

Ownership Restrictions and Economic Performance: The Case of Korean Banks

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I. Introduction

The property rights theory of the firm suggests that well-specified ownership rights ensure efficient and profitable operations of enterprises. The attenuation of ownership rights in public enterprises reduces the incentives of managers to minimize costs (Alchian 1965, 1977). Public enterprises thus perform less efficiently and less profitably than private enterprises.¹ Although there is controversial empirical support for this theory in the early literature,² this is a very appealing approach to the behavior of firms and still a challenging topic in economics.

Recently, Ehrlich et. al. (1994) analyzes panel data on 23 international airlines of different ownership types over the period 1973-83 in a dynamic model. They show that private enterprises perform much better than public enterprises in terms of the long-run annual rate of productivity growth (or cost decline). More recently, Kumbhakar and Hjalmarsson (1998) finds evidence that privately owned companies in Swedish retail electricity distribution are relatively more efficient, by constructing hedonic measures of physical output and output quality and network characteristics, during 1970-1990. Bartel and Harrison (1999) shows that public sector enterprises are inefficient because

¹ The public choice theory also suggests that the public sector perform less efficiently than the private sector (Buchanan and Tullock 1962; Niskanen 1975; Shapiro 1975; Tullock 1965). In contrast, Liebenstein (1966) argues that monopolies are likely to be X-inefficient, regardless of ownership. However, De Alessi (1983) supports the property rights theory criticizing Liebenstein's X-inefficiency argument.

² Some studies find results going in favor of private enterprises (Crain and Zardkoohi 1978; Davies 1977; Pelzman 1971), others find the reverse (Bruggink 1982; Meyer 1975), and yet others find the results with no statistically significant differences (Atkinson and Halvorsen 1986; Feigenbaum and Teeple 1983; Mann 1970). For more information about this comprehensive, see Boardman and Vining (1989).

of the environment in which they operate, rather than due to public ownership per se, using 1982-1995 panel data on manufacturing firms in Indonesia. The operation of a soft budget constraint was important. Also, Laporta et. al. (2000) indirectly supports the property right theory of firms, showing that government ownership of banks retards financial and economic development by analyzing large banks in 92 countries.

One implication of the property right theory of firms is that privately owned and managed banks perform better than government controlled banks that are owned by a broad sector of the public. This paper presents a test of the hypothesis with the data from Korean banking industry. The private ownership and management of banks are heavily restricted in Korea. A Korean national cannot hold more than 4 percent of total shares of nationwide commercial banks. Since the ownership and management of the national banks are restricted,³ the government becomes *de facto* their owner and virtually manages them. Under the environment, the banks are exposed to making large politically imposed loans. This is a factor alleged to have contributed to the financial crisis in 1997. The proponents of public (or state) ownership of banks argue that it helps overcome market failures due to information asymmetry and to better direct scarce capital to highly productive projects. However, the ground of the market failure explanations is not firmly established.⁴ Moreover, the industrial policy directing funds to priority projects results in misallocation of resources.⁵ It thus is meaningful to decide

³ Demsetz (1983) shows that there is no relation between ownership structure and profit. However, his result is relevant to the market environment with no government intervention.

⁴ In U.S. experience Rolnick and Weber (1984) found no evidence of any contagion effects from bank runs during the "free-banking" era (1837-1860). Reviewing the national banking era (1863-1913) Kaufman (1988) demonstrated that the evidence of contagions in the panics of 1878, 1893, and 1908 is weak except for 1893. Wicker (1980) found that the contagion effects had been limited regionally during the "Great Contraction" of 1930-1933, and that prior to 1932 the runs were confined for the most part to banks suffering from pre-run insolvency or to banks affiliated with insolvent firms.

