PRIVATIZATION, COMPETITION, AND SUPERCOMPETITION IN THE MEXICAN COMMERCIAL BANKING SYSTEM

by

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> "Mr. Pereguna…suggests that after privatisation in 1991-92 most banks abandoned common sense in a race to sign up customers and expand their credit base."
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A major theme in the literature of privatization is that the benefits are much abridged if a government monopoly is simply replaced by a private sector monopoly or oligopoly (Hanson, 1994). Variations on this theme surfaced in many discussions of Mexico's bank privatization of 1991-1992, in which controlling interests in Mexico's 18 government-owned commercial banks were sold to financial groups - chiefly organizations that already dominated the nation's securities industry.[1]

A near-universal concern was that years might pass between when Mexico's banking system was privatized and when its performance might approach most standards of competitiveness. Although Mansell Carstens (1993) argued that privatization would raise some measures of efficiency, she also suggested that spreads between banks' cost of funds and interest rates on loans could remain high for years - in part because the high degree of oligopoly power in the provision of bank services would likely continue.[2] Bazdresch and Warneck (1994) developed similar themes and - consistent with other authors - viewed Mexico's high interest rate margins as indicative of anti-competitive market power.

An important reason for many observers' pessimism about competition in Mexican banking was the market's heavy concentration. Gavito, Sánchez and Trigueros (1992) developed the anti-competitive implications of concentration in the Mexican commercial banking system while Gavito and Trigueros (1993) argued that "some additional measures would be useful to induce greater competition" in it.

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[1]Mexico's commercial banks had been nationalized in 1982 under the presidential administration of Jose Lopez Portillo. Under the administration of Miguel de la Madrid Hurtado (1982-8), so-called nonbank functions of the bank were allowed to be performed by private sector institutions. The 1991-92 privatizations of the Carlos Salinas de Gortari administration (1988-94) were part of a series of radical reforms in the financial services industry that actually began in 1987 during the de la Madrid Hurtado administration (1982-88).

[2]At the time of the nationalization of the Mexican commercial banking system in 1982, there had been 60 Mexican banks, of which 58 were nationalized. In order to capture perceived economies of scale, Mexico reorganized the commercial banking industry - merging the 58 commercial state-owned banks into just 18. Although the industry had been consolidating prior to 1982 in any case, these new mergers represented a significant increase in industry concentration. Indeed, at the time of privatization, the three largest banks accounted for nearly three-fifths of total assets in the commercial banking system, while the three largest U.S. banking organizations at that time held about one-seventh of U.S. commercial bank assets.

Market indicators suggested that, in fact, the new banks' purchasers themselves expected not to face very intense competition. Gruben, Welch and Gunther (1994) and Gruben and Welch (1996) suggested that the high price-to-book ratios paid for the banks signaled that the new owners expected the banking system's industrial organization to remain relatively uncompetitive. Lopez-de-Silanes and Zamarripa (1995) measured the excess of expected returns over competitive returns and found them positive and significant. The North American Free Trade Agreement might ultimately allow greater competitive pressures in Mexico. So might the decrease in restrictions on starting new banks (Gavito and Trigueros, 1993). All of this, however, would take time and maybe much time. Even though privatization was expected to bring increases in lending and in the capture of financial assets by the banking system, analysts also anticipated that Mexican banks would still behave collusively for years - underloaning, at least compared with a competitive regime, so that they could overcharge.

But even as this industrial organization of privatization literature depicted a collusive system following financial liberalization and privatization in Mexico, a parallel literature on the general trajectory of reactions to financial liberalization in developing countries suggested a different pattern of possible outcomes. In that paradigm the problem is not inadequate expansion of credit, but too much too fast. The excessiveness becomes recognizable ex post in a wave of loan defaults and a banking crisis.

Consistent with this narrative, a common trajectory following financial liberalization and the appearance of new or newly privatized banks (Gorton, 1992) includes rapid increases in bank assets - which would typically include loans. Similarly de Juan (1995) notes that on a bank-by-bank level, when new owners take control of a bank, they typically increase lending relative to the value of equity capital or the deposit base. Whether or not these liberalizations and related rapid loan expansions are followed by large increases in loan defaults - as they typically are in Gorton (1992), de Juan (1995), Kaminsky and Reinhart (1996), and McKinnon and Pill (1994) - a common adjunct to financial liberalization is often markedly increased competition in the banking system (IMF 1993).

