



Banking and the Financial Sector in Transition and Emerging Market Economies

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Abstract

Using data from 1996 to 2000, we investigate the effect of extensive foreign ownership on the banking sectors in general and bank efficiency in particular for eleven transition countries. Our unbalanced panel consists of 220 banks and 830 observations. Using stochastic frontier estimation procedures, we compute profit and cost efficiency scores. From these raw scores, we calculate efficiency scores for a bank relative to the mean score of other banks in the same country. We use these four efficiency scores and a financial indicator, return on assets, as dependent variables in a set of regressions having ownership type, year, and bank size as explanatory variables. To check for robustness, we include GDP growth to control for country-specific effects in both types of regressions and balance sheet financial data in return-to-asset regressions only.

Our results indicate that banking sectors in these countries became more efficient and more competitive toward the end of the 1990s. We find that ownership matters; government banks are less efficient than their private counterparts and majority foreign ownership generate higher efficiency scores. Moreover, we find that the participation by international institutional investors in foreign-owned banks, which occurs in about 10% of our observations, has an additional significant impact. Such banks earn higher returns on assets and are more efficient by the profit measure; however, these banks are not significantly more cost efficient. Hence, international institutional investors appear to be more interested in cherry-picking the best banks for their portfolios rather than in facilitating the transfer of know-how and modern technology to banks in transition countries.

1. **Banking in the Transition Economies: The Foreign Factor**

Banking sectors in transition countries differ from their counterparts in many developing and emerging market countries by the high percentage of assets held in banks with majority foreign ownership. The change in foreign participation in banking in these countries from the early transition years to the later ones is dramatic. This paper investigates the impact of extensive foreign ownership on the banking sectors and on the performance of banks in eleven transition countries. These countries are four northern European countries, the Czech Republic, Hungary, Poland, and Slovakia; four southern European countries, Bulgaria, Croatia, Romania, and Slovenia, and the three Baltic countries, Estonia, Latvia, and Lithuania.

In 2000, the percentage of assets in banks with majority foreign ownership in these countries ranges from highs of 97.4% in Estonia and 84.1% in Croatia to a low of 15.6% in Slovenia (Keren and Ofer, 2002). In eight of the eleven countries, more than half of the assets are in banks having majority foreign ownership; in Slovakia and Romania 42.7% and 46.7% of assets are in banks having majority foreign ownership leaving Slovenia as the outlier in terms of foreign ownership. By contrast, in Latin America, only Chile had more than 50% of its banking sector controlled by foreign interests in 1999 and that number was only 53.6% (IMF, 2000). In the transition countries, the change in ownership structure over the last half of the decade has been remarkably rapid. In 1997, in only Hungary and Latvia were more than half of the assets in majority foreign-owned banks. Moreover, Estonia and Croatia had only 28.8% and 3%, respectively, of their assets in majority foreign-owned banks in 1997 (Keren and Ofer, 2002).

How should we expect foreign ownership to affect the banking sectors of these transition countries and the performance of the individual banks therein? Claessens, Demirgüç-Kunt and Huizinga (2001) investigate performance differences between domestic and foreign banks in eighty countries, both developed and developing, over an eight-year period from 1988 to 1995. These authors find that foreign bank entry was followed by a reduction in both the profitability and the overhead expenses of domestic banks. Hence, these authors suggest that foreign participation improves the efficiency of

domestic banking. However, banking sectors in transition economies are different from their counterparts in the developed or the developing countries due to the legacies of central planning.

Prior to the transition, banking sectors in most transition countries were segmented functionally with a state savings bank having an extensive branch network and responsible primarily for collecting household deposits, a state foreign trade bank handling all transactions involving foreign currency, a state agricultural bank provided short-term financing to the agricultural sector, and a state construction bank funding long-term capital projects and infrastructure development (Bonin and Wachtel, 1999). Domestic commercial transactions were handled by the National Bank until these responsibilities were hived off to newly created state banks, in some countries a few in others many. Most countries started the transition with a small number of large fully government-owned banks and few if any private or foreign banks. Even by 1993, banks with majority government ownership controlled more than half of all banking assets in Hungary, Lithuania, Poland, and Slovakia (Keren and Ofer, 2002).

In Croatia and Slovenia, the initial situation was different because both were republics of Yugoslavia prior to 1991. As such, these two countries inherited the legacies of the Yugoslavian banking system. Since the 1950s, Yugoslavia had a two-tier banking system consisting of a National Bank and individual commercial banks that were not state-owned but rather owned collectively under the Yugoslavian system of self-management. Croatia and Slovenia each had only one main bank. However, the establishment of internal company banks in the late 1970s in these countries led to excessive numbers of small unhealthy banks. Hence, even though concentration ratios were high, the banking sectors contained many small and undercapitalized banks. The major banks in both countries were weakened considerably when their foreign currency deposits at the National Bank of Yugoslavia in Belgrade were blocked after the secession of these former republics. This policy of the Yugoslavian, mainly Serbian, government left Croatian and Slovenian banks with a serious currency mismatch problem because they had loans denominated in foreign currency and no foreign currency deposits. Government rehabilitation policies to resolve this problem in both countries led to the nationalization of these banks. Therefore, government-owned banks were created in

Slovenia and Croatia as part of a bank- restructuring program. Majority-government-owned banks held 58.9% and 47.8%, respectively, of all banking assets in Croatia and Slovenia by 1993 (Keren and Ofer, 2002).

As former republics of the Soviet Union, the three Baltic countries, i.e., Estonia, Latvia, and Lithuania, have legacies similar but not equivalent to those of the Central European countries. Soviet-style banking was not only segmented in the manner described above but it was centralized in Moscow. The banking sectors in the small Baltic republics were a mixture of Soviet banking, e.g., branches of the state savings bank, and smaller banks. Secession left banking in disarray; connections with the Russian banking system were not severed immediately and entry of small undercapitalized banks added to the fragility of the financial system. In 1993, Estonia had only one bank with majority foreign ownership, three government-owned banks, and 17 other private banks for a total of twenty-one banks in a country of 1.5 million people. In the fall of the previous year, three of Estonia's largest banks holding about 40% of all banking assets were declared insolvent and, in 1993, eight small commercial banks were closed for failing to meet quite minimal capital requirements (Bonin, Mizsei, Szekely and Wachtel, 1998). Due to hyperinflation, monetization ratios in Estonia were low with M2 to GDP at only about 17%. Hence, the first priority in the Estonian transition was to deal with financial and banking crises due partially to the legacies of the Soviet past. The other Baltic countries faced similar issues. In essence, the banking sectors of these countries were recreated during the transition.

For transition economies, Buch (1997) argues that foreign bank entry improves the production of financial services, promotes banking competition, facilitates the privatization of government-owned domestic banks, and transfers know-how and new technology to the host countries. Several studies examine empirically the impact of foreign bank entry and ownership on banking sectors in transition countries. Using averages across ownership classes from 1996 to 1998, IMF (2000) reports that return on equity is significantly higher for foreign banks than for domestic banks in Hungary, Poland and the Czech Republic. However, comparisons of averages fail to account for classification changes due to the ongoing and rapid privatization of government-owned domestic banks during this period. If foreign banks cherry pick and buy the more

profitable domestic banks first, some differences in these averages may be due to selection bias.

