

Foreign Banks in Mexico: New Conquistadors or Agents of Change?

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Abstract

Since Mexico opened its banking sector to foreign competition following the 1994 financial crisis, foreign financial institutions have acquired more than 80 percent of Mexican domestic banking assets. Supporters of foreign direct investment (FDI) argue that foreign banks have been an important source of capital as well as skills, technology, and management know-how. Critics accuse foreign banks of earning excess profits without significantly contributing to banking sector development. Based on an empirical analysis of foreign bank entry between 1997 and 2004, this paper shows that FDI had a positive, but limited impact on banking sector development. The key contribution of foreign banks was the recapitalization of the banking sector following the financial crisis. But there is only limited evidence that banking sector efficiency increased as result of a transfer of skills, technology, or management know-how. The main reason for the limited impact of FDI was the low level of competitive intensity in the Mexican banking sector.

1. Introduction

With U.S.\$186 billion in commercial assets, the Mexican banking sector is the second largest in Latin America. Credit penetration is one of the lowest in the region, with domestic banking credit accounting for 13 percent of GDP. Following the 1994 financial crisis, the Mexican banking sector contracted sharply, with domestic banking credit declining at an annual rate of 6.0 percent in real terms between 1994 and 2004. In the mid-1990s, the Mexican government opened the banking sector to foreign direct investment (FDI). The main impetus behind the government's decision to remove restrictions on foreign entry was the undercapitalization of domestic banks after the financial crisis. Despite a costly bailout program, many banks lacked adequate capital reserves and the government turned to foreign investors to improve the capitalization and overall competitiveness of Mexican banks. The liberalization of the investment regime triggered a wave of FDI in the Mexican banking sector. Between 1994 and 2004, foreign banks invested more than U.S.\$30 billion in Mexican financial services, culminating in Citigroup's U.S.\$12.5 billion takeover of Banamex in August of 2001. By 2002, foreign financial institutions controlled more than 80 percent of Mexican banking assets.

This level of foreign control of a country's banking system is unprecedented for an economy the size of Mexico and has triggered an intense debate about the role of foreign banks in the national economy. Critics of banking sector FDI argue that foreign banks have earned excess profits without contributing to banking sector development. The main charge is that foreign banks have failed to expand domestic credit and thus impeded economic growth and development. Instead, foreign investors are accused of increasing fees and commissions, cherry-picking the most profitable customers, and squeezing small and medium enterprises out of credit markets. Supporters of banking FDI, by contrast, argue that foreign banks have been an important source of capital as well as skills, technology, and management know-how. In this view, foreign capital helped stabilize the banking system after the financial crisis, making it more resilient to exogenous shocks and building investor confidence. Foreign bank also increased the efficiency of the Mexican banking sector by transferring skills, technology,

and management know-how from their more developed home markets, making it an engine for growth and development as Mexico integrates its economy with the U.S. and the rest of the OECD.¹

This paper contributes to this debate by analyzing the impact of foreign entry on the development of the Mexican banking sector. It complements existing work in the academic literature, which suffers from a number of important gaps and shortcomings. There is surprisingly little work on the role of foreign banks by scholars studying the Mexican financial system. Rather, these writers have focused on the decline in domestic banking credit since the financial crisis, exploring causal factors behind the credit crunch (Gonzales 2002), alternative sources of finance (Gonzales/Marrufo 2001, Martinez 2001), and lending to favored interests (La Porta et al. 2003, Maurer/Haber 2004). An exception is a recent paper by Haber/Musacchio (2005), which studies the effect of foreign bank entry in Mexico. But their analysis likewise focuses on bank lending and does not provide a comprehensive assessment of the effect of foreign entry on the Mexican banking sector. The international banking literature, by contrast, has studied the effects of foreign bank entry quite extensively. Cross-country regressions have found that foreign banks operating in developing countries tend to be more efficient than domestic banks and that foreign entry is associated with a reduction in profitability and overhead expenses of domestic banks (Claessens et al. 2001, Claessens/Lee 2002). Similar findings are reported by country case studies, though there is some disagreement about size and strength of the effects of foreign entry (Barajas et al. 2000, Clarke et al. 2000, Denizer 2000).

This literature has three important shortcomings. First, it does not provide a comprehensive measure of FDI impact. Studies use various efficiency indicators as dependent variables, but

¹ Critics of banking FDI include prominent left-of-center politicians, such as Senator Jesus Ortega of the PRD, consumer advocates such as CONDUSEF, and much of the popular press. Supporters of foreign banks entry include many centrist and conservative politicians, the Mexican Bankers Association, and most banking analysts and market commentators. The debate mirrors a broader discussion in the academic literature about the costs and benefits of banking FDI in emerging markets. For a summary of the arguments, see Levine (1996), Dages et al. (2000), Peek/Rosengreen (2000), Graham (2001), and Mathieson/Roldos (2001). For surveys of the empirical literature, see Clark et al. (2001) and Goldberg (2004).

fail to analyze the relationships among them. As a result, it remains unclear which causal factors drive the observed performance differences between foreign and domestic banks. Second, the literature fails to analyze the direct effect of foreign entry on the domestic banks acquired by foreign financial institutions. Instead, studies of banking FDI focus on the indirect effect of foreign entry on domestic-owned banks. This misses a key transmission mechanism for FDI impact, which is a critical omission in the case of Mexico, where foreign banks have acquired more than 80 percent of banking assets. Third, the literature fails to control for important selection effects when comparing the performance of domestic and foreign-owned banks. Foreign banks are likely to acquire banks with certain characteristics such as high profitability or low overhead expenses, so the ex-post observation of a performance differential may simply be a reflection of this initial selection rather than any positive effect of foreign ownership.

This paper improves on the existing literature in three ways. First, it focuses on productivity as key measure of FDI impact. Productivity is a more comprehensive measure of bank performance than the various efficiency indicators used in the literature. Moreover, disaggregating the determinants of productivity permits an analysis of the causal factors driving performance differences between foreign and domestic banks. Additional measures of FDI impact used in the paper include capitalization, asset quality, and lending. Second, the paper focuses on the direct effect of foreign bank entry. As mentioned above, foreign financial institutions have acquired more than 80 percent of Mexican banking assets. Hence, an analysis of the direct effect of foreign ownership on the acquired domestic banks is essential to understanding the effect of foreign entry on the Mexican banking sector. Third, the paper uses a research design that controls for selection effects operating at the entry stage. Most studies of banking FDI use a cross-sectional research design, which makes it very difficult to control for endogenous bank entry. This paper tracks changes in performance over time for banks acquired by foreign financial institutions, which avoids the selection problem.

The paper analyzes foreign bank entry between 1997 and 2004 using balance sheet and income statement data for all Mexican commercial banks. The results show that foreign entry had a positive, but limited impact on banking sector development. The key contribution of

foreign banks was the recapitalization of the banking sector after the financial crisis. Between 1997 and 2004, foreign banks increased sector capitalization by more than U.S.\$8.8 billion or 42 percent of total banking sector capital in 2004. A second important contribution of foreign banks was the improvement in asset quality of Mexican banks, which accelerated the reduction of bad debt in the banking system. The impact of FDI on the efficiency of the Mexican banking sector was more limited. Foreign entry had a positive effect on banking sector productivity, but failed to affect a set of productivity drivers typically associated with banking FDI. On the income side, foreign banks increased interest rate margins and fee income of their Mexican acquisitions. On the cost side, foreign ownership had a negative effect on provisions for non-performing loans, which drove much of the productivity impact of FDI. Foreign entry had no effect on administrative cost or employment levels of Mexican banks. The main reason for the limited productivity impact of FDI was the low level of competitive intensity in the Mexican banking sector, which reduced pressures on banks to improve operating efficiency. Foreign entry had no significant effect on domestic credit provision.

On balance, then, FDI played a positive, but limited role in the development of the Mexican banking sector after the 1994 financial crisis. The primary reason for the government's decision to lift restrictions on banking FDI was to enlist foreign help in the recapitalization of the banking sector and the results show that foreign entry did have the desired effect. Foreign ownership also improved the asset quality of Mexican banks and thus accelerated the reduction of bad debt in the banking system. Foreign entry had a positive effect on the efficiency of the Mexican banking sector, but the effect was more limited than envisioned by advocates of banking FDI. The results do not support the main charge of FDI critics that foreign entry restricted domestic credit. A policy implication that follows from this analysis is that strengthening banking sector competition would increase the productivity impact of FDI and improve the quality of financial intermediation in Mexico. Most importantly, greater competition would increase the pressure on banks to improve operating efficiency. It would also put downward pressure on interest rate margins and fees and force banks to improve revenue performance.

The remainder of the paper is organized in six sections. Section 2 summarizes the development of the Mexican banking sector since the 1994 financial crisis. Section 3 discusses measurement issues and outlines the research design of the study. Section 4 describes data sources and construction of the data set. Sections 5 and 6 present and discuss the results of the empirical analysis. Section 7 concludes.

2. Development of the Mexican Banking Sector since the 1994 Financial Crisis

The weakness of the Mexican banking sector after the 1994 financial crisis had its roots in developments a decade earlier. In 1982, the Mexican government nationalized the banking system in response to an economic crisis. It reduced the number of banks and obliged them to lend a significant portion of their reserves to the public sector. Given the lack of competitive pressures, the banks failed to develop credit skills and processes. Between 1991 and 1992, the Salinas administration returned the commercial banks to private ownership. The new bank owners were mostly brokerage houses or industrialists with little banking experience. Expectations of economic growth fueled a sharp increase in bank lending. Aggressive lending combined with a lack of credit skills led to an increase of bad debt in the banking system.²

The devaluation of the Peso in December of 1994 triggered a severe economic and financial crisis, which caused a rapid build up of non-performing loans and a sharp decline in bank lending. Fearful that the banking system would collapse under a rising level of bad debt, the Mexican government implemented a series of capitalization and restructuring programs and intervened in the operations of several problem banks. While government intervention was successful in stabilizing the banking sector, the scope of the rescue effort was not sufficient to address the sector's capitalization needs. The high fiscal cost of the banking rescue made

² For analyses of financial market liberalization in Mexico, see Gruben/McComb (1997), Minushkin (2002), and Haber (2005).

further support politically difficult and the government turned to foreign investors to improve the capitalization and overall competitiveness of Mexican banks.³

Starting in the mid-1990s, the Mexican government gradually removed restrictions on the operation of foreign banks. The North American Free Trade Agreement (NAFTA), which came into force on January 1, 1994, opened the Mexican banking sector to foreign banks by permitting entry through the establishment of chartered subsidiaries. Prior to NAFTA, the only foreign bank operating in Mexico was Citibank, which had been established before restrictive legislation was signed in 1966. In March of 1995, the Mexican Congress passed legislation allowing foreign financial institutions to acquire majority stakes in Mexican banks. However, foreign interest in the three largest banks was limited to 30 percent. In December of 1998, the government removed all remaining limitations on foreign ownership of Mexican banks.

The liberalization of the investment regime triggered a wave of FDI in the Mexican banking sector. Foreign banks were attracted by the size and growth potential of the Mexican market and the sector's low asset valuations. Between 1994 and 2004, foreign banks invested more than U.S.\$30 billion in Mexican financial services. Following regulatory changes in 1995, BBV (Spain), BSCH (Spain), and Bank of Nova Scotia (Canada) acquired minority stakes in smaller banks, which they gradually increased to take full control. Between 2000 and 2002, Citigroup (U.S.A.), HSBC (U.K.), and the two Spanish banks took over the industry leaders and merged them with their local operations. Banking FDI reached a peak in 2001 with Citigroup's U.S.\$12.5 billion takeover of Banamex, the largest foreign acquisition in Mexico and the largest financial sector deal ever in Latin America (Figure 1).⁴

By 2004, foreign financial institutions controlled 82 percent of Mexican banking assets, up from 16 percent in 1997. Foreign entry drove a process of consolidation, with the top five

³ See Graf (1999), McQuerry (1999), and Haber (2005) for detailed analyses of the banking sector rescue.

