CONSOLIDATION, MARKET POWER AND COST ECONOMIES IN THE BANKING INDUSTRY: EMPIRICAL EVIDENCE FROM ARGENTINA

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Consolidation, Market Power and Cost Economies in the Banking Industry. Empirical Evidence from Argentina *

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Abstract

The Argentine banking industry has experienced increasing consolidation during the last decade. On the one hand, it can be argued that this has resulted from cost economies, perhaps associated with technical change. But on the other, it can also be argued that increased concentration in this industry may allow the exploitation of market power in the input (deposits) and output (loans) markets. These issues are addressed in this study using bank-level data for Argentine retail banks over the period 1993-2000 to estimate a cost-function based model incorporating deposits- and loans-market pricing behaviour. The results provide evidence of market power exploitation in the market for loans and also the presence of significant cost economies. The findings further show an increase in consumers' surplus and banks' profits over the period possibly associated to the exploitation of cost economies and technical change which may have counteracted the effect of market power.

Keywords: banking industry, market power, cost economies, welfare analysis.
JEL classification: L10, G21, C33, D60.

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1. Introduction

The banking system has traditionally experienced a reduced role within the Argentine economy because of financial repression, political uncertainty and macroeconomic instability. But the financial liberalisation of the 1990s, the convertibility plan and associated major structural reforms such as the liberalisation of trade, the adjustment of public finance, privatisation and the renegotiation of the national debt all contributed to reducing macroeconomic instability and stimulating recovery. These reforms prompted the financial system to grow in a more competitive environment which in turn led to changes in the structure of the banking sector towards greater consolidation. As a result of this process, which accelerated after the Mexican crisis of 1994, the number of banks almost halved during the 1990s while concentration of deposits and loans among the largest institutions increased sharply.

These significant changes raise important policy concerns. On the one hand, it can be argued that a high level of concentration could allow banks to take advantage of oligopoly and oligopsony power by raising the interest rate on loans and reducing the rate on deposits leading to excess profits. On the other hand, the increasing size of banks may be indicative of the potential for scale and other types of economies, which could allow larger firms to increase their cost efficiency. These efficiency gains can be transferred to borrowers and depositors in the form of higher deposit and lower loan interest rates if competition limits the exploitation of market power. Thus, modelling and measuring the market and cost structure of the banking industry requires detailed consideration of the oligopoly and oligopsony nature of the market as well as the cost structure of the industry. Such a model facilitates the evaluation of whether any benefits from efficiency gains have been translated to customers or if exploitation of market power and cost economies has instead resulted in excess profits.

Previous studies have several drawbacks. First, most studies have focused on the measurement of market power without consideration of the cost structure or have estimated cost economies ignoring the market influences on the behaviour of banks and ultimately the impact of both on economic welfare. Second, studies have basically relied on aggregate data, which are limiting for at least two reasons. On the one hand, results based on the assumption that firms have identical cost functions may be misleading if firms are heterogeneous. On the other hand, difficulties emerge if the industry is represented in terms of an oligopoly and oligopsony rather than monopoly and monopsony framework, as this requires modelling individual decision-making units. Third, deposits have frequently been considered as inputs, but the potential for oligopsony power in this market has been ignored. Finally, most studies have analysed market power at the nation-wide level, thereby overlooking the problems associated with the notion of the relevant banking market.

This study investigates the market and cost structure of the Argentine banking industry using a panel data set for the period 1993-2000. The focus of the analysis is on the measurement of market power (in both the markets for loans and deposits), scale economies and technological change and their impact on economic welfare. Towards this aim it uses a cost function-based model to characterise the cost structure of retail banks along with profit maximisation conditions over loans and deposits, and it considers regional differences as fixed effects. The paper is organised as follows. Section 2 presents a brief overview of the Argentine banking sector while section 3 reviews related studies regarding the measurement of market power and cost economies in this industry. Section 4 introduces the model and section 5 presents its empirical implementation, the data sources and discusses the results. Finally, the last section summarises and presents the conclusions.

2. The Argentine Banking Industry in the 1990s

At the end of the 1980s the Argentine economy was characterised by high inflation as a result of increasing fiscal imbalances and foreign debt expansion over the decade. During 1989 consumer prices increased by 4,924%, the real exchange rate reached the highest historic level, GDP dropped by 6.2% leading to a surplus in the balance of trade of $5.4 billions and the unemployment rate rose to 7.6%. In this context, the government set out an ambitious economic programme oriented towards deregulation of markets, liberalisation of financial markets, renegotiation of public debt, reorganisation of the public sector mainly through the privatisation of public utilities and opening of trade. At the beginning of 1991 with the fixing of the exchange rate through the Convertibility Law the performance of the Argentine economy changed to a substantial degree and the macroeconomic instability notably reduced: annual inflation rate fell to one digit, GDP increased at an annual rate of 5.5% throughout the first half of the decade (although growth rates have been volatile since 1996), fiscal deficit that reached 3% of GDP was virtually eliminated but unemployment increased, the trade balance surplus became deficit and foreign debt increased.[1]

[1] The Convertibility Law instituted a dollar standard and a dual currency system, in which both the dollar and the peso were legal tender. The new law forbid the Central bank from using the money supply to finance the public deficit, and money creation was permitted only to the extent that international reserves

The effects of both economic recovery and financial liberalisation had a significant impact on the functioning of domestic financial and credit markets, basically characterised by an increase in the degree of monetisation and an improvement in the credit volume.[2] In concurrence, a new Central Bank Charter aided the recovery, modernisation and development of the financial sector. In particular, it limited rediscounting and public sector loans to emergencies and forbade the use of money supply to finance public deficit. At the same time, profound reforms regarding regulation were implemented. The Central Bank improved the regulation and supervision of capital and reserve requirements and the inspection of financial entities through the Superintendence of Financial Institutions. More severe norms concerning capital adequacy, diversification of credit risks, provisions for non-performing loans and minimum auditing standards were adopted. In addition, foreign entry restrictions were loosened and a process towards the privatisation of state-owned banks started.

Table 1

Mergers and acquisitions, failures, privatisation and entry in the Argentine banking sector, 1993-2000

Type of bank	December 1993	M&A	F	T	P	A	December 2000
Public	31	-2	-1	1	-14	0	15
- National	3	0	0	0	-1	0	2
- Regional	28	-2	-1	1	-13	0	13
Private	138	-63	-27	3	14	9	74
- Domestic	120	-61	-27	4	14	6	56
- Foreign*	18	-2	0	-1	0	3	18
Total	169	-65	-28	4	0	9	89

Source: Own calculations based on BCRA. M&A: mergers and acquisitions; F: failures; T: transformations; P: privatisations; A: authorisation of new entities. * Only includes branches of foreign banks. Banks controlled by foreign owners but registered in Argentina are considered domestic.

Consequently, the reforms implemented throughout the decade of the 1990s led to failures, mergers and acquisitions and also to the entry of large foreign institutions, which prompted a constant process of consolidation that accelerated during the Mexican crisis of 1994. Several significant transactions took place between 1996 and 1998 whereby British, Canadian, French and Spanish financial institutions, among others, acquired many domestic banks. These new

were increased. The guarantee of deposits was completely eliminated and reinstated in 1995 after the Mexican crisis (Véganzonès and Winograd, 1997).

[2] The M3 to GDP ratio, a measure of financial depth, raised from 5.2% in 1990 to 18.4% in 1994 and 25.2% in 1998 (ABA, 1999).

entrants added to several existing foreign banks including Citibank, Bank Boston, ABN Amro and Lloyds. As a result of this process, the number of banks dropped from 169 to 89 between 1993 and 2000, as Table 1 shows. The 28 failures and the 65 mergers and acquisitions, almost all of them among private banks, explain this reduction in the number of institutions. In addition, the privatisation of almost half of the 28 public regional banks operating in 1993 explains the reduction in the number of public banks.

Table 2

Market structure and activity level in the Argentine banking industry, 1993-2000

Measure	1993	1994	1995	1996	1997	1998	1999	2000
Number of banks	169	167	127	121	116	103	93	89
Volume (billion $)*								
Loans	48.1	557	52.7	56.9	66.4	81.7	81.1	77.6
Deposits	48.2	49.9	44.8	53.6	69.7	83.1	84.5	85.9
Number of accounts (million)								
Loans	4.9	5.0	4.5	5.5	7.5	9.6	9.8	10.2
Deposits	7.8	9.1	9.1	10.1	12.7	16.8	18.3	19.1
Concentration **								
HHI	453.2	426.8	501.9	499.2	498.8	592.4	626.6	663.7
Market share (%)**								
Large	85.8	85.1	80.7	80.5	80.5	85.6	91.5	92.2
Medium	10.1	11.2	15.7	15.3	9.0	11.8	6.2	5.5
Small	4.1	3.7	3.6	4.2	10.5	2.6	2.3	2.2
Public	45.9	41.7	42.7	36.7	33.9	33.3	33.5	33.1
Private	54.1	58.3	57.3	63.3	66.1	66.7	66.5	66.9

Source: Own calculations based on BCRA. * Constant pesos December 2000. ** Loans.