Buch (2000) compares interest rate spreads in three European fast-track transition countries, i.e., Hungary, Poland and the Czech Republic, from 1995 to 1999. She finds evidence consistent with the hypothesis that foreign banks create a more competitive market environment in transition economies, but only after they have attained sufficient aggregate market share. Similarly, Hasan and Marton (2003) find that, in Hungary, relatively more efficient foreign banks created an environment that forced the entire banking system to become more efficient. Drakos (2002) examines net interest margins from 1993 to 1999 to assess the efficiency of banking sectors in eleven transition countries, nine of which are countries considered in this paper. The author finds that margins decrease significantly over time for the entire group of banks and that ownership matters in that, somewhat surprisingly, government-owned banks set narrower margins than other banks. Drakos concludes that foreign entry increases the efficiency of the banking sector, both directly and indirectly, in these transition countries. Fries and Taci (2002) analyze bank performance in sixteen transition countries from 1994 to 1999 and conclude that, although foreign ownership is not correlated with stronger real growth in lending, a greater presence of foreign banks in the financial sector has a positive spillover effect of real growth in loans. Hence, the empirical literature on banking in transition countries finds relatively strong competitive effects of foreign bank entry for the banking sectors and uncovers some subtle ownership effects for individual banks.

In a somewhat related paper, Fries, Neven, and Seabright (2002) examine the effects of financial sector reform on the performance and competition of banking sectors in sixteen transition countries from 1994 to 1999. In countries that have made significant progress on financial reforms, these authors find that banks make reasonable margins on loans, offer competitive rates on deposits, and make negative returns on equity, on average. In countries that have not proceeded very far in reforming their financial sectors, banks achieve high rates of return on equity mainly at the expense of depositors held hostage to low, sometimes negative, real returns on their accounts for lack of alternatives. These results point to some pitfalls with using performance measures and with pooling data from several transition countries that we attempt to deal with in our empirical

analysis. First, high return to equity or assets is not indicative of good performance; quite the contrary, it indicates a lack of development of the financial sector in transition countries. Second, country effects are important to take into account in pooled data across transition countries at various stages of reform. In the study most closely related to our paper but considering only one transition country, Nikiel and Opiela (2002) find that foreign banks servicing foreign and business customers are more cost-efficient but less profit-efficient than other banks in Poland. Other estimates of efficiency frontiers for banks in transition countries include Hasan and Marton (2003) for Hungary and Kraft and Tittiroglu (1998) for Croatia.

The paper is organized as follows. Section 2 describes the data; we are using an unbalanced panel of banks from 1996 to 2000 in eleven transition countries. The ownership typology is developed and descriptive statistics presented in this section. Section 3 discusses measures of bank performance and defends our choice of return on assets versus other measures. In this section, we also develop our methodology for creating four bank efficiency measures and present simple comparisons of means for these performance variables across ownership classes. Section 4 contains the regression results using these five performance variables, i.e., return on assets, raw profit efficiency, raw cost efficiency, relative profit efficiency and relative cost efficiency, as dependent variables and taking bank size, year dummies, and ownership categories as explanatory variables. In addition, we present regressions in which GDP growth is included to proxy for country-specific effects and other balance sheet variables are added to assess the robustness of our empirical results. Section 5 concludes with some tentative policy implications and suggestions for further work.

2. The Data and the Ownership Typology

Banking research around the world has made widespread use of the bank level data provided by Thompson's BankScope and Bureau van Dijk. We employ both bank-specific and national-level variables in our empirical analysis. Financial statement data are available from the early 1990s for close to ten thousand banks around the world. However, the data, particularly for banks from less developed and transition countries, requires substantial editing before a reliable data set can be constructed. Careful review

of these data is needed to avoid double counting of institutions, to choose the most appropriate accounting standards, and to exclude non-bank financial institutions of various kinds. As noted earlier, we investigate banking performance in eleven relatively advanced transition countries. Our preliminary investigations suggest that the bank data in the other transition countries, mostly notably those from the former Soviet Union, are less accurate and represent very different institutional structures and experiences. Although data are available beginning in 1993, the early data include only a handful of institutions in some of the most advanced transition countries. As a result, we use panel data from 1996 to 2000; the panel is unbalanced because of missing data for some years for some banks.

In many instances, more than one set of accounts reflecting different levels of organizational consolidation and multiple accounting standards is provided for an individual banking institution. For the eleven countries in our sample, banks are included according to the following selection criteria. First, the consolidated bank or bank holding company is used whenever more than one set of accounts is provided for a specific bank. Second, international accounting standards data are used wherever available and, if these are not available, inflation-adjusted local accounting standards data are used. If the only data available are local standards nominal data, we use these. In cases for which international accounting data are available only for one or two years and substantially more data are available using local standards, local standards data are used. Third, central banks, government development banks, investment banks, export-import banks and cooperative banks are excluded from the sample. Finally, bank observations are excluded from the data set if there are extreme values for the ratios of equity to asset, loan to asset, or non-interest expenditures to assets. Excluding these outliers results in the loss of very few additional observations.

One aspect of the BankScope data that has attracted little attention to date is the information on the ownership structure of each bank. The major individual owners, as of 1999, are listed by name, country of origin, and percentage ownership stake. Although the ownership information is not exhaustive, we are able to determine the nature of the controlling interest in virtually all cases. However, we cannot consider changes of ownership during the data period with the information available. Hence, another reason

for using only 5 years of data is for financial data to reflect bank operations under the reported ownership structure.

We code the ownership data to indicate the percentage of government ownership, the percentage of foreign ownership and the percentage of domestic private ownership. If ownership percentages do not add to 100%, we infer the characteristics of the remaining owners. Such judgments are less significant than might appear to be the case because our primary interest is in the type of majority owner. If the data provide such information, as is usually the case, an assumption about residual owners is irrelevant. If there is no majority owner and the stakes do not add up to 100%, we assume that there are unreported domestic private owners so long as some private ownership is indicated. If no private ownership is indicated, we attribute the residual to the largest category of owners reported. In this way, we allocate 100% of the bank's shares to foreign, government or private owners for each observation. For about 10% of the observations, international financial institutions, e.g., EBRD or IFC, or internationally sponsored investment funds, e.g. the U.S. enterprise funds, have an ownership stake in the bank. Hence, we also code the participation of such an international institutional investor.

Our final data set includes 220 banks from eleven countries for a total of 830 bank-year observations with both ownership and financial information. The number of banks from each country and the number of bank-year observations are shown in Table 1. No one country dominates our sample; Poland, Hungary and Croatia have the largest number of banks. Polish banks make up about 16% of the sample while banks in either Croatia or Hungary account for less than 15% of the observations. The bank-year observations are spread evenly over the years in the sample with the exception of the first year, which has significantly fewer observations in total and in Romania, Bulgaria and Lithuania. After the first year, the total number of observations in any year ranges from 164 to 187, which is a difference of less than 15%. After 1996, the numbers of observations in each country are relatively stable with the exception of Romania in 1997.

The proportions of bank-year observations with majority foreign, majority government or private ownership are shown by total and by country in Table 1. In all countries, these proportions sum to 100%, or very close to it, indicating that there are only a few banks without a majority owner of any particular type. Majority ownership

does not necessarily indicate the presence of a single majority owner. For example, the stakes of several minority foreign owners may be aggregated to yield a majority position for foreigner owners as a group even though no one single owner has a majority stake.