⁴ Foreign bank entry in Mexico occurred in the broader context of financial sector liberalization in Latin America. See Guillen/Tschoegl (2000) for an analysis of market entry by Spanish banks in Latin America. See Tschoegl (2005) for a comparative analysis of banking FDI in emerging and transition economies.

institutions accounting for 83 percent of banking assets in 2004, compared to 75 percent in 1997 (Figure 2). In 2004, four of the five largest banks were under foreign control; in 1997 only one of the top five bank was foreign-owned. BBVA Bancomer (BBVA) and Banamex (Citigroup) dominate the Mexican banking sector, accounting for 49 percent of commercial assets in 2004. In January of 2003, Serfin (BSCH) and Santander-Mexicano (BSCH) merged their operations under the Santander-Serfin brand to form a potential challenger to the leaders. Other key players include Banorte, the only major bank still controlled by local investors, and HSBC (Figure 3).

Following the 1994 financial crisis, the Mexican banking sector contracted sharply. Between 1994 and 2004, commercial banking assets declined at an annual rate of 1.9 percent in real terms, while domestic banking credit fell by 6.0 percent annually. Over the same period, the Mexican economy grew robustly, making the contraction of the banking sector even more pronounced in relative terms, with assets declining from 59 percent of GDP in 1994 to 27 percent of GDP in 2004 and credit falling from 43 percent of GDP to 13 percent of GDP (Figure 4). This lack of a relationship between credit growth and economic expansion contrasts with the experience of several Latin American countries, which experienced a simultaneous decline of banking credit and economic growth (Barajas/Steiner 2002). The key to Mexico's "creditless recovery" after the financial crisis was the increasing role of non-bank sources of credit, including suppliers, capital markets, corporate headquarters, retailers, and Sofoles (special purpose lending institutions). The share of these non-bank sources in total credit to the private sector increased from 41 percent in 1997 to 67 percent in 2004 (Figure 5). While bank lending has fallen in real terms, not all credit classes have been affected equally. Commercial and mortgage credit have declined sharply in real terms, but consumer lending has expanded, fueled primarily by an increased in credit card lending.

3. Measuring FDI Impact

This paper uses productivity as key measure of FDI impact. Productivity is a more comprehensive measure of bank performance than the various efficiency indicators used in

the literature, such as profitability, net interest margin, and overhead expenses. Moreover, existing studies fail to explore the relationships among the various indicators used to assess the effect of foreign entry. As a result, it remains unclear whether, for example, a decline in profitability is driven by a reduction in margins, an increase in overhead expenses, or a factor not considered by the study. Disaggregating the determinants of productivity, by contrast, permits analysis of the causal factors driving performance differences between foreign and domestic banks. This section discusses measurement issues related to the use of productivity as dependent variable, describes three other measures of FDI impact used to assess the effect of foreign entry, and outlines the research design of the study.

Productivity

Productivity is defined as the amount of output created per unit of input. For example, labor productivity is typically measured as output per employee or output per labor hour and capital productivity as output per unit of capital goods employed.⁵

Output can be measured in physical terms or in price terms. Examples for physical output in banking include the numbers of checks processed, the volume of loans administered, or the number of telephone inquiries handled. A physical output approach would aggregate output data across a bank's range of activities (by weighting them, for example, with their average labor input) to form a real output indicator. This output indicator would then be divided by a corresponding labor input index for a measure of labor productivity.⁶ The primary advantage of a physical output approach is that it does not require data on product prices, which can be difficult to obtain in banking. However, such an approach requires extensive primary data collection. Physical output is also hard to define for certain banking activities (particularly in wholesale banking) and there are few reliable estimates for the labor intensity weights used in the data aggregation.

⁵ See Griliches (1987) for a discussion of productivity and related measurement issues.

⁶ See McKinsey Global Institute (1998) for an example of a physical output-based approach to measuring banking productivity.

A price-based approach uses real value added as output measure. Value added refers to the additional value created at a particular stage of production. It is obtained by subtracting expenditures on intermediate goods and services from output. Value added may be stated gross or net and is related to net operating surplus by the following accounting definitions:

$$\text{Gross Value Added} = \text{Gross Output} - \text{Intermediate Inputs}$$

$$\text{Net Value Added} = \text{Gross Value Added} - \text{Depreciation}$$

$$\text{Net Operating Surplus} = \text{Net Value Added} - \text{Personnel Expenses}$$

Measuring value added requires only moderate detail on output and quantities, but it does require price data for products and intermediate inputs. Methods for calculation value added include double and single-indicator methods, with double-deflation generally regarded as the gold standard (Cassing 1996, OECD 2000). National statistical agencies use these methods to calculate sector-wide value added figures for the financial services industry, but the data requirements are too demanding for use in a study of banking productivity on the firm level.

This paper uses income statement data to calculate value added for Mexican banks. The above accounting definitions imply the following identity:

$$\text{Gross Value Added} = \text{Net Operating Surplus} + \text{Personnel Expenses} + \text{Depreciation}$$

All the information on the right-hand side can be obtained from a bank's income statement. To obtain real value added, gross value added needs to be deflated using an appropriate deflator. As input measure, this paper uses the number of employees for the following definition of productivity:

$$\text{Productivity} = \text{Real Gross Value Added} / \text{Number of Employees}$$

The advantages of using income statement data to calculate value added and productivity are threefold. First, the data requirements are manageable for a study of banking productivity on the firm level. Second, firm-level data can be aggregated to perform productivity calculations for sub-groups of banks or the entire banking sector, always comparing apples with apples.

Third, the causal drivers of productivity change can be analyzed by disaggregating the determinants of net operating surplus using more detailed income statement data.

Figure 6 disaggregates the determinants of net operating surplus and shows how they affect banking productivity. Figure 7 provides a simplified version that eliminates the double counting of depreciation and personnel expenses. This framework will be used in the empirical analysis to assess the causal drivers of productivity change in the Mexican banking sector and the impact of foreign bank entry on the performance of Mexican banks. Figure 8 indicates how specifically FDI might affect banking productivity.

Other Measures of FDI Impact

In addition to productivity, this paper uses three other measures of FDI impact: capitalization, asset quality, and lending.

The undercapitalization of Mexican banks after the financial crisis was the main driver behind the government's decision to open the banking sector to FDI. The question is whether and to which extent foreign entry improved the capitalization of Mexican banks. So far, there has been no systematic study of the capitalization effect of foreign entry on the Mexican banking sector, so this study will fill an important gap in the literature.

Many advocates of banking FDI in emerging markets argue that foreign banks can help improve the asset quality of local banks by transferring credit workout and risk management skills from their more developed home markets. Emerging market governments often liberalize banking FDI after a financial crisis and a key problem their banking sectors usually face is unsustainably high levels of bad debt. Credit workout is a complex and difficult task in the best of times and foreign banks are often credited with helping reduce non-performing loans in post-crisis emerging markets. Foreign banks are also frequently credited with transferring risk management skills to less developed banking markets, which contributes to lowering the risk level of banks' loan portfolios. But the international banking literature has not analyzed the effect of foreign entry on the asset quality of banks in emerging markets, so this study will help fill a gap in that literature.

Finally, this paper assesses the effect of foreign entry on domestic credit provision. The role of foreign banks in the decline of banking credit is subject of considerable debate and has been studied in the Latin American context (Dages et al. 2000, Peek/Rosengreen 2000). But these papers do not analyze the direct effect of a change in ownership status on the lending behavior of banks. An exception is recent work by Haber/Mussachio (2005), which finds that foreign entry does not affect the lending behavior of Mexican banks.

Research Design

This paper assesses the impact of FDI on the Mexican banking sector by analyzing the direct effect of foreign entry on the domestic banks acquired by foreign financial institutions. This approach differs from existing studies of banking FDI, which focus on the indirect effect of foreign entry on domestic-owned banks. Analyzing the indirect effect of foreign entry would contribute little to our understanding of banking FDI in Mexico. This is because foreign banks have acquired more than 80 percent of Mexican banking sector assets. Hence, an analysis of the direct effect of foreign ownership on the acquired domestic banks is essential to understanding the impact of FDI on the Mexican banking sector.

To assess the effect of foreign ownership on bank performance, this paper analyzes firm-level panel data using a two-way fixed effects model. The baseline model regresses bank performance (y) on an indicator of foreign ownership (foreign), a vector of bank-specific control variables (x), and a full set of bank (a) and time (g) dummy variables:

$$y(it) = \text{foreign}(it) + \mathbf{b}'\mathbf{x}(it) + a(i) + g(t) + u(it)$$

This model specification provides an estimate of the change in performance following a change in ownership status, controlling for time-varying bank-specific factors, unobserved heterogeneity, and time trends that are common to all banks. Heterogeneity is a concern because of potential omitted variable bias. For example, banks are likely to differ in their performance level at the time of acquisition for reasons that are unique to each bank, such as quality of management or organizational structure. These factors that are not explicitly considered in the analysis, so pooling observations may introduce serious bias into the model

estimators. By including bank-specific intercepts, the analysis controls for time-invariant omitted variables and thus removes an important source of estimation bias.

In this specification, the model removes any “between” bank variation from the analysis and uses only the “within” variation for each bank that changes ownership status to estimate the effect of foreign ownership. The model is thus equivalent to a difference-in-difference (DID) analysis in which the performance of one group that is subject to a “treatment” is compared to that of a control group that is not subject to the treatment. The treatment effect in classic DID studies is often a policy intervention, such as an increase in the minimum wage, and the goal of the analysis is to estimate the effect of the policy on some variable of interest, say employment (Card/Krueger 1994). In this study, treatment consists of acquisition by a foreign financial institution and the variable of interest is any of the productivity and non-productivity measures of bank performance discussed above.⁷

A key concern in DID studies is the comparability of treatment and control group. Often the two groups differ in some important respects and the task for the researcher is to model the sources of that difference to ensure comparability. For this study, comparability is less of a concern since treatment and control group are drawn from the same population of Mexican commercial banks. A potential issue is the effect of bank selection. Foreign investors do not pick their acquisition targets at random. Rather, they are likely to acquire banks with certain characteristics and this selection effect may affect the comparability of the treatment and control group. Note, however, that the research design controls for differences in bank-specific initial conditions through the unit fixed effects. The only way for selection to affect comparability would be for banks in the treatment group to have a different propensity for performance change. While valid in theory, this concern is unlikely to be an issue in practice. This is because, in the case of Mexico, performance was only one of a number of criteria driving bank selection. Market, regulatory, and competitive factors constrained the supply of potential acquisition candidates, which limited the pool of banks from which foreign investors

⁷ See Meyer (1995) and Angrist/Krueger (2000) for surveys of DID methods. Recent papers on specific issues in DID analysis include Besley/Case (2000) on policy endogeneity, Bertrand et al. (2004) on serially correlated outcomes, Abadie (2005) on the comparability of treatment and control groups, and Athey/Imbens (2006) on nonlinear DID estimators.

could choose at any point in time.⁸ But given the small number of banks in the Mexican banking sector, composition of treatment and control group are likely to differ, so the model adds a number of bank-specific control variables to ensure comparability.

4. Data

Balance sheet and income statement data for Mexican commercial banks were obtained from the National Banking and Securities Commission (CNBV). Most of the data was available from CNBV's electronic database. Certain items required for the productivity analysis were obtained from the CNBV bulletins, others were provided by the CNBV statistics department. This yielded complete balance sheet and income statements for all Mexican banks from 1997 to 2004 on a quarterly basis. Data for 1996 were collected, but not included in the analysis since CNBV changed the reporting requirements for Mexican banks in January of 1997. CNBV also provided headcount data for all Mexican commercial banks from 1997 to 2004. Data on domestic credit provision were obtained from the central bank (Banco de Mexico). The National Institute of Statistics, Geography, and Information (INEGI) provided exchange rate data and various deflators. The quantitative analysis was complemented with fifteen semi-structured interviews with senior company executives (4), government officials (6), and industry experts (5) conducted in 2003 and 2004.

The dataset includes balance sheet and income statement data for all commercial banks reported by CNBV between 1997 and 2004. Not included are banks under government control that were intervened after the financial crisis. The majority of these banks were liquidated. Others were cleaned up by the government and auctioned off to existing domestic or foreign players or new foreign entrants. The aggregation of all commercial banking data

⁸ Because of the concentration of the banking sector, only a small number of banks of at least moderate size was available for acquisition. Until December of 1998, foreign interest in the three largest banks was limited to 30 percent. Throughout the observation period, the government used regulatory enforcement and debt guarantees to promote foreign takeover of certain banks. Finally, as foreign investors increased their share of the Mexican banking sector, only a few local banks remained as acquisition targets.

yielded a balance sheet and an income statement for the banking sector as a whole. These “bottom up” numbers matched the “top-down” balance sheet and income statement data reported by CNBV nearly perfectly, indicating the accuracy of the dataset.