⁵ Korea experienced that industrial policies of the 1960s that favored chemical and heavy industry seriously

which is the better institutional arrangement between privately owned and publicly owned banking systems. In addition, by giving some implication which institutional arrangement creates more moral hazard problem, this study will provide an answer for the fundamental reason of the financial crisis in Korea in 1997.⁶

Our study differs from the existing literature in several aspects. First, most of the evidence has compared the performance of public (or mixed) and private firms in some specific industries, such as electric and water utilities, fire services, refuse collection, railroads, and airlines. No study attempted to compare the performance between the publicly, widely own and government controlled firms and private managed firms. Second, studies explicitly testing the effect of ownership in the banking industry are rare. Works by Davies(1981) and by Lewin(1982) are exceptions that test for ownership “effects”.⁷ Davis (1981) finds that privately owned banks have better performance than publicly owned counterparts, while Lewin (1982) finds no significant difference between them.⁸ Third, and most important, we explicitly include the politically imposed loan to evaluate the relative performance between two different ownership-typed banks.

The remainder of the paper is organized as follows. Section II contains a brief overview of Korea banking system. Section III contains a simple model for economic performance linked to manager’s behavior. Section IV discusses the estimation

misallocated real and financial resources. It created overcapacity in those industries and denied resources to medium and small businesses.

⁶ Barth et. al (2000) finds that the likelihood of a banking crisis is greater, the tighter the restrictions placed on bank ownership of nonbanking firms, investigating banks in 60 countries.

⁷ Laeven (1999) does not compare the relative efficiencies between private-owned banks and government-owned banks , but shows that the family-owned and company-owned banks in East Asia took more risk than the foreign –owned banks.

⁸ The two studies just employed a simple statistical test without implementing a serious econometric test.

methodology and the data. Section V presents the empirical results. Section VI presents the summary and conclusions.

II. An Overview of the Korean Banking System

A few large banks with extensive branch networks dominate the commercial banking sector in Korea. As of June 1999, there are eleven nationwide commercial banks in Korea.⁹ Two are owned by dominant shareholders: the Shinhan Bank and the Koram Bank. Nine banks are widely owned: the Korea Exchange Bank, the Hanvit Bank, The Kookmin Bank, the Chohung Bank, the First Bank of Korea, the Seoul Bank, and the Hanna Bank, the Housing Bank of Korea and the Peace Bank.¹⁰ The total number of domestic branches of nationwide commercial banks amounts to 4,174. Those eleven commercial banks hold approximately 85 percent in the total assets of commercial banks.

In Korea, the government traditionally owned the large nationwide commercial banks and directed them to provide priority to strategic sectors and industries with subsidized credit. Prior to 1980, the government, owning commercial banks, had not only exercised

⁹ There also are six local commercial banks. The local banks' business area was restricted to specific cities until November 1998. The shareholding ratio that an individual can hold for a local bank is limited up to 15%.

¹⁰ There were only five commercial banks until the end of 1970s: the Commercial Bank of Korea, the Chohung Bank, the Hanil Bank, the First Bank of Korea, and the Seoul Bank. After financial liberalization and restructuring from 1980, eleven new commercial banks entered the sector and there were sixteen commercial banks in total at the end of 1997. The eleven new banks were Shinhan Bank(1982), Koram Bank(1983), Dongwha Bank(1989), Dongnam Bank(1989), Daedong Bank(1989), Hana Bank(1991), Boram Bank(1991), Peace Bank(1992), Korea Exchange Bank(1989), Kookmin Bank(1995), and Housing Bank of Korea(1997). After Korean financial crisis, the number of banks was reduced from sixteen to the eleven banks listed in the text. Boram bank was absorbed into Hana Bank, three banks (Dongwha Bank, Daedong Bank, and Dongnam bank) were sold, and Commercial bank and Hanil Bank were merged into Hanvit Bank.

strong influence in appointment of top managers, but also supervised the budget, organization and business activities of banks. The government privatized financial institutions in an attempt to move toward private sector-oriented management of economy. After privatization of the banks over the period from 1981 to 1983, an individual was allowed to take minority stakes in banks of up to 4%. The primary reason for this restriction was to prevent the large business groups, *chaebols*, from owning and controlling the banks. Because of this restriction the large nationwide Korean banks became widely owned. During the privatization, on the other hand, the government allowed foreigners entry into the banking system, and thus two new nationwide non-Korean owned banks were established in each of which a single individual was a substantial shareholder.¹¹ Since then, two types of banks, government-controlled bank (GCB) and the privately controlled bank (PCB), have operated in the Korea banking system.

