 percent in the annualized active interest rate, gives an average decrease of 13 percent in the market shares of the entities. These elasticities are noticeable larger than the elasticities found by Nakane, M. et al. (2006) in the Brazilian financial intermediation industry, with an average of 1.4 percent.

Table 3 shows the mean direct elasticity of the passive interest rate in the demand for investment services for the entities included in the sample. In this case, the mean elasticity among the estimated models is approximately 17 percent. Therefore an increase of 1 percent in the annualized passive interest rate gives an average increase in the market share of 17 percent. Comparing this result, it is similar to the average found by Nakane, M. et. al. (2006), although Dick (2002) calculated an average of approximately 6 percent.

Table 3: Averages of the passive interest rate elasticity by deciles

Deciles	**GMM sys**			**GMM sys excl. BLP**			**GMM Nested**		
	Elast.*	Elast.**	Std**	Elast.*	Elast.**	Std**	Elast.*	Elast.**	Std**
	alpha: 63.27			*alpha: 61.51*			*alpha: 78.41*		
1º	49.187	21.897	2.984	36.197	16.117	2.199	26.721	11.902	1.627
2º	33.375	18.985	3.261	24.620	14.025	2.410	18.038	10.579	1.742
3º	27.455	24.261	4.360	20.405	18.401	3.691	15.179	10.560	1.734
4º	23.013	18.147	3.011	17.188	11.471	1.421	13.186	12.339	2.390
5º	20.168	18.699	3.244	15.127	15.640	2.817	11.693	11.397	1.754
6º	18.793	25.045	4.394	14.155	17.989	2.926	10.871	11.788	2.041
7º	17.435	30.416	4.536	13.217	20.435	3.743	10.045	13.545	2.316
8º	16.068	26.771	3.858	12.033	21.038	2.303	9.144	15.962	2.489
9º	12.966	21.964	4.911	9.834	17.980	3.086	7.514	15.400	2.393
10º	9.384	15.236	2.452	7.061	11.876	3.000	5.521	10.564	2.550
Mean	22.23	22.23	3.72	16.58	16.58	2.78	12.50	12.50	2.12

*Deciles of elasticicies by descending order. ** Average of elasticities by increasing deciles of Lerner Indexes. These results are obtained from the same composition of entities used for the estimations in table xx, with 64 entities.
Source: Own elaboration based on the results of the models proposed in this paper.

VII. Marginal costs and Lerner indexes

The price-cost margins can be calculated from equations (21) and (22)[21] and derived from the first order conditions[22].

$$p_j^L + r_j^L - \left(wr^{*d} + (1-w)\, r^{*L}\right) - mc_j^L = -s_j^L \left(\frac{\partial s_j^L}{\partial r_j^L}\right)^{-1} \tag{21}$$

$$p_j^d - r_j^d + \left(wr^{*d} + (1-w)\, r^{*L}\right) - mc_j^d = s_j^d \left(\frac{\partial s_j^d}{\partial r_j^d}\right)^{-1} \tag{22}$$

The marginal costs for the multinomial specification are given by equations (23) and (24), while the marginal costs for the nested logit specification are given by equations (25) and (26). Note that the differences among these models are due to differences in the elasticities of the demand functions.

[21] The spread compatible with the model can be obtained subtracting equations (21) and (23).
[22] Note that the optimal pricing rules, the rates are both functions of the reference rates, and neither is a function of the other.

$$mc_j^L = p_j^L + r_j^L - \left(wr^{*d} + (1-w)r^{*L}\right) + s_j^L \left(\frac{\alpha_1 \left(s_j^L\right)}{\left(1-\lambda_1\left(1-s_j^L\right)\right)} \right)^{-1} \quad (23)$$

$$mc_j^d = p_j^d - r_j^d + \left(wr^{*d} + (1-w)r^{*L}\right) - s_j^d \left(\frac{\alpha_2 \left(s_j^d\right)}{\left(1-\lambda_2\left(1-s_j^d\right)\right)} \right)^{-1} \quad (24)$$

Given that this industry offers heterogeneous products, the market power of each firm depends on its ability to differentiate itself from its competitors. That is why the interest rates depend on the price elasticities of the demand function and the Lerner index considers this characteristic to measure the market power of the firms. The Lerner indexes are then the price-cost margins as percentage of the prices.

$$mc_j^L = p_j^L + r_j^L - \left(wr^{*d} + (1-w)r^{*L}\right) + \frac{\tau_1}{\alpha_L}\left(1 + (\tau_1 - 1)s_{j|B_l}^L - \tau_1 s_j^L\right)^{-1} \quad (25)$$

$$mc_j^d = p_j^d - r_j^d + \left(wr^{*d} + (1-w)r^{*L}\right) - \frac{\tau_2}{\alpha_d}\left(1 + (\tau_2 - 1)s_{j|B_l}^d - \tau_2 s_j^d\right)^{-1} \quad (26)$$

The Lerner Index for the loan and investment services are equations (27) and (28), and they depend on the price elasticity of the demand, and the share of the entity in the market (and in its nest for the nested logit specification). The measures of concentration based just in market shares are incomplete because they consider only one relevant dimension. Therefore, the Lerner index may be a better indicator of the market power of the entities in the financial intermediation industry.

$$Lerner^L = \frac{p_j^L + r_j^L - \left(wr^{*d} + (1-w)r^{*L}\right) - mc_j^L}{p_j^L + r_j^L} = \frac{-s_j^L \left(\frac{\partial s_j^L}{\partial r_j^L}\right)^{-1}}{p_j^L + r_j^L} \quad (27)$$

$$Lerner^d = \frac{p_j^d + \left(wr^{*d} + (1-w)r^{*L}\right) - r_j^d - mc_j^d}{p_j^d + \left(wr^{*d} + (1-w)r^{*L}\right)} = \frac{s_j^d \left(\frac{\partial s_j^d}{\partial r_j^d}\right)^{-1}}{p_j^d + \left(wr^{*d} + (1-w)r^{*L}\right)} \quad (28)$$

Table 4: Average of marginal costs, margins over the prices and Lerner indexes for the loan service industry (ordered by deciles of Lerner indexes).