Each bank was classified as “retail” or “non-retail” and “domestic-owned” or “foreign-owned.” A bank was classified as “non-retail” when it met the following criteria: < 5 branches, < 20,000 accounts, and < 200 employees. These banks included investment banks, commercial lenders, and wholesale banks. A bank was classified as “foreign-owned” when a foreign financial institution controlled more than 50 percent of equity or had effective management control.⁹ Non-retail banks were excluded from the analysis. Many of these banks had volatile income statements and idiosyncratic balance sheet structures. The foreign banks in this category mostly service corporate clients in their home country rather than the Mexican market and their financial structures are likely to be influenced more by tax considerations than by the operational requirements of the Mexican banking sector. The remaining “retail” banks account for between 93 and 97 percent of all commercial banking assets between 1997 and 2004.

The following banking entities were excluded from the analysis: (1) Centro (2000-2004). Centro’s banking operations were integrated into Banorte in 2000. Centro remained a separate legal entity to hold certain legacy assets. It was excluded from 2000 onwards since it was not an operational bank. (2) BBVA Bancomer Servicios (2000-2004). Bancomer was acquired by BBVA in 2000 and merged with its Mexican operations. BBVA Bancomer Servicios was created to hold certain legacy assets. It was excluded since it was not an operational bank. (3) Banco Azteca (2002-2004). Banco Azteca is a banking start-up founded by the owner of the Elektra retail chain in 2002. The balance sheet and income statement data for the first two years of operation reflect start-up costs and a unique business model. It was excluded to avoid biasing the results.

⁹ The only exception to the 50 percent rule was BBVA, which acquired 32.2 percent of Bancomer in a transaction that merged Bancomer with BBV Probusa and gave BBVA management control of the new entity.

Throughout the paper, monetary values are expressed in constant prices with 1997 as base year. Real value added is calculated using a deflator for the financial services sector provided by INEGI. Growth rates are expressed as compound annual growth rate (CAGR), the year-over-year growth rate over a specified period of time.

5. Results

Figure 9 shows the development of Mexican retail banking productivity between 1997 and 2004. Over this time period, productivity grew at an annual rate of 12.8 percent. Most of the productivity increase took place in the years immediately following the financial crisis, with productivity growing by 20.9 percent annually between 1997 and 2000, followed by 7.1 percent annual productivity growth between 2000 and 2004.

Figure 10 illustrates the main drivers of productivity growth between 1997 and 2004. The values indicate the partial contribution of a factor to overall productivity change. For example, headcount reductions by Mexican banks between 1997 and 2004 resulted in a productivity increase of P\$46,000. Likewise, an increase in net interest margins over the 1997-2004 period boosted sector productivity by P\$22,000. The key driver of productivity growth was an improvement in asset quality – reflected in reduced provisions for non-performing loans, followed by increases in fee income, and headcount reductions. Reduced treasury income, resulting from a decline in interest rates between 1997 and 2004, had a negative effect on banking sector productivity.

Figure 11 compares the productivity of domestic and foreign-owned banks. With the exception of 2000, the productivity of foreign-owned banks exceeded that of domestic banks, often by a considerable margin. Over the 1997-2004 period, foreign banks had higher average productivity than domestic banks (P\$370,000 vs. P\$272,000), but domestic banks exhibited higher annual productivity growth (10.4 percent vs. 7.0 percent). However, it would be premature to conclude from these data that foreign entry had a positive effect on Mexican banking sector productivity. This is because of the selection effect discussed earlier

– foreign-owned banks may have simply acquired those domestic banks that were more productive.

Model Specification

To control for selection at the entry stage and other confounding factors, the statistical model described in Section 3 analyzes changes in performance for domestic banks acquired by foreign financial institutions. The model was estimated for fourteen different measures of bank performance: productivity, nine productivity drivers, and four non-productivity measures of bank performance.

Table 1 lists the different performance measures as discussed in Section 3. Productivity drivers are measured over assets to control for bank size. Lending was measured both by total loans and by loans to the non-financial private sector (NFPS) since promissory notes issued by the government after the financial crisis account for a large part of loan portfolios during the observation period. NFPS lending includes commercial, housing, and consumer lending and is generally regarded as the key credit category driving aggregate economic activity. NFPS loans were used to measure asset quality since only private sector lending is subject to credit risk. Table 2 provides averages and growth rates for the Mexican banking sector as a whole.

In addition to bank fixed effects, which control for time-invariant difference between banks, the model specifies a set of time-varying bank-level controls to ensure comparability of treatment and control group. The vector of control variables includes measures that reflect differences in scale, business model, and legacy of Mexican commercial banks. Share of total retail banking assets controls for economies of scale, which are typical in financial services. Lending to the non-financial private sector over assets captures the degree to which a bank's business model depends on traditional intermediary functions as opposed to non-lending activities, such as trading and investing, and lending to the government. Lastly, Fobaproa promissory notes as share of assets indicate how much of a bank's asset base is in form of government paper that was provided in exchange for bad loans transferred to the government after the 1994 financial crisis. Controls for macroeconomic or sector-level factors are

unnecessary since factors that affect all banks equally are picked up by the time dummy variables.

The data set contains quarterly data for all Mexican retail banks between 1997 and 2004 as described in Section 4. Quarters in which an FDI transaction was completed were excluded from the analysis to avoid bias due to extraordinary charges associated with the transaction. This yielded 377 observations for 15 banks. The data were examined for seasonality, but the hypothesis of a seasonal component was rejected. Tables 3–5 provide descriptive statistics.

Five different models were estimated. Their specification is summarized in Table 6. Model 1 pools observations to provide empirical justification for the fixed effects specification. Model 2 estimates the baseline model on the full data set. Diagnostic results show that most variables exhibit some form of serial correlation in the error process. Bertrand et al. (2004) show that serial correlation in DID models can lead to serious understatement of standard errors and hence overestimation of t-statistics and significance levels. They demonstrate that simple parametric corrections, such as specification of an AR(k) error structure, often fail to address the serial correlation problem. This is due partly to the small sample bias in the estimation of the autocorrelation parameter and partly to the misspecification of the autocorrelation process. An alternative estimation technique – specification of an unrestricted covariance structure over time within groups – generally performs much better, but exhibits some downward bias when the number of groups is small. To compare the two estimation techniques, this paper specifies both an AR(1) error structure (Model 3) and an unrestricted variance-covariance matrix (Model 4). As further robustness check, Model 5 estimates Model 4 on a reduced data set that excludes banks that operate only for a short period of time during the observation period. Some of these banks have unusual balance sheet structures related to the government bailout of the banking sector in the mid-1990s, which may influence results. Their deletion yielded a balanced panel with 312 observations for 10 banks.¹⁰

¹⁰ The excluded banks were smaller banks that were taken over by domestic competitors or subsidiaries of foreign banks that were merged with larger Mexican banks acquired by their parent companies. None of the excluded banks changed ownership status during the observation period.

Table 7 summarizes the results of the empirical analysis. For each measure of bank performance, the coefficient estimate of the foreign ownership variable is provided for each of the five models in Table 6, together with standard errors and p-values. Grey shading indicates significance at the 10% level or better. Table 8 provides more detailed estimation results for Model 5. Table 9 provides diagnostic results.

Productivity

The results show that acquisition by a foreign financial institution had a positive and highly significant effect on the productivity of Mexican banks. An F-test indicates that the pooling of observations is not appropriate. This suggests that the baseline model (Model 2) is correctly specified. Examination of the residuals from Model 2 indicates that the errors are serially correlated. Autocorrelations, partial autocorrelations, and Portmanteau (Q) statistics up to nine lags were calculated for each individual time series. Five of the fifteen series showed first-order autocorrelation at the 5% level. A Phillips-Perron test rejected the null hypothesis of a unit root. As a summary measure, Table 9 provides the result of a test for autocorrelation in panel data models proposed by Wooldridge (2002: 275) and the Durbin-Watson statistic. Given the relatively mild autocorrelation in the data, the Wooldridge test does not reject the null hypothesis of no autocorrelation, but the Durbin-Watson statistic is more ambiguous.

To correct for autocorrelation, Model 3 estimates a Prais-Winsten model in which the errors are assumed to follow an AR(1) process.¹¹ The size of the coefficient and the standard error of the foreign ownership variable increase, but the effect of foreign ownership on productivity remains significant at the 1% level. Table 9 provides the transformed Durbin-Watson statistic, which suggests that Model 3 successfully corrects for first-order autocorrelation. Model 4 specifies an unrestricted covariance structure over time within groups as an alternative approach to dealing with serial correlation. The variance-covariance matrix was estimated by clustering robust standard errors on the bank level (Arellano 1987, Bertrand et

¹¹ A Prais-Winsten specification was chosen because it can accommodate unbalanced panels. The alternative FGLS model (as implemented in STATA) requires balanced panels.

al. 2004). The standard error of the foreign ownership variable almost doubles in size compared to Model 2, but the effect of foreign ownership remains significant, now at the 5% level. The drop in significance compared to Model 3 is consistent with Bertrand et al.'s argument that simple parametric corrections may not fully resolve serial correlation problems in DID models. Model 5 estimates Model 4 on the reduced data set. The size of the foreign ownership coefficient increases, but the effect remains significant at the 5% level.

Productivity Drivers

To determine the factors driving the effect of foreign ownership on the productivity performance of Mexican banks, the above analysis was conducted for each productivity driver in Figure 7.

The results show that the productivity impact of foreign ownership was driven by both income and cost factors. On the income side, foreign ownership had a positive and significant effect on fee income of Mexican banks. The effect on net interest margins was positive, but not significant. During the observation period, interest income of Mexican banks included guaranteed interest from loans transferred to the government during the post-crisis debt restructuring, which may have masked the impact of foreign ownership on margins. Hence, a narrower measure – the difference between the interest rates a bank charges its borrowers and pays its depositors – was used to estimate the effect of foreign ownership on margins. As Table 7 shows, foreign ownership had a positive and highly significant effect on the interest rate margin of Mexican banks. The positive effect of foreign ownership on fee income and interest rate margins translated into a positive effect on the overall operating margin, but the effect was not statistically significant.

On the cost side, foreign ownership had a negative and highly significant effect on non-performing loan provisions, which translated into a negative and significant effect on the overall cost ratio. The effect of foreign ownership on administrative cost was positive and small, but not statistically significant. Income and cost effects combined for a positive and significant effect of foreign ownership on value added. The effect of foreign ownership on employment levels of Mexican banks was negative, but not statistically significant. The

positive effect of foreign ownership on the productivity of Mexican banks was thus driven by increases in value added, which resulted from higher interest rate margins, increased fee income, and reduced provisions for non-performing loans. Foreign ownership had no statistically significant effect on administrative cost or employment levels.

Comparing the results for Models 1 and 2 shows the importance of controlling for unobserved heterogeneity. For more than half of the performance measures, the foreign ownership coefficient changes sign or significance when bank fixed effects are included. All variables showed some form of autocorrelation in the residuals, but as the Wooldridge and Durbin-Watson tests indicate, the magnitude of the autocorrelation problem varies considerably. In all cases, autocorrelation showed an AR(1) pattern and the hypothesis of a unit root was consistently rejected. The transformed Durbin-Watson statistic suggests that Model 3 successfully corrects for autocorrelation. Specification of an unrestricted covariance structure increases standard errors and reduces t-statistics for all variables, but the effects of foreign ownership remain significant at conventional levels. Estimating Model 4 on the reduced data set changes results very little.

