Privatization, Foreign Entry, and Bank Risk in an Emerging Banking System: The Case of Argentina, 1996-1999

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Abstract

This paper examines the impact of privatization and foreign entry on the choices of risk of various types of banking institutions in the Argentine banking system during the period 1996-1999. Following the empirical methodology of Shrieves and Dahl (1992) and others, we estimate a simultaneous equations model of a bank's choices of capital and risk and test differences in behavior based on ownership type. Our results do not show any differences in the behavior of various institutions in terms of capital. However, we do find evidence that, following privatization and foreign entry, both existing private banks and privatized banks did increase their asset portfolio risk. These findings support the argument that private banks in Argentina faced increased competition from aggressive entry of foreign banks. Finally, we do not find evidence that foreign banks attempted to increase their risk and we find only limited evidence that foreign acquired banks exhibit higher risk. *JEL G20, G21*

I. Introduction

The Argentine banking system went through a period of major restructuring during the 1990s. After an unsuccessful prior experience with financial liberalization in the 1980s, Argentina began a process of strengthening and restructuring its banking system, which accompanied the introduction of a currency board in 1991. This process was characterized by the adoption of stricter regulatory standards, the privatization of several provincial banks, the facilitation of foreign entry into the domestic banking system, and the introduction of market-based approaches for bank discipline.

During the period 1992-1999, the structure of the banking system changed substantially. More than 90 institutions were closed, including 54 banks and 14 non-banks. The number of institutions in the system decreased from 212 in 1992 to 119 by mid-1999. There were also 18 privatizations, mainly of provincial banks (Calomiris and Powell, 2000). In addition, beginning in 1995, several foreign banks entered the domestic market, primarily through acquisitions of domestic institutions. As a result, by 1999, around half of the assets in the banking system were under foreign control. Foreign banks also had minority stakes in several other institutions. Privatization and foreign entry resulted in aggressive competition among financial institutions for market share.

Privatization and foreign entry has taken place in a number of emerging banking systems in recent years as a response to systemic banking crises. The IMF and the World Bank have offered policy recommendations emphasizing the benefits of privatization and liberalization in emerging banking systems. In a recent study, the World Bank (2001) concludes that "Facilitating the entry of reputable foreign financial firms to the local market should be welcomed too: they bring competition, improve efficiency, and lift the quality of financial infrastructure". However, regarding the impact of privatization, the World Bank study also notes that "… privatization has to be designed carefully if the

benefits are to be gained and the risks of an early collapse minimized". In a survey of the role of foreign banks in emerging markets, the IMF (2000) concludes that "The evidence to date on the effects of foreign bank entry suggests that the competitive pressures created by such entry lead to improvements in banking system efficiency, but it is still unclear whether a greater foreign bank presence contributes to a more stable banking system and a less volatile supply of credit". Thus, it is important to gain further understanding on the impact of privatization and foreign entry both on the overall banking system and on the behavior of the private, domestic and foreign, and public institutions in emerging economies.

A number of recent studies have provided empirical evidence regarding the effects of privatization and foreign entry on the efficiency and profitability of emerging economies' banking systems (see Claessens et. al. (2001), Clarke et. al. (2000, 2001), Denizer (1999), Claessens and Glaessner (1999)). Furthermore, there have been studies that examined the patterns of market penetration by foreign institutions as well as the reactions of domestic institutions. These studies have focused on the lending behavior of the various types of institutions in the system (Dages et al. (2000), Berger et. al. (2001)). However, there has not been an empirical analysis of the implications of privatization and foreign entry on the choices of banking institutions in emerging economies regarding their targeted levels of asset portfolio risk. In the only related study, Laeven (1999) examined the behavior of foreign and domestic banks in Asia during 1992-1996 and found that foreign-owned banks took relatively limited risks compared to other banks. The purpose of this paper is to contribute to the above literature by examining the impact of the process of privatization and foreign entry, in the case of the Argentine banking system, on the choice of asset portfolio risk of different types of institutions. The developments in the Argentine banking system during the second half of the 1990s provide a unique case study to address the issue of risk behavior of various types institutions in the system. The reason is that, in this case, the process of privatization and foreign entry, which could enhance the incentives for risk-taking in some institutions, was combined with a serious effort to strengthen the regulatory environment in the system, which would provide the opposite incentives.

The policy recommendations encouraging privatization and foreign entry in emerging banking systems are based on the argument that these changes improve the efficiency and solvency of the system. There is ample empirical evidence that private banks are more profitable and more efficient than government-owned banks. Moreover, it is argued that the presence of foreign banks in an emerging banking system facilitates the transfer of improved risk management technology and promotes competition. On the other hand, foreign banks may decide to focus on the low-credit-risk segment of the market and attract customers away from domestic banks. Faced with increased competition from foreign banks, it is likely that domestic banks may target the high-credit-risk segment of the market to compensate for their loss of market share. Thus, the strategies that foreign banks follow to penetrate the domestic market may have significant implications for the performance of domestic banks. To provide some additional empirical evidence on these effects, we draw on the recent Argentine experience and attempt to answer the following questions. How did the privatization of domestic institutions and the entry of foreign institutions affect the overall level of risk in the system? How did the various types of institutions, based on ownership type, respond to privatization and foreign entry in terms of their choice of a target level of asset portfolio risk? Finally, did the privatized and foreign-acquired institutions alter their behavior in terms of risk, and if so, how?

In this study, we use a panel data set of all commercial banks operating in Argentina during the period 1995-1999. To examine any differences in the risk behavior of banks based on ownership, we divide the institutions in the system into three categories: public banks, domestic private-owned banks, and foreign-owned banks. Moreover, we examine separately the behavior of privatized and foreign-acquired banks in the system. Following previous work by Shrieves and Dahl (1991), Jacques and Nigro (1997) and others, we make the assumption that the choice of asset portfolio risk by a banking institution is made simultaneously with the choice of its level of capital. Within this framework, the targeted risk level of a bank's asset portfolio is affected by its level of capital. At the same time, the level of capital is affected by the level of portfolio risk, as well as the existing regulatory environment. Thus, our empirical analysis employs a simultaneous equations framework to examine the effects of privatization and foreign

entry on both the level of capital and the level of risk of the various types of institutions in the Argentine banking system.

Our main findings show that there was not any significant difference among the three types of institutions in terms of their targeted level of capital during the examined period. However, we do find that privatized institutions, which were mainly acquired by other domestic banks, did exhibit a lower target of capital and a higher target of risk during the period 1996-1999. But, our empirical findings are not robust when we divide our sample period into two subperiods to account for increased foreign bank presence in the system. Furthermore, domestic private banks did exhibit a higher target level of risk, particularly during the period 1998-1999. The foreign-acquired domestic banks did not exhibit a significantly different behavior in terms of their target level of capital, but we did find limited evidence that they had a higher target level of risk. Finally, our findings show that privatized institutions did attempt to lower their target levels of risk after the privatization took place, particularly during the 1998-1999 period.

The paper is organized as follows. Section II reviews the theoretical arguments on the relationship between bank capital and risk. In section III, we present the main developments in the regulatory environment, as well as the structural changes that took place in the Argentine banking system during the 1990s. Section IV presents the data and the econometric methodology, and section V the econometric results. Finally, section VI presents the conclusions and discusses our main findings.

II. The Relationship Between Bank Capital and Risk

A. Theoretical Arguments

The theoretical literature on the relationship between bank capital and risk emphasizes the relationship between changes, rather than levels, in bank capital and changes in risk. In the literature, there exist theoretical arguments for both a positive and a negative relationship. Kim and Santomero (1988) have stated that banks with relatively low risk aversion will select a low level of capital and a high level of risk. This negative relationship between bank capital and risk has also been emphasized by a number of

papers that examined the option value of deposit insurance (Merton (1977), Kareken and Wallace (1978), Dothan and Williams (1980), Diamond and Dubvig (1986)). Under this argument, a bank's stockholders may benefit from the "deposit insurance subsidy" by increasing the bank's leverage and risk. However, maximization of the option value of deposit insurance is restricted by leverage-related and risk-related costs. If the marginal cost of increased leverage and risk is greater than the marginal benefit, banks will choose higher levels of capital when they have higher levels of risk.