	GMM sys			GMM sys excl. BLP			GMM sys Nested		
Deciles	Costs	Margin	Lerner	Costs	Margin	Lerner	Costs	Margin	Lerner
	Lc	Lc	%	Lc	Lc	%	Lc	Lc	%
1º	0.469	0.011	2.04	0.467	0.012	2.28	0.475	0.016	3.01
2º	0.197	0.011	3.78	0.196	0.012	4.22	0.191	0.016	5.92
3º	0.134	0.011	4.97	0.132	0.012	5.55	0.125	0.016	7.86
4º	0.102	0.011	5.86	0.101	0.012	6.54	0.095	0.016	9.22
5º	0.084	0.011	6.52	0.082	0.012	7.26	0.076	0.016	10.35
6º	0.069	0.011	7.55	0.067	0.012	8.40	0.066	0.016	11.32
7º	0.055	0.011	8.12	0.053	0.012	9.03	0.055	0.016	12.14
8º	0.042	0.011	8.98	0.041	0.012	9.97	0.051	0.016	13.04
9º	0.036	0.012	9.96	0.034	0.013	11.01	0.029	0.016	15.36
10º	0.003	0.012	14.28	0.002	0.013	15.76	0.001	0.017	21.13
Mean	0.113	0.011	7.33	0.111	0.012	8.14	0.111	0.016	11.05

Source: Own elaboration based on the results of the models proposed in this paper.

Tables 4 and 5 show the marginal costs, the margin over the costs in (local currency) and the Lerner indexes for both markets by deciles (of Lerner indexes).

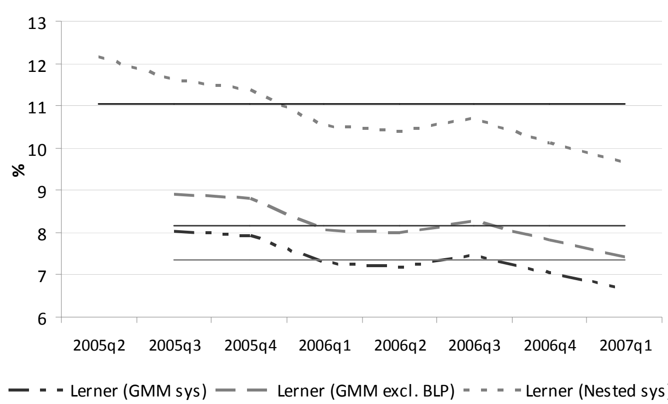
Table 5: Average of marginal costs, margins over the prices and Lerner indexes for the investment service industry (ordered by deciles of Lerner indexes).

	GMM sys			**GMM sys excl. BLP**			**GMM sys Nested**		
Deciles	Costs	Margin	Lerner	Costs	Margin	Lerner	Costs	Margin	Lerner
	Lc	Lc	%	Lc	Lc	%	Lc	Lc	%
1º	0.136	0.002	1.12	0.135	0.003	1.52	0.134	0.004	2.06
2º	0.091	0.002	1.55	0.090	0.003	2.10	0.089	0.004	2.81
3º	0.065	0.002	1.78	0.064	0.003	2.38	0.075	0.004	3.14
4º	0.066	0.002	2.00	0.071	0.003	2.68	0.057	0.004	3.50
5º	0.059	0.002	2.10	0.053	0.003	2.81	0.052	0.004	3.82
6º	0.039	0.002	2.24	0.040	0.003	3.02	0.047	0.004	4.05
7º	0.023	0.002	2.43	0.027	0.003	3.28	0.036	0.004	4.24
8º	0.024	0.002	2.65	0.021	0.003	3.52	0.020	0.004	4.62
9º	0.028	0.002	2.80	0.024	0.003	3.76	0.016	0.004	4.95
10º	0.040	0.003	3.55	0.037	0.004	4.41	0.029	0.004	5.53
Mean	0.055	0.002	2.26	0.055	0.003	3.00	0.054	0.004	3.93

Source: Own elaboration based on the results of the models proposed in this paper.

In the market of loans, the average Lerner indexes vary from 2 percent to 21 percent, while in the market of financial investments they vary from 1 percent to 5.5 percent approximately, depending on the deciles and the model[23]. Therefore, the possibilities of gaining a larger market power are mainly in the loan service market.

Figure 3: Evolution of the average Lerner index for the loan services.



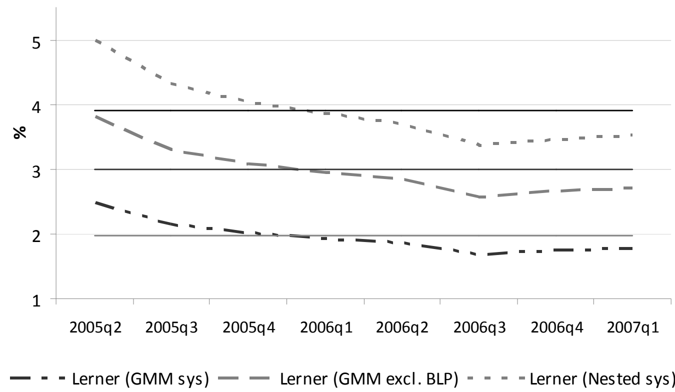
Source: own elaboration based on data of Central Bank of Argentina

Figures 3 and 4 show the average evolution of the Lerner index for the loan and investment markets. In both markets the average Lerner indexes decrease, about 2 percentage points for the loan services and 1 percentage point for the investment services. One explanation of such tendency is an

[23] There are certain anomalies in the obtained results. As a consequence of large Lerner indexes, 9.4% and 5.8% of the marginal costs are negatives for both models in the market of investment services and loans respectively. Some of the reasons for these results could be due to a lack of fit of the models, problems in the calculus of the implicit interest rates or a lack of adjust in the representativeness of the reference rates for these particular entities. However, the detailed study of these anomalies is out of the scope of this paper.

increase in the competency among entities. It is probable that this period of relative macroeconomic stability and favorable economic perspectives have fostered these results, given that there were not important changes in the structure of this industry[24]. Besides, the Lerner indexes for the investment services are lower, and although they decreased almost steadily until the third quarterly of 2006, they stabilized around 3.5 percent afterwards (for the nested logit specification).