Despite the noteworthy reduction in the number of institutions, Table 2 shows that financial intermediation significantly increased as deposits and loans rose from $48.2 and $48.1 to $85.9 and $77.6 billions respectively, with an impressive jump in the number of accounts. Concentration, as measured by either deposits or loans, also increased sharply. The Herfindhal Hirschman Index (HHI) estimated for loans increased noticeably but it remained low in absolute terms, going from about 453 to 664 over the entire period.[3] This tendency towards increasing concentration could be explained by the mergers and acquisitions that not only reduced the number of banks but also tended to increase the inequality in the size distribution

[3] The HHI of concentration is defined as the sum of the squared market shares of all banks in the market. The formula is $HHI=\sum s_j^2=(v^2+1)/N$, where s_j is the market share of bank *j*, *N* the number of banks in the market and *v* the coefficient of variation of banks' market shares. The HHI synthesises information on both the distribution of market shares and the number of banks in the market. By construction, the HHI

of banks.[4] As Table 2 also shows, large banks increased their market share of loans from 85.8% in 1993 to 92.2% in 2000, while medium and small-sized institutions lost 4.5% and 1.9% of the market in loans over the period. These figures also indicate that public banks lost their market share to private institutions in the market for loans mainly due to the privatisations of regional public banks mentioned above.

Table 3

Financial indicators for the Argentine banking industry, 1993-2000

Indicator (%)	1993	1994	1995	1996	1997	1998	1999	2000
Interest rates (annual)								
Deposits*	6.4	5.6	7.7	5.7	5.5	5.8	6.0	6.4
Loans*	20.2	20.8	23.1	18.0	16.3	16.6	17.6	17.6
Call money	6.3	7.3	9.0	6.1	6.5	6.7	6.6	7.9
Economic efficiency								
Operating expenses / Assets	9.04	6.10	5.76	4.67	4.31	3.88	3.85	3.23
Labour expenses / Assets	5.37	4.59	4.35	3.52	3.20	2.86	2.86	2.43
Deposits/Employee (thousand $)	308	410	377	474	588	724	824	836
Profitability								
Profit / Equity (r_{OE})	0.84	1.20	-3.44	2.40	4.86	2.79	1.82	-0.43
Profit / Asset (r_{OA})	0.15	0.18	-0.51	0.32	0.60	0.29	0.19	-0.04
Net interest income / Assets	8.41	7.25	7.40	4.98	4.17	4.13	4.11	3.31

Source: Own calculations based on aggregate financial statements. *Average of interest rates on deposits (loans) in domestic and foreign currency, weighted by the volume of deposits (loans).

The level of interest rates as presented in Table 3 suggests that the intermediation spread has been significant over the period, although it declined from 13.8% in 1993 to 11.2% in 2000.[5] The figures in Table 3 also show that interest rates significantly rose during the Mexican crisis of 1995 but that at the end of the period the interest rate on deposits equals its initial level while that on loans is one sixth lower than its initial value. The efficiency ratios suggest a clear improvement over the entire period. On the one hand, they show a sustained decrease in operating expenses as a proportion of total assets from 9.04 to 3.23 (the reduction in the number of employees as well as in wages seems to be one of the main reasons that explains this tendency). On the other, deposits per employee almost tripled during the period suggesting an increase in the degree of 'bancarisation' and in labour productivity. Despite these changes,

has an upper value of 10,000, in the case of a monopolist firm with 100% of the market, and tends to zero in the case of a large number of firms with small market shares.

[4] The number of banks dropped from 169 to 89 and the dispersion in market shares increased from 1.5% to 2.4% (a measure of disparity among banks).

profitability, measured by returns on equity or returns on assets, shows no significant improvement.[6]

3. Previous Studies

The *traditional approach* to the analysis of market power is based on the structure-conduct-performance hypothesis (SCP). The conceptual basis of this paradigm, due to Mason (1939) and Bain (1951), basically states that high levels of concentration (structure) facilitate the adoption of collusive behaviour and thus the setting of higher prices and reduced output levels (conduct) ultimately leading to higher profitability (performance). Cowling and Waterson (1976), Dansby and Willig (1979) and others demonstrate that there are some market conditions under which the hypothesis is valid. In contrast, several economic theories challenge the realism of those specialised conditions and show that the structure-performance linkage can disappear under alternative assumptions. For example, the theory of contestable markets describes one set of conditions that yield competitive outcomes even in concentrated markets (Baumol et. al., 1982); another example is the theory of trigger price strategies which suggests one means by which collusive behaviour may be sustained among arbitrarily many firms (Friedman, 1971).

Empirical studies based upon this hypothesis usually explore different relationships between structural concentration measures and profit margins or price levels. In general, these studies seem to provide support for the structure-performance linkage but methodological and other flaws have permeated many of such works. Gilbert (1984) and Weiss (1989) provide good summaries of profit- and price-concentration studies in banking while Demsetz (1973), Smirlock (1985) and Kimmel (1991) present some methodological criticisms. More recent studies such as Kurts and Rhoades (1991) and Berger (1991, 1995) try to fix these flaws but provide limited support for the structure-performance relationship in banking. It therefore

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[5] The intermediation spread is simply measured as the difference between the interest rate on loans and that on deposits.

[6] Argentine banking institutions have low profitability when compared with European Union (EU) and Organisation for Economic Cooperation and Development (OECD) countries. For example, the average return on equity for UE and OECD countries in 1997 was 11.8 and 10.5% respectively compared to 4.9%. Argentine banks have also very high intermediation margins relative to UE and OECD countries i.e. net interest income as a percentage of total assets were 1.65 and 2.15% compared to 4.17%. Finally, banking institutions in Argentina have high ratios for operating and labour expenses i.e. the ratio of operating expenses as a percentage of total assets in UE and OECD countries were 1.76 and 2.16% while 4.31% in Argentina.

becomes evident that a lack of strong theoretical foundations and mixed empirical results motivated the search for alternative methodologies to analyse market power.

An *alternative approach* to the analysis of market power, based on more sound microeconomic foundations, directly explores the behaviour of output or price instead of relying on an observation of market structure. More precisely, this approach assumes that firms set prices or quantities in order to maximise profits and that such a decision is based on cost considerations and on the degree of competition in the market, which depends on demand conditions and also on the characteristics of interaction among firms (see Iwata, 1974; Appelbaum, 1979, 1982; Gollop and Roberts, 1979). Then, if the inverse market demand is given by $p=p(Q,z)$ where p is price, Q market output and z a vector of other shift variables, an effective marginal revenue function can be defined as $MR=p+\lambda/\eta$ (where η is the price semi-elasticity of demand and λ is and index of market power).[7] Next, the equilibrium condition that the industry (or the firm) sets its marginal revenue equal to its marginal cost can be presented as $p=MC(Q,w)-\lambda/\eta$ (Bresnahan, 1982).[8, 9]

This methodology has been applied to Uruguayan banks by Spiller and Favaro (1984) and Gelfand and Spiller (1987), to samples of US banks by Shaffer (1989) and Shaffer and DiSalvo (1994), to Canadian banks by Shaffer (1993), to Finnish banks by Suominen (1994), to Norwegian banks by Berg and Kim (1994, 1998), to Italians banks by Angelini and Cetorelli (1999), to European banks by Neven and Roller (1999) and Shaffer (2001) and to Israeli banks by Ribon and Yosha (1999). Many such studies find competitive conduct at the overall bank level (even though banking markets in these studies are highly concentrated), while others provide evidence of some degree of market power among banks in the industry. These studies, however, have been somewhat hampered by limitations of data and methodology.

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[7] Under the assumption of homogenous products and quantity setting firms.

[8] The parameter λ has come to be called the conjectural variation, which denotes a firm's anticipated response by its rival(s) to an output change, even though the parameter has no essential connection with conjectures or expectations as such. Indeed, as noted by many authors, the conjectural variation is a valid parameterization of any type of oligopoly equilibrium, whether or not it is assigned the traditional conjectural interpretation (Bresnahan, 1989).

[9] This method involves using historical data to estimate market demand, production or cost functions along with pricing equations derived from profit maximising conditions, whose parameters allow inference of the degree of market power. Then, if data for each bank in the market are available and a complete model including separate equations for each bank in the industry can be estimated, then, as λi moves farther from zero, the conduct of firm i moves farther from that of a perfect competitor. If only aggregate data for the banking industry is available, the equilibrium condition is inferred from aggregate (demand and/or cost) functions and the parameter λ indicates the industry average ($\lambda=0$ indicates the

Most of these studies rely on *aggregate industry data* (due to data constraints), which are limiting for at least two reasons. Firstly, most studies are based on the assumption that firms have identical cost functions, which may lead to misleading results, if firms are heterogeneous. Neven and Roller (1999) try to fix this flaw and estimate a model under the assumption that marginal cost functions differ across firms. Secondly, because the industry is represented in terms of monopoly rather than oligopoly framework since the latter requires modelling individual decision-making units. Spiller and Favaro (1984) and Berg and Kim (1994, 1998) using firm level data incorporate the oligopolistic nature of the banking industry into the (conventional) structural model finding different types of oligopolistic interactions among banks. In addition, most existing studies analyse market power at the *nation-wide level* (in part due to the above mentioned data constraints), thereby overlooking the problems associated with the notion of relevant banking market, generally considered of a relatively narrow size. Angelini and Cetorelli (1999) separate banks according to their prevalent geographical are of business and find differences in market power among regions.

While only a few studies in this methodology follow the production approach for the definition of outputs and inputs most of them adopt the intermediation approach. This view describes banking activities as the 'transformation' of money borrowed from depositors into money lent to borrowers and thus considers labour, physical as well as financial capital (deposits and funds borrowed from financial markets) as inputs while the volume of loans and investment outstanding represent outputs. In general, banks are assumed to be *price takers in the inputs markets*, but if banks have market power in deposits the results may be biased. Ribon and Yosha (1999) appear to be the only to consider the possibility of oligopsony power in the deposits market and find that a certain degree of market power in this market seems to exist.