Majority foreign ownership, measured as a percentage of the bank-year observations, is highest in Estonia, Hungary and the Czech Republic. The percentage of total observations with majority foreign ownership is 59% and only Croatia, Latvia, and Slovenia have percentages below 50% for majority foreign ownership. The dramatic change in bank ownership during the second half of the 1990s in these transition countries is evidenced by the small percentage of bank-year observations with majority government interest. For the entire sample, the percentage of majority government ownership is less than 10%; in no country is this percentage above 15%. Domestic private ownership is strongest in Latvia, Croatia and Slovenia, with percentages above 50% for each country. The percentage of majority domestic private ownership for the entire sample is about 31.5%. Regarding participation by international institutions and international investment funds, 82 of the 830 observations have such participation including banks in every country, except Latvia and Slovenia. Banks in Bulgaria, Estonia, and Romania have the highest participation by international institutional investors. Of these 82 bank-year observations, 79 are for banks with majority foreign ownership; one bank in Romania is responsible for the other 3 observations. Consequently, banks with international institutional investors are virtually all majority foreign-owned.

Descriptive statistics for the major financial variables are presented in Table 2. BankScope provides data on bank assets in 1993 U.S. dollars. For the banks in our sample, assets range from about ten million to over sixteen billion dollars, with an average of over one billion and a coefficient of variation of more than two. Obviously, the banks in our sample are of quite varying size. Regarding other financial characteristics of these banks, the average loan-to-asset ratio is 43%, the average deposit-to-asset ratio is 76%, and the average ratio of non-interest expense to assets is about 7%. Although the range for each of these is substantial, no one of these measures has a coefficient of variation above one. Hence, size is the primary element of heterogeneity for bank characteristics in our sample.

Turning to the performance measures, the mean rate of return on assets is almost 1% and the mean rate of return on equity is about 5%. The coefficient of variation is about 6 for the rate of return on assets but almost 8.5 for the rate of return on equity. In addition, the ranges of these two performance variables confirm, as expected, that the rates of return on equity vary more than the rates of return on assets for the banks in our sample. In the next section, we introduce additional measures of bank performance based on cost and profit efficiency scores.

3. Bank Performance: Measures and Ownership Effects

Of the two measures of bank performance discussed in the previous section, we choose return on assets rather than return on equity. Return on equity is problematic because it is sensitive to strategies for writing off bad loans. The percentage of non-performing loans is quite variable both across countries and over the years in our sample period. As an extreme example of the change over time, non-performing loans decreased from 59% in 1998 to only 4% in 2000 in Romania (Keren and Ofer, 2002). Across countries, in 2000, the percentage of non-performing loans is relatively high in Slovakia at 26%, in Croatia at 20%, in the Czech Republic at 19%, and in Poland at 16% compared to only 2% in Estonia, 3% in Hungary, and 5% in Latvia (Keren and Ofer, 2002). Therefore, we conclude that return on equity may be non-comparable across these transition countries and even across time within some of them.

Fries, Neven and Seabright (2002) show that return on equity is higher in transition countries that have undertaken less reform because the rates paid to depositors are lower due to underdeveloped financial sectors. Hence, any variable using bank returns will be affected by country-specific characteristics. In summary, we prefer return on assets to return on equity because of the variation in non-performing loans within our sample but we use it as a dependent variable only for a set of benchmark regressions due to its likely dependence of the degree of financial sector reform in any country and for any year.

In addition to this financial return measure, we develop measures of bank efficiency. Using standard techniques, we specify cost and profit functions based on the balance sheet data and estimate stochastic efficiency frontiers. Measures of efficiency

are based on the distance of a particular bank observation from the efficient frontier. We use these raw efficiency scores as an additional measure of bank performance. However, structural conditions in banking and macroeconomic conditions may generate differences in banking efficiency from country to country. Since our primary interest is in the relationship between bank ownership and an individual bank's performance or efficiency score, we want to control for country-specific effects. In order to do so, we construct a relative efficiency score, which is a bank observation's raw efficiency score divided by the average raw efficiency scores of all banks in its home country. Relative efficiency scores are used in addition to the raw efficiency scores and the return on assets as dependent variables in our regressions.

Although the methodology for estimating efficiency scores is fairly common, we provide a brief explanation for completeness. Measures of the X-efficiency of banks are derived from stochastic frontier analysis. This methodology starts with a standard cost or profit function and estimates the minimum cost or maximum profit frontier. The efficiency measure for a specific bank is the distance from the frontier. The methodology has been applied widely to banking and other industries since its introduction by Aigner *et al.* (1977). Recent econometric developments are summarized in Kumbhakar and Lovell (2000) and Berger and Mester (1997) discuss applications to banking. Although we estimate both cost and profit efficiency, we illustrate the methodology using cost efficiency first and discuss its application to the profit function later.

Suppose that total costs for the i -th bank in year t are given by equation (1) in which Y_{it} represents the various products or services produced by the firm, P_{it} represents the prices of inputs and ε_{it} represents a random disturbance term that allows the cost function to vary stochastically, i.e. it captures the fact that there is uncertainty regarding the level of total costs that will be incurred for given levels of production.

$$TC_{it} = f(Y_{it}, P_{it}) + \varepsilon_{it}. \quad (1)$$

Suppose further that the error term in equation (1) has two components, a controllable factor and a random or uncontrollable component. In this case, the cost function is given by the following equation:

$$TC_{it} = f(Y_{it}, P_{it}) + u_{it} + v_{it}, \quad (2)$$

where v_{it} represent random uncontrollable factors that affect total costs, such as weather, luck, or labor strikes.

The v_{it} 's are identically distributed as normal variates and are, on average, equal to zero. On the other hand, the u_{it} 's represent the controllable components, which consist of factors influencing the bank's technical and allocative efficiency that can be changed by management. The u_{it} 's are distributed normally according to $N(0, \sigma_u^2)$ so that the distribution is truncated below zero. The frontier function approach maintains that the managerial or controllable inefficiencies only increase costs above frontier or best practice levels and that random fluctuations can either increase or decrease costs from these benchmarks. The frontier is given by $f(\cdot) + \varepsilon_{it}$ and is stochastic. The positive term, u_{it} , represents inefficiency for cost, or efficiency in the estimation of a profit frontier. This term can cause the cost, or profit, of each bank to be above or below the frontier.

Jondrow *et al.* (1982) demonstrate that the ratio of variability ($\lambda = \sigma_u/\sigma_v$) for u_{it} and v_{it} can be used to estimate a firm's inefficiency. Small values of λ imply that the uncontrollable factors, σ_v , dominate the controllable inefficiencies, σ_u . A measure of controllable inefficiency for the i -th firm is formulated as:

$$E[u|\varepsilon] = \sigma\lambda/(1 + \lambda^2)[\phi(\varepsilon\lambda/\sigma)/\Phi(\varepsilon\lambda/\sigma) + \varepsilon\lambda/\sigma], \quad (3)$$

where $\sigma = (\sigma_u^2 + \sigma_v^2)^{1/2}$, ϕ is the standard normal density function, Φ the cumulative normal density function, and all other terms are defined previously.