Figure 4: Evolution of the average Lerner index for the investment services.



Source: own elaboration based on data of Central Bank of Argentina

Independent of the model specification, the Lerner indexes have decreased. The differences among the models are mainly in the calculated levels of price-costs margins. Where the nested logit specification gives the larger levels and the multinomial logit model (with BLP's instruments) gives the smaller ones.

VIII. Conclusions

This study contributes to the existing literature of "New Empirical Industrial Organization" (NEIO) applied to the financial intermediation industry in two dimensions. This is the first paper that estimates Lerner indexes for the financial intermediary industry of Argentina using structural demand models of differentiated products, and also this study proposes a model that has some differences with other models in this literature.

This paper uses balance sheets of the financial intermediary institutions of Argentina during the period 2005:q1-2007:q1. This period showed relatively stable financial circumstances and favorable macroeconomic perspectives, after the recovery from the recession of 1999-2002 that ended up in a currency and banking crisis.

---

[24] Regarding the macroeconomic stability, it is interesting notice that during the third quarterly of 2006, one relevant macroeconomic indicator, the Embi+, showed a short term increase. That might have affected the evolution of the Lerner indexes.

In the proposed model, the demands of the financial services come from consumers who are maximizing their utility as well as financial entities that are maximizing their benefits. For modeling the share of each entity, I used a multinomial logit modified to consider some persistence in the individual choice and a nested logit approach to relax the assumption of independence from irrelevant alternatives (IIA). Market equilibrium is assumed to be a Nash-Bertrand equilibrium, in which each firm takes the prices of its competitors as given. Finally, the marginal costs and the Lerner indexes can be calculated from the solution of the model.

The estimation strategy of the demand functions involves robust Generalized Method of Moments (GMM) in two stages and instrumental variables methodologies to avoid the simultaneity problem; given that the interest rates, the benefits and the concentration in the market are determined all together. Then, two different groups of demands are estimated; on one hand the demands for services of financial investments and, on the other hand, the demands for loans. The instruments for the demand functions are known as cost-shifters, BLPs (Berry, Levinsohn & Pakes, 1995) and the lags of the variables assumed predetermined.

The estimated coefficients for the control variables in the demand specifications have in general the expected sign. Besides, both implicit interest rates are significant at the 1 percent level. For the demand of deposits, this coefficient has a positive sign and for the demand of loans it has a negative sign. The coefficients of these rates are particularly relevant, given that they are used to calculate the price elasticities of each entity and, therefore, the Lerner indexes. The coefficients of the service fees are significant in only one specification (at only 10 percent) although they have the expected negative signs. For the multinomial specification, the lags of the market shares were significant at 1 percent, indicating some effect of signaling or persistence in the consumer choices. While in the case of the nested logit specification, the parameters related to the intra-group correlation are significant at 1 percent, which suggests that this specification may be valid.

According to the obtained parameters, the Lerner indexes, the price minus marginal cost as percentage of price, were calculated from the equations of the model. These indexes are a measure of the market power, which are expected to be zero under perfect competition and may be interpreted as a proxy of the loss of social welfare. Among the results, some evidence supports the presence of market power in the financial intermediation industry. This is especially true in the loan market where 24 percent and 44.5 percent of the market in the sample were concentrated by entities that had price-cost margins that exceeded 13 percent -- on average -- for each specification correspondingly. For the investment services the calculated Lerner indexes are smaller; 24 percent and 29 percent of the market in the sample were controlled by entities that had price-cost margins that exceeded 5 percent -- on average -- for the multinomial and the nested specifications correspondingly. It is interesting to notice that these results are obtaining without assuming collusive behaviors; in fact, it is assumed that each entity fixes its prices without considering the effect of such a decision on other entities[25]. Also, the results provide some signals of an increase in the degree of competition for both specifications of the demand systems. During the period under study the margins estimated for the credit market had an average reduction of approximately 1.4 and 3.3 percentage points (the multinomial and the nested specifications correspondingly). Likewise, the average margin in the financial investment services decreased approximately 0.9 and 1.5 percentage points (though at a lower rate at the end of the period). These trends might be related to business strategies developed under circumstances of relative macroeconomic stability and after approximately five years of steady growth. Even though the expectations of prosperity of a country such as Argentina with a history of high uncertainty might be peculiar, macroeconomic circumstances may have made such trends possible. In this sense, promoting financial stability appears to be fundamental to encourage competition in the financial intermediation industry.

[25] Regarding the fit of the model, there are some estimated marginal costs (6% for loan and 9% for investment services) with a negative sign. This may be a warning about the fit of the model for some entities and it would be interesting to try other specifications with a subsample of institutions. However the available number of observations is not enough to split the sample and obtain reliable results.

References

Adams, R. M., K. P. Brevoort, and E. K. Kiser (2007); «Who Competes With Whom? The Case of Depository Institutions"». Journal of Industrial Economics, Vol. 55, No. 1, pp. 141-167, March.

Adams, R. M., L-H. Röller and R. C., Sickles (2002); «Market Power in Outputs and Inputs: An Empirical Application to Banking», CIC Working Papers FS IV 02-33, Wissenschaftszentrum Berlin (WZB), Research Unit: Competitiveness and Industrial Change (CIC).

Anderson T.W. and C. Hsiao (1981), «Estimation of Dynamic Models with Error Components», *Journal of American Statistical Association*, Vol. 76 pp.598 - 606.

Arellano M. and O. Bover (1995), «Another Look at the Instrumental Variable Estimation of Error-Components Models», Journal of Econometrics, Vol. 68 pp.29 - 51.

Arellano, M. and B. Honoré (2001); «Panel Data Models. Some Recent Developments», en J. Heckman and E. Leamer (eds.): Handbook of Econometrics, Vol 5, 2001.

BCRA (2007); «Boletín de Estabilidad Financiera», Primer semestre de 2007. Electronic edition. http://www.bcra.gov.ar/pdfs/polmon/bef0107e.pdf.