Under this paradigm of financial liberalization, large spreads between cost of funds and interest rates on loans are not prima facie evidence of an uncompetitive financial system. Instead, after a repressed financial system is liberalized, the banks are unable to supply intermediation services efficiently because they lack expertise, qualified human resources, and adequate technology. The result is high intermediation costs that are in

turn covered by a large spread between cost of funds and interest rates charged (de la Cuadra and Valdés, 1992).[3] Banks' portfolios become riskier because banks cannot evaluate the riskiness of loans and higher real interest rates under the new regime. Lenders lack past distributions on which to base their assessments.[4]

These depictions of post liberalization/privatization banking markets are consistent with a more general theoretical literature on strategic interaction among firms in growing markets where investment and growth of the firm are constrained by physical factors (which could include qualified personnel) or financial factors. In this literature, firms make pre-emptive investments as part of a struggle for market share (Spence, 1979).

These same depictions of post liberalization/privatization banking markets are also consistent with studies of consumer behavior in which, for example, a credit card holder typically develops a long-standing affinity for the first credit card he or she receives (Wall Street Journal, 1996). That is, banks fighting for market share may be willing to engage in riskier strategies in newly opened markets (as, in a de facto sense, consumer credit turned out to be in Mexico in the early 1990s) than they might in a more mature market for the simple reason that the long-term stream of rewards might be correspondingly greater to survivors who practiced pre-emptive behavior.

Moreover, while concerns were raised about concentration in Mexico's privatized banking system, concentration by itself does not imply uncompetitive behavior. Although five banks accounted for 87 percent of

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[3]Among the reasons de la Cuadra and Valdés (1992) offered for increasing spreads is that - when liberalization frees up funds for intermediation and when borrowers who were credit rationed under the old financially repressive regulations now cue up for loans - the increase in loan riskiness outstrips the increase in loan volume. This change must be factored into the spread. Mansell Carstens (1993) notes that in the Mexican case the increased risk was manifested in relative asset shifts toward consumer credit - the demand for which had long been pent up. It should be noted that between December 1991 and December 1993 alone, gross past due loans in Mexican commercial banks more than tripled, rising from 10,250.36 to 32,681.60 million. During the same period, the indice de morosidad (gross past due loans as a percentage of total loans) increased from 4.13 to 7.26.

[4]It should be noted that while bank privatization was an important financial market reform, it was by no means the only one. Beginning in November 1988 and largely finishing in 1990 Mexico removed controls on interest rates on bank liabilities and assets, eliminated sector-by-sector quotas and all other obligatory or targeted lending, and phased out reserve requirements and liquidity coefficients. Moreover, as Mansell Carstens (1995) notes, in 1988 20 percent of Mexican government financing came from the banking system but by 1993 all such financing occurred in the money market. To offer another perspective, in 1988 only 25 percent of bank lending was unrestricted, meaning that the rest was required as credits to the federal government, as deposits in the central bank, or as other obligatory credits. By 1990, the year before the privatizations began, 70 percent of bank lending was unrestricted and by 1991 100 percent was.

all Canadian bank assets in the early to mid-1980s - a measure of concentration similar to that of the Mexican banking system - Shaffer's (1993) results from econometric tests of market contestability for 1969-89 "are generally consistent with perfect competition, and strongly reject the hypothesis of joint monopoly" and Nathan and Neave (1989) derived similar results for Canada using another measuring technique for 1982-84.

Nevertheless, concentration has been shown able to attenuate competition in banking markets under conditions that are common in the western hemisphere. In a study of concentration and competitive behavior in regional U.S. banking markets, Clark and Speaker (1992) found that the relation between concentration and measures of non-competitive behavior was positive and significant under regimes of high entry restrictiveness.

Although research on bank liberalizations or privatizations are not uncommon, it is somewhat more difficult to find econometric characterizations and hypothesis tests about them. In an effort to offer a past distribution - and so to facilitate assessments of future bank privatization outcomes - we use Bresnahan's approach (1982) as developed for banking by Shaffer (1993) to identify the strategies that banks in Mexico typically followed in the wake of privatization. Some possible alternatives - although they are mutually exclusive at any point in time - include the following. (1) Banks acted as price takers - behaving as if their demand functions and marginal revenue functions were identical and producing to a point where marginal cost equaled marginal revenue. The results would have included loan levels and interest rates consistent with perfect competition. (2) Banks recognized a distinction between demand and marginal revenue functions, colluded, produced at levels where marginal cost equaled marginal revenue, and so (compared to the perfectly competitive outcome) effectively underloaned in order to overcharge. (3) As in case (1), banks behaved as if the marginal revenue function and the demand function were identical. Differing from case (1), banks produced at output levels beyond where marginal cost equals marginal revenue (or price) - moving to a point where marginal cost exceeded marginal revenue - and creating what Shaffer (1993) refers to as a "supercompetitive market."