A commonly used translog functional form is employed to estimate costs:

$$\begin{aligned} \ln TC_{it} = & \alpha_0 + \sum_{k=1}^4 \alpha_k \ln Y_{kit} + \sum_{l=1}^2 \beta_l \ln P_{lit} \\ & + \frac{1}{2} \sum_{k=1}^4 \sum_{m=1}^4 x_{km} \ln Y_{kit} \ln Y_{mit} + \frac{1}{2} \sum_{l=1}^2 \sum_{n=1}^2 \gamma_{ln} \ln P_{lit} \ln P_{nit} \\ & + \sum_{k=1}^4 \sum_{l=1}^2 \delta_{kl} \ln Y_{kit} \ln P_{lit} + \varepsilon_{it} \end{aligned}$$

where $x_{km} = x_{mk}$ and $\gamma_{ln} = \gamma_{nl}$ by symmetry and $\sum_l \beta_l = 1$, $\sum_{ln} \gamma_{ln} = 0$, $\forall i$, and $\sum_l \delta_{kl} = 0$,

$\forall i$, by linear homogeneity. The actual estimation uses the FRONTIER program developed by Coelli (1999). The program derives the X-efficiency score for a best-practice, cost-efficient bank, which is located at the lowest point of the cost curve, i.e. close to zero. This means cost efficiency scores above zero indicate higher inefficiency.

Total costs are the sum of interest and non-interest costs. The four output variables Y_{it} are total deposits, total loans, total liquid assets and investments other than loans and liquid assets. The two input prices are the price of capital, measured by the ratio of non-interest expenses to total fixed assets, and the price of funds, measured by the ratio of interest expenses to total deposits. Although separate measures are available for cost associated with employees and office-related operating expenses, we did not have any information on number of employees for sample banks. Hence, we follow Hasan and Marton (2003) and use a broad measure for the price of capital, the ratio of non-interest expenses to assets.

For estimation of the profit frontier, we utilize a non-standard specification that has been applied to banking data by Pulley and Humphrey (1993), Humphrey (1994), and Berger *et al.* (1996). This approach assumes that firms have some market power in output markets. Hence, profits are a function of input prices and output quantities and the bank chooses both input quantities and output prices. This contrasts with the standard approach that assumes perfectly competitive output markets and specifies a revenue function. In that approach, revenues are a function of output prices and input quantities but the bank chooses its output quantities based on given prices. Since market power varies significantly, we do not know whether specific banks choose output prices, output quantities, or both. Assuming that output quantities are exogenous, i.e. banks choose output prices, supports the use of the non-standard approach.

The estimation of a profit function has the practical advantage that output price data are not needed. Thus, we specify a non-standard profit function identical to the cost function above, except that total costs are replaced by total profit on the left-hand-side of the equation. Total profit is measured by net profit earned by the bank. Following the literature, we add a constant amount to profit for all banks in the sample to avoid having

negative net profits for any bank observation. Adding a constant makes all profit numbers positive and allows us to take logarithms of all profit function variables. With respect to profit efficiency, a best-practice efficient bank will have a maximum score of one and the more efficient is a bank, the closer to one will be its profit efficiency score.

Table 2 includes overall descriptive statistics for the efficiency measure and table 3 presents means of the raw profit and cost efficiency scores along with return on assets by country and by year. Higher scores indicate higher profit efficiency, while lower scores indicate better cost efficiency. Both efficiency measures increase after 1998, which is the year with the lowest efficiency scores. Moreover, efficiency scores for 1999 and 2000 indicate improvement from 1997. Hence, we conclude that bank efficiency increases unambiguously in the latter two years of the 1990s. Regarding return on assets, 1998 is again the year of poorest performance as the average rate of return on assets for the banks in our sample is negative. Similar to the efficiency measures, the rate of return on assets is lower in both 1999 and 2000 than it is 1997 or 1996. Remembering our earlier interpretation, decreasing returns on assets indicate a more competitive and more developed banking sectors. Hence, the efficiency measures and the return on assets provide consistent evidence of improvements over time in the banking sectors of these transition countries.

Regarding bank efficiency by country, the interpretation is subtler. Five countries, i.e., Estonia, Croatia, Latvia, Lithuania, and Slovenia, have profit and cost efficiency measures that are better than the respective sample-wide means. These results are consistent with our intuition about the development of the banking sectors in these countries. Notice that no previously centrally planned Eastern European country is included in this group. Three countries, i.e., Hungary, Romania, and Slovakia, have profit and cost efficiency measures that are worse than the respective sample-wide means. Although we expect banking sector reform to be lagging in Romania and Slovakia, the inclusion of Hungary in this group is surprising. In addition, three countries, i.e., Bulgaria, the Czech Republic, and Poland, have one measure above and one measure below the respective sample-wide means. Focusing on cost efficiency, only Bulgaria is worse than the sample-wide mean while banks in the Czech Republic and Poland are more cost efficient than average. This last comparison accords with our intuition about

the relative development of the banking sectors in these three countries and suggests a mild preference for cost efficiency measures over profit efficiency measures.

Regarding returns on assets, banks in the Czech Republic and Slovakia have negative average rates of return; in addition, banks in Croatia, Estonia, Hungary, Latvia, and Lithuania have below average mean rates of return. Banks in Bulgaria, Poland, Romania, and Slovenia have above average mean returns on assets. Using the interpretation that higher returns on assets indicate a less developed and less competitive banking sector, the surprising results are those for Slovakia, Poland and Slovenia. Of these countries, Slovakia had an extremely high percentage of non-performing banks loans during the period, ranging from a high of 44% in 1998 to 26% in 2000. The percentage of non-performing loans in Slovenian banks was stable at 9% from 1995 to 2000; Poland is intermediate between the other two countries with percentages ranging from 24% in 1995 to 16% in 2000. Hence, we have no satisfactory explanation for these surprising results but rather consider this further reason to use the return-to-assets variable cautiously.

Table 4 presents the means of variables, both performance measures and bank characteristics, by ownership group; table 5 records the t-statistics and significance levels for comparisons between ownership categories for the six performance measures. Taking the bank characteristics first, with the possible exception of privately owned banks, table 4 indicates that average bank size is virtually equal across ownership groups. The average loan to asset ratio is similar for all banks except for those with majority government ownership, which have a substantially lower loan-to-asset ratio. Regarding the deposit side of the balance sheet, foreign-owned banks have the highest average deposit-to-asset ratio at 77.6% while government-owned banks have the lowest at 74%. Hence, government-owned banks tend to make substantially fewer loans and collect somewhat less deposits, both relative to their assets, than banks in the other groups. Furthermore, the average non-interest expenditure to asset ratio is highest in government-owned and private banks at about 8% and lowest in foreign-owned banks at about 6%.

Finally, foreign-owned banks have substantially higher average returns on both assets and equity than either of the other two groups with government-owned banks having substantially lower averages, even negative for return on equity, than private

banks. Since virtually all banks with international institutional investors are also foreign majority-owned, comparing these two groups provides interesting insights into the characteristics of the international banks. Banks with international institutional investors are slightly larger on average and have somewhat lower ratios of both loans and deposits to assets than other foreign-owned banks. In addition, these banks have substantially higher average rates of return on both assets and equity. Surprisingly, banks with international institutional investors have a somewhat higher average ratio of non-interest expenditure to asset, at almost 7%, than foreign-owned banks. In summary, banks that attract international institutional investors in these transition countries have high average returns, are reasonably large, have relatively high non-interest expenses, and are less actively involved in domestic lending and deposit collection.

Table 5 identifies the significant differences in the six performance measures between pairs of ownership groups; we discuss these briefly to highlight the salient features. Relative to government banks, foreign-owned banks have higher average returns on assets, are more cost efficient by the raw measure, and much more efficient by both relative cost and profit measures. When foreign-owned banks are compared to private banks, the only difference that is significant at better than 5% is the superior raw profit efficiency measure for private banks. Comparing government banks to private banks indicates significant superior performance, on average, by private banks according to all four efficiency measures. Finally, the impact of having an international investor is presented in the final column in which these banks are compared to all other banks in the sample. International banks have higher average returns on assets, higher average profit efficiency by either measure, and better cost efficiency using the relative measure.