BCRA; «Manual de Cuentas de la Superintendencia de Entidades Financieras y Cambiarias», Régimen Informativo. http://www.bcra.gov.ar/pdfs/texord/manual.pdf.

Berger A. (1995); «The relationship between capital and earnings in banking», *Journal of Money, Credit and Banking,* Vol.27, pp. 404-31.

Berger, A. N. and T. H, Hannan (1989); «The Price-Concentration Relationship in Banking», *The Review of Economics and Statistics*, MIT Press, vol. 71(2), pp. 291-99, May.

Berry, S. (1994); «Estimating Discrete-Choice Models of Product Differentiation», *RAND Journal of Economics*, Vol. 25, pp. 242-262.

Berry, S., J. Levinsohn and A. Pakes, (1995); «Automobile Prices in Market Equilibrium», *Econometrica*, Econometric Society, vol. 63(4), pp. 841-90, July.

Berry, S.T., J. Levinsohn and A. Pakes (2004); «Differentiated products demand systems from a combination of micro and macro data: the new car market», *Journal of Political Economy,* 112, 1, 68-105.

Bhargava, A. and D. Sargan (1983); «Estimating dynamic random effects models from panel data covering short time periods», *Econometrica*, 51, pp. 1635-1660.

Blundell, R. and S. Bond (1998); «Initial conditions and Moment Conditions in Dynamic Panel Data Models», *Journal of Econometrics*, 87, 1, pp. 115-143.

Bresnahan, T. (1989); «Empirical Studies of Industries with Market Power», in R. Schmalansee y R.D. Willig (eds.), *Handbook of Industrial Organisation*, Vol. 2, Amsterdam: Elsevier.

Bresnahan, T. F.; Stern, S. and Trajtenberg, M., 1997, 'Market Segmentation and the Sources of Rents from Innovation: Personal Computers in the Late 1980s,' RAND Journal of Economics, 28, pp. 17–S44.

Burdisso, T. and L. D'Amato (1999); «Prudential regulations, restructuring and competition: the case of the Argentine banking industry», Central Bank of Argentina, Working Paper n°10, October.

Chamberlain, G. (1982); «Multivariate Regression Models for Panel Data», *Journal of Econometrics*, 18, pp. 5-46.

Dabós, M. and P. D., Aromi (2001); «Measuring the level of competition in the Argentine banking industry», Universidad de San Andrés. Department of Economics; UDESA Working papers of economics, 23 p; May.

Degryse, H.A., and Ongena, S. (2008). Competition and regulation in the banking sector: A review of the empirical evidence on the sources of bank rents. In A. Thakor & A. Boot (Eds.), Handbook of Financial Intermediation and Banking. Amsterdam: Elsevier.

Demirguc-Kunt, A. and R. Levine (2001); «Financial Structures and Economic Growth: A Cross-Country Comparison of Banks», *Markets and Development*, Cambridge, MA: MIT Press.

Dick, A. (2002); «Demand Estimation and Consumer Welfare in the Banking Industry», Finance and Economics Discussion Series, Federal Reserve Board, 2002-58.

Fernández de Guevara, J. Maudos and F. Perez (2005). «Market Power in European Banking Sectors», Journal of Financial Services Research, Springer, vol. 27(2), pages 109-137, April.

Fischer K-H. and H. S. Hempell (2005); «Oligopoly and Conduct in Banking; An Empirical Analysis», Deutsche Bundesbank Research Centre, Discussion paper.

Fixler D., M.Reinsdorf and G. Smith (2008). «How Have the New Measures of Bank Services in the US National Accounts Performed?. Bureau of Economic Analysis. Presentation at the American Economic Association Meetings.

Fixler, D. and K. Zieschang (1999); «The Productivity of the Banking Sector: Integrating Financial and Production Approaches to Measuring Financial Service Output», *Canadian Journal of Economics*, 32(2), pp.547-569

Gelfand, M. D. and Spiller, P. T. (1987); «Entry barriers and multiproduct oligopolies: Do they forebear or spoil?», *International Journal of Industrial Organization*, Elsevier, vol. 5(1), pp. 101-113, March.

Goldberg, P.K. (1995); «Product differentiation and oligopoly in international markets: the case of the U.S. automobile industry», *Econometrica*, 63, 4, pp. 891-951.

Hannan, T. H. (1991); «The functional relationship between prices and market concentration: the case of the banking industry», Finance and Economics Discussion Series 169, Board of Governors of the Federal Reserve System (U.S.).

Hannan, T. H. and A. N., Berger (1991); «The Rigidity of Prices: Evidence from the Banking Industry», *American Economic Review,* American Economic Association, vol. 81(4), pp. 938-45, September.

Maudos J. and J. Fernández de Guevara (2006); «The cost of market power in the European banking sectors: social welfare loss vs. inefficiency cost», *Journal of Banking and Finance*.

McFadden, D. (1973); «Conditional Logit Analysis of Qualitative Choice Behavior», *Frontiers of Econometrics*, P. Zarembka (eds), New York, Academic Press.

McFadden, D. (1978); «Modeling the Choice of Residential Location», *Spatial Interaction Theory and Planning Models*, A. Karlgvist, et al. (eds.), Amsterdam, North-Holland.

McFadden, D. (1981); «Econometric Models of Probabilistic Choice», *Structural Analysis of Discrete Data*, C. Manski y D. McFadden (eds.), Cambridge, MIT Press.

Molnár J., M. Nagy and C. Horváth (2006); «A Structural Empirical Analysis of Retail Banking Competition: the Case of Hungary», Noviembre. Magyar Nemzeti Bank, Working Paper 2007/1.

Nakane, M. I., L. S., Alencar, and F. Kanczuk, (2006); «Demand for bank services and market power in Brazilian banking», Working Paper Series 107, Banco Central do Brasil.

Nevo, A. (2000); «A practitioner’s guide to estimation of random-coefficients logit models of demand», *Journal of Economics and Management Strategy*, 9, 4, pp. 513-548.

Nevo, A. (2001); «Measuring market power in the ready-to-eat cereal industry», *Econometrica*, 69(2), pp. 307-342.