Non-Productivity Measures

Table 7 shows that acquisition by a foreign financial institution had a negative and significant effect on the non-performing loan ratio and a positive and highly significant effect on the capitalization of Mexican banks. By contrast, foreign ownership had no significant effect on domestic credit provision, measured either by total loans or by loans to the non-financial private sector. All four non-productivity measures of bank performance exhibited strong autocorrelation in the residuals.¹² As with the productivity measures, autocorrelation showed a clear AR(1) pattern. In contrast to the previous analyses, however, specification of an AR(1) error structure did change some of the results. Most importantly, the effect of foreign ownership on NFPS lending disappeared. For asset quality, significance dropped from the 1%

¹² Conceptually this is because the numerator of the non-productivity measures is based on balance sheet data, which are stock figures, whereas the numerator of the productivity measures is based on income statement data, which are flows. Stocks exhibit fewer short-term fluctuations than flows and are prone to trending.

to the 10% level. With an unrestricted covariance structure, the effect of foreign ownership on asset quality is significant at the 5% level. The effect of foreign ownership on the two lending variables remains insignificant.

Of the four non-productivity measures, the effect of foreign ownership on bank capitalization was the most powerful. This raises the question of how strong the capitalization effect of banking FDI was in absolute terms. The widely quoted figure of U.S.\$30 billion total financial services FDI between 1997 and 2004 is not a reliable indicator of the capitalization effect of FDI. This is because it cannot be assumed that all FDI flows contributed to strengthening the capitalization of the Mexican banking sector. In cases where foreign banks acquired equity stakes from existing shareholders, these shareholders may have simply transferred the proceeds abroad.

Figure 12 provides a lower bound estimate for the capitalization effect of banking FDI. For each foreign acquisition of Mexican banking assets, subsequent transactions involving a flow of capital from or to the foreign financial institution were researched using Thompson SDC, Bloomberg, and the financial press. For each transaction, the recipient of the funds was determined – domestic banks, the government, or shareholders. The individual transactions were aggregated by category and by year and then summed over all years. The most conservative assumption is that only funds flowing directly to the acquired banks or to the government (as compensation for recapitalization under government intervention) contributed to the strengthening of the banking sector, i.e. that all funds flowing to shareholders potentially ended up abroad. Based on this assumption, the capitalization effect of FDI was approximately U.S.\$6.4 billion or U.S.\$8.8 billion in 2004 dollars. These figures are lower bound estimates because some shareholder funds were likely reinvested in the banking sector and because the transaction history summarized in Figure 12 is incomplete. Not all transactions involving a capital flow from a foreign investor to a Mexican bank are a matter of public record. In a number of cases, foreign majority shareholders bought smaller equity stakes on the open market or increased the capital of their Mexican subsidiaries without a public announcement. These transactions are not included in the calculation.

Control Variables

Table 8 provides more detailed estimation results for Model 5. The size variable has a negative and significant effect on administrative expenses, cost ratio, and employees. This confirms the existence of economies of scale in retail banking. On the income side, size has a negative and significant effect on net interest margins, which translates into a negative and significant effect on overall operating margins. One possible interpretation is that smaller banks are able to focus on more profitable niche businesses, whereas large banks offer a full range of banking products to a broad customer base, which lowers average margins.

The lending variable has a positive and significant effect on fee income and net interest margins. This suggests that Mexican banks generate fee income primarily from their traditional intermediary function rather from non-lending activities. A possible interpretation of the effect on net interest margins (together with the absence of a significant effect on interest rate margins) is that a strong lending franchise tends to increase the profitability of non-lending business which banks generate through cross-selling from their lending customers. The positive effect of the lending variable on the income side translates into a positive and significant effect on value added and productivity, suggesting that the traditional intermediary function remains a key performance driver in Mexican retail banking.

The Fobaproa variable has a negative and significant effect on interest rate margins. This suggests that banks that derive a large share of their interest income from Fobaproa promissory notes perform the traditional intermediary function of deposit-taking and lending less profitably than banks that have a lower share of bailout bonds on their books. This may be either because a large share of Fobaproa notes indicates the weakness of the bank's performance as financial intermediary or because a large share of guaranteed interest income lowers the incentive for banks to improve their intermediation performance. The positive effect of the Fobaproa variable on asset quality suggests that banks with a significant non-performing loan problem have made most use of the government bailout program after the financial crisis. The negative effect on capital reflects the fact that Fobaproa promissory notes have lower provisioning requirements than other banking assets.

6. Discussion

The results show that FDI had a positive, but limited impact on the development of the Mexican banking sector. The key contribution of foreign banks was the recapitalization of the banking sector after the financial crisis. Foreign entry had a positive and highly significant effect on the capitalization of Mexican banks. Between 1997 and 2004, foreign banks increased sector capitalization by more than U.S.\$6.4 billion or U.S.\$8.8 billion in 2004 dollars. This is equivalent to 42 percent of 2004 banking sector capital. The capitalization impact of FDI was likely higher since this estimate is based on very conservative assumptions. The primary reason for the government's decision to lift restrictions on banking FDI was to enlist foreign help in the recapitalization of the banking sector and the results show that foreign entry did have the desired effect.

A second important contribution of foreign entry was the reduction of bad debt in the banking system. Many advocates of banking FDI in emerging markets argue that foreign banks improve the asset quality of local banks by transferring credit workout and risk management skills from their more developed home markets. In addition to the effect on banking sector capitalization, this has been an important justification for removing barriers to banking FDI in post-crisis emerging markets. The results show that foreign entry had a positive and significant effect on the asset quality of Mexican banks and thus accelerated the reduction of bad debt the banking system after the financial crisis.

The impact of FDI on the efficiency of the Mexican banking sector was more limited. Foreign entry had a positive and highly significant effect on banking sector productivity, but failed to affect a set of productivity drivers typically associated with banking FDI. On the income side, foreign banks increased interest rate margins and fee income of their Mexican acquisitions. On the cost side, foreign ownership had a negative effect on provisions for non-performing loans, which drove much of the productivity impact of FDI. Foreign entry had no effect on administrative cost or employment levels of Mexican banks.

The balance of income and cost effects was somewhat surprising. Most banking analysts emphasize the cost benefits of banking mergers and are skeptical about gains on the revenue

side. Likewise, most advocates of banking FDI in emerging markets stress the role of foreign banks in reducing costs rather than enhancing revenues. The positive effect of foreign entry on interest rate margins was particularly surprising since interest rates declined significantly between 1997 and 2004, making it more difficult to increase margins. Interviews with banking experts suggest at least two ways in which foreign banks increased interest rate margins of their Mexican subsidiaries. First, they lowered the costs of funds by increasing the proportion of demand deposits, which are less costly than time deposits. The driving factor was product innovation. For example, BBV Probursa used daily lotteries to attract new savings accounts, a tactic that had been successful in BBV's Spanish home market. Santander-Serfin created the "Maxicuenta Millionaria" product, a checking account linked to monthly lottery draws. BBVA Bancomer introduced low-interest-bearing products such as the "Libreton" savings account to improve its funding mix.¹³ Second, foreign banks increased the profitability of the asset base by increasing the share of performing private sector loans. The primary driver was the transfer of technology and risk management skills from their more developed home markets. For example, sophisticated credit evaluation methods using computer models and credit scoring methods helped banks expand loan volumes and lower credit risk.¹⁴

The positive effect of foreign entry on fee income was less surprising since banks tend to increase fees and commissions in low-interest rate environments. But the question is why foreign-owned banks were able to increase fee income relative to domestic banks. One driving factor was again product innovation. For example, foreign-owned banks were very aggressive in expanding credit card lending through innovative products such as "Serfin Light," a low-fee credit card with an interest rate capped at 24 percent. While these cards carried fees that were lower than those of existing credit cards, they triggered a rapid

¹³ In 1996/97, BBV Probursa attracted 350,000 new savings accounts and more than U.S.\$125 m in deposits in 10 months with daily raffle giveaways of cars and Disney World vacations (Business Week, 23 June 1997, p. 62). For a detailed analysis of lottery-linked deposit accounts, see Guillen/Tschoegl (2002).

¹⁴ In 2004, investments in technology allowed Scotiabank Inverlat to approve car loans electronically in two hours, down from four days in 2000. Processing time for mortgage loans was reduced from seven working days to four hours (The Globe and Mail, 16 October 2004, p. B4).

expansion in credit card use, which produced healthy and stable income streams. Foreign banks also introduced innovative mortgage products, which they combined with fee-generating insurance policies. Santander-Serfin, for example, launched “Super Casa,” a mortgage loan product that is bundled with a 9-month unemployment insurance policy. But foreign banks have also been accused of using their dominant market position to increase fees for standard services, such as ATM usage, without providing any new customer benefits. A 2004 study by CONDUSEF, the financial consumer watchdog, criticized foreign banks for charging fees as much as ten times higher in Mexico than in their home countries. In the same year, the central bank governor Gilberto Ortiz threatened to limit the amount banks can charge for certain services unless the banks lower commissions.¹⁵ The banks responded to these criticisms by emphasizing that Mexico is riskier than other countries and that cost structures are higher due to security concerns and an inefficient legal system.¹⁶

Foreign ownership had a negative and highly significant effect on NPL provisions, which reduced overall costs and thus boosted value added and productivity. The negative effect on NPL provisions mirrors the positive effect of foreign entry on asset quality, which reduced the need to provision against bad debt. As Table 7 shows, the effect of foreign ownership on NPL provisions was large (coefficient estimate of -1.0 for a variable with mean 1.0 and standard deviation of 1.3) and single-handedly drove the effect of FDI on the overall cost ratio of Mexican banks. That effect was also large (coefficient estimate of -1.0 for a variable with mean 3.7 and standard deviation of 1.7) and accounts for much of the impact of foreign entry on value added. Hence, a significant portion of the effect of foreign ownership on productivity was driven by the reduction in NPL provisions after the 1995 financial crisis.

The lack of FDI impact on administrative expenses was surprising since foreign banks are often credited with increasing operating efficiency of their emergent market subsidiaries. The efficiency effect of FDI is typically driven by a combination of three factors: the relative inefficiency of local banks; the superior management skills, business processes, and

¹⁵ John Lyons, “Mexican Officials Prod Banks to Boost Lending,” *The Wall Street Journal*, 22 March 2004, p. A17.

¹⁶ Monica Campbell, “Mexico – Chase is on for the Whole Enchilada,” *The Banker*, 1 June 2004.

technology of foreign banks; and merger-related economies of scale. In the case of Mexico, all three factors were present: Mexican banks had high administrative costs compared to their counterparts in more developed markets; BBVA, BSCH, Citigroup, and HSBC had demonstrated aggressive cost management in other emerging markets; and most foreign banks had existing operations in Mexico, which they merged with their local acquisitions. Yet foreign ownership had no statistically significant effect on the administrative expenses of Mexican banks. The lack of FDI impact on employment was surprising for many of the same reasons: in the mid-1990s, Mexican banks were overstaffed; foreign banks used personnel more efficiently due to superior business processes and technology; and mergers of existing operations with local acquisitions provided for the elimination of duplications. Yet foreign entry had no significant impact on the employment level of Mexican banks.

Some of these findings may be explained by idiosyncratic factors. For example, the high cost ratio of Mexican banks may reflect unique costs of doing business in Mexico, such as additional expenses for security and dealing with an inefficient legal system. And the lack of FDI impact on employment may be due to the fact that Mexican banks significantly reduced headcount in the late 1990s before the large-scale entry of foreign banks. Each of these factors reflects a salient characteristic of the Mexican banking sector during the observation period. But as explanations of the specific findings they are incomplete at best and cannot account for the pattern of FDI impact observed in the data. First, the cost-ratio of Mexican banks may be high by international standards, but to account for the lack of FDI impact on administrative costs, this argument would need to assume that Mexican banks operated at the efficiency frontier after the financial crisis and that economies of scale were minimal, which is at variance with both common wisdom and expert opinion (Faucher 2003). Second, while it is true that domestic-owned banks account for the bulk of headcount reductions after the financial crisis, there was scope for additional reductions, at a minimum to eliminate merger-related duplications. For example, analysts expected Bancomer to reduce headcount by 9,000, or about 21 percent of personnel, following its merger with BBV Probusa in 2000 (Mollin 2000).

The pattern of FDI impact is, however, consistent with an environment of limited competition: limited competition provided foreign banks with market power to simultaneously increase margins and fees on the income side and reduced pressures to cut administrative expenses and employment on the cost side.