Many studies focus instead on the cost structure of the banking industry by applying various methods to differing data sets for the purpose of estimating the degree of scale and scope economies. Humphrey (1990) and Berger et. al. (1993) provide good summaries of such studies in the banking industry. This line of research focuses on the properties of the cost function, and most studies assume output to be exogenous to the individual bank and hence the process by which it is determined is not specified in the models estimated. Thus, performance is assumed not to be affected by market power.[10]

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market is competitive, λ=1 denotes a monopoly market while with n identical firms playingCournot, λ equals 1/n).

None of the studies mentioned above analyses the impact of market power and cost economies, in a concentrated banking industry, on economic welfare. In a different context, Barnea et. al. (2000) estimate a welfare function, which depends on the degree of competition, the stability and the operational efficiency of the banking system, in order to compare the size distribution of banks in the Israeli banking industry with the optimal one. Notwithstanding this study is subject to several limitations, the findings suggest that a move towards a distribution with equal size banks (a fewer number of large and small banks and more medium banks) will tend to increase total welfare. [11]

In view of the limitations of previous empirical studies and in order to analyse the impact of both market power and cost economies on economic welfare in a consolidating banking industry, the next section introduces an empirical model based on Morrison (2001a,b,c).[12] The model consists of a cost function along with pricing equations derived from profit maximising conditions, and allows costs to differ across firms of differing size and to measure oligopoly and oligopsony power along with cost economies. The changes in consumers' surplus and banks' profits serve then as basis to the analysis of economic welfare.

4. The Model

The basis of the model is the established principle that, in equilibrium, profit-maximising firms will choose quantities such that marginal cost equals their perceived marginal revenue, which coincides with the output price under perfect competition but with the industry's marginal revenue under perfect collusion. In the input market, firms will choose the quantity that corresponds to the equality between the marginal factor cost and its value marginal product which in a perfectly competitive market coincides with the input price while in a pure monopsony equals the firm's marginal factor cost. In this way, characterisation of market power depends on the cost structure because it involves comparing the price of the output or input to its associated marginal valuation (the marginal cost for the output or the marginal value

[10] Berg and Kim (1994) find that measurements of scale economies in the Norwegian banking sector are not independent of market structure characteristics.

[11] This study uses the Marshallian surplus concept to evaluate deadweigth loss which is not an exact measure of welfare change (Hausman, 1981). It also estimates the markup of price over marginal cost using Hall's (1988) method which is a joint test of competition and constant returns to scale (CRS) and relatively small deviations from CRS may affect the power of the test.

[12] Morrison (2001a) has shown that a restricted cost function estimated along with pricing equations can be used to derive a rich set of cost elasticities and specially to analyse market power in input markets.

for the input). Moreover, detailed representation of costs with recognition of cost economies is fundamental to the interpretation of market power measures.

The most direct way to measure market power and cost economies is via a cost function-based model which incorporates pricing equations capturing the differences between output and input market prices and marginal costs or benefits (Morrison, 2001a). To represent the banking firm this study uses the following multioutput restricted cost function $c_j(q,w,x,z)$, where q is a vector of m outputs, w is a vector of i variable input prices, x is a vector of input quantities and z a vector of control and shift variables. The adoption of the intermediation approach leads in this case to the following definition of outputs and inputs: q includes loans (L) and investments (S), w includes the prices of labor (l), physical capital (k), materials (m) and other purchased funds (f), x represents the level instead of the price of deposits (d), t is a trend variable included to represent the effects of technical change and np is added to control for risk in the loans portfolio.[13] This cost function expressed in terms of the level of deposits facilitates the incorporation of market power in this market that causes the demand equation for x to have a different structure than that implied by a simple Shephard's lemma condition.[14,15]

A detailed representation of technological aspects such as *scale economies, technical change* and *input substitution* requires consideration of the functional form of the cost function. In particular, the functional form assumed for $c(\cdot)$ should be a second order form that allows for the cost-output relationship to be non-proportional and also to depend on all input prices (implying non-homotheticity if a full set of interaction terms between q and the w are included). Moreover, allowing for input substitution requires multiple inputs to be separately identified and a full pattern of cross effects or second-order terms across them allowed. This is facilitated by using a flexible functional form for $c(\cdot)$.

Characterising *market power* in output and input markets requires profit maximisation and potential deviations from competitive markets to be incorporated into the cost function model.

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[13] In cost function models deposits may be specified as outputs, inputs or as having both input and output attributes. In the intermediation approach deposits are viewed as (intermediate) inputs, generated by the bank by offering means of payment services to depositors, and used in conjunction with other inputs to originate loans and other earning assets. In contrast, in the production approach deposits are considered as outputs while in the value-added approach deposits are considered to have both output and input characteristics. In this study, the adoption of the intermediation approach appears to be appropriate since a formal test rejected the hypothesis that deposit function as output (see empirical results).

[14] The conceptual basis for including the quantity instead of the price of deposits relies on the recognition of endogenous pricing behaviour associated to market imperfections (Morrison, 1999a).

[15] An alternative approach to measuring market power in the deposits market requires restrictive assumptions on the cost structure, in particular fixed proportions and separability of the deposits input from the others, which may not be appropriate for the banking industry.

In the m output market, the profit maximising output supply decision can be represented by $MC_m=MR_m$ where $MC_m=\partial c_i/\partial q_{mi}$ represents marginal cost and $MR_m=p(Q_m)+q_{mi}(\partial p_m/\partial Q_m)\cdot(\partial Q_m/\partial q_{mi})$ is marginal revenue computed from an inverse demand function $p(Q_m)$ representing the output demand structure (Appelbaum, 1982). After some manipulation, this optimality condition for firm i can also be presented as:

$$(1) \qquad p_{mi} = \frac{\lambda_{mi}}{\eta} + \frac{\partial c_i}{\partial q_{mi}}$$

where m=L,S, $\lambda_{mi}=(\partial Q_m/\partial q_{mi})\cdot(q_{mi}/Q_m)$ is usually defined as the *conjectural elasticity* of total industry output with respect to the output of the ith firm and $\eta=-(\partial Q_m/\partial p_m)/Q_m$ is the market demand price semi-elasticity. Under perfect competition $\partial Q_m/\partial q_{mi}=0$ and $\lambda_{mi}=0$ while under pure monopoly $\lambda_{mi}=1$ since $Q_m=q_{mi}$.[16] From (1) the degree of market power for the ith firm, can be defined as $\tau_{mi}=(p_{mi}-\partial c_i/\partial q_{mi})/p_{mi}=\lambda_{mi}/\eta_p$, which is composed of two parts: the conjectural elasticity and the demand price elasticity (η_p). It follows that the separate identification of λ_{mi} and η requires the simultaneous estimation of (1) along with a demand function from which the parameters necessary for the identification of η can be recovered.

A similar specification can be constructed for the x input market since the cost function is expressed in terms of the level instead of the price of x. In this market, profit maximisation implies the equality between the marginal factor cost and its marginal revenue product (or marginal value product if the product market is competitive), $MFC_d=w(X_d)+x_{di}(\partial W_d/\partial X_d)\cdot(\partial X_d/\partial x_{di})=[p(Q)+q_i(\partial p/\partial Q)\cdot(\partial Q/\partial q_i)]\cdot(\partial q_i/\partial x_i)=MRP_d$ where MFC_d is computed from an inverse supply function $w(X_d)$. However, if the primal-based MRP_d is replaced by its dual equivalent $-\partial c_i/\partial x_{di}$, which is the shadow value of x_d or the variable-input cost-saving from an additional unit of x_d (Morrison, 1999a), the cost-side version of the optimal input pricing equation can be expressed as:

$$(2) \qquad w_{di} = -\frac{\lambda_{di}}{\varepsilon} - \frac{\partial c_i}{\partial x_{di}}$$

where w_{di} is the input market price, $\lambda_{di}=(\partial X_d/\partial x_{di})\cdot(x_{di}/X_d)$ is firm's i *conjectural elasticity* in market X_d, $\varepsilon=(\partial X_d/\partial w_d)/X_d$ is the industry input supply price semi-elasticity and $-\partial c_i/\partial x_{di}$ is the

[16] In the special case of Cournot behavior, λ is simply the output share of the ith firm.

marginal shadow price of x_d for firm i.[17] From (2) the degree of market power for the ith firm, can be defined as $\tau_{di}=-(w_{di}+\partial c_i/\partial x_{di})/w_{di}=\lambda_{di}/\varepsilon_w$ where ε_w is the price elasticity of input supply. For the same reasons as above, estimation of λ_{di} and ε_w requires adding an input supply function to the model.

The estimating equations for implementation of the model include the cost function, output demand, input supply and pricing equations. The flexible functional form specified for the cost function is the following translog function:

$$(3)\quad \ln c_{it}(\mathbf{q,w,x,t}) = \alpha_0 + \sum_j \beta_j \ln w_{jit} + \sum_m \beta_m \ln q_{mit} + \beta_d \ln x_{djt} + \beta_t t + \frac{1}{2}\sum_j\sum_k \gamma_{jk} \ln w_{jit} \ln w_{kit}$$

$$+ \frac{1}{2}\sum_m\sum_n \gamma_{mn} \ln q_{mit} \ln q_{nit} + \frac{1}{2}\gamma_{dd}(\ln x_{dit})^2 + \frac{1}{2}\gamma_{tt}t^2 + \sum_j\sum_m \gamma_{jm} \ln w_{jit} \ln q_{mit}$$

$$+ \sum_j \gamma_{jd} \ln w_{jit} \ln x_{it} + \sum_j \gamma_{jt} \ln w_{jit} t + \sum_m \gamma_{md} \ln q_{mit} \ln x_{dit} + \sum_m \gamma_{mt} \ln q_{it} t$$

$$+ \gamma_{dt} \ln x_{dit} t + \alpha_{np} \ln np_{it} + \sum_r \alpha_r D_r \qquad i=1,\ldots N, \quad t=1,\ldots T$$

where c_{it} represents total cost, w_{it} denotes input prices, q_{mit} represents the volume of output m and x_{dit} is the volume of deposits for firm j in period t and subscripts j,k=l,k,m,f denote inputs labor, physical capital, materials and other funds and m,n=L,S denote outputs loans and investments. A time trend t is added to serve as an indicator of technological progress, the variable np is a proxy for loan quality and D_r is a dummy variable included to allow for differences across geographical areas. N is the number of banks and T the number of observations per bank, which varies across institutions.