Our results for 1987 (when Mexico sold to the private sector a total of 34 percent of the ownership in the publicly-owned commercial banks) through 1991 (when Mexico began to sell controlling interest in each commercial bank to the private sector), are consistent with case (1) above, the more or less competitive case. That is, the mean bank treated the marginal revenue and demand functions as the same and produced where marginal cost equaled marginal revenue. Starting in 1992, however, when Mexico completed the sale of

controlling interest in each commercial bank to the private sector, the supracompetitive case (case (3) above) held.

The case (3) bank strategy is consistent with efforts to derive the long-term benefits of an early lead in market share (Shaffer, 1994) for those who can survive the obvious short-run inefficiencies. Although it is either tenuous or impossible to draw any conclusions from just two examples, it is interesting to note that Shaffer (1993) identifies a systemic shift to case (3) behavior in Canada immediately following liberalization there in the early 1980s just as we do for Mexico after liberalization and privatization there. More to the point, such findings raise supervisory and regulatory questions that can only be answered with many more models of financial liberalizations and privatizations than two. When human capital constraints are binding, as Lopez-de-Silanes and Zamarripa (1995) argue was true in the Mexican case, a loan expansion strategy to a point where marginal cost exceeds marginal revenue might also be consistent with increases in past due loan ratios like those that occurred in Mexico well before the peso crash of 1994.

1. The Model

Perhaps because of the intense regulation to which the banking industry is subject, measuring the degree of competition in banking markets has long been the subject of study. In early work (see Gilbert's 1984 survey), a positive link between concentrations and returns was imagined to be prima facie evidence that competition had been abridged. This approach actually did not offer a clear statistical delineation of what competitive returns were, however, and offered other statistical problems that are well-documented in the literature.

To avoid these difficulties, we apply a simultaneous equation model that Shaffer (1989, 1993, 1995) introduced to the banking literature and that has been applied to additional areas and countries by Shaffer and DiSalvo (1994), Shaffer (1994), Molyneux, Lloyd -Williams and Thornton (1994), and Molyneux, Thornton, and Lloyd-Williams (1996). This approach allows us to test the competitiveness of the Mexican commercial banking system by estimating an index of market power (λ) and then identifying breaks in competitiveness by applying a dummy variable. The test revolves around the idea that profit-maximizing firms set marginal cost equal to what the literature refers to as their *perceived marginal revenue*. If the firm's perceived marginal revenue schedule and the firm's demand schedule are identical, then setting marginal cost equal to perceived marginal revenue is the same as setting marginal cost equal to demand price, yielding the classical conditions for

a competitive equilibrium. Here, of course, firms behave simply as price takers. In the collusive extreme, in which firms act as a joint monopoly, the firm sets marginal cost equal to a perceived marginal revenue that corresponds to the industry's marginal revenue curve (Bresnahan, 1982). Because the firm only perceives the marginal revenue schedule and the demand schedule as identical under competitive equilibrium, the index we use to gauge the competitiveness of the Mexican commercial banking system simply expresses the deviation of the average bank's perceived marginal revenue curve from the industry demand schedule. If there is no deviation, we have pure competition.

Following Bresnahan (1982)) we write a demand function for commercial bank services:

$$Q = D(P, Y, \alpha) + \epsilon, \tag{1}$$

where Q is quantity, P is price, Y is a vector of exogenous variables, α is a vector of demand equation parameters to be estimated, ϵ is a random error term. Actual (as distinguished from perceived) marginal revenue is:

$$\begin{aligned} MR &= P + h(Q, Y, \alpha), \\ &= P + Q/(\partial Q/\partial P) \end{aligned} \tag{2}$$