Ohmori, T. (2003); «On Indirect Measurement Methods of Deposit and Loan Service Prices Using Published Interest Rate Data to Measure Deposit and Loan Services Prices, and Problems with this Method», Economic Statistics Division, Research and Statistics Department, Bank of Japan.

Richards T., R. Acharya and Albert Kagan (2008). «A Spatial Model of Market Power in Non-Metro Banking». Journal of Economics and Business.

Shaffer, S. (1993); «Market conduct and excess capacity in banking: a cross-country comparison», Working Papers 93-28, Federal Reserve Bank of Philadelphia.

Sigbjorn A. B. and K., Moshe (1996); «Banks as multioutput oligopolies: an empirical evaluation of the retail and corporate banking markets», Proceedings, Federal Reserve Bank of Chicago, May, pp. 183-201.

Streb J. M., J., Bolzico, P., Druck, A., Henke, J., Rutman and W. Sosa Escudero, (2002); «Bank relationships: effect on the availability and marginal cost of credit for firms in Argentina», CEMA Working Papers 216, Universidad del CEMA.

Suominen, M. (1994); «Measuring Competition in Banking: A Two -Product Model», *Scandinavian Journal of Economics*, Blackwell Publishing, vol. 96(1), pp. 95-110.

Train K. (2003); *Discrete Choice Methods with Simulation*. Cambridge University Press, 2003. http://elsa.berkeley.edu/books/choice2.html

Wang, J. C. (2003); «Service Output of Bank Holding Companies in the 1990s and the Role of Risk», Federal Reserve Bank of Boston, Documento de Trabajo No. 03-6, Septiembre.

Whelan, C. (2003); «Is Equating Market Share to Market Power a Sound Economic Principle?», *Journal Of The Statistical and Social Inquiry Society Of Ireland***,** Vol. 32, pp.109–127.

Appendix A: Price elasticities of the demands

Multinomial dynamic logit model.

The equation that models the market share of entity j during the period t under the multinomial logit assumptions is equation (1).

$$s_{jt}(\cdot)=\frac{\exp(\delta_{jt})}{1+\sum_{r=1}^{J}\exp(\delta_{rt})} \quad \text{Where:} \quad \delta_{jt}=\beta p_{jt}+\alpha\, r_{jt}+\lambda\ln(s_{jt-1})+\gamma\, x_{jt}+\zeta_j+\xi_{jt} \tag{1}$$

In order to derive the price elasticity in the long term when the lag of the market share of entity j is included as an additional characteristic, I will assume that the parameter λ is zero for the outside option.

$$s_{jt}(\cdot)=\frac{\exp(\beta p_{jt}+r_{jt}\ \alpha+\gamma x_{jt}+\zeta_j+\xi_{jt})(s_{jt-1})^{\lambda}}{1+\sum_{r=1\neq j}^{J}\exp(\beta p_{rt}+r_{rt}\ \alpha+\lambda\ln(s_{rt-1})+\gamma x_{rt}+\zeta_r+\xi_{rt})+\exp(\beta p_{jt}+r_{jt}\ \alpha+\gamma x_{jt}+\zeta_j+\xi_{jt})(s_{jt-1})^{\lambda}} \tag{2}$$

Steady state and comparative statics.

$$1+\sum_{r=1\neq j}^{J}\exp(\delta_r)+\exp(\beta p_j+r_j\ \alpha+\gamma x_j+\zeta_j+\xi_j)(s_j)^{\lambda}=\exp(\beta p_j+r_j\ \alpha+\gamma x_j+\zeta_j+\xi_j)(s_j)^{\lambda-1} \tag{3}$$

$$\frac{1+\sum_{r=1\neq j}^{J}\exp(\delta_r)}{\exp(\beta p_j+r_j\ \alpha+\gamma x_j+\zeta_j+\xi_j)}=(s_j)^{\lambda-1}\left[1-(s_j)\right] \tag{4}$$

<u>Price elasticity</u>

$$\partial s_j/\partial r_j \Rightarrow \frac{-\left(1+\sum_{r=1\neq j}^{J}\exp(\delta_r)\right)\exp(\beta p_j+r_j\ \alpha+\gamma x_j+\zeta_j+\xi_j)\alpha}{\left(\exp(\beta p_j+r_j\ \alpha_1+\gamma x_j+\zeta_j+\xi_j)\right)^2}=(s_j)^{\lambda}(s_j)^{-2}\left((\lambda-1)\left[1-(s_j)\right]-(s_j)\right)\frac{\partial s_j}{\partial r_j} \tag{5}$$

Using equation (1) where $1+\sum_{r=1}^{J}\exp(\delta_{r0})=\frac{\exp(\delta_{j0})}{s_{j0}(\cdot)}$*, equation (5) becomes*

$$\frac{\partial s_j}{\partial r_j}=\frac{-\alpha(s_j)^2}{\exp(\delta_j)(\lambda(1-s_j)-1)}\frac{\exp(\delta_{jt})}{s_{jt}(\cdot)}=\frac{\alpha(s_j)}{(1-\lambda(1-s_j))} \Rightarrow \textit{elasticity}: \frac{\partial s_j}{\partial r_j}\frac{r_j}{s_j}=\frac{\alpha_1 r_j}{(1-\lambda(1-s_j))} \tag{6}$$

<u>Cross-price elasticity</u>

$$s_{jt}(\cdot)=\frac{\exp(\delta_{jt})}{1+\sum_{r=1}^{J}\exp(\delta_{rt})} \quad \text{Where:} \quad \delta_{jt}=\beta p_{jt}+r_{jt}\ \alpha+\lambda\ln(s_{jt-1})+\gamma x_{jt}+\zeta_j+\xi_{jt} \tag{7}$$

$$s_{jt}(\cdot)=\frac{\exp(\delta_{jt})}{1+\sum_{r=1\neq k}^{J}\exp(\delta_{rt})+\exp(\beta_1 p_{kt}+r_{kt}\alpha\ +\gamma\, x_{kt}+\zeta_k+\xi_{kt})s_{kt-1}{}^{\lambda}} \tag{8}$$

Steady state and comparative statics.