Banks that have high levels of leverage and risk also face the costs of complying with existing regulatory standards. The threat of regulatory action increases the implicit costs of higher risk and attempt to change bank behavior. Thus, we should observe a positive relationship between changes in asset risk and changes in bank capital as banks with higher levels of risk attempt to increase their capital, but also banks with higher levels of capital engage in riskier projects.

Another explanation of the positive association between bank capital and risk has emphasized the unintended effects of implementing minimum regulatory capital standards. Koehn and Santomero (1980) and Kim and Santomero (1988) have argued that constraints on a bank's leverage due to minimum regulatory standards may cause banks to view leverage and risk as substitutes. A bank that is forced to lower its leverage due to regulatory standards will increase its level of risk to achieve a desired level of total risk. As a result, we will observe a positive relationship between bank capital and risk for those banks that have levels of capital near the minimum regulatory requirements.

Orgler and Taggart (1983) have argued that there must be a positive relationship between bank capital and risk coming from the desire of banks to avoid the costs of bankruptcy. Under this argument, banks that operate with high levels of portfolio risk tend to increase their levels of capital due to the fact that their probability of bankruptcy is higher. Higher levels of capital reduce the attention that a bank receives from regulators and also send a positive signal to depositors regarding its soundness.

Finally, there is an argument for a positive relationship between bank capital and risk based on agency theories of the firm. Agency theories of the firm have emphasized conflicts of interest between a firm's owners and managers. These divergent interests could be reflected in banking as different preferences towards a bank's level of risk.

Saunders, Strock and Travlos (1990) have made the argument that a bank's managers have an incentive to target a lower level of asset risk than a bank's stockholders would prefer. This is because a bank's managers stand to lose much more when the bank becomes insolvent, if it is assumed that they are compensated by fixed claims on the bank and have firm and industry specific human capital. Thus, managers of banks with higher levels of asset risk are expected to choose a higher level of capital to reduce the probability of insolvency and vice versa.

B. Empirical Evidence

Several empirical studies have tested the above hypotheses on the relationship between changes in bank capital and changes in risk. Most of those studies have employed data from U.S. banks. In an early empirical study of the relationship between capital and risk, Shrieves and Dahl (1992) emphasized the endogenous determination of a bank's capital and risk. Using a simultaneous equations framework, they found that the majority of banks in their sample mitigate the effects of increases in capital by increasing their exposure to asset risk. Their results also showed that this behavior was also present in banks with levels of capital above the minimum required, which provides support for the arguments of the positive relationship between bank capital and risk based on cost avoidance and managerial risk aversion.

Jacques and Nigro (1997) used the same framework to examine the effects of the introduction of risk-based capital standards on bank capital and portfolio risk. Examining the impact of the new standards on the behavior of U.S. banks during the first year after they were implemented, they found that the risk-based standards brought about significant increases in capital ratios and decreases in portfolio risk of banks that already met the new risk-based standards.

Aggarwal and Jacques (2001) examined the effects of the Federal Deposit Insurance Corporation Improvement Act (FDICIA) and its mandate for Prompt Corrective Action (PCA) on bank capital and risk. Their empirical results showed that both undercapitalized and adequately capitalized banks responded to PCA by increasing their leverage ratios. At the same time, banks also reduced their levels of credit risk in

response to PCA. Rime (2001) offered similar evidence from the experience of the Swiss banking system. He found that regulatory pressure led Swiss banks to increase their levels of capital, but did not affect their levels of risk. Finally, in a related study, Saunders, Strock and Travlos (1990) examined the effects of ownership structure on bank risk taking. Using a sample of U.S. bank holding companies over the period 1978-1985, they found that banks in which managers had a controlling minority share exhibited a lower risk in their asset portfolios.

III. The Restructuring of the Argentine Banking System

A. Developments in the Regulatory Framework

In an effort to achieve macroeconomic stability and fight hyperinflation, Argentina adopted a currency board with the implementation of the Convertibility Plan of 1991. As part of the Convertibility Plan, a number of policies were implemented to liberalize the Argentine banking system and to strengthen the regulatory framework. During the period 1992-1994, the Banco Central de la Republica Argentina (BCRA) imposed international standards for capital adequacy, accounting and provisioning, and took steps to improve banking supervision. The new standards were broadly based on the recommendations of the Basle Committee on Banking Supervision as stated in the 1988 Basle Accord and were implemented in a short period of time. Other major changes in the financial system included the independence of the BCRA, as well as restrictions on the conduct of monetary policy and access to the lender of last resort facilities.[1]

Following the recommendations of the Basle Committee, capital adequacy requirements were determined by calculating the implicit risk of the different assets in a bank's portfolio. The capital-to-risk-adjusted-assets ratios were calculated by weighting assets by credit, interest and market risk exposure. At the end of 1992, a minimum regulatory requirement of 9.5% was set for the risk-adjusted capital ratio. This was

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[1] Alston and Gallo (2001) have demonstrated, by using an institutional analysis that incorporates both political and economic factors, that the institutional changes of the Convertibility Plan and the Central Bank independence were the ultimate determinant of the privatization process in Argentina.

raised to 11.5% in December 1994 during the aftermath of the Mexican peso crisis. In addition, credit risk requirements were imposed during that period, which linked credit risk to the interest rate charged on each loan, and the minimum requirement was near 14% by the end of 1994. In 1996, market risk requirements were added to the minimum standards and a capital requirement for interest rate risk was imposed in 1999. Furthermore, the Superintendency (a semi-autonomous supervisory unit within the BCRA) established a CAMEL rating system for banking supervision. Banks with a poor rating faced more pressure to raise their capital requirement.

In addition, the BCRA tried to enhance banking supervision through market discipline by requiring banks to issue subordinated debt equal to 2% of their deposits each year. However, due to a deteriorating environment in local and international markets during the second half of the 1990s, not all the banks in the system were able to obtain financing from the market. To address this problem, the regulatory authorities established different ways to comply with this requirement. Banks were allowed to use subordinated debt that was also considered as part of Tier 2 capital. In addition, banks could hold a deposit or loan from a foreign investor or other local bank as a way of complying with the subordinated debt requirement. But, banks that failed to comply with the requirement were required to increase their minimum capital requirement by 5 percentage points and their liquidity requirement by 1 percentage point.

Moreover, after the Mexican peso crisis, the BCRA replaced the reserve requirement that applied only to deposits with a liquidity requirement that applied to all liabilities. The reasoning for this requirement was that, during the crisis of 1994-1995, banks with a greater fraction of time deposits had experienced larger losses in deposits compared to banks with primarily short-term deposits because of a low reserve requirement on time deposits. Thus the goal of the new requirement was to introduce reserves intended for "systemic liquidity protection". The requirement was implemented at rates that declined depending on the residual maturity of each liability and was required for all types of liabilities. Furthermore, even though deposit insurance had been abolished in the early 1990s, Argentina re-introduced a limited deposit insurance scheme in 1995. This deposit insurance system was funded by banks through risk-based

premiums. The system initially covered deposits up to $20,000, but it was later expanded to cover deposits up to $30,000.

B. Privatization and Foreign Entry

Even though there had been some consolidation activity in the Argentine banking system in the early part of the 1990s, the process was significantly accelerated after the Mexican peso crisis and the negative spillover effects on the Argentine banking system. The restructuring process during the second half of the 1990s was characterized by a stronger effort towards privatization of several institutions and by increased foreign entry into the system. The privatization effort was mainly concentrated on public provincial banks. During the period 1995-1996, there were 11 privatizations, followed by an additional 4 during the 1997-1999 period. The privatized institutions were primarily acquired by other domestic banks or groups of investors. As a result of this privatization effort, the number of public-owned banks decreased from 33 in 1994 to 15 in 1999. However, there are two large banks that remain under public control, the Banco de la Nacion Argentina, which is under the control of the Federal Government, and the Banco de la Provincia de Buenos Aires, which is under the control of the provincial government of Buenos Aires. These two banks controlled approximately 25% of deposits and 22% of the loan market at the end of 1999.