By partially differentiating the cost function with respect to each input price and using Shephard's lemma, the following input share equations are obtained:

$$(4)\qquad s_{jit} = \beta_j + \sum_k \gamma_{jk} \ln w_{kit} + \sum_m \gamma_{jm} \ln q_{mit} + \gamma_{jd} \ln x_{dit} + \gamma_{jt} t$$

[17] In order to analyse market power in both output and input marketsSchroeter (1988) uses the following expression: $p_m(1+\theta_m)=w_d(1+\theta_d)+MC$. However, stating the optimisation problem in this manner requires restrictive assumptions on the cost structure, as stated above, in particular fixed proportions and separability of the x_d input from the others. Also assuming the θ_m and θ_d parameters are equal, suggests the same conjectural variations in both input and output markets, which relies on fixed proportions.

where $s_{jit}=\partial \ln c_{it}/\partial \ln w_{jit} = x_{jit}\cdot w_{jit}/c_{it}$ is the share of input j in total cost. These cost share equations are estimated along with the cost function to improve efficiency.

The hypothesis of profit maximisation implies that (3) satisfies the symmetry, linear homogeneity in input prices, monotonicity and concavity properties. A necessary and sufficient condition for the translog cost function to satisfy symmetry is that $\gamma_{jk}=\gamma_{kj}$ for all j, k. If the cost function is linearly homogeneous in input prices, the share equations will be homogeneous of degree zero in prices. Then, to ensure symmetry and linear homogeneity in input prices, the following parameter restrictions on equations (3) and (4) are imposed: $\Sigma_j \beta_j=1$, $\Sigma_j \gamma_{jk}=0$, $\gamma_{jk}=\gamma_{kj}$ for all j,k, $\Sigma_j \gamma_{jm}=0$, $\Sigma_j \gamma_{jd}=0$, $\Sigma_j \gamma_{jt}=0$. In contrast, monotonicity and concavity are not general properties of the translog, unlike symmetry they cannot be conveniently summarised by linear restrictions on parameters of equations (3) and (4), instead the consistency of the estimated equations with respect to these properties must be evaluated. To satisfy the monotonicity conditions that the cost function is non-decreasing in output and increasing in input prices, the marginal cost of output and input cost shares must be positive and for concavity the matrix A-$\hat{s}+ss^T$ must be negative semidefinite where A is the symmetric matrix of γ_{jk}, s is the share vector $s=[s_j]^T$ and $\hat{s}$ is a diagonal matrix which has the share vector s on the main diagonal (Diewert and Wales, 1987). Since the cost function includes the level instead of the price of x_d, additional regularity conditions require the restricted function (3) to be decreasing and convex in x_d; the shadow value of x_d must be positive and decreasing in x_d.

The marginal cost function for loans and marginal shadow price function for deposits are obtained from the cost function by partially differentiating (3) with respect to q_{Lj} and x_{dj} respectively. As a result, the optimal pricing equations for loans and deposits stemming from (1) and (2) have the form: [18]

$$(5) \qquad p_{Lit} = \theta_L + \left(\frac{c_{it}}{q_{Lit}}\right)\cdot\left(\beta_L + \gamma_{LL}\ln q_{Lit} + \gamma_{LS}\ln q_{Sit} + \sum_j \gamma_{Lj}\ln w_{ijt} + \gamma_{Ld}\ln x_{dit} + \gamma_{Lt}t\right) + \sum_r \theta_{Lr}D_r$$

$$(6) \qquad w_{dit} = \theta_d + \left(\frac{c_{it}}{x_{dit}}\right)\cdot\left(\beta_d + \sum_m \gamma_{dm}\ln q_{mit} + \sum_j \gamma_{dj}\ln w_{ijt} + \gamma_{dd}\ln x_{dit} + \gamma_{dt}t\right) + \sum_r \theta_{dr}D_r$$

[18] Since banks account for a very small part of the market for securities, following Klein (1971),Hannan (1991) and others, banks are assumed to be price-takers in this market. For that reason equation (5) refers to the loans market.

where p_{Li} is the interest rate on loans and w_{di} the interest rate on deposits for firm i, $\theta_L=\lambda_L/\eta$ measures the difference between p and the marginal cost of loans, $\theta_d=\lambda_d/\varepsilon$ represents the gap between w_d and the marginal benefit from deposits, η is the price semi-elasticity of the demand for bank loans and ε the price semi-elasticity of the supply of deposits. Dummy variables D_r are also added to these equations to allow θ_L and θ_d to vary across regions.

In order to estimate η_p and ε_w the demand for loans and supply of deposits are specified as log-linear functions of the form:

(7) $\ln Q_{Lt} = \eta_0 + \eta_p \ln p_{Lt} + \eta_Y \ln Y_t + \eta_Z \ln Z_t$

(8) $\ln X_{dt} = \varepsilon_0 + \varepsilon_w \ln w_{dt} + \varepsilon_Y \ln Y_t + \varepsilon_Z \ln Z_t$

where Q_L is the aggregate demand for loans and X_d the aggregate supply of deposits expressed as functions of total income Y, the price of a substitute Z, and the interest rate on loans p_L and deposits w_d respectively. The parameter η_p is the price elasticity of demand for loans and ε_w the price elasticity of supply of deposits. Equations (7) and (8) can be viewed as first-order approximations to arbitrary demand functions.

The complete model consists of equations (3), (4), (5), (6), (7) and (8) and in principle may be estimated as a full system. In practice, however, it has proven to be difficult to estimate and is very demanding of data resources (Huang and Sexton, 1996). For those reasons the loans demand and the deposits supply functions (7) and (8) are estimated separately from quarterly time-series data while the cost function, input cost share and pricing equations are estimated as a system using annual bank-level data.

Market Power and Cost Elasticities

From equations (5) and (6) different measures of market power can be constructed from the estimated parameters θ_L and θ_d. The degree of market power in the loans market τ_L can be obtained dividing θ_L by the average interest rate on loans p_L. In the market for deposits, τ_d can be computed dividing θ_d by the average interest rate on deposits w_d.[19] In both cases, the overall

[19] These measures can also be calculated by using the estimated cost function, predicted costs and observed output and input prices in order to estimate marginal costs (marginal shadow values).

deviation from zero indicates the presence of market power.[20] The conjectural elasticities for the average bank can also be estimated from (5) and (6) as $\lambda_L=\theta_L\cdot\eta=\tau_L\cdot\eta_p$ and $\lambda_d=\theta_d\cdot\varepsilon=\tau_d\cdot\varepsilon_w$, that is, multiplying τ_L by the loans market demand price elasticity and τ_d by the corresponding price elasticity of deposits supply obtained from (7) and (8) respectively.[21] In this case, $\lambda_L>0$ and $\lambda_d>0$ imply effective oligopoly and oligopsony power.

From the parameters of (3) several cost elasticities representing the cost structure may be computed. The elasticity of cost with respect to output, which represents the cost changes associated with scale q, may be expressed as $\varepsilon_{cq}=\Sigma_m(\partial c/\partial q_m)\cdot(q_m/tc)=\Sigma_m(\partial \ln c/\partial \ln q)\cdot(c/tc)$ where $tc=c(\cdot)+w(X_d)\cdot x_d$ and in terms of the coefficients of (3) as:

$$(9)\qquad \varepsilon_{cq}=\sum_m\left(\beta_m+\gamma_{mm}\ln q_{mit}+\gamma_{mn}\ln q_{nit}+\sum_j\gamma_{jm}\ln w_{jit}+\gamma_{dm}\ln x_{dit}+\gamma_{mt}t\right)\cdot\left(\frac{c_{it}}{tc_{it}}\right)$$

Since scale economies can be measured as $SCE=1/\varepsilon_{cq}$ values of ε_{cq} higher (lower) than one indicate the presence of scale economies (diseconomies).

The elasticity of cost with respect to time often interpreted as technological change, which measures the rate of downward shift of the cost function over time, can be estimated by the restricted cost function as $\varepsilon_{ct}=(\partial c/\partial t)\cdot(1/tc)=(\partial \ln c/\partial t)\cdot(c/tc)$ and from (3) can be written as follows:[22]

$$(10)\qquad \varepsilon_{ct}=\left(\beta_t+\gamma_{tt}t+\sum_j\gamma_{jt}\ln w_{jit}+\sum_m\gamma_{mt}\ln q_{mit}+\gamma_{dt}\ln x_{dit}\right)\cdot\left(\frac{c_{it}}{tc_{it}}\right)$$

where negative values indicate the contribution of technical change in reducing banking costs.