Despite the privatization of the commercial banks, the government continued to influence bank operations ranging from credit allocation policies to the selection of top management. Currently, to become a president of a bank, a person has to be recommended by a board of non-standing directors and approved by Financial Supervisory Commission.¹² The board of non-standing directors is composed of those recommended by stockholder representatives (70%) and those recommended by the board of directors (30%). On the surface, the influence of the government seems to be

¹¹ They are Shinhan Bank and Koram Bank. The Shinhan Bank and the Koram Bank were established in 1982 and 1983 respectively. The major shareholder of Shinhan Bank and Koram Bank is a Japanese-Korean(26.25%) and an American(30.69%) respectively.

¹² Previously, instead of the board of non-standing directors, a commission for the recommendation of president recommended a president candidate.

ruled out. Yet, in practice, the government overrules out the board of non-standing directors and appoints and dismisses the presidents of banks. Evidences for such government interference are easily found in various sources. Here is an example:

"On June 3, the selection of presidents of banks was announced in major daily newspapers as if the reshuffling of the cabinet is announced. Such an announcement of the government, which stated that it wants to respect the autonomy of banks to the maximum degree, provoked a skeptical view in the banking industries that 'the will of the government to financial autonomy is doubtful.' The resistance from the banking industry was unexpectedly strong. Though the selection of president was a hot issue during the month of June, the intentions of the government were implemented except in Koram Bank, whatever the repercussions of the president selection were in June. This is because, among the commercial banks concerned, i.e., Seoul Bank, Foreign Exchange Bank and Koram Bank, only the Koram Bank had major shareholders as members of non-standing directors" (Bank World, July 1997).

On the other hand, GCBs and PCBs operate in the same regulatory environment. Both GCBs and PCBs are subject to the same reserve requirement and interest policies. A total amount of payment guarantee for a bank cannot exceed 20 times of net worth. A bank cannot lend more than 15 percent of net worth to a single person or a single corporation. Nor it can possess more than 15 percent of other company's shares. Bank cannot invest more than 10 percent of net worth in debenture or other securities and bonds with more than three years' maturity. It cannot possess real estate other than that required for business. In addition, all banks have access to the discount window of the Bank of Korea, Korea's central bank. They also are provided with the deposit insurance

through the Korea Deposit Insurance Corporation.¹³

III. A Simple Model

Banks are assumed to invest illiquid loans L , and nonearning cash assets, R . Loans yield a return, r_L . All assets are financed by deposits. The balance sheet is given by $D = R + L$. It is assumed that both loans and deposits require labor inputs, but reserves do not. Reserves will be assumed to be equal to the required reserve ratio times D . Banks are also assumed to be price-takers in labor markets with w being the price per unit of N . The profit of a bank will be given by

$$\pi = r_L L - r_D D - wN \quad (1)$$

For analytical convenience, the bank technology is assumed to exhibit constant returns with

$$L = gN, \quad g > 0, \quad (2)$$

$$D = hN, \quad h > 0, \quad (3)$$

Banks are assumed to be price-makers in loan markets, in which the loan demand is given by

$$r_L = a - bL, \quad a, b > 0 \quad (4)$$

The banks, however, are assumed to be price-takers in deposit markets with the rate r_D on deposits.¹⁴ The bank's problem is then to maximize profits π , subject to the

¹³ Before the Corporation was in place in 1997, the government played the implicit deposit insurer.