A second major structural change in the Argentine banking system was the significant foreign entry during the second half of the 1990s. Before 1990, there were very few foreign banks present in Argentina. The removal of restrictions on foreign direct investment and repatriation of profits that accompanied the Convertibility Plan allowed more foreign institutions to enter the domestic market. Nevertheless, their share of the domestic system was below 20% of total assets by the end of 1994. After the Mexican peso crisis, there were efforts to encourage the entry of foreign institutions in an attempt to increase competition and efficiency in the domestic banking system. Foreign institutions entered the domestic market primarily through acquisitions of domestic institutions that were in good financial condition and had an established network of branches, rather than trying to acquire privatized provincial banks. This process began

slowly in 1995-1996, but accelerated significantly during 1997-1999.[2] As a result, foreign banks controlled around half of the assets in the system by 1999 (Dages et. al., 2000).

Foreign entry resulted in an aggressive competition for market share. Dages et. al. (2000) show that foreign banks in Argentina penetrated successfully the commercial, government, interbank, and personal loan markets. They also examined the lending behavior of domestic banks, public and private, as well as foreign banks during the second half of the 1990s and found evidence that there were differences in lending behavior between state banks and domestic private banks. But, domestic private and foreign banks exhibited comparable lending behavior and had similar compositions of loan portfolios. As Clarke et. al. (2000) also demonstrated, foreign banks competed aggressively with domestic private banks in all segments of the market. However, foreign banks did not appear to have a significant effect on the performance of public banks.

There is also additional empirical evidence on the effects of foreign entry from cross-country studies and other case studies of banking systems. Claessens et. al. (2001) examined the effects of foreign entry in 80 countries during the period 1988-1995. Their results showed that foreign banks had higher profits than domestic banks in developing countries. They also found that an increased presence of foreign banks is associated with a reduction in profitability and margins for domestic banks. In a similar study, Denizer (2000) examined the effects of foreign entry on Turkey's banking system during the period 1980-1997. He found that foreign entry was associated with a reduction on overhead expenses of domestic commercial banks. At the same time, foreign entry had a strong competitive effect on the Turkish banking system and foreign banks contributed to the development of the domestic financial sector.

Furthermore, a couple of studies have examined the impact of the privatization and restructuring process on the degree of market power and the efficiency of the banking system in Argentina. Burdisso et. al. (1998) examined the effects of privatization on the

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[2] Calomiris and Powell (2000) offer an explanation for the delayed foreign entry by claiming that foreign banks waited until the institutional changes in the Argentine financial system that took place in the early 1990s were first tested by a major external shock – such as the Mexican peso crisis – before they made the decision to invest in Argentina.

overall efficiency of the banking system during the period 1991-1996. They found that the process of privatization and restructuring that took place during that period had resulted in an improvement of the performance of banks in the system through the reduction of their portfolio risk, thus leading to a more efficient allocation of credit. In a follow-up study, D' Amato et. al. (1999) found no evidence of market power in the retail-banking sector using a sample of the 20 largest banks in Argentina during the period 1996-1998. They showed that the degree of concentration in more populated areas where financial markets are more developed was very small.

IV. Empirical Methodology and Description of Data

A. Econometric Model Specification

To examine the effects of privatization and foreign entry on the level of risk in the Argentine banking system, we follow the previous literature on the relationship between bank capital and bank risk (Shrieves and Dahl (1992), Jacques and Nigro (1997)) and assume that decisions on a bank's level of risk are made simultaneously with decisions on the level of capital. Thus, following this simultaneous equations framework, we are also able to examine whether the various types of banking institutions exhibit different behavior in terms of their targeted levels of capital.

Following the model of Shrieves and Dahl (1992), we assume that changes in bank capital and risk are decomposed into two components: a discretionary adjustment and a change caused by exogenously determined random shocks. Thus, we write

$$\Delta CAP_{j,t} = \Delta^d CAP_{j,t} + E_{j,t} \tag{1}$$

$$\Delta RISK_{j,t} = \Delta^d RISK_{j,t} + S_{j,t} \tag{2}$$

where $\Delta CAP_{j,t}$ and $\Delta RISK_{j,t}$ are the observed changes in capital and risk levels, respectively, for bank j in period t.

The discretionary adjustment in bank capital and risk is modeled using the partial adjustment framework. This recognizes the fact that banks may not be able to adjust their desired levels of capital and risk instantaneously. Therefore, we write

$$\Delta^d CAP_{j,t} = a\left(CAP^*_{j,t} - CAP_{j,t-1}\right) \qquad\qquad (3)$$

$$\Delta^d RISK_{j,t} = b\left(RISK^*_{j,t} - RISK_{j,t-1}\right) \qquad\qquad (4)$$

where $CAP^*_{j,t}$ and $RISK^*_{j,t}$ are the target levels of capital and risk for bank j, respectively. Within the partial adjustment framework, the discretionary changes are proportional to the difference between the target level and the level existing in period $t-1$.

Now, substituting equations (3) and (4) into equations (1) and (2), we obtain

$$\Delta CAP_{j,t} = a\left(CAP^*_{j,t} - CAP_{j,t-1}\right) + E_{j,t} \qquad\qquad (5)$$

$$\Delta RISK_{j,t} = b\left(RISK^*_{j,t} - RISK_{j,t-1}\right) + S_{j,t} \qquad\qquad (6)$$

The above two equations show that the observed changes in capital and risk in period t are a function of the target levels of capital and risk, the previous period's levels of capital and risk, and any exogenous shocks.

In this modeling approach, target levels of capital and risk are assumed not to be observed directly. However, we assume that these levels depend upon a set of observable variables. The exogenous shocks could capture, for example, a change in the overall macroeconomic environment or an unexpected change in a bank's financial condition. In our model, we use a number of variables that could influence the target levels of capital and risk. Several of these variables have also been used in previous empirical studies of the relationship between bank capital and risk.[3] We use a bank's size (*SIZE*), measured by the natural log of a bank's total assets, to account for the fact that larger banks may be able to access the capital markets more easily or may be able to have a more diversified portfolio of assets. As Aggarwal and Jacques (2001) point out, larger banks may be willing to hold less capital due to their ability to raise additional funds from the capital market. In this case, we would expect a negative relationship between a bank's size and its target level of capital. We, thus, hypothesize that there is a negative relationship between a bank's size and its target level of capital, as well as a negative relationship between a bank's size and its target level of risk due to portfolio diversification. We also include a bank's profitability (*ROA*) to account for the fact that more profitable

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[3] See the studies by Shrieves and Dahl (1992), Jacques and Nigro (1997), Aggarwal and Jacques (2001), Rime (2001), and Aggarwal, Jacques and Rice (2000).

banking institutions may be able to increase their level of capital through retained earnings. Based on previous empirical findings, we expect a positive relationship between changes in capital and profitability. Furthermore, Argentine banks are characterized by holding a "buffer" of excess capital. Due to the fact that raising capital through the markets is a costly process in Argentina, we expect that banks would attempt to retain profits as a means of raising their capital ratios.

We also include a proxy of a bank's current losses. This variable, approximated by the ratio of current loan loss provisions to potential bad loans $(LLOSS)$, accounts for the fact that loan losses will affect a bank's risk-adjusted assets to total assets (Rime, 2001). We include this variable in the risk equation and assume that banks with higher loan losses will exhibit lower future levels of risk-adjusted assets.[4] We also assume that banks with more expected losses would attempt to raise their levels of capital to comply with regulatory requirements. In addition, we include the ratio of government securities to total assets $(BONDS)$ to control for the fact that Argentine banks held a significant portion of their assets in terms of government securities. We expect that banks with high levels of government securities in their portfolios will be able to have higher capital ratios through sales of securities, particularly in an environment of falling interest rates. Alternatively, as Aggarwal and Jacques (2001) point out, if banks with large holdings of government securities retained, rather than sold, these securities during a falling rate environment, then they may be required to have lower levels of capital to comply with existing regulations. Moreover, banks with high ratios of government securities in their asset portfolios will be exhibiting lower levels of risk.