These elasticity measures are based on $c(\cdot)$, therefore depend on a given level of x_d. However, when output increases, x_d responses will have impacts on w_d (in the presence of market imperfections in this market) which will appear as price-related cost economies or diseconomies. Two alternative approaches can be adopted to construct measures that

[20] In addition, these τ measures may also be used to define the industry output and input market power indicator based on the classical Lerner index that is defined as $L_m=\Sigma\tau_{mi}\cdot s_i$ and $L_d=\Sigma\tau_{di}\cdot si$ where s_i is the market share of firm i (Appelbaum, 1982).

[21] These λ measures should be interpreted as the conduct of the average firm in the industry.

incorporate such price-related adjustment: including the 'desired' optimal condition for x from the input pricing equation into c(·) or using a 'combined' elasticity that directly appends the adjustment of x from a change in output. These approaches to the problem are similar empirically, but the latter is conceptually the most appealing (Morrison, 1999c).

This method simply relies on the chain rule of differentiation. Since the desired level of x_d depends on the output produced, the c(·) function may be expressed as c(·,q,x(q)), where (·) represents all other arguments of the function. Then, the cost elasticity becomes: $\varepsilon_{cqd}=\sum_m(\partial tc/\partial q_m+\partial tc/\partial x_d\cdot\partial x_d/\partial q_m)\cdot(q_m/tc)=[\partial c/\partial q_m+(\partial c/\partial x_d+w(x_d)+x_d\cdot\partial w(x_d)/\partial x_d)\cdot(\partial x_d^*/\partial q_m)]\cdot(q_m/tc)$ where $x_d^*=x_d(q_m)$ expression results from solving for x_d from the pricing equation (6). However, x_d enters in both natural and logarithmic units in (6) implying that no closed form analytic solution for x_d^* exists. Hence, the method developed by Brown and Christensen (1981) and used by Morrison (1992) and Considine (2001) in a somewhat different context is adopted, implicitly computing $\partial x_d/\partial q_m$ as $-(\partial\Phi/\partial q_m)/(\partial\Phi/\partial x_d)$ where Φ is an implicit function for optimal x_d^*:

(11) $$\Phi_{it} = w_{dit} + \theta_d + \left(\frac{c_{it}}{x_{dit}}\right)\cdot\left(\beta_d + \sum_m \gamma_{dm}\ln q_{mit} + \sum_j \gamma_{dj}\ln w_{ijt} + \gamma_{dd}\ln x_{dit} + \gamma_{dt}t\right)$$

Therefore, the cost-output elasticity ε_{cqd} can be expressed as follows:

(12) $$\varepsilon_{cqd} = \varepsilon_{cq} + \sum_m \left\{ z_{it} + w_{dit} + x_{dit}\cdot\left[\left(\frac{c_{it}}{x_{dit}^2}\right)\cdot\gamma_{dd} - \frac{z_{it}}{x_{dit}}\right]\right\}\cdot \left[\left(\frac{c_{it}}{x_{dit}}\right)\cdot\left(\frac{\gamma_{dm}}{q_{mit}}\right)\Big/\left(-\frac{z_{it}}{x_{dit}}\right)\right]\cdot\left(\frac{q_{mit}}{tc_{it}}\right)$$

where $z_{it} = (c_{it}/x_{dit})\cdot(\beta_d + \sum_m\gamma_{dm}\ln q_{mit} + \sum_j \gamma_{dj}\ln w_{jit} + \gamma_{dd}\ln x_{dit} + \gamma_{dt}t)$. Then, the cost-time elasticity can be computed from the translog parameters as:

(13) $$\varepsilon_{ctd} = \varepsilon_{ct} + \left\{ z_{it} + w_{dit} + x_{dit}\cdot\left[\left(\frac{c_{it}}{x_{dit}^2}\right)\cdot\gamma_{dd} - \frac{z_{it}}{x_{dit}}\right]\right\}\cdot\left[\left(\frac{c_{it}}{x_{dit}}\right)\cdot\gamma_{dt}\Big/\left(-\frac{z_{it}}{x_{dit}}\right)\right]\cdot\left(\frac{1}{tc_{it}}\right)$$

[22] This measure is not in elasticity form since the denominator is not in logs, so the measure cannot be interpreted as a percentage change.

These cost elasticities are the most appropriate measures for cost analysis, since they represent the full range of cost impacts arising from output increases or technological change, including associated input price changes due to market imperfections. In a similar manner, marginal costs and market power measures can also be estimated, incorporating the impact of output increases on input prices due to market imperfections.

5. Empirical Implementation and Results

Data and Variables

The data for estimation of the system of equations (3), (4), (5) and (6) consists of annual information from the Report of Condition and Income Statement of each retail bank over the period 1993-2000.[23] The banks in the sample are classified into three different size bands (large, medium and small) based on bank asset values in 1993. If a bank's asset size is less than $150 million (the median for all banks), the bank is classified as small-sized; when the asset size is greater than $150 million but less than $700 million, the bank is classified as medium-sized and when the asset size exceeds $700 million it is classified as a large bank.[24]

Banks are also clustered in four separate markets (Centre, North, South and National) according to their prevailing area of business. The country is partitioned in three areas: Centre, North and South (comprising the following provinces, in the order: Buenos Aires, Capital Federal, Córdoba, Santa Fe, Entre Ríos, Mendoza, San Juan, San Luis and La Pampa; Misiones, Corrientes, Formosa, Chaco, Jujuy, Salta, Tucuman, Santiago and La Rioja; and Neuquén, Río Negro, Chubut, Santa Cruz and Tierra del Fuego). Each bank is considered to belong to a certain area if it collects at least 70% of its deposits in that area. As the threshold is increased, the criterion tends to move banks with an area-wide outreach to the nation-wide category.[25] The following dummy variables are defined according to this criteria D_{Ce}, D_{No}, D_{So} and D_{Na}

[23] Of special interest from the standpoint of competition analysis is the retail banking industry, which serves households and small businesses. Wholesale commercial banking is essentially a distinct industry wherein large banks provide a wide range of sophisticated services to large corporate customers. Retail banking is then more likely than wholesale banking to be subject to market power due to information asymmetries between buyers and sellers, switching costs, and the prevalence of local rather than national or international markets.
[24] The size distribution of firms is asymmetric with a long right-hand tail, i.e. many small firms and few very large firms.
[25] Since information on deposits per bank per area is only available for the period 1998-2000, each bank is assumed to maintain during 1993-1997 the same distribution of deposits as in 1998

which equal 1 for banks in Central, Northern, Southern and National regions respectively and 0 otherwise.

The definition of outputs and inputs follows the intermediation approach. Thus, q_L is measured as the volume of loans, q_S as total assets minus loans, property and equipment and other fixed assets and x_d as the volume of deposits. The interest rates on loans p_L and deposits w_d are given by the ratios of interest income from loans to total loans and interest paid on deposits to total deposits respectively.[26] Since loans are denominated in domestic (pesos) and foreign (dollars) currency, a quantity index is constructed by Divisia aggregation of loans in pesos and dollars as follows: $\ln q_t - \ln q_{t-1} = (1/2)\Sigma_i(s_{it} + s_{i,t-1})\cdot(\ln q_{i,t} - \ln q_{i,t-1})$ where q_i represents the ith type of loan, p_i the interest rate, $s_i = p_i \cdot q_i / \Sigma_i p_i \cdot q_i$ its share in total revenues and t represents the time period.[27] A Divisia quantity index of deposits (in pesos and dollars) is also constructed using the same methodology. The interest rates on loans and deposits are estimated by dividing the interests income from loans and interest paid on deposits by the corresponding quantity indexes.

The prices for the inputs labor, capital, materials and other funds are computed as follows. The wage rate (w_l) is proxied by the ratio of personnel expenses (wages, insurance payments and subcontracted services cost) to the number of employees in the respective bank. The price of capital in each bank (w_k) is generated as sum of the depreciation rate and the opportunity cost of capital. The latter is approximated by the interest rate for loans less the expected rise in the value of the investment goods employed, which is proxied by the growth rate of the wholesale price index. The price of materials (w_m) is constructed as administrative expenses minus personnel and capital costs divided by the value of total assets. The price of other funds in each bank (w_f) is given by the ratio of interest expenses on other purchased funds to other borrowed funds (including interbank and federal funds purchased, commercial papers and other purchased funds). Total cost in each bank (c) includes all operating expenses and interest payments on other funds. The control variable np is proxied by the ratio of provisions for bad loans to total loans. All nominal data were converted into 2000 prices using the wholesale price index. Summary statistics for the cost, input and output variables are presented in table 4 for all banks in the sample and by subgroups based on total asset size.

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[26] Because the price data are subject to error from this estimation procedure, observations in which the prices on loans and deposits are more than 2.5 standard deviations from the mean value for that year were dropped. As a result 7 institutions were excluded due to negative or implausibly large prices.

[27] Banks provide different types of loans, which can be classified as retail or corporate loans. Retail loans include financing to households and small firms: mortgages, personal loans and pledges. Corporate loans consist basically on financing to large corporation: overdrafts, interbank loans and promissory notes. Given that information on interest rates for both types of loans is only available since 1998, the analysis is restricted to total loans.