The function $h(Q, Y, \alpha)$ is the semi-elasticity of demand, and $h(\cdot) \leq 0$. Firms' *perceived* marginal revenue is:

$$MR^p = P + \lambda h(Q, Y, \alpha), \tag{2'}$$

where λ is a new parameter to be estimated, $0 \leq \lambda \leq 1$. Here, λ measures the degree to which firms recognize the distinction between demand and marginal revenue functions. Let $c(Q, W, \beta)$ be the average firm's marginal cost function, where W is a vector of exogenous supply side variables and β is a vector of supply side parameters to be estimated. Maximizing firms will set *perceived* marginal revenue equal to marginal cost, or

$$P = c(Q, W, \beta) - \lambda h(Q, Y, \alpha) + \eta, \tag{3}$$

where η is a random error term. If firms act as price takers, so that they do not perceive a difference between their marginal revenue functions and demand function, then $\lambda = 0$. If firms act as a joint monopoly, clearly perceiving a difference between their demand and marginal revenue functions, they set output where marginal cost equals marginal revenue such that $\lambda = 1$. Intermediate values of λ correspond to other oligopoly solution concepts. Of particular interest, $\lambda = 1/n$ suggests a Cournot equilibrium.

From the point of view of our analysis, an important detail of this procedure is that (Shaffer,1993) $-\lambda$ is also a local estimate of the percentage deviation of aggregate output from the competitive equilibrium level of output. Since actual price deviates from the competitive price by $-\lambda Q/(\partial Q/\partial P)$, and actual quantity deviates from the competitive quantity by $\partial Q/\partial P$ times the deviation in price, actual quantity will deviate from the competitive quantity by $-\lambda Q$. Thus, the percentage deviation in quantity is $-\lambda Q/Q = -\lambda$. If $-\lambda < 0$ then output is less than what would occur in competitive equilibrium, meaning that firms are behaving as if they perceived that they had market power. Even more interestingly if $-\lambda > 0$, then actual output seems to exceed the competitive equilibrium level of output, although static allocative efficiency requires the marginal cost pricing outcome of $\lambda = 0$.

To estimate λ, it is necessary to estimate simultaneously specifications of both (1) and (3), treating P and Q as endogenous variables. The demand function is specified as:

$$Q = \alpha_0 + \alpha_1 P + \alpha_2 Y + \alpha_3 PZ + \alpha_4 Z + \alpha_5 PY + \alpha_6 YZ + \epsilon \qquad (2")$$

where Q is output quantity, P is output price, Y is a measure of macroeconomic activity, assumed to be an exogenous variable, and Z is the price of a substitute for bank output, also assumed to be exogenous. The interaction terms, the products PZ, PY and YZ, are necessary to permit rotation of the demand curve as required to identify λ.[5]

Following Shaffer (1993), we utilize the translog cost function to estimate the average commercial bank's cost function, as follows:

$$\begin{aligned} \ln C = {} & \gamma_0 + \gamma_1 \ln Q + \gamma_2 (\ln Q)^2 + \gamma_3 \ln W_1 + \\ & \gamma_4 \ln W_2 + \gamma_5 \ln^2(W_1) + \gamma_6 \ln^2 (W_2)/2 + \\ & \gamma_7 \ln W_1 \ln W_2 + \gamma_8 \ln Q \ln W_1 + \gamma_9 \ln Q \ln W_2, \end{aligned} \qquad (4)$$

[5]As Shaffer (1993) explains, according to Lau (1982), a necessary and sufficient condition to identify λ is that the demand equation not be separable in at least one exogenous variable that is included in the demand function, but excluded from the marginal cost function. This condition is satisfied if α_3 and α_5 do not both equal zero. This specification of the demand function, apart from the interaction terms, represents a first-order (linearized) approximation of the true demand function (Shaffer 1993). Our results lead to the conclusion that α_3 and α_5 are not zero, therefore λ is identified.

where C is total cost, W_1 and W_2 are exogenous input prices, as explained below. Equation (4) gives rise to following marginal cost function, c(Q, W, β),

$$MC = (C/Q)(\beta_1 + \beta_2 \ln Q + \beta_3 \ln W_1 + \beta_4 \ln W_2) + \eta \quad (5)$$

Therefore, equation (3) is specified as follows:

$$P = -\lambda Q/(\alpha_1 + \alpha_3 Z + \alpha_5 Y) + (C/Q)(\beta_1 + \beta_2 \ln Q + \beta_3 \ln W_1 + \beta_4 \ln W_2) + \xi . \quad (3')$$

For our purpose of analyzing the effect of privatization of the commercial banking sector in Mexico, we estimated, rather than equation (3'), the following specification of (3):

$$P = -\lambda Q/(\alpha_1 + \alpha_3 Z + \alpha_5 Y) + (C/Q)(\beta_1 + \beta_2 \ln Q + \beta_3 \ln W_1 + \beta_4 \ln W_2) - \beta_5 DQ/(\alpha_1 + \alpha_3 Z + \alpha_5 Y) + \xi , \quad (3'')$$

where D is a dummy variable to be explained below and ξ is a random error term. We then estimate simultaneously the system of equations represented by (2") and (3").