To capture the effect of the liquidity requirement imposed on Argentine banks after 1995, we include the ratio of liquid reserves to total assets $(LIQUIDITY)$. Banks with higher liquidity ratios are faced with less risk and, thus, need to hold less capital. At the same time, banks with higher liquidity may be more willing to increase their levels of risk. Thus, we expect to find a negative relationship between the ratio of liquid reserves to total assets and the level of a bank's capital and a positive relationship between this ratio and the level of a bank's portfolio risk.

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[4] Banks may also be faced with unexpected losses due to events not under their control. Our model captures these unexpected losses through the error term in the capital and risk equations.

Finally, we use dummy variables in the estimated equations of capital and risk to account for differences in the behavior of banking institutions based on ownership type. We first include two dummy variables, $(PRIVATE)$ and $(FOREIGN)$, to account for differences in the target levels of capital and risk between the domestic private banks and foreign banks, on the one hand, and public banks, on the other. Based on previous empirical findings (see La Porta et. al. (2000) and World Bank (2001)), we assume that privately owned banks, either domestic or foreign, will be employing better techniques to measure and manage risks, and, thus, will have a lower target level of risk compared to public banks. Further support of our hypothesis comes from evidence by Barth, Caprio and Levine (2001) and Caprio and Martinez-Peria (2000), which shows that state-ownership of banks has a positive effect on the probability of a banking crisis and is associated with less competition in the banking system. Furthermore, evidence from case studies of banking systems in distress shows that state ownership of banks tends to reduce the incentives that bankers have for acquisition of information, which is essential for the efficient use of the banking system (see Goldstein and Turner (1996) and Goldstein (1997)).

Second, we use two dummy variables, $(PRIVATIZED)$ and $(FOREIGN1)$, to separate those banks that were privatized after 1994, as well as those that were acquired by foreign banks during the same period, from the rest of the banks in the system. The first group includes mainly former provincial banks that were acquired by other domestic banks or groups of domestic investors. The second group includes several domestic banks that were acquired by foreign banks, as well as domestic banks in which foreign banks have a minority shareholding. With the exception of one bank, the Banco Frances del Rio de la Plata, which is listed as having a minority shareholding of 32% by BBVA in 1999, the remaining banks in this group have a foreign majority shareholding. We expect that these banks will have a lower target of risk and higher target of capital after they were privatized or acquired by foreign banks. This will be due to the application of better management techniques, the removal of bad assets from their portfolios, and the incentives of the new management to establish a reputation and improve the solvency of the new institution.

Furthermore, there is evidence from Dages et. al. (2000) and Clarke et. al. (2000) that foreign banks in Argentina were competing primarily with domestic private banks for the same portion of the market during our examined period. Dages et. al. (2000) also show that the composition of the loan portfolios of domestic privately owned and foreign banks were very similar between 1994 and 1999, despite the fact that the share of foreign banks in the Argentine lending market rose from 18% in 1994 to 48.1% in 1999. Thus, we could expect that, given the rapid increase in the share of foreign banks in the Argentine banking system, there may have been a negative effect on domestic private banks based on the implications of the "cherry pick" hypothesis of foreign entry. According to this hypothesis, foreign banks "cherry pick" the most profitable customers in the market, forcing domestic banks to cover for their lost market share by increasing their lending to higher-risk customers and, thus, increase the overall level of risk of their portfolios. We would, therefore, expect to find a higher target level of risk among domestic private banks, as well as privatized banks acquired by other domestic banks or groups of investors, compared to the rest of the banks in the system, especially during the period after 1997 when several foreign banks entered the Argentine banking system. Finally, with respect to the foreign-acquired banks, we would expect to find that they exhibit a lower target of risk and a higher target of capital. This would be explained by the application of better management techniques and their ability to target the low credit risk segment of the lending market.

B. Definitions of Capital and Risk

In our analysis, we employ variables to measure bank capital and risk similar to those used in several other studies. For the definition of capital, we use both the capital-to-risk-adjusted-assets ratio $(CAPRWA)$ and the ratio of total capital to total assets $(CAPTA)$. Both variables have been used in previous studies on bank capital and risk.[5] In Argentina, the BCRA follows the recommendations of the Basle Committee to calculate minimum risk-adjusted capital ratios. The minimum capital requirement is calculated by weighting assets based on their credit, market and interest rate risks. The

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[5] For example, see Jacques and Nigro (1997) and Aggarwal and Jacques (2001).

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BCRA requires that banks maintain a 11.5% minimum requirement. This is the ratio of total (Tier I plus Tier II) capital over risk-adjusted assets. The total capital used in the calculation of this ratio is defined with the term "Integration" in the source of bank information published by the BCRA that we use in this paper. Thus, in our model, we use both the ratio of "Integration" over risk-adjusted assets and the corresponding ratio over total assets.

As for our definition of a bank's asset portfolio risk, we follow previous studies by Avery and Berger (1991), Berger and Udell (1993) and Berger (1995) and use the ratio of risk-adjusted assets to total assets as our measure of risk $(RISK)$. Avery and Berger (1991) have shown that this ratio is highly correlated with a bank's risky behavior. In addition, most of the banks in our sample do not have traded stock. Therefore, we could not use a capital market measure of risk, such as the variance of stock returns.

Thus, our estimated model is

$$\Delta CAP_{j,t} = \boldsymbol{b}_0 + \boldsymbol{b}_1 SIZE_{j,t} + \boldsymbol{b}_2 ROA_{j,t} + \boldsymbol{b}_3 LLOSS_{j,t} + \boldsymbol{b}_4 BONDS_{j,t} + \boldsymbol{b}_5 LIQUIDITY_{j,t} + \boldsymbol{b}_6 \Delta RISK_{j,t} + \boldsymbol{b}_7 CAP_{j,t-1} + \boldsymbol{b}_8 OWNERSHIP + \boldsymbol{e}_{j,t} \tag{7}$$

$$\Delta RISK_{j,t} = \boldsymbol{d}_0 + \boldsymbol{d}_1 SIZE_{j,t} + \boldsymbol{d}_2 LLOSS_{j,t} + \boldsymbol{d}_3 BONDS_{j,t} + \boldsymbol{d}_4 LIQUIDITY_{j,t} + \boldsymbol{d}_5 \Delta CAP_{j,t} + \boldsymbol{d}_6 RISK_{j,t-1} + \boldsymbol{d}_7 OWNERSHIP + u_{j,t} \tag{8}$$

In our estimation approach, we account for the panel nature of our data and we assume that the error term in the above equations is written as $\boldsymbol{m}_j + v_{j,t}$, i.e., we assume a one-way error component model. In this case, $\boldsymbol{m}_j$ denotes the unobservable bank-specific effect and $v_{j,t}$ denotes the remainder disturbance. We follow a singe-equation estimation approach, such as 2SLS, to estimate our simultaneous equation system. A full-information estimation approach, such as 3SLS, would result in more efficient estimates, but it also depends greatly on a correct specification of the equations in our system. To avoid any estimation problems due to misspecification of the model, we used the 2SLS method. Given our assumption about the error term, the generalized 2SLS estimates are consistent, but are not efficient. To obtain efficient estimates, we employ Baltagi's (1981) error-component 2SLS (EC2SLS), which takes into account the one-way

error component specification in our model. Thus, we estimate each of the equations in the system with EC2SLS.