Table 4

Summary statistics for sample banks, 1993-2000

Variable		Overall	Large	Medium	Small
Assets (million $)		1,156.6	4,520.1	592.4	125.8
Loans (million $)	q_L	713.6	2,715.5	386.9	91.9
Investments (million $)	q_S	426.2	1,676.2	211.1	48.0
Deposits (million $)	x_d	615.5	2,012.8	501.0	80.6
Interest rates (%)					
Loans	p_L	20.7	16.9	19.2	23.9
Deposits	w_d	8.9	7.0	8.2	10.4
Other input prices (%)					
Labor (thousand $ per employee)	w_l	29.7	36.4	29.2	27.0
Capital	w_k	25.2	21.1	23.8	28.3
Materials	w_m	3.5	2.1	3.3	4.4
Funds	w_f	3.3	3.3	3.2	3.5
Total costs excluding deposits (million $)	c	81.2	280.1	55.1	13.9
Input cost shares (%)					
Labor	s_l	45.1	46.7	45.5	43.9
Capital	s_k	15.0	13.2	14.3	16.5
Materials	s_m	30.6	25.2	30.4	33.4
Funds	s_f	9.3	14.9	9.9	6.2
Number of banks*		122 (52)	19 (13)	42 (18)	61 (20)

Constant pesos December 2000. * Number of banks in 1993 (2000) respectively.

The data for estimation of equations (7) and (8) consist of quarterly industry-level data for the period 1994-2000. The aggregate volume of loans (Q_L) and deposits (X_d) and the average interest rate on loans (p_L) and deposits (w_d) estimated as the ratio of interest on loans/deposits over total loans/deposits were obtained from the Banco Central de la República Argentina (2001). The activity level (Y) is proxied by the GDP and the price of a substitute (Z) is estimated as sum of the LIBOR rate and the level of sovereign risk reflected in the price of the FRB bonds issued by the Argentine government.[28] This information was obtained from the Ministerio de Economía y Obras y Servicios Publicos (2001).

Empirical Results

The demand for loans and supply of deposits were estimated by Two Stage least Squares (2SLS), because of the endogeneity of p_L and w_d, using industry-level data.[29] The estimated functions are:

[28] This variable may be considered as a proxy for the market interest rate. Shaffer (1989, 1993) and Suominen (1994) have used the market interest rate as a proxy for Z while analysing market power in the US, Canadian and Finnish banking markets respectively.

[29] The instruments used include all exogenous variables and the lagged values of Q_L, X_d, p_L and w_d.

(14) $\ln Q_{Lt} = 3.012 - 1.538 \ln p_{Lt} + 0.524 \ln Y_t + 0.591 \ln Z_t$ DW= 1.52

(0.30) (-2.48) (1.71) (3.43)

(15) $\ln X_{dt} = -34.967 + 1.471 \ln w_{dt} + 3.996 \ln Y_t$ DW= 1.71

(-3.49) (2.00) (4.40)

where *t* statistics are indicated in parenthesis. All the coefficients have the expected signs and are statistically different from zero at significance levels of 10% or less (except the constant term in the demand equation). Based on the Durbin-Watson statistic the hypothesis of non-correlated disturbance terms can not be rejected. The price elasticity of demand for loans equals η_p= 1.54 while the deposits supply price elasticity equals ε_w= 1.47 suggesting that borrowers and depositors are sensitive to variations in interest rates. Vessala (1995) finds similar estimates for the interest rate-elasticity of demand for loans in the Finnish banking sector. In constrast, Ribon and Yosha (1999) find lower estimates for both the elasticities of demand for loans and supply of deposits in the Israeli banking industry but they report a small difference between them, as in this case.

The system based on the cost function, input shares and pricing equations was then estimated on the basis of the bank-level data over the entire sample and also over three subsets of data comprising large, medium- and small-sized banks respectively.[30] Additive error terms were appended to each equation, linear homogeneity in input prices and symmetry restrictions imposed across equations and one share equation was omitted to avoid singularity.[31] The system was estimated by (iterative) Three Stage Least Squares (3SLS) to take into account the joint endogeneity of prices and quantities in the loans and deposits markets that may be characterised by noncompetitiveness.[32] The results presented in Table 5 show that most of the

[30] Hunter and Timme (1991) recognised that the estimation of a cost function using data for all banks is based on the maintained hypothesis that all banks operate along the same average cost curve, which may be violated if banks differ appreciably with regard to product mixes and individual products exhibit substantially different production characteristics. McAllister and McManus (1993) further noted that the fitting of a translog cost function over a population of banks that varies widely in terms of product mixes and size may result in specification bias. Then, both suggested the use of restricted samples of banks that are similar in output mix and size. Since the sample of Argentine banks presents marked differences in terms of size (measured by the value of total assets) and output composition (small banks provide credit to households and small firms while large banks specialise in more sophisticated products and provide financing to large corporations), the estimates of the cost function based on the overall sample should be interpreted with caution.

[31] In this case the labour share equation was omitted. However, the estimates are invariant to the choice of share equation deleted since 3SLS provides maximum-likelihood estimates.

[32] The instruments used include all exogenous variables, the lagged values of input prices, deposits and loan levels, interest rates on loans and deposits and input cost shares.

Table 5

Parameter estimates for cost function, input cost share and pricing equations (3 - 6)

Using overall sample of banks and subsamples of large, medium- and small-sized banks, 1993-								
	Overall		Large		Medium		Small	
Parameter	Coef	SE	Coef	SE	Coef	SE	Coef	SE
α_0	2.312 ***	0.124	2.501 ***	0.449	4.382 ***	0.373	2.245 ***	0.219
β_l	0.592 ***	0.021	0.876 ***	0.071	0.768 ***	0.042	0.531 ***	0.039
β_k	0.060 ***	0.017	-0.041	0.040	0.009	0.033	0.191 ***	0.029
β_m	0.298 ***	0.018	0.062	0.044	0.185 ***	0.030	0.224 ***	0.037
β_f	0.050 ***	0.012	0.104 **	0.041	0.038	0.032	0.054 ***	0.020
β_L	0.703 ***	0.060	1.519 ***	0.163	0.233 *	0.134	0.848 ***	0.101
β_S	0.278 ***	0.040	-0.460 ***	0.166	0.101	0.097	0.278 ***	0.073
β_d	-0.119 ***	0.036	-0.329 ***	0.071	-0.096	0.077	-0.171 **	0.081
β_t	0.005	0.027	0.144 ***	0.045	-0.015	0.044	-0.001	0.053
γ_{ll}	0.128 ***	0.007	0.179 ***	0.013	0.119 ***	0.009	0.122 ***	0.010
γ_{kk}	0.063 ***	0.005	0.077 ***	0.008	0.051 ***	0.006	0.067 ***	0.008
γ_{mm}	0.174 ***	0.004	0.183 ***	0.005	0.166 ***	0.004	0.193 ***	0.007
γ_{ff}	0.030 ***	0.002	0.059 ***	0.005	0.023 ***	0.003	0.030 ***	0.003
γ_{lk}	-0.005	0.004	-0.042 ***	0.009	-0.004	0.006	0.006	0.007
γ_{lm}	-0.107 ***	0.004	-0.120 ***	0.005	-0.108 ***	0.004	-0.111 ***	0.007
γ_{lf}	-0.016 ***	0.002	-0.017 ***	0.006	-0.007 *	0.004	-0.017 ***	0.004
γ_{km}	-0.056 ***	0.003	-0.029 ***	0.004	-0.044 ***	0.004	-0.071 ***	0.006
γ_{kf}	-0.003	0.002	-0.006	0.004	-0.003	0.003	-0.002	0.003
γ_{mf}	-0.011 ***	0.001	-0.035 ***	0.003	-0.013 ***	0.002	-0.011 ***	0.003
γ_{LL}	0.175 ***	0.024	-0.240 ***	0.062	0.285 ***	0.042	0.040	0.038
γ_{SS}	0.148 ***	0.012	0.082 *	0.050	0.151 ***	0.022	0.153 ***	0.017
γ_{dd}	-0.053 ***	0.012	-0.044 **	0.020	-0.023	0.021	-0.054 *	0.031
γ_{tt}	-0.013 ***	0.005	-0.016 ***	0.005	-0.019 ***	0.005	-0.010	0.009
γ_{lL}	-0.019 **	0.008	-0.045 **	0.020	-0.035 ***	0.012	-0.019	0.013
γ_{kL}	0.020 ***	0.005	0.041 ***	0.010	0.027 ***	0.009	-0.021 **	0.009
γ_{mL}	-0.019 ***	0.007	-0.001	0.013	-0.011	0.009	0.016	0.012
γ_{fL}	0.019 ***	0.005	0.006	0.011	0.019 **	0.009	0.024 ***	0.007
γ_{lS}	-0.029 ***	0.005	0.015	0.019	-0.029 ***	0.007	-0.046 ***	0.009
γ_{kS}	-0.019 ***	0.004	-0.029 ***	0.009	-0.024 ***	0.005	-0.023 ***	0.006
γ_{mS}	0.026 ***	0.005	-0.006	0.012	0.040 ***	0.005	0.037 ***	0.008
γ_{fS}	0.022 ***	0.003	0.019 *	0.010	0.014 **	0.005	0.032 ***	0.005
γ_{ld}	0.026 ***	0.007	-0.018	0.012	0.011	0.010	0.041 ***	0.012
γ_{kd}	-0.018 ***	0.005	-0.018 **	0.008	-0.009	0.007	-0.010	0.008
γ_{md}	0.016 ***	0.006	0.052 ***	0.007	0.010	0.007	0.011	0.011
γ_{fd}	-0.024 ***	0.004	-0.015 **	0.007	-0.012 *	0.007	-0.042 ***	0.006
γ_{lt}	-0.012 ***	0.002	-0.015 ***	0.006	-0.007 **	0.003	-0.008 **	0.004
γ_{kt}	0.009 ***	0.001	0.011 ***	0.002	0.008 ***	0.002	0.011 ***	0.002
γ_{mt}	0.005 **	0.002	0.006 *	0.004	0.005 **	0.002	-0.004	0.004
γ_{ft}	-0.002	0.001	-0.002	0.003	-0.005 **	0.002	0.001	0.002
γ_{dL}	0.003	0.015	0.093 ***	0.020	-0.046 *	0.027	0.058 **	0.028
γ_{LS}	-0.192 ***	0.013	0.056	0.054	-0.182 ***	0.024	-0.198 ***	0.018
γ_{Sd}	0.060 ***	0.009	-0.028 **	0.014	0.071 ***	0.013	0.052 ***	0.017
γ_{Lt}	-0.017 **	0.006	-0.037 ***	0.014	-0.007	0.010	-0.006	0.010
γ_{St}	0.024 ***	0.006	0.031 **	0.014	0.019 **	0.008	0.031 **	0.012
γ_{dt}	-0.006	0.004	-0.010 **	0.005	-0.002	0.007	-0.019 **	0.009
α_{np}	0.183 ***	0.052	0.265 ***	0.096	0.124 *	0.070	0.064	0.087
θ_L	0.085 ***	0.005	0.074 ***	0.011	0.080 ***	0.007	0.140 ***	0.009
θ_d	-0.059 ***	0.004	-0.029 ***	0.004	-0.052 ***	0.005	-0.096 ***	0.010
No.obs	665		129		252		284	