Many articles on the Mexican banking system disaggregate the system according to market scope including large national, small national, multiregional and regional. Out of appreciation for this bank-by-bank heterogeneity of market scope, it should be noted that the technique offered here does not rely on any particular definition of bank markets. As long as the data sample spans at least one complete market, then estimates of λ are unbiased. In cases where the industry comprises multiple markets, λ signifies the average degree of market power over the separate markets. Note here that λ reflects the behavior of the average firm in the sample. As Shaffer (1993) notes, a dominant firm or cartel plus a competitive fringe would generate estimates of λ that are a weighted average of the competitive and collusive values - therefore exceeding the competitive value.

Another detail that could be particularly important in the Mexican context is that although this model assumes banks are input price takers, violations of the assumption do not damage the results in a way that would bother most modelers. If banks have market power over deposits, in violation of the assumption, it can be shown that the specification of λ overstates the overall degree of market power by misattributing any deposit

power to the asset side.[6] Here, a finding of perfect competition or supracompetition would be even more striking than if the input price taking assumption were not violated.

2. Data

Monthly data on all Mexican commercial banks were made available from the Central Bank of Mexico and from Mexico's National Banking Commission for the period April, 1987 through December, 1993. These data covered all commercial banks that were owned by the state as well as the two private banks, Obrero and Citibank. Following December, 1993, data are reported only on a quarterly basis by the CNB, making subsequent observations incompatible with our monthly series.

This period gives us roughly two years of monthly observations on the Mexican commercial banks after the largest banks --and those banks holding most of the system's assets and deposits-- had been returned to private ownership. Of the total of 81 observations on the variables in the data set, there were two missing observations on total assets for the months of January and February, 1990. These observations were simply excluded from the data supplied by the CNB. Thus, these estimations were based on a sample of size 79.

As in Shaffer (1993), we utilize the intermediation model of a bank. This approach, developed by Klein (1971) and Sealey and Lindley (1977) treats a bank as a firm that uses labor to acquire deposits and, then, uses labor and deposits to generate assets. The measure of output (Q) is thus total assets measured in 1000s of new pesos. The price of output (P) is total interest income in 1000s of new pesos divided by total assets, i.e., the average rate earned on assets. It should be noted that this average rate of return will be affected not only by market lending rates but by changes in the past due loan ratio.[7] Since deposits and labor are the only production inputs, we require input prices for deposits (W_1) and labor (W_2). We use the average interest rate paid on deposits, i.e., total financial costs/total liabilities for W_1 and the average monthly cost of labor, i.e., total personnel expenditures/total personnel in 1000s of new pesos for W_2 in the marginal cost function.

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[6]For proof of this point, see Shaffer (1994), 8-9.

[7] Regulatorily speaking, interest income that a past-due loan would have earned if it had not been past due would actually have been booked for one month and thereafter would have been required to be provisioned against. We are indebted to Javier Gavito of Mexico's National Banking Commission for this point.

The substitute for banking services we utilize is commercial paper, although this market is thin in Mexico. To proxy the price of this paper (Z), we use the rate on 28-day peso-denominated treasury bills (Cetes). As a measure of national output, we employ the monthly index of industrial production (Y). This is the only output measure available on a monthly basis. All nominal variables were deflated using the consumer price index. The dummy variable (D) was set equal to zero for all months in the sample prior to January, 1992. It took the value of 1 for all months in the sample beginning with and following January, 1992.

An attractive feature of 1987 as a starting point for the data is that it offers fewer opportunities for expense preference behavior to affect our results than earlier commencement points would have. The expense preference hypothesis describes an operational environment where managerial preferences for large staffs, leisure, political accommodation or plush offices motivate deviations from cost-minimizing behavior. Expense preference behavior represents the diversion of monopoly profits to cover inflated marginal costs, closing the gap between price and marginal cost and masking monopoly or other noncompetitive behavior.