C. Description of Data

In this study, we use data from commercial banks in Argentina during the period 1995-1999. The data source is the annual publication *Informacion de Entidades Financieras* published by the BCRA. This publication contains detailed balance sheet and income statement data, as well as a number of indicators on efficiency, performance, capital adequacy and risk profile for all the commercial banks operating in Argentina.

Due to the existence of a one period lag in our estimated econometric model, we lose one annual observation from 1995. As a result, our sample is a panel of 330 bank-year observations on Argentine banks during the period 1996-1999. The examined period coincides with the major changes that took place in the Argentine banking system during the second half of the 1990s. To construct our final sample, we excluded all the cooperative banks in Argentina. This reduced our sample by a total of 20 observations over the four-year period. These banks have a very small share of the banking system and they also have a different ownership structure compared to the rest of the banks in our sample. Moreover, we omitted 12 bank-year observations for which there was missing information on the variables used in our model.

Table 1 summarizes the main characteristics of the banks used in our sample. The number of banks in each year varies from 74 to 93. Banks in Argentina hold on average about half of their assets in the form of loans and around 12 percent of their assets are in the form of government securities. During our examined period, banks are on average well capitalized with a capital-asset ratio around 16 percent and a capital-to-risk-adjusted-assets ratio between 22 and 27 percent. The Argentine banks also exhibit a decline in their ratio of risk-adjusted assets to total assets, as well as the share of problematic loans to total assets. This indicates that there was an effort to reduce the overall level of risk exposure of banks in the system. Finally, Argentine banks exhibited on average an improvement in profitability during 1996-1998, followed by a decline in 1999 due to a deteriorating macroeconomic environment.

Examining the distribution of capital and risk by ownership type during our examined period, as presented in Table 1, we first observe that all institutions in the system are well capitalized. Only the former provincial banks that were transferred under private control have lower capital adequacy ratios compared to the rest of the banks in the system, but these ratios also increase by 1999. In terms of leverage ratios, public and private banks show an increase during our examined period, while foreign banks exhibit a considerable decrease and foreign acquired banks do not exhibit any significant change. But, in terms of risk-adjusted capital ratios, all banks in the system, except foreign banks, have increased these ratios by the end of the 1990s. The foreign banks show a U-shaped pattern with a fall until 1998 and a subsequent increase in 1999. Finally, in terms of risk, all banks in the system, except for the privatized banks, show a decrease in risks during the examined period.

As a preliminary analysis of our hypotheses, we present in Table 2 the results of nonparametric tests of differences in means for bank risk by various types of ownership and by year. We conduct two types of tests. First, we test for differences in the mean values of risk-adjusted assets to total assets by type of ownership holding the year constant. Then, we test differences in mean values across years holding the type of ownership constant. To examine the effects of the process of privatization and foreign entry on the risk of the various institutions in the Argentine banking system, we chose to compare banks in 1996 with banks in 1999.

The results of Table 2 show that for 1996 there is a statistically significant difference in risk only between private and foreign banks. In this case, private banks have a statistically significant higher mean level of risk compared to foreign banks. However, we do not find any statistically significant difference in the mean levels of risk either between private and public banks or between foreign and public banks for that year. Performing the same tests for the year 1999, we do find a statistically significant difference in means between both private and public banks and between private and foreign banks. In both cases, private banks have a higher average level of asset portfolio risk compared to other banks in the system in 1999. This supports our hypothesis that private banks attempted to cover their losses of market share due to foreign entry by targeting the higher risk segment of the market.

We also performed t-tests of differences in means between 1996 and 1999 holding constant the ownership type of the institution. The results of these tests did not show any statistically significant difference in the mean levels of risk for the various types of institutions between the two years. However, we must point out that the mean levels of risk are lower in 1999 compared to 1996 for all the types of institutions. Finally, we performed a t-test for difference in the mean levels of risk between 1996 and 1999 for the overall banking system. The results of this test showed a statistically significant difference and, more specifically, a decline in the average level of risk in the overall system between 1996 and 1999. These results provide supporting evidence for the argument that foreign entry improves the stability of the banking system in emerging economies.

V. Econometric Results

A. Main Results

The main results from the estimation of our simultaneous equations model with EC2SLS are presented in Tables 4 and 5. In Table 4, the variable (CAP) is defined as the ratio of total capital (Tier I plus Tier II) to risk-adjusted assets. In Table 5, we use the ratio of total capital to total assets in our estimation. In both tables, the results presented are for the whole period, 1996-1999, and the variable $(RISK)$ is given by the ratio of risk-adjusted assets to total assets in all estimated equations.

Our results show a negative relationship between changes in capital (ΔCAP) and changes in risk $(\Delta RISK)$ in the Argentine banking system during the second half of the 1990s. This relationship is significant in most of the equations and, particularly, when we use the ratio of total capital to risk-adjusted assets as a measure of capital. Previous studies by Shrieves and Dahl (1992), Aggarwal and Jacques (2001) using data from U.S. banks and by Rime using data from Swiss banks have found a positive relationship between changes in capital and changes in risk. However, Jacques and Nigro (1997) found an inverse relationship between these two variables with data from U.S. banks

during 1991, the period after the implementation of risk-based capital adequacy standards. Our results seem to show support for the "deposit insurance subsidy" argument, which suggests that a bank will maximize the option value of deposit insurance by increasing its leverage and risk. This explanation is consistent with the fact that Argentina re-introduced a limited, fully funded, deposit insurance system in 1995, which covered deposits up to $20,000 initially, and was subsequently raised to $30,000. But, the above argument implies a flat-rate deposit insurance pricing formula, while the deposit insurance scheme in Argentina was funded through premia on banks calculated using a risk-based pricing formula (Calomiris and Powell, (2000)).

A possible explanation of the negative relationship between bank capital and risk shown in our results is that banks in Argentina were still operating under false incentives. Even though several institutions were allowed to fail after the Mexican peso crisis in 1995 and, in some cases, depositors suffered significant losses, the government-assisted privatizations and the re-introduction of deposit insurance may have sent the signal to the banks that the marginal benefits from increased asset risk were higher. Given the historical experience of the banking system in Argentina, several banks may have attempted to exploit the re-introduction of deposit insurance by increasing their risk and leverage. Alternatively, as Marcus (1984) and Keeley (1990) have pointed out, increased competition and entry in the banking system could cause bank charter values to decline and lead banks to switch from a positive capital-risk relationship to a negative one. This argument is also consistent with negative relationship between capital and risk given by our estimated model and the experience of the Argentine banking system with privatization, foreign entry and increased competition during the second half of the 1990s.

The other explanatory variables of the target levels of capital and risk are overall statistically significant and have the expected signs. A bank's size $(SIZE)$ has a negative and statistically significant effect on its target level of capital. This negative effect appears mainly when capital is defined as the ratio of capital to total assets. We also find a negative and statistically significant effect of a bank's size on its target level of risk. This would imply that larger banks have a greater ability to manage the risk in their asset portfolio or can target customers with lower credit risk. We find a positive, but not

statistically significant, effect of a bank's profitability (ROA) on its level of capital. The positive coefficient is consistent with results from previous studies, which show that banks with higher earnings can raise their levels of capital through internal sources. Banks with higher loan loss provisions $(LLOSS)$ have a higher target level of capital. This relationship is significant in all of the estimated equations. This is consistent with the argument that banks with higher expected losses attempt to increase their levels of capital to comply with existing regulatory standards and cover any potential losses. We also find a statistically significant positive relationship between loan loss provisions and the level of bank risk. This confirms the argument that banks with lower asset quality, meaning higher loan loss provisions, have higher risk.

Banks with more government securities $(BONDS)$ in their portfolios have a lower level of risk. This relationship is statistically significant in all of the estimated equations. This result is explained by the lower risk involved with investment in government securities and also reflects the methodology of the Basle Committee's recommendations of assigning a lower risk weight to government securities. We also find that the share of government securities in a bank's asset portfolio had a statistically significant positive effect on the level of capital when capital is measured in terms of risk-adjusted assets. The ratio of liquid assets to total assets $(LIQUIDITY)$ has a negative, but not statistically significant, effect on the level of capital and, in general, a positive and not statistically significant effect on the level of risk in most of the estimated equations. This finding is consistent with the hypothesis that banks with more liquid assets are exposed to lower risks and, thus, are in need of less capital.