In summary, banks having majority foreign ownership and banks with private ownership are unambiguously more efficient than government-owned banks. In addition, the involvement of institutional international investors is associated with significantly higher returns on assets and better efficiency, for the most part, compared to all other banks. In the next section, we use five of these performance measures, with return on equity omitted for reasons already discussed, as dependent variables in regressions containing dummy variables for years, ownership categories, and bank characteristics as

explanatory variables to investigate further the ownership effects suggested by these comparisons.

4. Competition and Ownership in Banking in Transition

Over the second half of the 1990s, foreign participation in the banking sectors of the transition countries in our sample increased dramatically as we explained earlier using data on the percentage of banking assets held in majority foreign-owned banks. Table 1 corroborates the importance of foreign bank ownership for the countries in our sample by presenting evidence on the percentage of bank-year observations in the group having majority foreign ownership in 1999. These range from 29% in Slovenia to 100% in Estonia with a mean of 59% for the entire sample. Some foreign participation is the result of strategic investors taking control of government-owned banks as the latter are privatized while some is due to greenfield operations set up by foreign parent banks. The literature suggests that foreign participation, by itself, should improve the performance of banking sectors in transition countries due partially to spillover effects (Claessens, Demirgüç-Kunt and Huizinga, 1998). Hence, we expect to find improvements in banking performance measures over time in our data.

If return on assets is used as a performance measure, improved performance requires some interpretation. The banking literature argues that increased competition leads to smaller margins, i.e., lower returns. The literature on banking in transition countries recognizes that financial performance measures are often higher, the less reformed is the banking sector and the less developed is the regulatory procedures (Fries, Neven, and Seabright, 2002). Hence, we expect to find decreases in the return on assets over time as banking sectors in our transition countries become more competitive and more developed. The coefficients on the time dummies in the regression models enable us to test the hypothesis of improvement over time for all performance measures.

The banking literature concludes that ownership matters; in particular, government ownership of banks is asserted to be less efficient than private ownership (Bonin, Mizsei, Szekely and Wachtel, 1998). The literature on banking in transition countries argues that, in the privatization process, foreign investors bring state-of-the-arts technology and human capital to domestic banks that are encumbered by the legacies of

the past centrally planned era (Buch, 1997). In addition, many foreign greenfield operations have grown quickly to become moderately sized banks in their host countries by the second half of the 1990s. Obviously, these banks use modern technology from, and rely on the human capital of, their parent banks. Hence, the literature suggests that privately owned banks should perform better than government-owned banks and that banks having a majority foreign owner should exhibit an additional performance-enhancing result.

We identify a further ownership characteristic, namely the participation of an official institutional portfolio investor, i.e., the EBRD or the IFC, or an internationally sponsored investment fund, e.g., the U.S. enterprise funds. At the beginning of the transition, the EBRD took a temporary ownership stake in several large banks during the early stages of the privatization process as the government divested itself of some portion of its ownership stake. This strategy was intended to bridge ownership transfer and to facilitate the privatization of the bank to a strategic foreign owner, who would eventually purchase the EBRD's stake. During this period, the IFC and various international investment funds also took ownership stakes in banks in transition countries but their decisions were based mainly on financial considerations.

As the transition progressed, the EBRD began to make its investment decisions on expected return rather than on promoting the development of the banking sectors in transition countries. Consequently, by the second half of the 1990s, and certainly by 1999 the year in which we measure ownership, all international institutional investors were making investment decisions based primarily on financial considerations. To some extent, these investors were attempting to cherry pick the best banks for their portfolios. On the other hand, international institutions are involved in facilitating the transfer of technology and know-how to banks in the transition countries. In addition, the participation in ownership of a high profile international institution or investment fund may confer a quality signal and, thus, enable the bank to attract better clients, to hire more highly trained personnel, and to access cheaper sources of funding.

These three possibilities, namely, cherry-picking by investors, transfer of technology, and screening, lead us to expect that banks having ownership participation of international institutional investors will be those with superior measures of performance.

However, the underlying causality is difficult to establish. The cherry-picking strategy suggests that portfolio investors look for the best banks and follow, rather than lead, high performance. The technology transfer scenario argues that international institutions promote the development of the banks in which they take an ownership stake and, thus, are partly responsible for any improved performance. The signaling effect could involve a combination of both. To investigate these two competing hypotheses, we compare the effect of having international institutional investors on bank performance using financial returns, profit efficiency measures, and cost efficiency measures. If the effects on profit efficiency and return on assets are positive and the effect on cost efficiency is not, we have evidence to support the cherry-picking explanation.

A core set of regression results for the performance measures is shown in Table 6. The explanatory variables for the regressions are dummy variables to reflect the ownership groups, a variable to reflect bank size, namely, the log of assets, and dummy variables for each year. The regressions in table 6 contain no explanatory variables to control for country-specific effects. However, average country scores are used to construct the relative efficiency scores so that these dependent variables measure a bank's efficiency relative to all other banks in its own country. In this sense, country-specific effects are taken into account in the relative efficiency regressions.

Additional explanatory variables are introduced to the regressions in table 7. GDP growth in the country in which the bank operates is included to control for country-specific effects. For the raw efficiency measures, both coefficients have the expected signs and are highly significant. In the relative efficiency regressions, the coefficients have the correct sign but are insignificant. However, since the relative efficiency measures already capture country-specific effects, this is not an unexpected result. Hence, we conclude that countries that grow faster have more efficient banking sectors. In addition, the coefficients on GDP growth are negative and highly significant in the two return-on-asset regressions, which is consistent with our interpretation of the increasing competitiveness of transition banking sectors. Hence, faster growth is associated with more developed and more competitive banking systems in these countries. This result is consistent with the literature studying the relationship between financial sector development and economic growth across countries (Wachtel, 2001).

The other additional variables in the return-on-asset regressions in table 7 are bank-specific characteristics, i.e., the ratios of both loans and deposits to assets and non-interest expenditures as a ratio of assets. The loan to asset ratio is negative but insignificant in both regressions and the ratio of deposits to assets is also negative but insignificant in the regression in column 5 of table 7. However, when non-interest expenditures are included in column 6, the coefficient of the deposits-to-assets ratio remains negative but becomes significant at the 5% level. From this regression, we conclude that banks focusing more on collecting deposits, e.g., retail banks, tend to have lower returns relative to their assets than other banks. In addition, the coefficient of the variable capturing non-interest expenditures is negative and highly significant as expected. Logically, banks having higher expenditures generate smaller returns. Regarding robustness, a comparison of column 6 in table 7 and column 2 in table 6 indicates that the inclusion of bank-specific characteristics does affect the coefficients of ownership type somewhat but that the result for international group remains significant although now at the 5% level.

Before investigating banking sector performance over time and ownership effects, we consider the impact of bank size, measured by the log of assets, on the performance measures. Taking the coefficients in the twelve efficiency regressions in tables 6 and 7, bank size has a negative and highly significant at the 1% level effect in all cases. Hence, larger banks have poorer efficiency scores. In addition, the coefficient representing bank size is negative but insignificant in the four return-on-asset regressions. Although we find no significant association between bank size and return on assets, we find strong support for the hypothesis that large banks in transition countries are less efficient.