The virtually complete government ownership (complete except for two commercial banks) that characterized the Mexican commercial banking system for the five years following the 1982 bank nationalization seems to have offered opportunities for expense preference behavior. Indeed, when the Mexican government in 1987 sold to the private sector 34 percent of its ownership in the commercial banking system, and subsequently liberalized bank regulations associated with interest rates and credit allocation, measures of bank efficiency and profitability rose rapidly - simultaneously suggesting expense preference behavior before these events and much reduced expense preference behavior thereafter.

3. Estimation and Results

Equations (3') and (3") were each paired with two variants of the marginal cost equation, equation (5), a version on which no a priori restrictions were placed and a version in which the linear restriction $b_3 + b_4 = 0$ (linear homogeneity in input prices) was included. Therefore, a total of four different systems of equations were estimated. This restriction would be appropriate if physical capital is not an input to the banks' production. Data that enable us to measure physical inputs over this time frame were unavailable, but Shaffer's (1993) estimates for Canada do not show substantive differences in results between those in which physical capital was

included and those in which it was not. As long as physical capital does not vary much from month to month the linear restriction does not seem unreasonable.

Our a priori expectations on the parameter estimates (a_i for α_i , b_i for β_i) were generally confirmed by the results, with the exception of a_4. Since the demand curve is assumed to be downward sloping, the estimate of $\partial Q/\partial P = a_1 + a_3 Z + a_5 Y < 0$ must hold. We also expected to find $a_2 > 0$ and $a_4 > 0$. As earlier noted, either a_3 or a_5 must be different from zero in order to identify λ, a conclusion we can reach most easily in the case of a_3. Our estimate of the parameter vector β also met with a priori expectations, although we held no a priori expectation on b_5.

The systems of equations were estimated by the method of Full Information Maximum Likelihood using SAS. Full Information Maximum Likelihood estimation assumes normally distributed errors. Initial parameter values for the FIML estimation were supplied by first estimating the system by non-linear Three-Stage Least Squares. The interaction variable YZ had to be omitted in the estimation because it was nearly perfectly linearly correlated with the variable Z. This was due to the small variation in industrial production that occurred over the period of the sample. Therefore, in the reported results, there are no estimates for α_6.

Problems with multicollinearity remain in this sample. In particular, ln W_1 is highly correlated with Z, causing difficulty in estimating and making inferences on the parameter vector β. Nevertheless, convergence of the estimates was fairly rapid in all cases. The estimates also appear to be robust relative to initial values of the parameter estimates. Different sets of initial values chosen arbitrarily from within a fairly wide neighborhood of the FIML estimates (a range from a factor of .5 to 2 times the reported FIML estimates) did not yield significantly different results.

4. Interpretation and Discussion of Results

The results suggest bank behavior that is consistent with competitiveness before the privatization[8] but with supercompetitiveness - in which bankers still treat the marginal revenue function and the demand function as

[8]Despite our distinction between a publicly-owned and a privately owned banking system, it is useful to recall that Mexico's commercial banks were at least partially privatized during our entire sample period. In 1987, 34 percent of the equity in the 18 publicly-owned was sold to private investors and large increases in profitability and efficiency soon followed. It was not until the privatization of 1991-92, however, that private investors were permitted to hold the majority of the equity in each bank.

identical but marginal cost exceeds marginal revenue - after the privatization. Recall that the value of $-\lambda$ represents a typical bank's percentage deviation of output from competitive levels. Thus, a $-\lambda < 0$ signifies output below the competitive level while $-\lambda > 0$ suggests that output for some reason exceeds the competitive level.