¹⁴ In Korea, there are about 5,800 nonbank depository institutions. Thus, the deposit market of Korea can be defined as competitive.

technology and demand.

$$\max_{L,D} \pi = r_L L - r_D D - w N \quad (5)$$

$$\text{s.t. } L = g N$$

$$D = h N$$

$$r_L = a - bL$$

If a private owner himself manages his own bank, he would try to maximize his own profit and be careful in making decision because of his large stake. The more the amount of his own wealth he invests, the larger his stake and the greater his concern in making decision. If he does not manage a bank by himself, he motivates managers to maximize his wealth by linking the managers' pecuniary income streams with the profits of the firm. The manager then has the incentive to invest more of his own time and effort in the bank. Such managerial behavior would yield an increase in the profits and secure the survival of the firm in the long run. Thus, we assume that if the manager attempts to maximize the owner's profit, he would allocate all employed labor into the production process. However, managers have an incentive to allocate a part of the employed labor in pursuing his private objectives other than maximizing the owner's wealth.¹⁵ We assume that the independent private reward function is:

$$Z(N) = k N, \quad k \geq 0. \quad (6)$$

Then, the objective function is modified, as follows:

¹⁵ As De Alessi (1974) notes, the managers in GCBs can insure himself against the risk of personal loss by investing organizational funds in larger staffs in making decisions.

$$V = (1 - \mu)\pi + \mu Z(N) \quad (7)$$

where μ is the weight assigned to manager's private objectives. It is more likely that μ is lower in PCB than in GCB. As Alchian (1965, 1977) emphasizes, the crucial difference between PCB and GCB lies in the impossibility of transferability of controlling ownership in the latter. Since ownership in the GCBs is widely dispersed, ownership rights in the GCBs are not effectively transferable through market. The nontransferability of ownership in GCBs mitigates the advantages from specialization in ownership, and inhibits the capitalization of future market consequences into their current property right in the bank (De Alessi 1980). As Jensen and Meckling (1976) argues, the attenuation of ownership rights may also be a serious problem in private, management-controlled firms. However, the managerial behavior of the private, management-controlled firms can be constrained by the market for corporate control and the market-oriented internal control mechanisms (Denis et. al. (1997). Thus, the PCBs are more exposed than the GCBs to the discipline of the market, and PCB managers are more inhibited from making those choices which lower the wealth of the owners. For convenience we assume that under PCBs $\mu = 0$.

In addition, the managers of GCBs, particularly those having a strong relationship with politically influential people, can survive and even prosper in the presence of persistent deficits and significant economic losses.¹⁶ The managers thus concern themselves with the intentions of politically powerful persons and pursue their private interests rather than setting the maximization of profits and owner's wealth as primary

¹⁶ De Alessi (1974) shows that managers in public firms enjoy longer job tenure than their counterparts in private firms since a managerial conduct in public firms is subject to less discipline by owners, analyzing the tenure of managers in public and private electric utilities in the United States.

goals.¹⁷ Moreover, they may satisfy politically imposed objectives or constraints, such as support to ill-managed companies, provision of policy loans and political decision over the loans of large amount.¹⁸ It will be assumed that the level of political loans, L_p , is imposed on the GCB. Since the politically imposed loans do not reflect the risk-return relationship, it is plausible to assume that the effective interest rates on the politically imposed loans are lower than those on commercial loans,

$$r_p = \bar{r}_p < r_L. \quad (8)$$

We also assume that producing the politically imposed loans requires a certain amount of labor and its specification is:

$$L_p = sN. \quad (9)$$

Then, the objective function of GCB will become:

$$\max_N V_G = (1 - \mu)(r_L L_c + r_p L_p - r_D D - wN) + \mu Z \quad (10)$$

$$\text{s.t. } L_c = g'N, \quad g > 0$$

¹⁷ The large amount loaned to the Hanbo Steel Company, which was the trigger company of causing Korean financial crisis in 1997, was made without rigorous examination of the projects because bank managers were subject to political pressure.