Finally, in all of the estimated equations, the lagged values of capital and risk are statistically significant and all appear with a negative sign. The estimated coefficients for lagged capital range from –0.427 to –0.530. The corresponding estimated coefficients for lagged risk range from –0.339 to –0.949, which imply a much faster adjustment of risk towards the desired levels. Overall, these results imply a relatively fast adjustment of capital and risk towards the desired levels among Argentine banks during the examined period. This could be explained by the strict regulatory environment, which led banks to take steps to ensure compliance with existing regulations.

B. The Effect of Ownership on Bank Capital and Risk

The impact of the various types of ownership on a bank's target level of capital and, particularly, on its target level of risk is examined by including dummy variables in the estimated equations presented in Tables 4 and 5. First, in equations (1) and (2) in Table 4, we include dummy variables for domestic private banks $(PRIVATE)$ and foreign banks $(FOREIGN)$. Our results show that there was no statistically significant difference in either the levels of capital or the levels of risk between the domestic private banks or the foreign banks and the public banks. This finding most likely reflects the strict regulatory environment in Argentina during the second half of the 1990s. Regulations regarding capital and risk were strictly enforced by the BCRA and there was a strong incentive for all the banks in the system to comply with existing regulations in order to avoid any penalties. In addition, banks in Argentina did hold excess amounts of capital during the late 1990s, which reflects a response to the negative effects of the Mexican peso crisis on the system and the deterioration in world capital markets during the period of the turmoil in East Asia and Russia.

Nevertheless, to examine our hypothesis further, and to capture any additional effects, particularly on the target levels of risk of domestic private banks as a result of the rapid growth in market share of foreign banks during the second half of the 1990s, we decided to divide our sample in two subperiods and re-estimate our model. Hence, we re-estimated our model using data for the 1996-1997 period and data for the 1998-1999 period separately. The reasoning for this cutoff is that many foreign banks entered the Argentine banking system aggressively during 1997 and after. Thus, we expect that the increased competition from foreign banks could have had a negative effect on the credit quality of the asset portfolios of domestic private banks after 1997, as the domestic private banks attempted to cover for their lost clientele by expanding their businesses to higher-risk areas.

Tables 6 and 7 present the results from the estimation of our model for the periods 1996-1997 and 1998-1999, respectively. Even though we do not find any statistically significant difference among the behavior of private or foreign banks and public banks for the period 1996-1997, we do find that the domestic private banks exhibited a higher,

and statistically significant, level of risk compared to other banks in the system during the 1998-1999 period. This finding is in accordance to our hypothesis that domestic private banks, most likely, expanded their businesses into higher-risk activities due to increased pressure from foreign bank entry.

We also examine any differences in the behavior of privatized and foreign-acquired banks compared to other banks in the Argentine banking system. In equations (3) and (4) shown in Tables 4 and 5, we include dummy variables for privatized banks ($PRIVATIZED$) and foreign-acquired banks ($FOREIGN1$). Our results show that privatized banks did have statistically significant higher levels of risk compared to other banks regardless of the definition of capital used in our estimation. This finding is even more interesting if one takes into account the fact that the privatized banks were sold after their non-performing assets had been removed from their portfolios and their losses had been absorbed by the provincial governments. However, privatized banks exhibited a lower, and statistically significant, level of capital when the variable capital was defined as a share of risk-adjusted assets. We also find that foreign-acquired banks show a statistically significant higher target of risk only when capital is defined in terms of total assets. To test the robustness of our results, though, we re-estimated our equations for the two sub-sample periods used above. The estimated equations for the two sub-periods do not show any statistically significant difference between the target levels of risk of privatized and foreign acquired banks and the rest of the banks in the system. Overall, our results on the risk behavior of privatized and foreign acquired banks are not robust to different sample periods and present limited evidence that these banks targeted higher levels of risk compared to other banks in the system.

C. The Impact of Privatization and Foreign Entry on the Adjustment of Capital and Risk

In addition to estimating the impact of the various types of ownership, as well as privatization and foreign entry, on the target levels of capital and risk for banks in Argentina, we examined the effect of privatization and foreign entry on the speed of adjustment of capital and risk. We assumed that banks that were privatized or transferred under foreign control would attempt to increase their levels of capital and decrease their

asset portfolio risk at a faster rate. Our argument is based on the fact that the new management in these banks would try to resolve any existing problems that led to the bank's privatization and improve that bank's overall performance and risk management.

Thus, we re-estimated equations (3) and (4) by adding interaction terms. We include interaction terms between $(PRIVATIZED)$ and $(FOREIGN1)$ and the lagged values of capital and risk to capture any marginal effects on the speed of adjustment from privatization and foreign entry. Our results do not show any statistically significant marginal effects on capital adjustment in all of the equations we estimated. In Tables 4 through 7 we include only the results from the estimated equations of changes in risk, which are presented in equation (5) of each table. We do not find any statistically significant marginal effects when we estimate the risk equation for the whole period in our sample. But, when we divide our initial sample period into the two sub-sample periods, we do find a negative statistically significant marginal effect of privatization on the adjustment of risk for the 1998-1999 period. This implies that, given the previous period's level of risk, those banks that were privatized did reduce their target level of risk at a faster rate compared to other banks in the system during that period. The additional marginal effect from privatization is also economically significant. The rate of reduction of the targeted level of risk is 22 percentage points higher in the case of privatized banks compared to other banks in the system. This result has an important implication for the privatization process and supports arguments in favor of privatization of banks that emphasize the positive effects of privatization on the stability of the system.

VI. Concluding Remarks

In this paper, we used data from commercial banks in Argentina during the 1995-1999 period to examine the effects of privatization and foreign entry on the level of risk in the banking system, as well as the behavior of the various types of institutions based on ownership regarding risk. Our main findings show that, due to increased competition from foreign entry, domestic private banks increased their levels of risk, particularly during the period 1998-1999. Former provincial banks that were privatized did exhibit a higher level of risk compared to other banks in the system, but the evidence is not robust

to various sample choices. Foreign acquired banks did not exhibit, overall, a different behavior in terms of choices of risk compared to other banks in the system. Finally, given their level of risk before privatization, those banks that were privatized did lower their levels of risk at a faster rate compared to other banks in the system, particularly during the period 1998-1999.

Overall, the above findings provide support for the arguments that privatization and foreign entry have positive implications for emerging banking systems. However, our results also show support for those arguments that raise concerns about the extent of the positive impact of entry of foreign banks in emerging economies. Within this context, there may be a negative effect on the stability of the system from the response of domestic institutions to increased competition of foreign banks, particularly in the form of a higher target of risk.

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Table 1

Main Characteristics of Sample of Argentine Banks, 1996-1999

(Mean sample values per year)

	1996	1997	1998	1999
Total Assets (Thousands of pesos)	1102028	1342552	1964632	1976057
Loans/ Total Assets	0.520	0.483	0.490	0.474
Bonds/Total Assets	0.120	0.111	0.110	0.131
Capital/Total Assets	0.170	0.163	0.148	0.160
Public	0.15	0.19	0.16	0.17
Private	0.15	0.14	0.15	0.19
Foreign	0.24	0.20	0.16	0.17
Privatized	-	0.08	0.09	0.10
Foreign Acquired	0.11	0.11	0.10	0.11
Capital/Risk Assets	0.271	0.249	0.228	0.272
Public	0.22	0.32	0.28	0.24
Private	0.19	0.18	0.18	0.24
Foreign	0.46	0.35	0.28	0.35
Privatized	-	0.14	0.13	0.16
Foreign Acquired	0.15	0.15	0.14	0.17
Potential Bad Loans/Loans	0.068	0.052	0.042	0.062
Risk-Assets/Total Assets	0.762	0.726	0.701	0.671
Public	0.73	0.65	0.62	0.65
Private	0.82	0.80	0.85	0.78
Foreign	0.66	0.63	0.58	0.56
Privatized	-	0.61	0.74	0.67
Foreign Acquired	0.73	0.77	0.74	0.64
Provisions/Irregular Portfolio	0.565	0.575	0.645	0.628
ROA	0.043	0.348	0.433	-0.911
Adm. Costs/Total Assets	0.077	0.057	0.050	0.073
Observations	88	93	75	74

Table 2

Bank Risk by Ownership Type and by Year

This table presents nonparametric tests of differences in means for bank risk, as measured by the ratio of risk-adjusted assets to total assets, by ownership type and by year. The null hypothesis is that the difference in means is zero. The table shows the results from t-tests of differences in means under the assumption of unequal variances. A (*), (**), (***) indicate significance at the 10%, 5%, and 1% level, respectively.