$$\frac{\partial s_j(\cdot)}{\partial r_k}=\frac{-\exp(\delta_j)\left(\exp(\delta_k)\alpha+\exp(\delta_k)\lambda\frac{\partial s_k}{\partial r_k}s_k^{-1}\right)}{\left(1+\sum_{r=1}^{J}\exp(\delta_r)\right)^2} \tag{9}$$

$$\frac{\partial s_j(\cdot)}{\partial r_k}=-s_k s_j\alpha\left(\frac{1+\lambda s_k}{1-\lambda(1-s_k)}\right)\Rightarrow \ elasticity: \ \frac{\partial s_j}{\partial r_k}\frac{r_k}{s_j}=-s_k r_k\alpha\left(\frac{1+\lambda s_k}{1-\lambda(1-s_k)}\right) \tag{10}$$

Nested logit model

The market share of the product j is given by equation (11)

$$s_{jt}=\frac{e^{\delta_{jt}/\tau}\left(\sum_{j\in B_l}e^{\delta_{jt}/\tau}\right)^{\tau-1}}{\sum_{k=1}^{K}\left(\sum_{j\in B_k}e^{\delta_{jt}/\tau}\right)^{\tau}} \qquad with \ \delta_{jt}=\beta p_{jt}+\alpha\, r_{jt}+\gamma x_{jt}+\zeta_j+\xi_{jt} \tag{11}$$

Taking logs and differencing equation (11), the direct price elasticity in (13) can be obtained from (12)

$$\frac{1}{s_{jt}}\frac{\partial s_{jt}}{\partial r_{jt}}=\frac{\alpha}{\tau}+\frac{(\tau-1)\left(\sum_{j\in B_l}e^{\delta_{jt}/\tau}\right)^{\tau-2}e^{\delta_{jt}/\tau}\frac{\alpha}{\tau}}{\left(\sum_{j\in B_l}e^{\delta_{jt}/\tau}\right)^{\tau-1}}-\frac{\tau\left(\sum_{j\in B_l}e^{\delta_{jt}/\tau}\right)^{\tau-1}e^{\delta_{jt}/\tau}\frac{\alpha}{\tau}}{\sum_{k=1}^{K}\left(\sum_{j\in B_k}e^{\delta_{jt}/\tau}\right)^{\tau}} \tag{12}$$

$$\frac{\partial s_{jt}}{\partial r_j}\frac{r_j}{s_{jt}}=\frac{r_j\alpha}{\tau}\left(1+(\tau-1)s_{jt|B_l}-\tau s_{jt}\right) \tag{13}$$

The same analysis is applied to loan and investment services to derive the equations in the paper.

Appendix B: Description of variables

Variables
credit_t: quarterly average of loans in local currency. This variable excludes Treasury notes, Bonds and differences of valuation.
rec_fin_t: quarterly average of deposits and selected components of other obligations due to financial intermediation. Thus deposits excludes funds related to services that the entities deliver on behalf of others but that are not financial intermediation services, as payments of subsidies to unemployed.
Pares_cred: number of "households" above the poverty line. The "households" are assumed to be groups of 4 persons. The number of persons below the poverty line comes from the percentage of people below the poverty line published semiannually by the Ministry of Economy of Argentina, based on the data of the Survey (EPH) elaborated by the National Direction of Statistics (NDEC). Total urban population was obtained from the INDEC. The projections of the urban population were calculated from provisional data of the 2001 Census. The semiannually number of individuals above the poverty line is the total urban population minus the calculated urban population bellow the poverty line. In order to obtain quarterly values, they were assumed equal to the average of consecutive semiannually values.
Pares_obl: Number of couples of persons whose incomes overcome the poverty line for households. Further details are similar to Pares_cred.
prest_sect_privnofin: quarterly average of loan disbursements to the non financial private sector, in local currency.
op_prest_secpriv: Number of operations by loans to the non financial private sector. It includes loans to firms and persons recorded by the BCRA as additional information provided by the entities.
Un_op_prest: Unit of loans. Quarterly average amount of loans disbursements (prest_sect_privnofin) over the number of operations by loans for the non financial private sector (op_prest_secpriv) in local currency.
Un_prest_Avmean: Average across t and across entities of the unit of loans (Un_op_prest) weighted by credit_t.
Market_Cred: Potential size of the loan market. That is, Pares_cred multiplied by Un_prest_Avmean.
Sh_credit: ratio of credit_t to the potential size of the loan market. Its log is ln_sh_credit.
Sh_Out_Inv: outside good for the market of investments.
Sh_Out_Crd: outside good for the loan market.
Un_op_inv_w_CAh: Unit of consumption of investment services. Quarterly average of the ratios of the amount of fix term deposits, saving, checking and current accounts to the number of operations recorded by each concept for the non financial private sector.
Un_inv_Avmean: Quarterly average across t and across entities of the unit of consumption of investment services, weighted by rec_fin_t.
Market_Inv: Potential size of the market of investment services. That is, Pares_obl multiplied by Un_op_inv_w_Cah.
Sh_Inv: ratio of rec_fin_compl_t to the potential size of the market of financial investments. Its log is ln_sh_oblig.
ra_trim_anlz: annualized active interest rate (ratio). This is the ratio of the sum of the monthly inflows by interests to credit_t. The flows of interests were calculated as the monthly differences of the accumulated amounts, which are reported in the balance sheets. Then, each calculus took into account the balance sheet date of each entity.
rd_trim_anlz: Annualized passive interest rate (ratio). This is the outcomes by financial obligations to rec_fin_t. Using a method similar to the calculus of ra_trim_anlz.
ATM_t: quarterly average of the number of automatic teller machines of the entity.
bs_uso_s_filyDep: quarterly average of the ratio of fixed assets, net from amortizations, to the number of branches and dependencies.
Compet_cred_irrec_s_act: mean of the quarterly averages of the ratio of non-performing loans to assets among competitor institutions.
Compet_dens_fil: mean of dens_fil among competitor institutions.
Compet_dens_filydep_nest: mean of dens_fil among the competitor institutions in the same nest.
dens_fil: quarterly average of the ratio of the number of branches to the number of provinces where the entity has at least a branch.
Dependenc_compet_t: quarterly average of the number of competitor's dependencies in the national market.
dummy_big: dummy = 1 if the quarterly average of the net assets is not lower than 1200 millions.
dummy_Card: dummy = 1 if the percentage of credit card loans is larger than 18%.
dummy_person: dummy = 1 if the quarterly average of the percentage of personal loans is larger than 25%.
dummy_prend: dummy = 1 if the quarterly average of the percentage of loans pledged against automotives is larger than 25%.
fil_ext_t: dummy = 1 if the entity is local and has at least one representation abroad during the relevant quarter.
FilyDepend_compet_t: mean of the number of branches and dependencies among competitor institutions.
Gtos_des_s_fil: quarterly average of the ratio of organization and development expenses net from its accumulated amortizations to number of branches. The organization and development expenses were deflated by an average between the retail and wholesale price indexes.
Gtos_des_s_filyDep: quarterly average of the ratio of organization and development expenses net from its accumulated amortizations to number of branches and dependencies. The organization and development expenses were deflated by an average between the retail and wholesale price indexes.
Gtos_des_t_defl_Compet: mean of organization and development expenses (deflated and net from its accumulated amortizations) of the competitor institutions.
Gtos_grl_s_fil: ratio of the quarterly average of general expenses (excluding publicity) to the quarterly average of the number of branches of the entity.
Gtos_grldefl: quarterly average of expenses in security services, electricity and comunications, maintenance and office supplies.
Gtos_grldefl_s_fil_nest: mean of the ratios of Gtos_grldefl to number of branches, among the competitor institutions in the same