Turning to the performance of the banking sectors over time, the coefficients for the year dummies in tables 6 and 7 are useful not only to investigate changes over time but also to infer the effects of increased foreign participation in banking sectors of transition countries because of the dramatic ownership changes during this period discussed above. These coefficients indicate differences in the performance measure from its value in the omitted year, 1996. In the four return-on-asset regressions, the coefficient for each year is negative with the largest coefficient for 1998. Of the sixteen year-dummies in these four regressions, six are significant at better than 1% and five

more are significant at the 5% level. This evidence provides strong support that the return on assets in the banking sectors is always less than its 1996 value. Hence, these banking sectors are becoming more competitive and more developed throughout the last half of the 1990s at the same time that foreign participation is increasing dramatically. Therefore, the expected relationship between increased foreign participation and improvements in banking performance is supported using the rate of return on assets as a performance measure. The improvement in returns from 1998 to 2000 may be related to the improvements in efficiency, to which we now turn.

In the three raw profit efficiency regressions, the coefficient on each year dummy is positive after 1998. Moreover, the coefficients on the dummies for the earlier years are insignificant while those after 1998 are mostly significant. Of the six post-1998 coefficients, one is significant at better than 1%, three more are significant at the 5% level, and the remaining two are significant at the 10% level. In the regression using GDP growth to proxy for country-specific effects, the coefficient is significant in both post-1998 years and highly significant in 1999. We take these results to indicate that efficiency, measured by profit, did not change in the first few years of our sample period but did improve after 1998 for banks in these transition countries.

With respect to the regressions using raw cost efficiency as the dependent variable, the year-dummy coefficients are negative in ten of the twelve cases but significant for only one year, namely, 1999 in column 3 of table 7. The two positive coefficients are for 1998 in the regressions in table 6. Although these results do not have the same statistical significance as those in the profit-efficiency regressions, they confirm the status of 1998 as the base year in which efficiency improvements in banks in these transition economies began. The results for the relative efficiency measures are less informative; the coefficients for the year dummies are all insignificant. However, these coefficients do not have the same natural interpretation as the ones in the regressions using raw efficiency scores so that this is not a troubling result. In summary, the evidence indicates that banks in these transition countries improved their efficiency after 1998 and that banking sectors were becoming more competitive throughout the second half of the 1990s.

Turning now to ownership effects, the excluded group in the regressions is banks with private domestic majority ownership along with a few observations for banks with no majority owner that are also included in this category as private banks. The results indicate that banks having majority foreign ownership, designated foreign group in the tables, are more efficient than private banks in their own countries. The six coefficients in the regressions using relative efficiency measures all have the expected sign; five are significant at the 1% level and the other one is significant at the 5% level. Furthermore, regarding robustness, the inclusion of GDP growth has virtually no effect on the size of the coefficient for foreign ownership in the relative efficiency regressions.

The same effect for foreign ownership is not observed in a similar comparison relative to private banks in all countries, i.e., using raw efficiency measures or return of assets. Nine of the coefficients in these ten regressions are insignificant. However, in the raw-cost-efficiency regression that includes GDP growth to control for country-specific effects in column 3 of table 7, the coefficient on majority foreign ownership is again significant, at the 5% level, and has the correct sign. This is consistent with the results from the relative-efficiency regressions that already account for country-specific effects in the dependent variable. Therefore, the evidence indicates strongly that majority foreign-owned banks are more efficient than private banks in their own countries; hence, we have identified a separate efficiency-enhancing effect of majority foreign ownership for banks in these transition countries.

Using similar reasoning, government owned banks, designated government group in the tables, tend to be less efficient than their private domestic counterparts. All six coefficients for government ownership in the relative efficiency regressions have the correct sign; two are significant at the 1% level, three are significant at the 5% level, and the remaining one is significant at the 10% level. In addition, the coefficient for government ownership has the correct sign and is significant in four of the six regressions using raw efficiency scores; two of these coefficients are significant at the 1% level and the other two are significant at the 5% level. Therefore, these results support strongly the hypothesis that government banks are less efficient than private banks. As in the case of foreign-owned banks, there are no significant differences between government-owned and private banks in the return-on-asset regressions, although all the signs are negative.

In summary, we conclude that majority foreign-owned banks are more, and government-owned banks are less, efficient than domestic private banks in transition countries. However, ownership does not seem to play a significant role in determining rates of return for these banks.

The ownership effects on returns to assets and on efficiency are usually quite small in size. The mean rate of return on assets for the whole sample is 0.9% and the standard deviation is 5.4%. Compared to the omitted group of private banks, foreign-owned banks have rates of return that are 0.4 percentage points higher and government-owned banks have rates of return that are 0.4 percentage points lower in the regression in column 2 of table 6; these effects are only a fraction of the standard deviation of the return on assets. Similarly the effects on profit efficiency are small. Even though the overall mean for profit efficiency is 0.89, and it is 1.0 for relative profit efficiency 1.0 by construction, the standard deviations of both profit efficiency measures are around 0.01. Relative profit efficiency in foreign-owned banks is 0.002 higher and in government banks is 0.003 lower than in private banks from column 5 in table 6; both effects are less than half of the sample standard deviation of relative profit efficiency, which is 0.008. The effects of ownership on cost efficiency are also less than the sample standard deviation of cost efficiency, which is 0.59. From the relative-cost-efficiency regressions in both tables, foreign-owned banks are about 8% more cost efficient and government-owned banks are about 10% less cost efficient than private banks; but again these effects are smaller than the sample standard deviation of relative cost efficiency, which is 0.29 or 29%. In summary, the largest ownership effects on efficiency are the deleterious effects of government ownership but even these are consistently less than one standard deviation of the respective standard deviations for this efficiency measure.

Finally, we investigate the effect of having an international institutional investor, designated as international group in tables 6 and 7. With only one exception, these banks are also majority foreign-owned so that, effectively, these two ownership characteristics can be combined in the analysis. The difference between banks having an international institutional investors and the omitted category, private banks, is given by the sum of the coefficients on foreign group and international group. The coefficient on the dummy variable for international group denotes the difference between these banks and all other

foreign-owned banks. Hence, it indicates the additional impact of having an international institutional investor.

In the return-to-asset regression and the two profit-efficiency regressions in table 6, the coefficient for international group is positive and significant at the 1% level. The difference between the return on assets for banks having international institutional investors and all other foreign-owned banks is 1.9% in column 2 of table 6, which is about one-third of a standard deviation of returns to assets. The effects on raw and relative profit efficiency are also considerably larger than the previous ownership effects as they measure about one-half of a standard deviation of the respective profit efficiency measures. In the two regressions using cost efficiency as a dependent variable, the international group dummy coefficient has the correct sign but it is significant only for relative cost efficiency and then only at the 10% level. Although banks with international institutional investors are not significantly more cost-efficient than other foreign-owned banks, all majority foreign-owned banks are considerably more cost efficient than privately owned banks.

In table 7, the international group coefficient retains its 1% significance level in both profit-efficiency regressions when GDP growth is included; it is still significant at the 5% level in the return-on-asset regression that includes all bank-specific characteristics and GDP growth in column 6. This coefficient has the correct sign but is insignificant in both cost-efficiency regressions in table 7 and is significant at only the 10% level in the other return-on-asset regression in column 5. These results indicate that the effect of international institutional investors is robust if financial returns are used to measure performance. In summary, the presence of an international institutional investor has an additional significant and large, relative to other ownership effects, positive impact on returns to assets and profit efficiency. However, having an international institutional investor does not improve cost efficiency to any significant degree.