As discussed above, FDI impact on the income side was driven by product innovation and the transfer of technology and risk management skills. But the discussion also noted widespread concerns by regulators and consumer advocates that banks used their dominant market position to increase fees for standard banking services that do not provide any new customer benefits. How much of the increase in fee income was driven by product innovation and how much by simple re-pricing of services is difficult to say. But the evidence suggests that product innovation alone cannot account for the magnitude of fee increases in recent years. There is no direct evidence suggesting that foreign banks increased interest rate margins simply by re-pricing loans and deposits. As discussed above, FDI impact on interest rate margins was clearly driven by product innovation and the transfer of technology and risk management skills, which resulted in lower funding costs and a more profitable asset profile. But the exercise of a dominant market position would certainly be compatible with this account and may have contributed to the positive effect of foreign entry on interest rate margins.

The lack of FDI impact on administrative expenses and employment can be explained directly as result of limited competitive pressures to improve operating efficiency. As mentioned above, most banking analysts emphasize the cost benefits of banking mergers and are skeptical about gains on the revenue side. Likewise, most studies of banking FDI in emerging markets stress the role of foreign banks in reducing costs rather than enhancing revenues. It therefore comes as a surprise that foreign entry had no significant effect on either administrative expenses or employment when there was clearly potential for efficiency improvements. In an influential paper, Berger and Hannan (1998) argue that a reduction in competitive pressures lessens incentives for managers to maximize operating efficiency. Market power may result in reduced operating efficiency through four mechanisms – shirking by managers, the pursuit of objectives other than profit maximization, political activities to

obtain and maintain market power, and managerial incompetence. They find evidence that banks in less competitive markets exhibit lower cost efficiency and estimate the efficiency cost associated with market power to be several times larger than the social loss from mispricing on the income side.

To demonstrate the validity of this account, it needs to be shown that competitive intensity in the Mexican banking sector between 1997 and 2004 was low. While a full-blown analysis of banking sector competition is beyond the scope of this paper, a number of key indicators from the banking and industrial organization literatures suggest that competition in the Mexican banking sector was indeed limited.

Two indicators of competitive behavior widely used in the banking literature are interest rate margins and operating cost. Many studies have found that banks with market power charge higher loan rates and offer lower deposit rates than banks in a competitive market. A decline in the interest rate margin is associated with an increase in competition (Ho/Saunders 1981, Saunders/Schumacher 2000). As Table 2 shows, the interest rate margin for the Mexican banking sector as a whole grew at an annual rate of 12.7 percent between 1997 and 2004, despite a significant decline in interest rates, which makes it more difficult for banks to increase margins. This is *prima facie* evidence for the pricing power of Mexican banks during the observation period. Some of that pricing power may have been derived from the product innovations and risk management methods introduced by foreign banks rather than from the exercise of a dominant market position *per se*. But the effect on the level of competition is the same.

Following Berger and Hannan (1998), the literature associates low operating cost with a high degree of competition and a decrease in operating cost with an increase in competitive pressures. As Table 2 shows, administrative expenses for the banking sector as a whole declined by only 1.8 percent annually between 1997 and 2004 and the administrative cost ratio remains high by international standards. As discussed above, the high cost ratio of Mexican banks may reflect country-specific factors, but given the operational inefficiency of Mexican banks after the financial crisis, the decline in operating cost is modest, which is consistent with an environment of limited competition.

Industrial organization studies have traditionally used market concentration as an indicator of competition. A competitive industry is characterized by a large number of small firms with little market power, whereas industries with a small number of large firms create market power, which reduces competitive pressures. As Figure 2 shows, the Mexican banking sector is highly concentrated and concentration increased between 1997 and 2004 through a process of FDI-driven consolidation. These data are clearly consistent with an environment of limited competition. However, the contestability literature has shown that even highly concentrated industries can exhibit competitive behavior and there is a growing consensus that concentration is not a particularly good indicator for the level of competition.¹⁷

An alternative approach is to estimate the pricing behavior of firms directly. Panzar and Rosse (1987), for example, measure the competitive conduct in a market by estimating deviation from competitive pricing. The Panzar-Rosse (PR) model has been widely used to study banking sector competition.¹⁸ For most countries, the results are consistent with monopolistic competition, which is a typical result in the contestability literature. A key assumption of the PR model is that the market is in equilibrium. This assumption may be reasonable for banking markets in many developed countries, but it clearly does not hold for post-crisis Mexico. There are also a number of measurement issues, which the literature has not yet addressed. Despite these objections, a PR model was estimated following the measurement conventions in the literature. The results show that the hypothesis of monopolistic competition cannot be rejected. While this result is not particularly informative, it provides further support for the view that competitive pressures in Mexico's banking sector were limited.¹⁹

In summary, key indicators used in the banking and industrial organization literatures suggest that competition in Mexico's banking sector between 1997 and 2004 was limited. This assessment is tentative and subject to a comprehensive analysis of banking sector competition, but the data are uniformly consistent with the view that banking competition was limited

¹⁷ See Claessens/Laeven (2004) for a review of the literature on competition in banking.

¹⁸ See Bikker/Haaf (2002), Claessens/Laeven (2004), and Buchs/Mathiesen (2005) for recent applications of the PR model to the banking sector.

¹⁹ Results are available from the author.

during the observation period. Limited competition then provides a parsimonious explanation for the pattern of FDI impact on Mexican banking sector productivity. It gave foreign banks market power to simultaneously increase margins and fees on the income side and reduced pressures to cut administrative expenses and employment on the cost side.

A policy implication that follows from this analysis is that strengthening banking sector competition would increase the productivity impact of FDI. An increase in competitive pressure would affect banking sector productivity in three ways. First, and most importantly, it would increase the pressure on banks to improve operating efficiency. The lack of FDI impact on administrative expenses and employment was surprising given the potential for efficiency improvements and the demonstrated expertise of foreign banks in improving operating efficiency of their emergent market subsidiaries. Following Berger and Hannan (1998), the gains from improving operating efficiency should be substantial and provide a significant boost to banking sector productivity. Second, it would reduce incumbent pricing power, putting downward pressure on interest rate margins and fees. The net effect on productivity would depend on the increase in transaction volume resulting from lower prices, but the increase in consumer surplus would clearly generate a positive net impact from a social welfare perspective. Third, it would increase the pressure on banks to improve revenue performance. Foreign entry had a positive impact on interest rate margins and fee income through product innovation and the transfer of technology and risk management skills. But interviews with banking experts suggest that there is further potential for improving performance on the income side. In particular, Mexican banks lack sophisticated customer relationship management systems, which would help them identify and target different customer segments, increase cross-selling, and improve the quality of their credit portfolios.

The optimal policy response must take into account the effect of banking sector competition on the stability of the financial system. A number of studies have found that greater competition may be good for efficiency, but bad for financial stability.²⁰ Others, however, argue that the relationship between competition and financial stability is more complex than

²⁰ See, for example, Keeley (1990). For a survey of the literature on competition and financial stability, see Carletti/Hartmann (2003).

this simple trade-off suggests and that under certain conditions competition increases stability (Allen/Gale 2000, 2004). In the case of Mexico, FDI significantly improved financial stability by increasing banking sector capitalization and reducing the amount of bad debt in the banking system. The effect on banking sector efficiency, by contrast, was much more limited. Given the severity of the financial crisis, Mexican regulators clearly favored stability over competition. But now that the banking sector has recovered from the crisis, greater competition would increase the productivity impact of FDI and improve the quality of financial intermediation in Mexico.

Lastly, the effect of foreign entry on lending highlights the importance of careful data analysis. Critics of banking FDI have accused foreign banks of restricting domestic credit and thus impeding economic growth and development. The baseline model does indeed find a negative and significant effect of foreign entry on lending to the non-financial private sector. However, diagnostic results show that this effect is the result of strong autocorrelation in the data. Once the analysis controls for autocorrelation, the effect of foreign entry on lending disappears. The results therefore do not support the main charge of FDI critics that foreign entry restricted domestic credit provision.

7. Conclusion

The paper analyzed foreign bank entry between 1997 and 2004 using balance sheet and income statement data for all Mexican commercial banks. The results show that foreign entry had a positive, but limited impact on banking sector development. The key contribution of foreign banks was the recapitalization of the banking sector after the financial crisis. Between 1997 and 2004, foreign banks increased sector capitalization by more than U.S.\$8.8 billion or 42 percent of total banking sector capital in 2004. A second important contribution of foreign banks was the improvement in asset quality of Mexican banks, which accelerated the reduction of bad debt in the banking system. The impact of FDI on the efficiency of the Mexican banking sector was more limited. Foreign entry had a positive effect on banking sector productivity, but failed to affect a set of productivity drivers typically associated with

banking FDI. On the income side, foreign banks increased interest rate margins and fee income of their Mexican acquisitions. On the cost side, foreign ownership had a negative effect on provisions for non-performing loans, which drove much of the productivity impact of FDI. Foreign entry had no effect on administrative cost or employment levels of Mexican banks. The main reason for the limited productivity impact of FDI was the low level of competitive intensity in the Mexican banking sector, which reduced pressures on banks to improve operating efficiency. Foreign entry had no significant effect on domestic credit provision.

On balance, then, FDI played a positive, but limited role in the development of the Mexican banking sector after the 1994 financial crisis. The primary reason for the government's decision to lift restrictions on banking FDI was to enlist foreign help in the recapitalization of the banking sector and the results show that foreign entry did have the desired effect. Foreign ownership also improved the asset quality of Mexican banks and thus accelerated the reduction of bad debt in the banking system. Foreign entry had a positive effect on the efficiency of the Mexican banking sector, but the effect was more limited than envisioned by advocates of banking FDI. The results do not support the main charge of FDI critics that foreign entry restricted domestic credit. A policy implication that follows from this analysis is that strengthening banking sector competition would increase the productivity impact of FDI and improve the quality of financial intermediation in Mexico. Most importantly, greater competition would increase the pressure on banks to improve operating efficiency. It would also put downward pressure on interest rate margins and fees and force banks to improve revenue performance.

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Figure 1

Major FDI Transactions in Mexico's Banking Sector, 1994-2004

Date	Target	Acquirer	Value (U.S.\$ m)	Description
13 Jun 1995	Probursa	BBV	350	BBV raises 20% stake in Probursa to 70%
21 Apr 1997	Mexicano	BSCH	379	Santander acquires 75% stake in Banco Mexicano
11 May 1998	Confia	Citibank	195	Citibank acquires 100% of Banca Confia
24 May 2000	Serfin	BSCH	1,540	Santander acquires 100% of Serfin
28 Aug 2000	Bancomer	BBVA	1,400	BBVA takes 32.2% stake in and control of Bancomer
31 Oct 2000	Inverlat	Bank of Nova Scotia	40	Bank of Nova Scotia increases stake in Inverlat to 55%
6 Aug 2001	Banamex	Citigroup	12,480	Citigroup acquires 99.9% stake in Banamex
25 Nov 2002	Bital	HSBC	1,135	HSBC acquires 99.5% stake in Bital
5 Mar 2003	Santander-Serfin	Bank of America	1,645	Bank of America acquires 24.9 stake from BSCH
20 Apr 2004	BBVA Bancomer	BBVA	3,910	BBVA increases stake in BBVA Bancomer to 97.8%