In point of fact, we could not reject the hypothesis that $\lambda = 0$ at a reasonable level of significance for any of the estimations. However, instead of equaling λ, the index of market power will equal $\lambda + \beta_5$ whenever the dummy variable is equal to one, as it does for 1992-3. In both models that we test, the hypothesis that the 1992-3 dummy variable β_5 equals zero can be rejected at the .05 level of significance

The sign and value of β_5, the dummy variable coefficient, deserve attention. Note that a positive and significant coefficient would suggest that the industry is acting less competitively after the government's divestiture of the largest banks. But instead of a positive and significant coefficient, those on our dummy variables took on negative and significant values, so that $(\lambda + \beta_{5)}) < 0$.[9] Here, the value of $-(\lambda + \beta_{5)})$ represents the typical bank's output's percentage deviation from competitive levels after privatization. This suggests that the supercompetitive level of output in the post-privatization market was 7-10 percent above what would have prevailed in a competitive market.[10]

Although our findings of supercompetitiveness for the average bank are inconsistent with a paradigm in which all banks underproduce in order to overcharge (where *overcharging* signifies prices that are higher than in

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[9]In light of the previous discussion of expense preference behavior, it deserves note that where $(\lambda + \beta_{5)}) < 0$, expense preference behavior would by definition be unsustainable. Although it is conceivable that under some circumstances a negative $(\lambda + \beta_{5)})$ could capture a time-consuming transition from expense preference behavior towards cost-minimizing behavior, it can be argued that the change in bank behavior after 1987 but before the privatization suggests at the very least significant reductions in such behavior well before the privatization.

[10]Because of the peculiarity of the supercompetitive outcome, we performed a Goldfeld-Quandt (1973) switching regression, following the application in Shaffer's (1993) model of the Canadian banking system. The only notable regime shift (in fact, the only regime shift) took place at the 1991-92 privatization process, as we had hypothesized.

a competitive outcome) the supercompetitive result nevertheless is consistent with several other paradigms. As noted earlier, supercompetitive behavior is consistent with short-run efforts to grab market share. If banks believe they can derive long-run profits from engaging in short-run inefficiencies in the extension of credit - overproducing and undercharging, given the risks involved. This approach is consistent with a model delineated by Spence (1979).

Although the market share argument as we have presented it might apply to many newly deregulated industries, the peculiarities of a deregulated banking environment with deposit insurance and lender-of-last-resort options in a McKinnon and Pill (1996) overborrowing model can clearly aggravate the phenomenon. That is, without these governmental supports the overborrowing (or, as we have cast it, overlending) could be less profound. The reaction to liberalization might not be qualitatively different, but deposit insurance against bad outcomes can be seen as lowering the constraints on risky behavior (Kareken and Wallace, 1978; Merton, 1977; Calomiris, 1990a, 1990b; Grossman, 1992; Hooks and Robinson, 1996; and a host of others) even if bank charter or franchise value does mitigate the risk-taking incentives of deposit insurance.

To the extent that our findings of supercompetitive bank behavior may signify a struggle for market share in Mexico, they are consistent with assessments of bank behavior in the wake of other liberalizations - although these other assessments have rarely involved econometric testing. Drees and Pazarbaşioğlu (1995) note that, following deregulation in Finland, Norway, and Sweden, banks appeared to have employed market-share strategies after deregulation.

Although we have argued that our post-privatization results are consistent with a temporary struggle for market share, other analytics could explain the risky behavior banks pursued in the early 1990s. Large inflows of international capital might explain the entrance of banks into riskier investments. This phenomenon could explain the subsequent large increases in the ratio of past due loans to total loans, but it may be more difficult to use as an argument for why banks suddenly produced services where marginal cost exceeded marginal revenue immediately after the privatizations.

Another argument that might be offered is that the deregulation of the banking system is tantamount to a reduction in the franchise value of the banking system and therefore a motivation to take larger risks. However,

for the case of Mexico during our study period, Rojas-Suarez and Weisbrod (1994) offer statistical evidence and arguments that the franchise value actually increased, rather than declined.

It is difficult to generalize from our results about what may occur as a general result of financial liberalization, but the consistency of Shaffer's (1993) findings for Canada with ours for Mexico offer grounds for concern although not for despair. Both Shaffer's (1993) results and ours find post-liberalization shifts in bank behavior away from an apparent matching of marginal cost to marginal revenue where banks treated the marginal revenue function and the demand function as if they were the same and toward supercompetition. Although the Canadian liberalization was not followed by banking problems of a magnitude anyone would characterize as a banking crisis, even Canada saw a significant increase in problem banks in the years following the liberalization.

That Canada did not suffer from a banking crisis demonstrates that a simple finding of the anomalous relation we identified between marginal cost and marginal revenue in Mexico is not necessarily the basis for serious subsequent banking difficulties. Moreover, whether or not supercompetitive behavior is really typical after privatizations or financial liberalization is a question that can only be answered by modeling the liberalizations of additional countries. But if supercompetitive behavior is indeed widespread in the wake of a liberalization, the fact that it is suboptimal in the long run raises questions about how regulators might optimally respond in the short run to a discovery that it has become typical - at least temporarily .