nest.
Gtos_grldefl_s_filyDep_nest: mean of the ratios of Gtos_grldefl to number of branches and dependencies, among the competitor institutions in the same nest.
Gtos_persdefl_s_L: quarterly average of the ratio of monthly flows of personnel costs to number of employees deflated by an average between the retail and wholesale price indexes.
Gtos_perswS_s_L: quarterly average of the ratio of monthly flows of staff costs to number of employees.
Gtos_perswSdefl_s_L: quarterly average of the ratio of deflated staff costs to number of employees
Gtos_perswSdefl_s_L_nest: mean of Gtos_perswSdefl_s_L among the competitor institutions in the same nest.
hand_chge_t: dummy = 1 since the ownership of the entity changes.
Ind_cons: dummy = 1 if the average of the percentage of loans of no more than 500 thousands of pesos (local currency) is larger than 20%.
Ind_noBank: dummy = 1 if the entity is not a bank.
Ind_person: dummy = 1 if the average of the percentage of personal loans in total loans is larger than 20%.
Ind_prcia: dummy = 1 if the entity has branches in more than 5 provinces.
Ing_serv_over_dep_anlz: quarterly average of the ratio of incomes by operations related to deposits to quarterly deposits. Annualized ratio.
Ing_serv_over_prest_anlz: quarterly average of the ratio of incomes by operations related to loans to quarterly loans. Annualized ratio.
L_x_fil_t: ratio of quarterly average workers to quarterly average branches.
L_x_filoDep_Compet: quarterly average of the ratio of the number of employees to the number of branches and dependencies of the competitor institutions.
ln_ATM_s_Pcias_t: the log of 1 plus the quarterly average of the ratio of the number of ATMs to the number of provinces where the entity has banches.
ln_cgos_incob_s_act_cens: log of 1 plus the quarterly average of the ratio of loan loss provisions to net assets.
ln_cred_irrec_s_act: log of 1 plus the quarterly average of the ratio of non-performing loans to assets.
ln_depcia_hab_t: log of 1 plus the average quarterly of the number of dependencies.
ln_esd_worst3_t: log of 1 plus the queaterly average of financing to debtors with non performing loans.
ln_fil_Resto_t: log of 1 plus the quarterly average of the number of branches in all provinces but in Buenos Aires, City of Buenos Aires, santa Fe and Cordoba.
ln_Shjk_credit: log of the share of loans of the entity in its nest.
ln_Shjk_Inv: log of the share of investment services of the entity in its nest.
num_Pcias_t: quarterly average of the number of provinces where the entity has at least a branch.
Person_s_cred_t: quarterly average of the percentage of personal loans in total loans.
pl_fijo_s_rec_fin_compl_t: quarterly average of the percentage of time deposits to the non financial private sector.
Prest_Card_s_cred_t: quarterly average of the ratio of amount of credit card loans (adjusted by an oficial price index, CER) to total loans.
prev_Totnet_s_act: quarterly average of the ratio of loan loss provisions to net assets.
publicbank: dummy = 1 if the entity is a public bank.
y0*: set of quarterly time dummies.

Appendix C: Complimentary tables

Table 1: Summary statistics for loan services

Loan services	Institutional customers	Individual customers	Total
	Quarterly average		
Active interest rate annualized (%)	11.68	17.22	16.29
Branches in other (than the main four) provinces	0.00	19.35	16.08
Branches in the four main provinces*	1.13	48.95	40.88
Credit-card loans (% of total financing)	0.00	11.34	9.42
Density of branches by provinces	1.09	11.82	10.01
Development expenses to branches (ratio, Lc)	786.35	133.83	244.02
Development expenses to branches and affiliated dependencies (ratio, Lc)	590.65	60.78	150.26
Dummy (=1) for credit-card loans larger than 18% of percentage of total financing	0.000	0.114	0.094
Dummy (=1) for loans under 500 mil pesos larger than 20% of total financing	0.176	0.181	0.180
Dummy (=1) for local entities with branches abroad	0.088	0.054	0.060
Dummy (=1) for personal loan oriented institution	0.000	0.243	0.202
Dummy (=1) for personal loans larger than 20% of percentage of total financing	0.000	0.373	0.310
Dummy (=1) for public institution	0.088	0.213	0.192
Dummy (=1) for secured loans larger than 25% of total financing	0.069	0.000	0.012
Non-performing loans (% of Assets)	8.86	8.36	8.44
Number of affiliated dependencies	0.62	25.20	21.05
Number of ATMs	0.07	119.64	99.45
Number of branches	1.13	68.30	56.96
Number of provinces	1.04	6.82	5.84
Personal loans (% of total financing)	1.07	18.61	15.65
Service fees (%)	1.33	3.58	3.20
Share loan services (%)	0.08	0.71	0.60
Share outside good for loan services (ratio)	59.65	59.72	59.71
Time deposits to available funds (from obligations) (%)	21.66	30.49	29.00
Unit of operation for loan services (Lc, thousands)	14.41	14.43	14.43
Workers per branch (ratio)	70.27	42.87	47.50