Source: Thomson SDC, Bloomberg, Trade Press

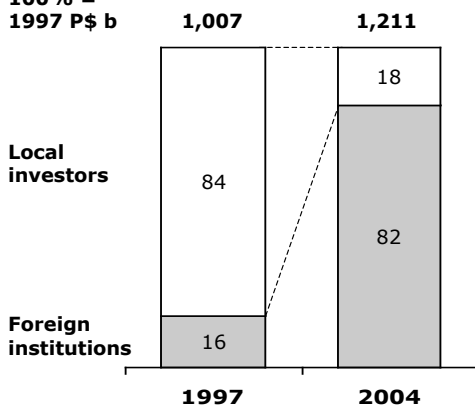
Figure 2

Foreign Entry and Banking Sector Consolidation

Share of assets

Percent

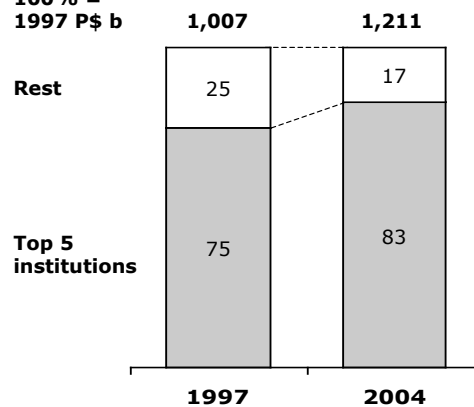
100% = 1997 P\$ b



Share of assets

Percent

100% = 1997 P\$ b



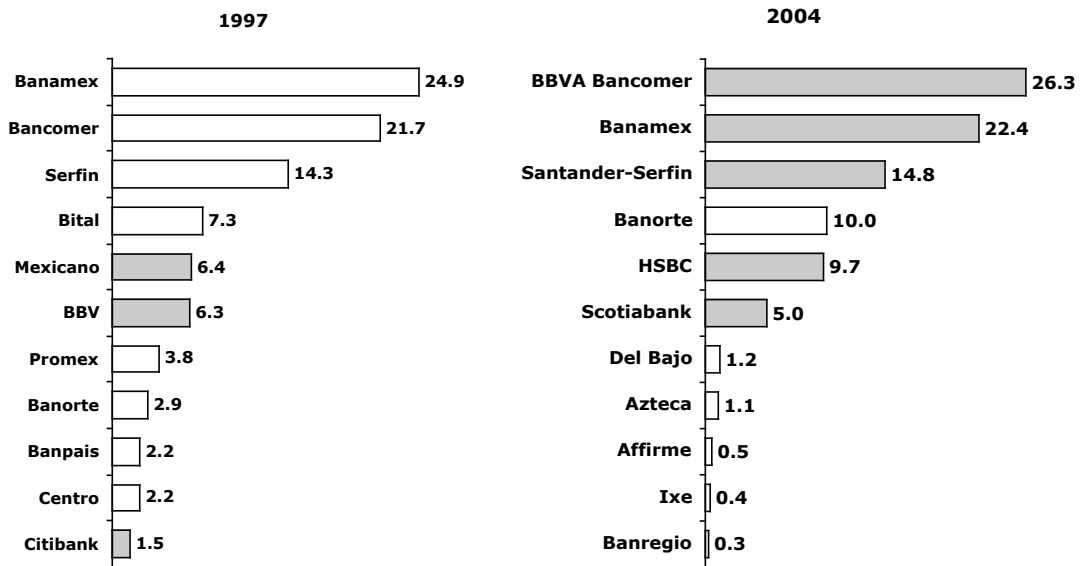
Source: CNBV, INEGI

Figure 3

Major Retail Banks 1997 and 2004

Share of assets (%)

■ = Foreign-owned



Source: CNBV

Figure 4

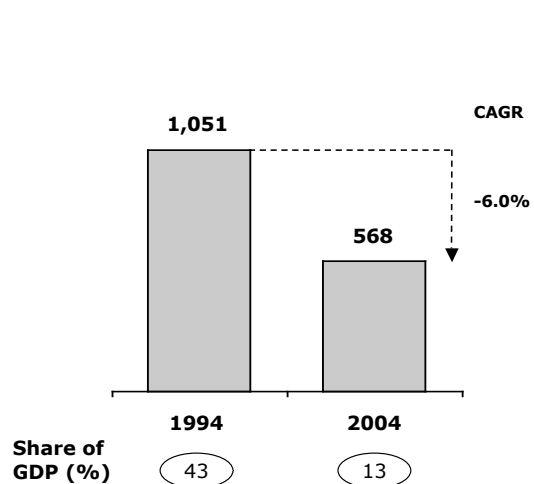
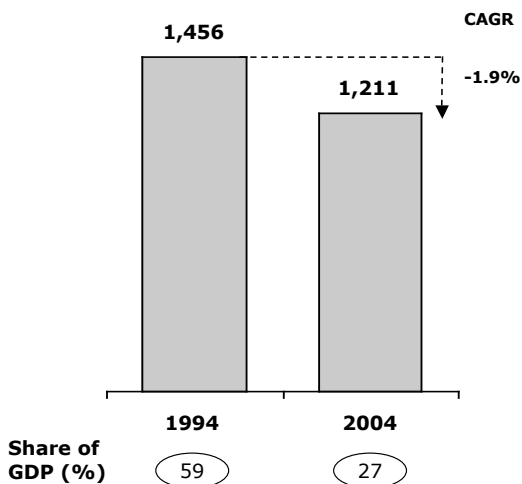
Commercial Banking Assets and Domestic Banking Credit, 1994-2004

Commercial Banking Assets

1997 PS\$

Domestic Banking Credit

1997 PS\$

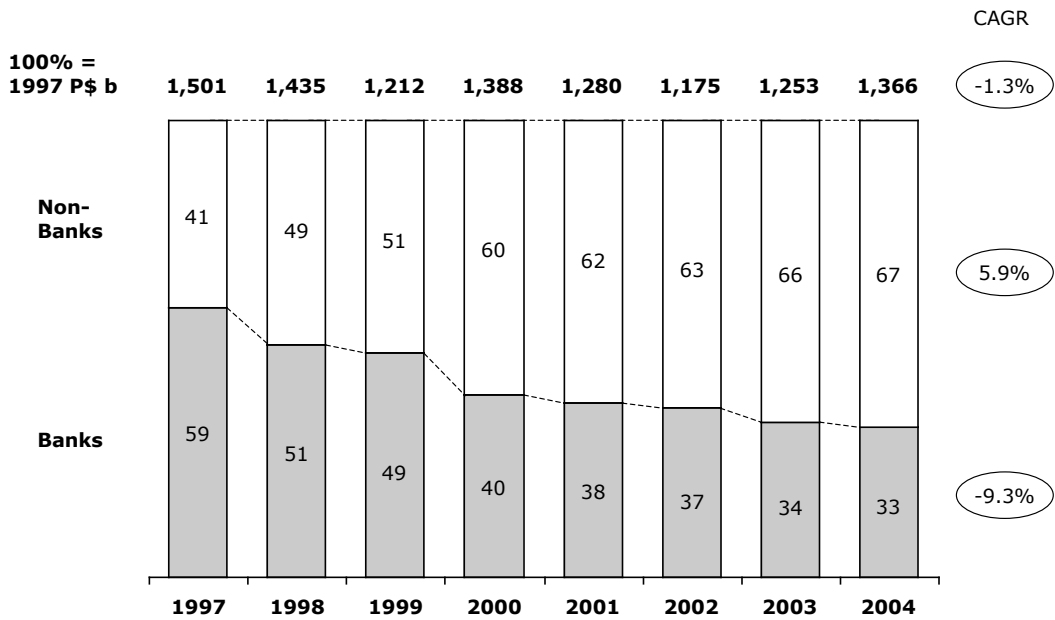


Source: CNBV, Banco de Mexico, INEGI

Figure 5

Total Credit to the Private Sector by Source of Credit, 1997-2004

Percent



Source: Banco de Mexico, INEGI

Figure 6

Drivers of Banking Productivity

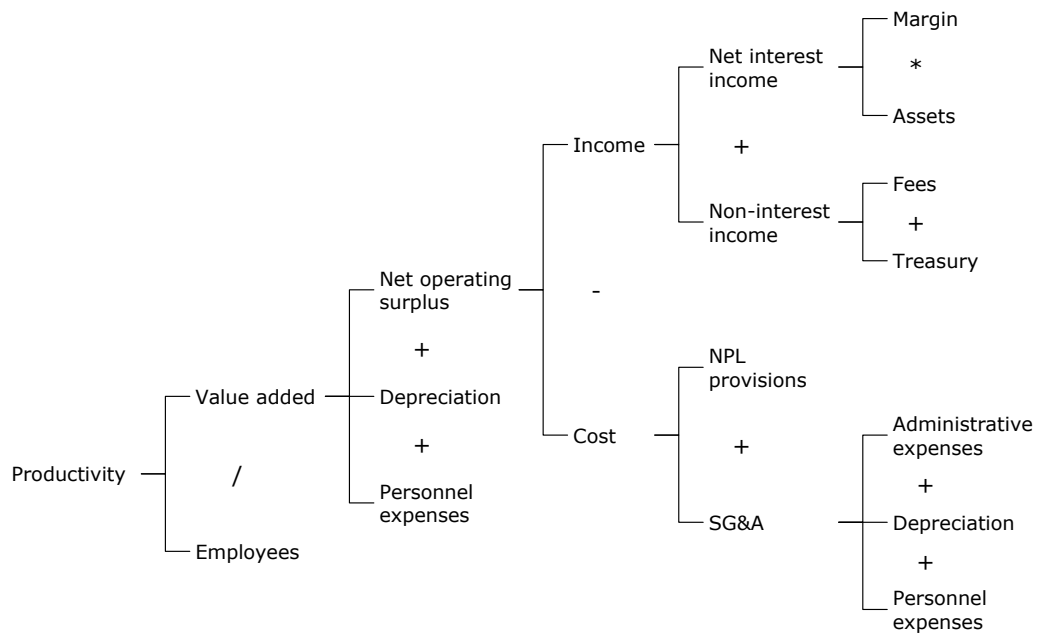


Figure 7

Drivers of Banking Productivity (reduced form)