	Private	Public	P-value of t-test
1996	82.848	72.322	0.15
	N = 46	N = 18	
1999	78.385	65.089	0.09*
	N = 32	N = 10	
	Private	Foreign	
1996	82.848	66.522	0.03**
	N = 46	N = 24	
1999	78.385	56.617	0.00***
	N = 32	N = 32	
	Foreign	Public	
1996	66.522	72.322	0.46
	N = 25	N = 18	
1999	56.617	65.089	0.25
	N = 32	N = 10	
	1996	1999	
Public	72.322	65.089	0.37
Private	82.848	78.385	0.51
Foreign	66.522	56.617	0.17
	1996	1999	
System-wide	76.243	67.175	0.04**
	N = 88	N = 74	

Table 3

Summary Statistics of Regression Variables

This table provides summary statistics for the regression variables in our sample of 330 bank-year observations from the Argentine banking system during the period 1996-1999. The variable CAP is the ratio of capital to risk-adjusted assets. The variable RISK is measured by the ratio of risk-adjusted assets to total assets. The variable SIZE is measured by the natural log of total assets. The variable LLOSS is the ratio of loan loss provisions to potential bad loans. The variable BONDS is the ratio of the bonds in a bank's asset portfolio divided by the bank's total assets. The variable LIQUIDITY is measured by the ratio of liquid assets to total assets.

Variables	Mean	Median	Min	Max	1st Quartile	3rd Quartile	Obs
ΔCAP	-0.001	-0.0008	-1.935	1.848	-0.033	0.034	330
ΔRISK	-3.058	-1.631	-108.65	82.85	-10.543	4.91	330
CAP_{t-1}	0.256	0.167	-0.148	2.373	0.134	0.247	330
$RISK_{t-1}$	74.858	74.46	7.736	191.41	57.25	89.136	330
SIZE	13.002	12.896	9.277	16.696	11.758	14.028	330
ROA	0.003	0.44	-29.2	57.84	-0.82	1.33	330
LLOSS	60.049	59.165	6	153.5	49.525	70.5	330
BONDS	0.118	0.097	0.0005	0.555	0.065	0.144	330
LIQUIDITY	1.478	0.647	0.0007	8.367	0.117	2.863	330

Table 4

EC2SLS Estimation of the Effects of Bank Ownership on Bank Capital and Risk

Results from Baltagi's error-components two-stage least squares (EC2SLS) estimation. The estimation uses annual data for the period 1996-1999. The dependent variable for capital is the ratio of total capital to risk-adjusted assets CAPRWA. The bank's risk RISK is measured by the ratio of risk-adjusted assets to total assets. SIZE is measured by the natural log of total assets. The variable LLOSS is the ratio of loan loss provisions to potential bad loans. The variable BONDS is the ratio of the bonds in a bank's asset portfolio divided by the bank's total assets. The variable LIQUIDITY is measured by the ratio of liquid assets to total assets. PRIVATE and FOREIGN are dummy variables that take the value 1 if the bank is domestically private-owned or foreign-owned, respectively. The variables PRIVATIZED and FOREIGN1 are dummy variables that take the value 1 if the bank has been privatized or has been acquired by a foreign bank during the examined period. P-values are in parentheses.

Variables	ΔCAP (1)	ΔRISK (2)	ΔCAP (3)	ΔRISK (4)	ΔRISK (5)
Intercept	0.077	52.106	0.015	53.070	53.129
	(0.59)	(0.00)	(0.91)	(0.00)	(0.00)
SIZE	-0.008	-2.446***	-0.002	-2.544***	-2.533***
	(0.33)	(0.00)	(0.79)	(0.00)	(0.00)
ROA	0.001	-	0.0008	-	-
	(0.54)	-	(0.71)	-	-
LLOSS	0.001***	0.143***	0.001***	0.128***	0.129***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
BONDS	0.395***	-51.488***	0.453***	-51.788***	-52.329***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
LIQUIDITY	-0.005	-0.215	-0.009	0.135	0.128
	(0.42)	(0.66)	(0.18)	(0.78)	(0.80)
ΔCAP	-	-18.410***	-	-18.150***	-18.110***
	-	(0.00)	-	(0.00)	(0.00)
ΔRISK	-0.002***	-	-0.002**	-	-
	(0.00)	-	(0.01)	-	-
CAP$_{t-1}$	-0.499***	-	-0.530***	-	-
	(0.00)	-	(0.00)	-	-
RISK$_{t-1}$	-	-0.356***	-	-0.339***	-0.341***
	-	(0.00)	-	(0.00)	(0.00)
PRIVATE	-0.002	3.971	-	-	-
	(0.93)	(0.13)	-	-	-
FOREIGN	0.059	-2.609	-	-	-
	(0.11)	(0.34)	-	-	-
PRIVATIZED	-	-	-0.088*	6.286*	7.450
	-	-	(0.09)	(0.09)	(0.32)
FOREIGN 1	-	-	-0.048	1.845	-1.572
	-	-	(0.31)	(0.61)	(0.87)
PRIVATIZED $\times$ RISK$_{t-1}$	-	-	-	-	-0.017
	-	-	-	-	(0.86)
FOREIGN 1 $\times$ RISK$_{t-1}$	-	-	-	-	0.046
	-	-	-	-	(0.71)
N	330	330	330	330	330
R^2	0.33	0.34	0.32	0.32	0.32

Table 5

EC2SLS Estimation of the Effects of Bank Ownership on Bank Capital and Risk

Results from Baltagi's error-components two-stage least squares (EC2SLS) estimation. The estimation uses annual data for the period 1996-1999. The dependent variable for capital is the ratio of total capital to total assets CAPTA. The bank's risk RISK is measured by the ratio of risk-adjusted assets to total assets. SIZE is measured by the natural log of total assets. The variable LLOSS is the ratio of loan loss provisions to potential bad loans. The variable BONDS is the ratio of the bonds in a bank's asset portfolio divided by the bank's total assets. The variable LIQUIDITY is measured by the ratio of liquid assets to total assets. PRIVATE and FOREIGN are dummy variables that take the value 1 if the bank is domestically private-owned or foreign-owned, respectively. The variables PRIVATIZED and FOREIGN1 are dummy variables that take the value 1 if the bank has been privatized or has been acquired by a foreign bank during the examined period. P-values are in parentheses.