Our findings that better profit efficiency and higher returns on assets are associated with the participation of international institutional investors in majority foreign-owned banks in these transition countries is consistent with the hypothesis that these investors are seeking financial returns on their investments. Moreover, our evidence indicates that these international institutions are no better than other foreign investors in

bringing cost efficiencies to banks. Since international institutional investors do seem to be able to choose banks with higher financial returns and more profit efficiency, we find more support for the cherry-picking hypothesis than for the technology-transfer hypothesis.

5. Conclusions

Our empirical results, coupled with the stylized fact that foreign participation in banking in these eleven transition countries has increased dramatically in the second half of the 1990s, indicate that foreign bank entry has generated more efficient and more competitive banking sectors in transition countries. In addition, the higher is GDP growth in a country, the more developed is its banking system; this result is found commonly in multi-country comparisons. For individual banks in these transition countries, private banks are more efficient than government-owned banks as expected. Furthermore, retail banking generates somewhat lower returns than other activities. Hence, banking sectors in transition economies are beginning to resemble those in other emerging and developing countries, except that the foreign presence is unusually high in transition countries.

The type of private ownership matters; majority foreign-owned banks are more efficient than their private domestic counterparts. Participation of international institutional investors also matters. Banks with such investors have higher returns on assets and are more efficient by profit measures than other foreign-owned banks. However, these banks do not exhibit significantly better cost efficiency than their counterparts. Hence, we conclude that international institutional investors are more interested in cherry-picking banks with high financial performance than in facilitating the transfer of new technology and modern banking practices.

Larger banks in these transition countries are unambiguously less efficient. Since the largest banks in many of these countries are the government specialty banks from the previous bureaucratically managed period, this result is not surprising. However, it does suggest that the legacies of the old regime still have persistent effects in these transition countries. To explore this possibility further, we could exclude the Baltic countries because their Soviet legacies are somewhat different from the legacies in the other

countries. Thus, a comparison of results with and without the Baltic countries could prove informative. Moreover, many of these large specialty banks and most of the large government banks created to institute a proper two-tier banking system have been privatized to strategic foreign investors. However, these banks are combined with foreign greenfield banks set up by parent banks from other countries in the category majority foreign-owned. Separating out banks with strategic foreign owners who acquired their stakes during the privatization process and comparing the results with those in this paper could yield important insights into the performance benefits of privatization. However, these extensions are left for future work in which we add more institutional information about the banking systems and provide detailed histories of individual banks.

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Table 1
Frequency Distributions by Country

	TOT- AL	BULG- ARIA	CZECH REP.	ESTONIA	CROA- TIA	HUNG- ARY	LATVIA	LITHUA- NIA	POLAND	ROMAN- IA	SLOVEN- IA	SLOVA- KIA
Total Number of Banks	220	18	24	3	30	30	20	8	33	19	18	17
Total Number of Observations	830	68	86	14	122	115	70	25	135	49	76	70
Observations by Year												
1996	126	6	15	2	20	20	11	2	23	1	13	13
1997	164	13	19	3	26	23	13	5	25	5	17	15
1998	180	15	19	3	26	22	15	5	29	14	15	17
1999	173	17	16	3	24	23	15	5	29	14	15	12
2000	187	17	17	3	26	27	16	8	29	15	16	13
Ownership: Percent of observations with majority ownership:												
Foreign	58.91	58.82	81.40	100.00	31.15	86.09	34.29	76.00	63.70	55.10	28.95	71.43
Government	9.63	11.76	9.30	0	12.30	5.22	10.00	0.00	7.41	12.24	13.16	14.29
Private	31.44	29.41	9.30	0	56.56	8.70	55.71	24.00	28.89	32.65	57.89	14.29
Ownership: Percent of observations with ownership interest from:												
International Organization	9.87	26.47	11.63	35.71	13.11	4.35	0.00	4.00	5.19	22.45	0.00	12.86

Table 2
Descriptive Statistics

	Mean	Standard Deviation	Minimum	Maximum
Return on Assets	0.0091	0.0542	-0.3793	0.6561
Return on Equity	0.0529	0.4434	-4.0000	2.2791
Loan to Asset Ratio	0.4254	0.1673	0.0249	0.9546
Deposit to Asset Ratio	0.7623	0.1268	0.0145	0.9308
Noninterest Expenditure to Asset Ratio	0.0689	0.0562	0.0106	0.7207
Total Assets (000s \$)	1,029,419	2,223,325	9,712	16,669,837
GDP Growth	0.0320	0.0334	-0.1090	0.1060
EFFICIENCY MEASURES				
Raw Profit	0.89	0.0106	0.8369	0.9222
Raw Cost	0.4337	0.5982	0.0675	6.9176
Relative Profit	1.0000	0.0083	0.9513	1.0357
Relative Cost	1.0000	0.3000	0.4740	4.2650

Table 3
Means of Return on Assets and Raw Efficiency Scores by Country and by Year

BY COUNTRY	TOTAL	BULG- ARIA	CZECH REPUBLIC	ESTONIA	CROA- TIA	HUNG- ARY	LATVIA	LITHUA- NIA	POLAND	ROMAN- IA	SLOVE- NIA	SLOVA -KIA
Cost Efficiency	0.4337	0.5436	0.4185	0.3215	0.4015	0.4941	0.2428	0.3519	0.3762	0.9499	0.2321	0.5133
Profit Efficiency	0.8905	0.9014	0.8863	0.8966	0.8942	0.8832	0.9028	0.9001	0.8859	0.8822	0.8936	0.8850
ROA	0.0091	0.0541	-0.0130	0.0055	0.0019	0.0066	0.0083	0.0026	0.0140	0.0132	0.0114	-0.0012
BY YEAR	1996	1997	1998	1999	2000							
Profit Efficiency	0.8894	0.8905	0.8885	0.8919	0.8920							
Cost Efficiency	0.4838	0.4290	0.5218	0.3756	0.3730							
ROA	0.0220	0.0189	-0.0044	0.0064	0.0078							

Table 4
Characteristics by Ownership Group

	Majority Foreign (479)	Majority Government (80)	Majority Private (261)	International Participation (82)
	1	2	3	4
Return on Assets	0.0118	0.0004	0.0070	0.0273
Return on Equity	0.0818	-0.044	0.0283	0.1266
Efficiency Measures				
Raw Cost Efficiency	0.4005	0.7034	0.4133	0.4180
Raw Profit Efficiency	0.8887	0.8868	0.8934	0.8931
Relative Cost Efficiency	0.9463	1.1654	1.0069	0.9475
Relative Profit Efficiency	0.9999	0.9954	1.0001	1.0003
Balance Sheet Ratios				
Log of Total Assets	13.058	13.301	11.895	13.404
Loan to Asset Ratio	0.4370	0.3339	0.4317	0.4198
Deposit to Asset Ratio	0.7763	0.7399	0.7433	0.7526
Non-interest Expenditure to Asset Ratio	0.0604	0.0802	0.0813	0.0687

Note: In Cost Efficiency estimates, the lowest score represents the most cost efficient where as in Profit Efficiency estimates the higher number represents the most profit efficient.