A common argument in the financial literature is that bank crises do not necessarily signal bad bank supervision or regulation or a bad legal structure on which bank supervision is based. Just as dams are economical means to avoid some floods but not all, it is possible that some types of bank crises would require such coercive regulation in order to avoid them that the regulations offer more problems than the crisis.

Even a finding that after liberalizations banks typically operate in the short run in ways that are not consistent with long-run optimality does not necessarily signal either bad bank supervision and bad bank regulations or law either. However, such a finding raises these questions in ways that a simple outcome of a banking crisis in and of itself would not. The reason is, operating at a point where marginal cost exceeds marginal revenue may be seen as far more likely to be endogenous than a bank crisis itself, whose causes may have more exogenous elements than those involved with producing supercompetitively.

Table 3.1

Results for Estimation of Equations (2") and Unrestricted (3')

Equation	DF Model	DF Error	SSE	MSE	Root MSE	R^2	Adj R^2
Q	4.5	74.5	4.3641E11	5.85779E9	76536.22	0.7237	0.7107
P	6.5	72.5	0.000432	5.9519E-6	0.002440	0.9714	0.9692

Parameter	Estimate	Std Err	Approx. `T´ Ratio	Approx. Prob > |T|
A0	1379754.79	825572.1	1.67	0.0989
A1	83924415	36580204	-2.29	0.0247
A2	-7590.33	6843.7	-1.11	0.2710
A3	2321286.24	495190.9	4.69	0.0001
A4	-200183.33	32634.6	-6.13	0.0001
A5	840009.48	337258.6	2.49	0.0150
λ	-0.043033	0.12236	-0.35	0.7261
B1	0.00599766	0.0016404	3.66	0.0005
B2	0.00043163	0.0001496	-2.89	0.0051
B3	0.00014460	0.00006671	2.17	0.0335
B4	0.00056957	0.0002237	2.55	0.0130

Table 3.2

Results of Estimation of Equations (2") and (3")

Equation	DF Model	DF Error	SSE	MSE	Root MSE	R^2	Adj R^2
Q	4.5	74.5	3.5798E11	4.80506E9	69318.57	0.7733	0.7627
P	7.5	71.5	0.000297	4.151E-6	0.002037	0.9803	0.9785

Parameter	Estimate	Std Err	Approx. `T´ Ratio	Approx. Prob > |T|
A0	714001.65	580105.9	1.23	0.2223
A1	-52278384	23980389	-2.18	0.0325
A2	-1946.58	4693.3	-0.41	0.6795
A3	1998425.38	402359.6	4.97	0.0001
A4	-177860.12	25506.7	-6.97	0.0001
A5	549220.03	221777.6	2.48	0.0156
λ	0.097824	0.11329	0.86	0.3908
B1	0.00318320	0.0013531	2.35	0.0214
B2	-0.00016678	0.0001186	-1.41	0.1639
B3	0.000086297	0.00005676	1.52	0.1329
B4	0.000076402	0.0001628	0.47	0.6403
B5	-0.147526	0.06916	-2.13	0.0364

Table 3.3

Results of Estimation of Equations (2") and (3") with Linear Restriction

Equation	DF Model	DF Error	SSE	MSE	Root MSE	R^2	Adj R^2
Q	4.5	74.5	3.1233E11	4.19237E9	64748.48	0.8022	0.7930
P	6.5	72.5	0.000261	3.5999E-6	0.001897	0.9827	0.9814

Parameter	Estimate	Std Err	Approx. `T´ Ratio	Approx. Prob > |T|
A0	497897.33	504405.5	0.99	0.3268
A1	-40279385	20148688	-2.00	0.0493
A2	18.682204	4027.2	0.00	0.9963
A3	1904847.34	376275.7	5.06	0.0001
A4	-166562.92	21583.4	-7.72	0.0001
A5	428758.59	185228.8	2.31	0.0234
λ	0.072766	0.07562	0.96	0.3392
B1	0.00207106	0.0005600	3.70	0.0004
B2	-0.00006023	0.00004645	-1.30	0.1989
B4	-0.00009061	0.00004109	-2.21	0.0306
B5	-0.133144	0.05046	-2.64	0.0102

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