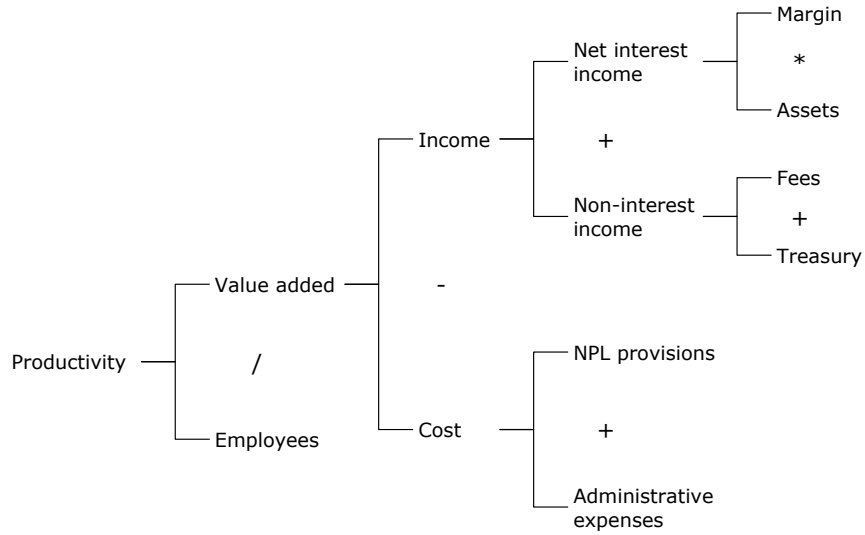


Figure 8

FDI Impact on Banking Productivity

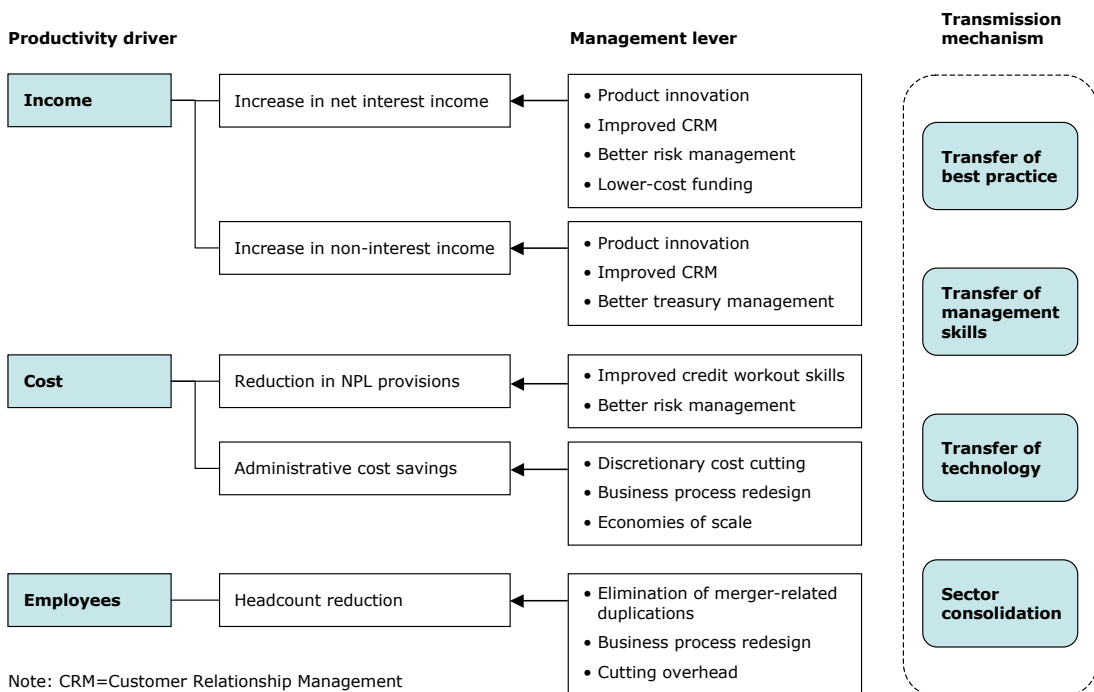
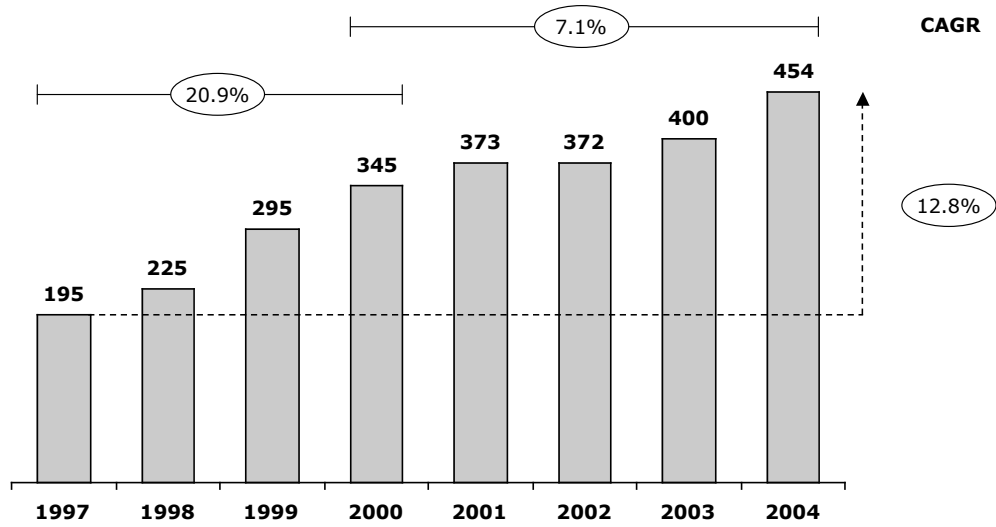


Figure 9

Mexican Retail Banking Productivity, 1997-2004

1997 P\$ thousand per employee

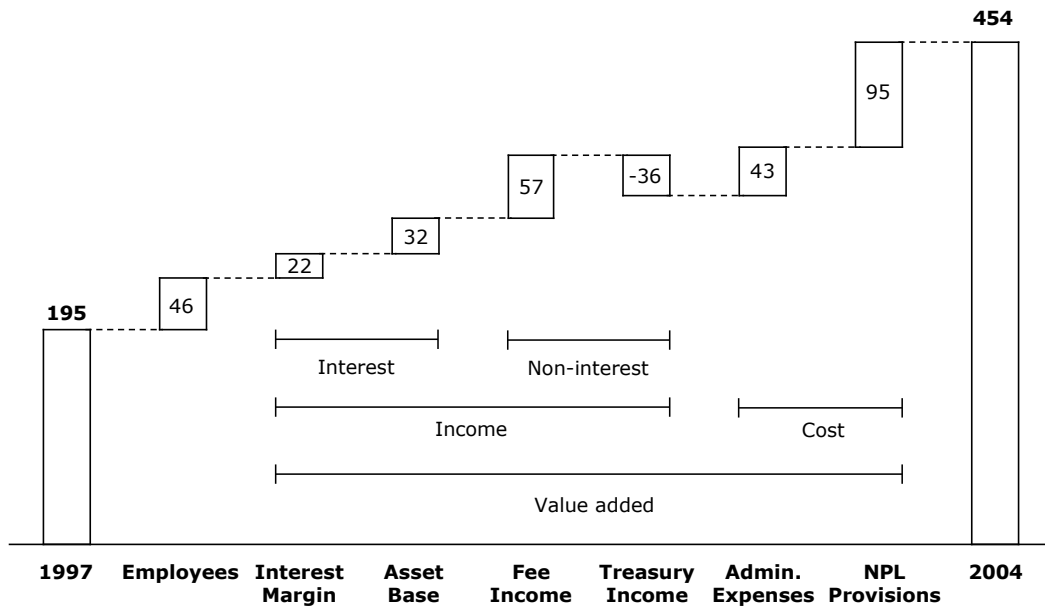


Source: Author's calculation based on data from Banco de Mexico, CNBV, and INEGI

Figure 10

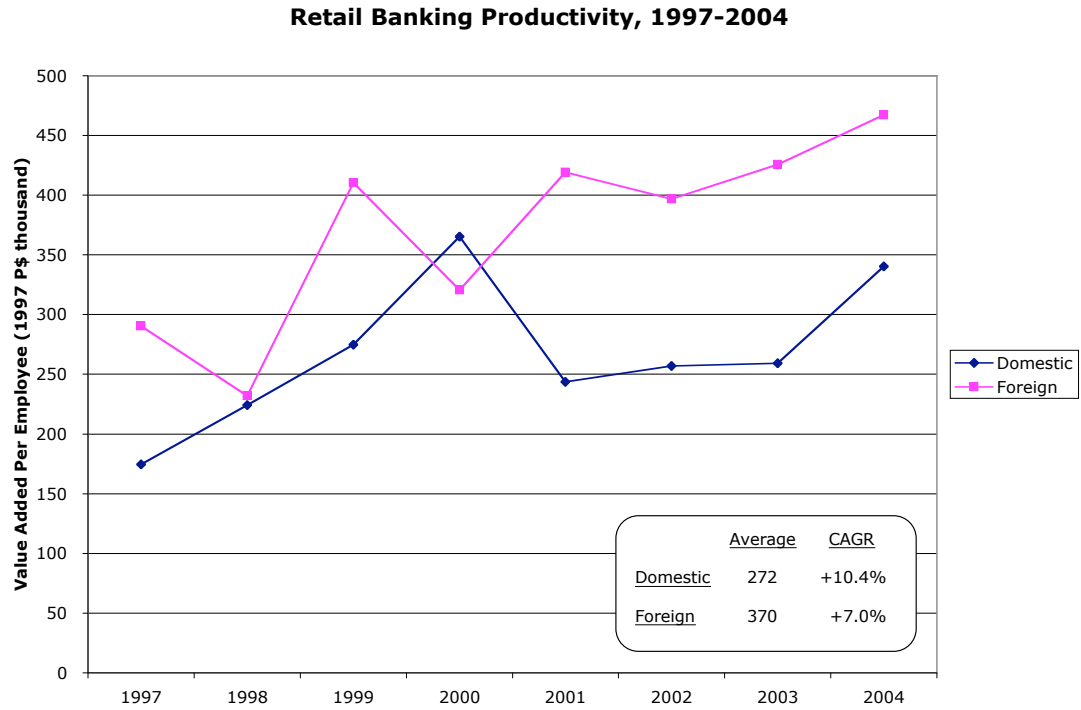
Drivers of Productivity Growth in Mexican Retail Banking, 1997-2004

1997 P\$ thousand per employee



Source: Author's calculation based on data from Banco de Mexico, CNBV, and INEGI

Figure 11



Source: Author's calculation based on data from Banco de Mexico, CNBV, and INEGI

Figure 12

Capitalization Effect of Major FDI Transactions*

U.S.\$ m

<u>Year</u>	<u>Domestic Banks</u>	<u>Government</u>	<u>Shareholders</u>	<u>Total</u>
1995	482	—	—	482
1996	610	21	—	631
1997	425	37	—	462
1998	150	45	—	195
1999	100	—	—	100
2000	1,400	1,580	76	3,056
2001	—	—	13,763	13,763
2002	818	280	1,354	2,452
2003	—	323	1,891	2,214
2004	200	—	3,954	4,154
Total	4,185	2,286	15,103	27,509

6,471 = 2004 U.S.\$8,825 m

* Initial acquisition and all subsequent transactions involving a flow of capital from/to foreign financial institution

Source: Author's calculations based on transaction records obtained from Thompson SDC, Bloomberg, and the financial press.

Table 1

Measures of Retail Banking Performance

<u>Variable</u>	<u>Measure</u>
Productivity	
- Productivity	Real Value Added / Number of Employees
<i>Productivity Drivers</i>	
Value Added	
- Value Added	Value Added / Assets
Employees	
- Employees	Number of Employees / Real Assets
Income	
- Operating Margin	(Net Interest Income + Fee Income + Treasury Income) / Assets
- Net Interest Margin	Net Interest Income / Assets
- Interest Rate Margin	Interest Received from NFPS Loans / Interest Paid on Deposits
- Fee Income	Fee Income / Assets
Cost	
- Cost Ratio	(NPL Provisions + Administrative Expenses) / Assets
- NPL Provisions	Provisions for Non-Performing Loans / Assets
- Administrative Expenses	Administrative Expenses / Assets
<i>Non-Productivity Measures</i>	
Asset Quality	
- NFPS NPL	Non-Performing NFPS Loans / NFPS Loans
Capitalization	
- Capital	Capital / Assets
Lending	
- Total Loans	Total Loans / Assets
- NFPS Loans	Loans to the Non-Financial Private Sector / Assets

Note: NFPS loans include commercial, housing, and consumer loans.

Table 2

Mexican Retail Banking Sector Performance, 1997-2004

<u>Variable</u>	<u>Average</u>	<u>1997</u>	<u>2004</u>	<u>CAGR</u>
Productivity				
- Productivity	317.5	194.6	453.6	+12.8
Value Added				
- Value Added	3.7	2.8	4.5	+7.0
Employees				
- Employees	11.2	12.8	9.2	-4.5
Income				
- Operating Margin	7.7	7.1	7.4	+0.7
- Net Interest Margin	5.4	4.7	5.1	+1.0
- Interest Rate Margin	6.5	3.6	8.3	+12.7
- Fee Income	1.6	1.1	2.1	+9.4
Cost				
- Cost Ratio	3.9	4.2	2.8	-5.5
- NPL Provisions	1.3	1.5	0.5	-15.3
- Administrative Expenses	2.6	2.7	2.4	-1.8
Asset Quality				
- NFPS NPL	11.8	19.1	4.5	-18.7
Capitalization				
- Capital	8.8	7.6	9.9	+3.9
Lending				
- Total Loans	62.5	71.7	54.0	-4.0
- NFPS Loans	33.0	40.6	30.3	-4.1

Note: Values are percent. Productivity is 1997 P\$ thousand. CAGR is 1997-2004 compound annual growth rate.

Table 3

Descriptive Statistics – Dependent Variables

<u>Variable</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>Min.</u>	<u>Max.</u>
Productivity				
- Productivity	328.9	178.5	-251.1	1,104.4
Value Added				
- Value Added	3.7	2.0	-2.1	12.5
Employees				
- Employees	12.3	4.3	3.5	25.3
Income				
- Operating Margin	7.4	2.6	1.1	16.6
- Net Interest Margin	5.7	2.4	-2.0	14.1
- Interest Rate Margin	7.6	8.3	-3.5	61.1
- Fee Income	1.2	0.9	-0.5	5.8
Cost				
- Cost Ratio	3.7	1.7	-0.5	11.2
- NPL Provisions	1.0	1.3	-2.9	6.8
- Administrative Expenses	2.7	0.9	-0.6	6.5
Asset Quality				
- NFPS NPL	9.0	9.2	0.0	45.4
Capitalization				
- Capital	10.5	6.6	3.3	41.3
Lending				
- Total Loans	66.4	14.3	27.9	97.1
- NFPS Loans	38.3	19.2	0.6	86.8

Note: Values are percent. Productivity is 1997 P\$ thousand. Income statement measures are annualized to facilitate comparison. Number of observations: 377. Mean values are unweighted averages and thus differ from sector averages reported in Table 2.