Table 5
Significance levels for t tests and (p-value) for difference in means across ownership groups

	Majority Foreign versus Majority Government	Majority Foreign versus Majority Private	Majority Government versus Majority Private	International Participation versus Others
Table 4 columns	(1) – (2)	(1)- (3)	(2)- (3)	(4)- Others
Return on Assets	2.00 (0.0475)#	1.14 (0.2568)	-1.06 (0.2900)	2.43 (0.0173)#
Return on Equity	1.47 (0.1461)	1.59 (0.1157)	-0.81 (0.4212)	1.48 (0.1419)
Cost Efficiency	-2.85 (0.0055)#	-0.29 (0.7695)	2.64 (0.0096)#	-0.430 (0.6663)
Profit Efficiency	1.89 (0.0612)+	-4.87 (0.0001)*	-4.20 (0.0001)*	2.31 (0.0231)#
Relative Cost Efficiency	-5.49 (0.0001)*	-1.75 (0.0799)+	2.86 (0.0052)#	-2.54 (0.0123)#
Relative Profit Efficiency	4.46 (0.0001)*	0.85 (0.3955)	-4.02 (0.0001)*	2.56 (0.0121)#

Note: *, #, and + indicate statistical significance of the parameters at 1, 5, and 10 percent significance level respectively.

Table 6
OLS Regressions for Performance Measures

Dependent Variable: Variables	Return on Assets		Raw Profit Efficiency		Relative Profit Efficiency		Raw Cost Efficiency		Relative Cost Efficiency	
	1	2	3	4	5	6	7	8	9	10
Intercept	0.028 (0.017)	0.033 (0.017)+	0.9263 (0.003)*	0.927 (0.003)*	1.017 (.003)*	1.018 (0.002)*	-0.0977 (0.192)	-0.0983 (.192)	0.5434 (.9491)*	0.6773 (.1034)
Foreign Group	0.0062 (0.0044)	0.004 (0.004)	-0.0004 (0.0008)	-0.001 (0.001)	0.0022 (.0007)*	0.001 (.0006)#	-0.0643 (0.0484)	-0.0640 (0.0492)	-0.0826 (0.024)*	-0.0766 (.0242)*
Government Group	-0.0047 (0.0071)	-0.004 (0.007)	-0.0026 (0.001)#	-0.002 (0.001)+	-0.0028 (.0011)*	-0.002 (0.001)#	0.2273 (.0781)*	0.2272 (.0782)*	0.1042 (.039)*	0.0706 (.0394)+
International Group		0.019 (0.006)*		0.005 (0.001)*		0.002 (.0001)*		-0.0024 (0.0710)		-0.0592 (.0352)+
Log of Assets	-0.0007 (0.0014)	-0.001 (0.001)	-0.0028 (.0002)*	-0.002 (.0002)*	-0.0014 (.0002)*	-0.001 (.0002)*	0.0467 (.0151)*	0.0467 (.0152)*	0.0386 (.0075)*	0.0480 (.0079)*
1997	-0.003 (0.006)	-0.003 (0.006)	0.0004 (0.0011)	-0.0005 (0.001)	-0.0003 (0.0009)	-0.0002 (0.0009)	-0.0454 (0.0697)	-0.0454 (0.0697)	0.0083 (0.0345)	0.0084 (0.0343)
1998	-0.027 (0.006)*	-0.026 (0.006)*	-0.0012 (0.0011)	-0.001 (0.001)	-0.0002 (0.0009)	-0.0001 (0.0009)	0.0426 (0.0683)	0.0426 (0.0684)	0.0054 (0.0339)	0.0119 (0.0337)
1999	-0.016 (0.006)#	-0.015 (0.006)	0.0022 (.0011)+	0.002 (0.001)+	-0.0002 (0.0009)	-0.0001 (0.009)	-0.1058 (0.0689)	-0.1058 (0.0690)	0.0042 (0.0341)	0.0124 (.0341)
2000	-0.015 (0.006)#	-0.014 (0.006)#	0.0024 (.0011)#	0.002 (0.001)#	-0.0002 (0.0009)	-0.0001 (0.0009)	-0.1063 (0.0678)	-0.1063 (0.0678)	0.0055 (0.0336)	0.0176 (0.0336)
Adjusted R ²	0.0258	0.0349	0.1795	0.1993	0.0803	0.0881	0.0349	0.0338	0.0579	0.0716
F-Statistics	4.14*	4.75*	26.91*	30.57*	11.34*	11.01*	5.29*	4.62*	8.28*	7.39*
Number	830	830	830	830	830	830	830	830	830	830

Note: *, #, and + indicate statistical significance of the parameters at 1, 5, and 10 percent significance level respectively. Std. Error in the parenthesis.

Table 7
Additional Performance Regressions

DEPENDENT VARIABLE: Variables	Raw Profit Efficiency	Relative Profit Efficiency	Raw Cost Efficiency	Relative Cost Efficiency	Return on Assets	
	1	2	3	4	5	6
Intercept	0.927 (0.003)*	1.018 (0.002)*	-0.110 (0.186)	0.532 (0.095)*	0.040 (0.018)#	0.105 (0.020)*
Foreign Group	-0.001 (0.001)	0.001 (0.0006)*	-0.094 (0.047)#	-0.078 (0.024)*	0.001 (0.004)	-0.001 (0.004)
Government Group	-0.001 (0.001)	-0.002 (0.001)#	0.174 (0.076)#	0.099 (0.038)#	-0.009 (0.007)	-0.007 (0.006)
International Group	0.006 (0.001)*	0.002 (0.0009)*	-0.080 (0.069)	-0.050 (0.035)	0.012 (0.006)+	0.013 (0.006)#
Log of Assets	-0.003 (0.0002)*	-0.001 (0.0002)*	0.064 (0.014)*	0.041 (0.007)*	0.0001 (0.001)	-0.001 (0.001)
Loan to Assets	-	-	-	-	-0.005 (0.011)	-0.008 (0.011)
Deposits to Assets	-	-	-	-	-0.017 (0.015)	-0.031 (0.015)#
Non-interest Expenditure to Assets	-	-	-	-	-	-0.268 (0.037)*
GDP Growth	0.0006 (0.0001)*	0.0001 (0.0001)	-0.047 (0.006)*	-0.002 (0.003)	-0.003 (0.0001)*	-0.005 (0.001)*
1997	-0.0003 (0.001)	-0.0002 (0.0009)	-0.030 (0.067)	0.008 (0.034)	-0.002 (0.006)	-0.001 (0.006)
1998	-0.0004 (0.001)	-0.0001 (0.0009)	-0.008 (0.66)	0.002 (0.034)	-0.030 (0.006)*	-0.030 (0.006)*
1999	0.003 (0.001)*	-0.0001 (0.009)	-0.202 (0.068)*	-0.001 (0.034)	-0.023 (0.006)*	-0.025 (0.006)*
2000	0.002 (0.001)#	-0.0001 (0.0009)	-0.088 (0.065)	0.006 (0.033)	-0.013 (0.006)#	-0.014 (0.005)#
Adjusted R ²	0.2401	0.0890	0.0944	0.0585	0.0742	0.1273
F-Statistics	30.11*	10.00**	10.60*	6.72*	7.04*	11.07*
Number	830	830	830	830	830	830

Note: *, #, and + indicate statistical significance of the parameters at 1, 5, and 10 percent significance level respectively. P-value is in parenthesis.

In Cost Efficiency estimates, the lowest score represents the most cost efficient where as in Profit Efficiency estimates the higher number represents the most profit efficient.