***, **, * coefficient significant at 1, 5 and 10% level. l=labor, m=materials, f=funds, k=capital, L=loans, S=securities, d=deposits, t=time trend and np=nonperforming loans estimated parameters are statistically different from zero at significance levels of 10% or less.[33] A log likelihood test rejected the null hypothesis that the sets of coefficients for the different size groups are the same. [34,35]

In order to explore the cost function properties, several regularity conditions were tested in addition to the linear homogeneity in input prices and symmetry imposed *a priori* during estimation. Monotonicity in output and input prices was satisfied since marginal costs and the fitted input cost shares were positive at most data points in the sample. Concavity in input prices was also satisfied for the range of observations because the matrices computed using the fitted input cost share equations and the relevant parameter estimates were negative semidefinite. The requirements with respect to deposits were not completely satisfied since the shadow price of deposits resulted positive at most data points[36] but the partial derivative of costs with respect to deposits was negative, not conforming with the convexity condition. Finally, the estimated costs were positive for all values of output satisfying the non-negativity condition, and continuity followed from the flexible functional form employed.

Additional restrictions were then imposed on the parameters of the translog cost function in order to investigate the production structure of the industry. Four hypotheses were tested: (i) homotheticity (the cost function can be written as a separable function in output, factor prices/ levels and time, $\gamma_{jm}=\gamma_{mt}=\gamma_{md}=0$), (ii) homogeneity with respect to output (the elasticity of cost with respect to output is constant, $\gamma_{jm}=\gamma_{mt}=\gamma_{md}=\gamma_{mm}=0$), (iii) unitary elasticity of substitution between inputs ($\gamma_{jk}=0$ and (iv) generalised Cobb-Douglas (unitary elasticity of substitution together with homogeneity, $\gamma_{jm}=\gamma_{mt}=\gamma_{md}=\gamma_{mm}=\gamma_{jk}=0$). The results of the structural tests of the cost function presented in Table 6 indicate that each restricted functional form of the production technology is strongly rejected. In all cases, the likelihood ratio test statistic

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33 The model was also estimated with regional dummy variables as fixed effects. However, the hypothesis of differences across regions was rejected. For that reason the estimates presented in Table 5 were obtained without regional dummy variables.

34 The likelihood test was performed by incorporating two dummy variables (for medium- and small-sized banks) into the pooled estimation and allowing every parameter to vary across the large, medium- and small-sized banks observations. This unrestricted model was then compared to the restrictedmodel which imposed common coefficients for all subgroups. The likelihood ratio statistic was 297.06 and the critical value was 50.9 at the 1% confidence level.

35 The stability of coefficients over time was also analysed by estimating the model over different subperiods. The estimates presented a stable pattern over time.

36 This result also suggests that deposits should be modelled as inputs in the Argentine banking industry. As Hughes et. al. (2000) pointed out, if deposits are outputs, then more variable inputs and, hence, variable expenditure will be required to produce q and the increased x_d, which implies that $\partial c/\partial x_d>0$. If deposits are inputs, an increase in their level allows a reduction in the expenditure on variable inputs needed to produce q, which implies that $\partial c/\partial x_d<0$. In this case, the shadow value of deposits is positive, that is $\partial c/\partial x_d<0$ implying that deposits function as inputs in production.

exceeded the chi-square critical value at 1% significance level suggesting that the use of the translog flexible functional form to estimate the cost structure appears to be appropriate.

Table 6

Structural tests of the cost function

Restrictions	Likelihood Ratio test statistic				df	Chi-square*
	Overall	Subsamples				
		Large	Medium	Small		
(i) Homotheticity $\gamma_{jm}=0,\ \gamma_{mt}=0,\ \gamma_{md}=0$	162.9	46.6	96.7	64.3	7	18.48
(ii) Homogeneity in output $\gamma_{jm}=0,\ \gamma_{mt}=0,\ \gamma_{md}=0,\ \gamma_{mm}=0$	370.3	130.7	229.5	185.4	11	24.73
(iii) Unitary elasticity of substitution $\gamma_{jk}=0$	855.6	337.6	380.6	330.4	6	16.81
(iv) Generalised Cobb-Douglas $\gamma_{jm}=0, \gamma_{mt}=0, \gamma_{md}=0, \gamma_{mm}=0, \gamma_{jk}=0$	1,066.8	427.5	529.6	456.8	17	33.41

* Critical values at 1% level

Although most of the parameters are not readily interpretable individually, some relevant implications about market power are evident from the pricing equation estimates presented in the last rows of Table 5. These results suggest significant departures from marginal cost (benefit) pricing. In the loans market, the parameter θ_L (positive and highly significant) indicates that banks seem to price above marginal cost, implying a possible exploitation of oligopoly power in this market. In the market for deposits, the coefficient θ_d, which is also statistically significant but negative, suggests that banks seem to pay more than the full value of their marginal benefit for increases in deposits, implying no market power exertion in this market. More direct assessment of market power requires evaluating the τ estimates presented in table 7 for the average bank. [37] These measures were calculated by using the estimated cost functions in Table 5, predicted costs and observed output and input prices.

In the loans market, the estimated value of τ_L for the average bank indicates that banks are pricing 40.3% above marginal cost, moreover, the average margin increased from 24.8 to 52.4% over the sample period. The margins also display some interesting patterns across subgroups of banks. The estimated values of τ_L for large, medium- and small-sized banks are 46.8, 48.1 and 61.1% respectively, which suggests that small banks seem to exercise a higher

[37] Even when the results from Panel A are derived from the parameter estimates for the overall sample and those from Panel B using parameter values for the subsamples of large, medium- and small-sized banks, the conclusions drawn are consistent across panels.

degree of market power pricing than larger financial institutions. This result could be explained by the fact that small-sized banks are more retail oriented providing credit to households and small firms while large banks are more oriented toward corporate customers. In addition, retail customers are less informed and less likely to switch from one bank to the other while corporate customers have a stronger incentive and ability to gather information and seek price offers from different banks. In this latter case, countervailing power could mitigate market power leading to large banks exerting a lower degree of oligopoly power than smaller institutions. In fact, Berg and Kim (1998) find that banks in Norway have substantial market power in the retail market while they appear to possess less market power in the corporate segment.

Table 7

Market power and cost elasticities measures, 1993-2000

	Loans	Deposits	Cost-output elasticity		Cost-time elasticity	
	τ_L	τ_d	ε_{cq}	ε_{cqd}	ε_{ct}	ε_{ctd}
A. Estimates derived using parameter values for overall sample of banks						
Overall	0.403	-0.589	0.731	0.824	-0.021	-0.030
1993	0.248	-0.550	0.764	0.839	0.004	-0.003
1994	0.312	-0.605	0.729	0.784	-0.011	-0.017
1995	0.389	-0.668	0.719	0.796	-0.019	-0.027
1996	0.329	-0.665	0.710	0.792	-0.024	-0.032
1997	0.340	-0.677	0.707	0.792	-0.031	-0.038
1998	0.395	-0.706	0.682	0.761	-0.037	-0.044
1999	0.510	-0.710	0.678	0.764	-0.043	-0.052
2000	0.524	-0.686	0.673	0.758	-0.051	-0.059
B. Estimates derived using parameter values forsubsamples of large, medium and small-sized banks						
Large banks	0.468	-0.324	0.792	0.885	-0.030	-0.041
Medium banks	0.481	-0.591	0.697	0.742	-0.016	-0.018
Small banks	0.611	-0.892	0.519	0.668	-0.002	0.032

For the deposits market, the average τ_D measure indicates that the average bank is paying 58.9% above the marginal shadow value of deposits. The results also show that this margin increased over the sample period from 55 to 68.6%. When analysed across subgroups of banks, the estimated value of τ_D indicates that small banks interest rate on deposits is 89.2% above the marginal shadow value of deposits while large banks pay just 32.4% above it. These results seem to suggest that small-sized banks, which may have limited access to other sources of funds, have to pay an over-price in order to attract deposits while large financial institutions, probably having access to international lines of credit, for example, pay a lower over-price for increases in deposits.[38]

The interpretation of these indicators of market power is reinforced with the consideration of the associated evidence of cost economy measures presented in Table 7. The cost elasticities measures were obtained by setting the variables in (9), and (12) equal to their average value of the total sample or subsample. The estimated value for the overall sample ε_{cq} = 0.731 suggests the presence of significant economies of scale which have increased over the sample period since ε_{cq} drop from 0.764 in 1993 to 0.673 in 2000. In addition, the most appropriate measure for cost analysis ε_{cqd}=0.824 indicates that even after adjusting for the effect of market imperfections in the market for deposits, the average bank operates with increasing returns to scale.[39] This measure also decreases over the sample period from 0.839 to 0.758. Probably this is due to the fact that while on the one side banks are exploiting the economies of scale through the consolidation process, on the other, regulatory changes and advances in technology are increasing the optimal scale leading to an increase in scale economies over time.