References: * the four main provinces produce approximately 72% of the national GDP. Lc: local currency (pesos)

Table 2: Summary statistics for investment services

Investment services	Institutional consumers	Individual customers	Total
	Quarterly average		
Passive interest rate annualized (%)	4.33	4.64	4.60
Fixed assets (excl. amortizations) to number of branches and dependencies (ratio)	4243.22	1115.38	1512.57
Density of branches by provinces	1.13	11.98	10.60
Development expenses to branches (ratio)	659.96	131.06	198.22
Development expenses to branches and affiliated dependencies (ratio, Lc)	408.27	59.32	103.63
Dummy (=1) for large institution	0.016	0.441	0.387
Dummy (=1) for non-banking financial institution	0.125	0.109	0.111
Dummy (=1) for personal loan oriented institution	0.000	0.236	0.206
Dummy (=1) for public institution	0.125	0.214	0.202
Loan loss provisions (% of Assets)	8.47	11.65	11.25
Number of ATMs	0.09	122.47	106.93
Number of ATMs to provinces (ratio)	0.09	22.43	19.59
Number of provinces with branches	1.05	6.94	6.19
Personal loans (% of total financing)	1.61	17.55	15.53
Service fees (%)	1.00	3.63	3.30
Share investment services (%)	0.13	1.54	1.36
Share outside good for investment services (%)	14.41	14.41	14.41
Unit of operation for investment services (Lc, thousands)	41.12	41.12	41.12
Workers per branch (ratio)	88.81	43.78	49.50

References: * the four main provinces produce approximately 72% of the national GDP. Lc: local currency (pesos)

Table 3: Instruments by specification.

Loan Services				Investment Services			
Instruments	**GMM sys**	**GMM sys excl. BLP**	**GMM sys Nested**	**Instruments**	**GMM sys**	**GMM sys excl. BLP**	**GMM sys Nested**
ATM_t	x	x	xx	ATM_t	x	x	
dens_fil	x	x		bs_uso_s_filyDep			xx
depcia_hab_t	x	x		Compet_cred_irrec_s_act			+
Dependenc_compet_t	xx	xx		Compet_dens_fil			+
dummy_Card			xx	Compet_dens_filydep_nest			x
dummy_person			xx	dens_fil	x	x	
fil_ext_t	x	x		dummy_big			xx
FilyDepend_compet_t			xx	dummy_person			xx
Gtos_des_s_filyDep			++	esd_worst3_t	+	+	
Gtos_grl_s_filyDep			xx	FilyDepend_compet_t	xx		
Gtos_grldefl_s_filyDep_nest			x	Gtos_des_s_filyDep			+
Gtos_persdefl_s_L			xx	Gtos_des_t_defl_Compet	xx		
Gtos_perswSdefl_s_L_nest			xx	Gtos_grldefl_s_fil_nest			x
hand_chge_t	xx	xx		Ind_noBank			xx
Ind_cons	xx	xx		Ind_prcia			xx
Ind_person	xx	xx		l.Gtos_grl_s_fil	x	x	
l.cgos_incob_s_act	x	x		l.ln_ATM_s_Pcias_t			x
l.dummy_prend	x	x		l.ln_Gtos_persdefl_s_L			x
l.ln_Gtos_des_s_fil	x	x		l.num_Pcias_t	x	x	
l.ln_num_Pcias_t	xx	xx		L_x_fil_t			++
L_x_filoDep_Compet			xx	l2.ln_Gtos_des_s_fil	x	x	
l2.ln_pl_fijo_s_rec_fin_compl_t	x	x		l2.ln_Ing_serv_over_dep_anlz	x	x	
l2.ln_Prest_Card_s_cred_t	x	x		ln_cgos_incob_s_act			x
ln_cred_irrec_s_act	+	+		ln_Gtos_perswSdefl_s_L	x	x	
ln_fil_Resto_t	x	x		ln_Gtos_perswSdefl_s_L_nest			x
ln_Gtos_grl_s_fil	x	x		ln_Ing_serv_over_dep_anlz			+
ln_Gtos_perswS_s_L	x	x		ln_L_x_filoDep_Compet			x
ln_Ing_serv_over_prest_anlz	+	+	++	ln_Prest_Card_s_cred_t			x
ln_L_x_fil_t	x	x		ln_Sh_Inv	+	+	
ln_L_x_filoDep_Compet	xx	xx		Person_s_cred_t	+	+	
ln_prev_Totnet_s_act	+	+		prev_Totnet_s_act	++, x	++, x	
ln_Sh_credit	+	+		publicbank	xx	xx	
Person_s_cred_t			++	y0*	xx	xx	xx
publicbank			xx				
y0*	xx	xx	xx				

References: + for instruments that are included in GMM collapse form from lags equal or larger than two, ++ for instruments that are included in GMM system collapse form from lags equal or larger than two, x for instruments that are included in IV form, xx for instruments that are included in IV sys form. The prefix l. indicates a lag of the variable, the prefix l2. indicates two lagged periods of the variable and the prefix ln_ indicates that the variable is in logs.

Table 4: Average of the market shares of the entities in the sample excluding the outside option's shares.

Deciles**	Loan services	Investment services
	Market share average (%)	
1º	0.18	0.12
2º	0.10	0.47
3º	0.17	1.00
4º	0.50	1.20
5º	0.87	1.69
6º	2.34	1.97
7º	1.90	1.79
8º	3.24	2.61
9º	1.89	0.78
10º	3.16	3.93
Mean*	1.45	1.57

**Deciles sorted by Lerner index, with the same composition of entities of the tables 4 and 5 in the paper for the nested logit specifications. * Average across entities.