Variables	ΔCAP (1)	ΔRISK (2)	ΔCAP (3)	ΔRISK (4)	ΔRISK (5)
Intercept	0.263	144.188	0.263	276.317	270.672
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
SIZE	-0.016***	-6.988***	-0.016***	-15.866**	-15.458**
	(0.00)	(0.00)	(0.00)	(0.01)	(0.02)
ROA	0.0007	-	0.0006	-	-
	(0.33)	-	(0.41)	-	-
LLOSS	0.0005***	0.073**	0.0005***	0.035	0.036
	(0.00)	(0.03)	(0.00)	(0.28)	(0.27)
BONDS	-0.108*	-56.715***	-0.094	-60.760***	-59.914***
	(0.06)	(0.00)	(0.11)	(0.00)	(0.00)
LIQUIDITY	-0.003	0.692	-0.004**	0.698	0.717
	(0.14)	(0.16)	(0.09)	(0.26)	(0.24)
ΔCAP	-	-21.300**	-	-13.445	-13.671
	-	(0.04)	-	(0.17)	(0.16)
ΔRISK	-0.0004	-	-0.0004	-	-
	(0.12)	-	(0.21)	-	-
CAP_{t-1}	-0.427***	-	-0.447***	-	-
	(0.00)	-	(0.00)	-	-
$RISK_{t-1}$	-	-0.798***	-	-0.949***	-0.946***
	-	(0.00)	-	(0.00)	(0.00)
PRIVATE	-0.001	7.461	-	-	-
	(0.94)	(0.27)	-	-	-
FOREIGN	0.012	3.659	-	-	-
	(0.43)	(0.60)	-	-	-
PRIVATIZED	-	-	-0.023	11.625*	12.277
	-	-	(0.25)	(0.07)	(0.19)
FOREIGN 1	-	-	0.001	8.722**	7.817
	-	-	(0.93)	(0.03)	(0.39)
PRIVATIZED $\times$ $RISK_{t-1}$	-	-	-	-	-0.010
	-	-	-	-	(0.91)
FOREIGN 1 $\times$ $RISK_{t-1}$	-	-	-	-	0.011
	-	-	-	-	(0.93)
N	330	330	330	330	330
R^2	0.19	0.23	0.18	0.19	0.20

Table 6

EC2SLS Estimation of the Effects of Bank Ownership on Bank Capital and Risk for 1996-1997

Results from Baltagi's error-components two-stage least squares (EC2SLS) estimation. The estimation uses annual data for the period 1996-1997. The dependent variable for capital is the ratio of total capital to risk-adjusted assets CAPRWA. The bank's risk RISK is measured by the ratio of risk-adjusted assets to total assets. SIZE is measured by the natural log of total assets. The variable LLOSS is the ratio of loan loss provisions to potential bad loans. The variable BONDS is the ratio of the bonds in a bank's asset portfolio divided by the bank's total assets. The variable LIQUIDITY is measured by the ratio of liquid assets to total assets. PRIVATE and FOREIGN are dummy variables that take the value 1 if the bank is domestically private-owned or foreign-owned, respectively. The variables PRIVATIZED and FOREIGN1 are dummy variables that take the value 1 if the bank has been privatized or has been acquired by a foreign bank during the examined period. P-values are in parentheses.

Variables	ΔCAP (1)	ΔRISK (2)	ΔCAP (3)	ΔRISK (4)	ΔRISK (5)
Intercept	0.654	80.753	0.504	80.365	84.702
	(0.00)	(0.00)	(0.02)	(0.00)	(0.00)
SIZE	-0.032**	-3.601***	-0.022	-3.624***	-3.857***
	(0.02)	(0.00)	(0.13)	(0.00)	(0.00)
ROA	0.005*	-	0.004	-	-
	(0.09)	-	(0.15)	-	-
LLOSS	0.0007	0.166***	0.001	0.163***	0.158***
	(0.26)	(0.00)	(0.13)	(0.00)	(0.00)
BONDS	0.447*	-86.385***	0.577**	-86.448***	-87.164***
	(0.06)	(0.00)	(0.02)	(0.00)	(0.00)
LIQUIDITY	-0.043***	0.419	-0.048***	0.610	0.670
	(0.00)	(0.68)	(0.00)	(0.54)	(0.51)
ΔCAP	-	-13.157***	-	-13.551***	-13.374***
	-	(0.00)	-	(0.00)	(0.00)
ΔRISK	-0.0008	-	-0.0004	-	-
	(0.48)	-	(0.68)	-	-
CAP_{t-1}	-0.797***	-	-0.821***	-	-
	(0.00)	-	(0.00)	-	-
$RISK_{t-1}$	-	-0.507***	-	-0.498***	-0.514***
	-	(0.00)	-	(0.00)	(0.00)
PRIVATE	-0.068	1.596	-	-	-
	(0.22)	(0.67)	-	-	-
FOREIGN	0.032	-0.906	-	-	-
	(0.60)	(0.83)	-	-	-
PRIVATIZED	-	-	-0.106	2.118	-4.430
	-	-	(0.26)	(0.72)	(0.67)
FOREIGN 1	-	-	-0.015	4.800	-13.737
	-	-	(0.88)	(0.47)	(0.63)
PRIVATIZED × $RISK_{t-1}$	-	-	-	-	0.114
	-	-	-	-	(0.44)
FOREIGN 1 × $RISK_{t-1}$	-	-	-	-	0.240
	-	-	-	-	(0.48)
N	181	181	181	181	181
R^2	0.40	0.38	0.39	0.38	0.38

Table 7

EC2SLS Estimation of the Effects of Bank Ownership on Bank Capital and Risk for 1998-1999

Results from Baltagi's error-components two-stage least squares (EC2SLS) estimation. The estimation uses annual data for the period 1998-1999. The dependent variable for capital is the ratio of total capital to risk-adjusted assets CAPRWA. The bank's risk RISK is measured by the ratio of risk-adjusted assets to total assets. SIZE is measured by the natural log of total assets. The variable LLOSS is the ratio of loan loss provisions to potential bad loans. The variable BONDS is the ratio of the bonds in a bank's asset portfolio divided by the bank's total assets. The variable LIQUIDITY is measured by the ratio of liquid assets to total assets. PRIVATE and FOREIGN are dummy variables that take the value 1 if the bank is domestically private-owned or foreign-owned, respectively. The variables PRIVATIZED and FOREIGN1 are dummy variables that take the value 1 if the bank has been privatized or has been acquired by a foreign bank during the examined period. P-values are in parentheses.

Variables	ΔCAP (1)	ΔRISK (2)	ΔCAP (3)	ΔRISK (4)	ΔRISK (5)
Intercept	0.063	63.205	0.053	74.465	70.624
	(0.61)	(0.00)	(0.63)	(0.00)	(0.00)
SIZE	-0.008	-2.932***	-0.008	-3.591***	-3.276***
	(0.25)	(0.00)	(0.26)	(0.00)	(0.00)
ROA	-0.002	-	-0.002	-	-
	(0.33)	-	(0.26)	-	-
LLOSS	0.001	0.077	0.001*	-0.015	-0.039
	(0.18)	(0.50)	(0.07)	(0.89)	(0.73)
BONDS	0.901***	-92.637***	0.936***	-85.580***	-92.164***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
LIQUIDITY	-0.914***	63.376***	-0.918***	60.579***	66.292***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
ΔCAP	-	21.971	-	22.021	27.545
	-	(0.18)	-	(0.20)	(0.12)
ΔRISK	-0.0003	-	-0.00002	-	-
	(0.67)	-	(0.97)	-	-
CAP_{t-1}	-0.143***	-	-0.144***	-	-
	(0.00)	-	(0.00)	-	-
$RISK_{t-1}$	-	-0.421***	-	-0.365***	-0.346***
	-	(0.00)	-	(0.00)	(0.00)
PRIVATE	0.0006	8.069*	-	-	-
	(0.98)	(0.07)	-	-	-
FOREIGN	0.038	-4.044	-	-	-
	(0.27)	(0.38)	-	-	-
PRIVATIZED	-	-	-0.069*	6.783	22.765**
	-	-	(0.06)	(0.16)	(0.03)
FOREIGN 1	-	-	0.017	2.144	-0.536
	-	-	(0.60)	(0.64)	(0.96)
PRIVATIZED $\times$ $RISK_{t-1}$	-	-	-	-	-0.224*
	-	-	-	-	(0.09)
FOREIGN 1 $\times$ $RISK_{t-1}$	-	-	-	-	0.029
	-	-	-	-	(0.83)
N	149	149	149	149	149
R^2	0.40	0.27	0.40	0.22	0.22