Table 4

Descriptive Statistics – Ownership Status

<u>Variable</u>	<u>Frequency</u>	<u>Percent</u>
Foreign		
- 1 = Foreign Ownership	135	35.8
- 0 = Domestic Ownership	242	64.2

Note: A bank was classified as foreign-owned when a foreign financial institution had more than 50 percent of equity or effective management control. Number of observations: 377.

Table 5

Descriptive Statistics – Control Variables

<u>Variable</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>Min.</u>	<u>Max.</u>
- Size	7.0	7.8	0.1	26.8
- Lending	38.3	19.2	0.6	86.8
- Fobaproa	15.4	19.5	0.0	87.2

Note: Values are percent. Size = assets / total retail banking assets. Lending = NFPS loans / total loans. Fobaproa = Fobaproa promissory notes / assets. Number of observations: 377.

Table 6

Model Specification

	<u>Model 1</u>	<u>Model 2</u>	<u>Model 3</u>	<u>Model 4</u>	<u>Model 5</u>
Full data set	X	X	X	X	
Reduced data set					X
Control variables	X	X	X	X	X
Time fixed effects	X	X	X	X	X
Bank fixed effects		X	X	X	X
AR(1) error structure			X		
Unrestricted VC matrix				X	X

Note: The reduced data set excludes banks that operate only for a short period of time during the observation period. VC matrix = variance-covariance matrix.

Table 7

Effect of Foreign Ownership on Performance of Mexican Banks

<u>Variable</u>		<u>Model 1</u>	<u>Model 2</u>	<u>Model 3</u>	<u>Model 4</u>	<u>Model 5</u>
Productivity						
- Productivity	Coeff.	104.950	149.154	152.115	149.154	164.943
	Std. Err.	19.178	33.133	38.013	61.822	58.706
	P-Value	0.000	0.000	0.000	0.030	0.020
Value Added						
- Value Added	Coeff.	0.162	1.248	1.264	1.248	1.463
	Std. Err.	0.219	0.359	0.396	0.504	0.471
	P-Value	0.462	0.001	0.002	0.027	0.013
Employees						
- Employees	Coeff.	-3.227	-0.746	-1.309	-0.746	-0.570
	Std. Err.	0.468	0.587	1.176	1.676	1.798
	P-Value	0.000	0.205	0.267	0.663	0.759
Income						
- Operating Margin	Coeff.	-0.820	0.308	0.293	0.308	0.464
	Std. Err.	0.272	0.356	0.446	0.432	0.466
	P-Value	0.003	0.388	0.512	0.488	0.346
- Net Interest Margin	Coeff.	-0.594	0.166	0.164	0.166	0.357
	Std. Err.	0.244	0.369	0.472	0.527	0.514
	P-Value	0.015	0.654	0.728	0.758	0.504
- Interest Rate Margin	Coeff.	-0.559	8.946	9.029	8.946	9.185
	Std. Err.	1.192	2.052	2.002	2.919	3.011
	P-Value	0.640	0.000	0.000	0.010	0.014
- Fee Income	Coeff.	-0.005	0.328	0.313	0.328	0.358
	Std. Err.	0.089	0.119	0.118	0.183	0.193
	P-Value	0.955	0.009	0.009	0.094	0.097

Note: Table shows results of regressions of performance variable on indicator of foreign ownership as specified in Table 6. Observations are quarterly for all Mexican retail banks from 1997 to 2004. Coefficients and standard errors for income statement measures are annualized to facilitate comparison. Shading indicates $P < 0.1$. Table 8 provides more detailed estimation results for Model 5. Table 9 provides diagnostic results.

Table 7 (continued)

Effect of Foreign Ownership on Performance of Mexican Banks

<u>Variable</u>		<u>Model 1</u>	<u>Model 2</u>	<u>Model 3</u>	<u>Model 4</u>	<u>Model 5</u>
Cost						
- Cost Ratio	Coeff.	-0.976	-0.928	-0.942	-0.928	-0.988
	Std. Err.	0.185	0.295	0.319	0.442	0.451
	P-Value	0.000	0.002	0.003	0.054	0.056
- NPL Provisions	Coeff.	-0.657	-0.997	-1.013	-0.997	-1.016
	Std. Err.	0.139	0.257	0.280	0.232	0.240
	P-Value	0.000	0.000	0.000	0.001	0.002
- Admin. Expenses	Coeff.	-0.319	0.069	0.070	0.069	0.027
	Std. Err.	0.104	0.146	0.174	0.314	0.323
	P-Value	0.003	0.635	0.685	0.828	0.935
Asset Quality						
- NFPS NPL	Coeff.	-7.045	-7.884	-5.123	-7.884	-8.792
	Std. Err.	0.783	1.156	2.686	2.642	2.236
	P-Value	0.000	0.000	0.057	0.010	0.003
Capitalization						
- Capital	Coeff.	0.208	4.375	3.055	4.375	4.484
	Std. Err.	0.608	0.515	1.139	1.370	1.363
	P-Value	0.608	0.000	0.008	0.007	0.009
Lending						
- Total Loans	Coeff.	-9.085	-3.329	-3.090	-3.329	-4.068
	Std. Err.	1.467	2.088	5.135	6.453	6.666
	P-Value	0.000	0.112	0.548	0.614	0.557
- NFPS Loans	Coeff.	-5.681	-5.970	-3.826	-5.970	-5.458
	Std. Err.	1.770	1.758	3.480	4.015	3.908
	P-Value	0.001	0.001	0.272	0.159	0.193

Note: Table shows results of regressions of performance variable on indicator of foreign ownership as specified in Table 6. Observations are quarterly for all Mexican retail banks from 1997 to 2004. Coefficients and standard errors for income statement measures are annualized to facilitate comparison. Shading indicates $P < 0.1$. Table 8 provides more detailed estimation results for Model 5. Table 9 provides diagnostic results.

Table 7 (continued)

Effect of Foreign Ownership on Performance of Mexican Banks

<u>Variable</u>	<u>Model 1</u>	<u>Model 2</u>	<u>Model 3</u>	<u>Model 4</u>	<u>Model 5</u>
- Number of observations	377	377	377	377	312
- Number of groups	n/a	15	15	15	10
- Observations per group					
• Average	n/a	25.1	25.1	25.1	31.2
• Minimum	n/a	8	8	8	27
• Maximum	n/a	32	32	32	32

Table 8

Estimation Results for Model 5

<u>Variable</u>		<u>Foreign</u>	<u>Size</u>	<u>Lending</u>	<u>Fobaproa</u>	<u>Constant</u>
Productivity						
- Productivity	Coeff.	164.943	-484.144	405.275	-262.164	103.371
	Std. Err.	58.706	578.441	108.723	188.170	150.539
	P-Value	0.020**	0.424	0.005***	0.197	0.510
Value Added						
- Value Added	Coeff.	1.463	-11.634	5.147	-7.154	1.653
	Std. Err.	0.471	7.225	1.372	1.147	1.690
	P-Value	0.013**	0.142	0.005***	0.548	0.353
Employees						
- Employees	Coeff.	-0.570	-29.789	2.947	-1.073	18.863
	Std. Err.	1.798	15.156	5.945	5.521	4.578
	P-Value	0.759	0.081*	0.632	0.850	0.003***
Income						
- Operating Margin	Coeff.	0.464	-26.774	4.822	-0.527	8.309
	Std. Err.	0.466	7.719	1.617	1.174	1.953
	P-Value	0.346	0.007***	0.015**	0.664	0.002***
- Net Interest Margin	Coeff.	0.357	-20.175	4.844	-1.621	5.210
	Std. Err.	0.514	7.452	1.573	1.093	1.925
	P-Value	0.504	0.024**	0.013**	0.172	0.024**
- Interest Rate Margin	Coeff.	9.185	6.045	10.553	-33.223	0.112
	Std. Err.	3.011	30.961	17.427	7.438	14.209
	P-Value	0.014**	0.850	0.560	0.002***	0.994
- Fee Income	Coeff.	0.358	-3.746	1.043	-0.324	1.179
	Std. Err.	0.193	2.931	0.391	0.450	0.643
	P-Value	0.097*	0.233	0.026**	0.490	0.100

Note: Bank fixed effects and time dummies not shown. Coefficients and standard errors for income statement measures are annualized to facilitate comparison. Significance levels: * = $P < 0.1$, ** = $P < 0.05$, *** = $P < 0.01$.

Table 8 (continued)

Estimation Results for Model 5

<u>Variable</u>		<u>Foreign</u>	<u>Size</u>	<u>Lending</u>	<u>Fobaproa</u>	<u>Constant</u>
Cost						
- Cost Ratio	Coeff.	-0.988	-14.941	-0.490	0.078	6.757
	Std. Err.	0.451	4.681	0.939	0.768	1.411
	P-Value	0.056*	0.011**	0.614	0.922	0.001***
- NPL Provisions	Coeff.	-1.016	-5.855	-0.613	0.619	2.400
	Std. Err.	0.240	3.631	1.165	0.817	1.465
	P-Value	0.002***	0.141	0.612	0.468	0.136
- Admin. Expenses	Coeff.	0.027	-9.087	0.123	-0.542	4.357
	Std. Err.	0.323	2.342	0.752	0.758	0.845
	P-Value	0.935	0.004***	0.873	0.493	0.001***
Asset Quality						
- NFPS NPL	Coeff.	-8.792	12.016	-14.393	16.895	19.383
	Std. Err.	2.236	36.997	12.705	7.636	11.418
	P-Value	0.003***	0.753	0.287	0.054*	0.124
Capitalization						
- Capital	Coeff.	4.484	-25.757	6.283	-12.714	13.662
	Std. Err.	1.363	13.283	4.922	4.301	3.922
	P-Value	0.009***	0.084*	0.234	0.016**	0.007***
Lending						
- Total Loans	Coeff.	-4.068	32.090		29.423	64.537
	Std. Err.	6.666	110.834		26.066	22.168
	P-Value	0.557	0.779		0.288	0.017**
- NFPS Loans	Coeff.	-5.458	-123.987		-14.820	85.587
	Std. Err.	3.908	43.400		12.443	13.704
	P-Value	0.193	0.017**		0.261	0.000***

Note: Bank fixed effects and time dummies not shown. Coefficients and standard errors for income statement measures are annualized to facilitate comparison. Significance levels: * = $P < 0.1$, ** = $P < 0.05$, *** = $P < 0.01$.

Table 9

Diagnostic Results

<u>Variable</u>	<u>Pooling</u>	<u>Wooldridge</u>	<u>DW-Original</u>	<u>DW-Transformed</u>
Productivity				
- Productivity	7.945	0.034	1.629	1.960
Value Added				
- Value Added	11.564	0.845	1.712	1.933
Employees				
- Employees	35.970	21.042	0.394	1.968
Income				
- Operating Margin	31.351	3.061	1.376	1.875
- Net Interest Income	17.322	11.463	1.344	1.838
- Interest Rate Margin	3.406	0.861	2.003	1.944
- Fee Income	27.962	0.418	1.948	1.930
Cost				
- Cost Ratio	13.298	9.064	1.754	1.904
- NPL Provisions	3.771	8.230	1.712	1.873
- Admin. Expenses	27.972	0.828	1.520	1.926
Asset Quality				
- NFPS NPL	19.508	15.177	0.366	1.632
Capitalization				
- Capital	107.015	65.859	0.410	1.857
Lending				
- Total Loans	22.620	15.633	0.462	2.171
- NFPS Loans	71.161	90.577	0.524	1.885

Note: The first column provides results of a partial F-test for heterogeneity. The critical value for rejecting the null hypothesis of homogeneity at the 1% level is 2.137. The second column provides result of a test for first-order autocorrelation in panel data proposed by Wooldridge (2002: 275). Values greater than 4.600 reject the null hypothesis of no autocorrelation at the 5% level. The third column provides the Durbin-Watson (DW) statistic before correcting for autocorrelation. The fourth column lists DW values after specification of an AR(1) error structure. As discussed in the paper, more extensive tests were conducted for the individual time series in each panel. Full diagnostic results are available from the author.