The results also show that scale economies diminish as firm size increases, however, the estimated ε_{cqd} reveals the presence of significant increasing returns to scale for all size bands suggesting that the average cost curve is not U-shaped. However, there may be a particular level of output, outside the observed range in the sample, above which banks would operate under constant or increasing returns to scale. In fact, for the US banking industry Berger and Mester (1997) find increasing returns to scale for all size classes up through $25 billion, with decreasing returns thereafter. In addition, Cavallo and Rossi (2001) for a sample of six European countries find constant returns to scale for large banks with average assets of $92 billion. In Argentina, the largest banks have less than $15 billion in assets, which may suggest that there still exist economies that can be exploited by an increase in the size of banks.

Table 7 also presents the estimates of time elasticities aimed at capturing the contribution of technical change in reducing average banking costs and obtained by setting the variables in (10) and (13) equal to their average value of the total sample or subsample. The estimated value for the overall period ε_{ctd} = –0.033 indicates that, costs were reduced by approximately 0.3% per

[38] Ribon and Yosha (1999) conclude that banks in the Israeli banking sector exercise market power in both the markets for loans and deposits.

[39] The cost elasticity ε_{cq}=0.731 indicates that a 10% increase in output would raise costs by 7.31% holding other variables constant. In addition, ε_{cqd}=0.824 suggests that costs would raise by 8.24% if the effect of output expansion on deposits is accounted for i.e. the increase in output would induce a higher demand for deposits and a higher interest rate on deposits (due to market imperfections in this market).

year as a consequence of technical change. When analysed over time, the results suggest that significant cost savings occurred in the industry during the period a result that may be connected to the incorporation of new technology, such as ATM or information systems technologies during the 1990s. When analysed over subgroups, the results appear to indicate that the effect of technical change on average costs has been significant for large and medium-sized banks while it has not been statistically significant for the group of smaller banks. These results may be due to cost increasing effects that have cancelled out technical innovations effects since technological change, defined as a trend, may capture not only production innovations but also the impact of other factors such as changes in organisational structure and processes on bank costs.

Welfare Analysis

The change in social welfare associated to the consolidation of the banking sector is now evaluated in a partial equilibrium framework by adding up the changes in aggregate consumer and producer surplus. The aggregate consumer surplus is measured by the compensating variation defined as $CV(p)=e(p^1,v^0)-e(p^0, v^0)$, where e(p, v) is the expenditure function, v(p, y) represents the indirect utility function, p is the price vector and y represents monetary income. When prices decline $p^1 < p^0$, CV is the negative of the area to the left of the Hicksian demand curve for base utility level v^0 between p^1 and p^0, and when $p^1 < p^0$, CV is positive and simply equal to that area, that is, $CV(p)=\int_{p0}^{p1} x^H(p, v^0)dp$ where x^H is the Hicksian demand (Jehle and Reny, 2001).[40]

Breslaw and Smith (1995) show that when prices change from p^0 to p^1, expanding the expenditure function in a Taylor series about (p^0, v^0) and disregarding other terms than the quadratic yields:

$$(14) \qquad CV(p) = x^H(p^0, v^0) \cdot (p^1 - p^0) + 0{,}5 \frac{\partial x^H(p^0, v^0)}{\partial p}(p^1 - p^0)^2$$

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[40] Exact measures of consumer surplus are computable at least theoretically from the knowledge of the ordinary demand curve (Hausman, 1981). Indeed, from Roy's identity, the indirect utility function, the expenditure function and therefore the Hicksian demand function can be recovered. However, this method can be extremely difficult to implement since it involves solving a differential equation that depends on the ordinary demand function, and this is analytically possible only in simple cases. An alternative methodology to approximate welfare measures is to use numerical methods.Vartia (1983) proposed a numerical algorithm to compute the compensated income from any ordinary demand function. Breslaw and Smith (1995) improved on Vartia's method and proposed a quicker algorithm.

and since at the initial equilibrium $x^H(p^0,v^0)=x^M(p,y)$, the derivative of the Hicksian demand can be obtained from the Slutsky equation as $\partial x^H(p^0,v^0)/\partial p=[\partial x^M(p^0,v^0)/\partial p]+x^H\cdot[\partial x^M(p^0,v^0)/\partial y]$ where x^M is the Marshallian demand function. To compute the compensating variation they developed a numerical algorithm that involves splitting up the price change into smaller intervals, evaluating the CV for each small change using (14) and finally adding together the CV computed at each step. This numerical algorithm can be easily implemented and is valid for any demand function.

The aggregate producer surplus or aggregate profit Π(p) equals the area between the market price and the industry marginal cost, and can be measured as follows:

$$(15) \qquad \Pi(p) = \int_0^{x(p^*)} [p^* - c'(x)]\, dx$$

where c'(x) represents marginal cost. This producer surplus can be estimated as the difference between total revenue and total cost for the equilibrium level of output. Finally, the change in total surplus dW(p) can be measured as sum of CV(p) and dΠ(p).

Table 8

Welfare effects of market power (million $)

Period	Lerner Index (%)	Interest rate loans (%)	Average cost ($)	CV	d Π	d W
Start of sample period (1993)	24.8	23.0	17.1			
End of sample period (2000)	52.4	14.9	11.0	4,053	2,361	6,414
- Output at 1993 level	52.4	16.1	13.0	3,263	1,137	4,400
- Lerner index at 1993 level	24.8	13.5	11.0	5,058	1,557	6,615

Positive (negative) numbers represent welfare gains (losses).

In order to compute the welfare effects of market power in the banking industry over the period 1993-2000 the compensating variation was computed applying Breslaw and Smith's algorithm with 300 steps and the change in profits was estimated as the difference between total revenue and total cost. The results presented in Table 8 show an increase in the consumers' surplus of $4.0 billion and in banks' profits of $2.3 billion implying an overall increase in economic welfare of $6.4 billion between 1993 and 2000. These findings could be explained by the increase in output in combination with the increasing returns to scale that led to lower average costs and also the effect of technological change, which might have counteracted the effect of increased market power in the market for loans.

To understand the effects of scale economies and market power on economic welfare, interest rates, average costs, consumer's surplus and bank's profits were also calculated under different assumptions. First, the importance of growth in output in combination with increasing returns to scale was analysed by keeping the output levels constant at the 1993 levels when calculating interest rates on loans and deposits and average costs for 2000. In this case, the compensating variation was $3.2 billion, banks' profits increased by $1.1 billion and total welfare increased by $4.4 billion. Second, the effect of market power on economic welfare was anlaysed by keeping the Lerner index constant at the 1993 level in order to predict interest rates. The results, presented in the last row of Table 8, indicate that in this case consumers' surplus increased by $ 5.1 billion, banks' profits by $1.5 billion, leading to a $6.6 billion increase in economic welfare.

6. Conclusions

This study estimates a cost-function based model incorporating output- and input-market pricing decisions to evaluate the market and cost structure of the Argentine banking industry during the 1990s. The model is based on a flexible translog cost function that allows a detail representation of technological aspects such as scale economies and technical change, and also on pricing equations for loans- and deposits-markets that allows the measurement of market power in these markets. The model is estimated using bank-level data for Argentine retail banks over the period 1993-2000.

The results provide evidences of market power pricing in the loans markets, which increased during the 1990s possibly due to the consolidation process. In addition, the findings seem to suggest that small-sized banks exert a higher degree of market power pricing than larger financial institutions, which may be explained by the fact that smaller banks are more retail oriented than larger ones. In contrast, the results indicate no market power pricing in the market for deposits. Moreover, these findings suggest that banks appear to pay interest rates on deposits in excess of their marginal shadow value of deposits. Additionally, small-sized banks seem to pay a higher margin over their marginal shadow value of deposits, a result possibly associated to their limited access to other sources of funds.

These indications of market power pricing seem to be related to cost economies. In fact, the measures of cost elasticity suggest that even relatively large banks operate with significant increasing returns to scale. This evidence indicates that there still exist economies that can be exploited by an increase in the size of banks and it points out that the consolidation process may proceed further. In addition, the results suggest that technological advances introduced during the 1990s contributed to lower the cost of bank production of large and medium-sized banks. However, the findings do not show any significant effect of technological change on average costs of small-sized financial institutions.

The implications of the cost and market structure patterns on economic welfare, evaluated in a partial equilibrium framework, suggest that both consumers and banks benefited over the sample period. In fact, the results indicate that consumers' surplus and banks' profits increased over the 1990s, possibly due to the expansion of banking activity in combination with the increasing returns to scale and the technological advances, which may have counteracted the effect of market power in the market for loans. These findings imply that policies forcing downsizing in industries characterised by high concentration levels may be misdirected if consolidation and resulting concentration are motivated by cost economies. Obviously, such action could limit the potential to lower costs in the industry, and thus ultimately reduce the product price for consumers.

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