¹⁸ The loans to Hanbo Steel Company made by the First Bank of Korea, Chohung Bank, and Industrial Bank increased leaps and bounds annually since 1993. Loans by Industrial Bank showed an increase rate from a previous year by 416.7 %, 167 %, and 176.5 % in 1994, 1995, and 1996, respectively. The amount of loans by each of three banks were not big at the beginning, but increased enormously in a short period. In the case of Chohung Bank, the loans to Hanbo Steel Company increased 700 times, from 700 million won in 1993 to 496.1 billion won, at the end of 1996. The loans by the First Bank of Korea showed an increase of 43 times between the end of 1993 and the end of 1996 to reach one trillion won and the amount of loans exceeded the net worth of 820 billion won (as of December, 1996). As a result of such non-performing loans, the total amount of insolvent loans in financial institutions reached 68 trillion won (Bank of Korea, "Bank Management Statistics," various issues and report materials). If we add the loans which are on the warning notice to non-performing loans, unsound loans approach 118 trillion won.

$$L_p = sN, \quad s \geq 0$$

$$D = hN, \quad h > 0$$

$$Z = kN, \quad k > 0$$

$$r_L = a - bL_c, \quad a, b > 0$$

$$r_p = \bar{r}_p < r_L$$

The first-order condition is:

$$\frac{dV_G}{dN} = (1 - \mu) \{ ag' - 2bg'^2 N + \bar{r}_p s - r_D h - w \} + \mu k = 0 \quad (11)$$

The first two terms in the brace represents the marginal revenue from additional private loans when employment is expanded. The third term in the brace, $\bar{r}_p s$, represents the marginal revenue from additional political loans. The fourth term and fifth term in the brace represent the marginal interest cost of additional deposits and the marginal cost of additional labor inputs. The last term of (11) represents the marginal benefit from additional private activity. The second order condition for a maximum is satisfied.

Solving (11),

$$N_G^* = \frac{ag' + \bar{r}_p s - r_D h - w + \left(\frac{\mu}{1-\mu}\right)k}{2bg'^2} \quad (12)$$

Corresponding to the employment, the costs of GCBs will be:

$$C_G^* = r_D h N_G^* + w N_G^* \quad (13)$$

To get the effect of the political loans and the private activity on the cost, we take the partial derivatives of the cost with respect to s and μ , respectively, and then

$\frac{\partial C_G^*}{\partial s} > 0$ and $\frac{\partial C_G^*}{\partial \mu} > 0$. This means that both the political imposed loans and the private activity increase the cost. Now, the profit of GCB will be:

$$\pi_G^* = r_L L_c + \bar{r}_p L_p - r_D D - wN_G^* = r_L g' N_G^* + \bar{r}_p s N_G^* - r_D h N_G^* - wN_G^* \quad (14)$$

For convenience, we assume that $L = L_c + L_p$, and then $g' = (g - s)$ will be. Then, when $\mu = 0$ and $s = 0$, it becomes the profit maximization case of PCB. From (12), therefore, the optimal employed amount of labor of the profit maximizing PCB will be obtained

$$N^* = \frac{ag - r_D h - w}{2bg^2} \quad (15)$$

Corresponding to this employment, the costs and profit of PCBs becomes

$$C^* = r_D h N^* + wN^* \quad (16)$$

$$\pi^* = r_L g N^* - r_D h N^* - wN^* \quad (17)$$

To compare the employed labors, costs, and profits between GCBs and PCBs, we can arrange (12), (13), and (14) as (18), (19), and (20) respectively.

$$N_G^* = N^* + \phi \quad (18)$$

where $\phi = \frac{1}{2bg^2} (\bar{r}_p s + \frac{\mu}{1-\mu} k)$. Also,

$$C_G^* = C^* + \phi(r_D h + w) \quad (19)$$

$$\pi_G^* = \pi^* - (r_L - \bar{r}_p) s N^* - ((r_L - \bar{r}_p) s + r_D h + w) \phi + (r_L g) \phi \quad (20)$$

The second term in (18) is always positive. Thus, we can infer that there is the overemployment in GCBs. It is very similar to the Averch and Johnson (1962) effect

such that there is overcapitalization in the firms subject to a rate of return regulation. The overemployment in GCBs has two sources: one is due to the manager's pursuit of his private objectives, and the other results from the politically imposed loans. This implies that the more the private pursuit and the higher the degrees of the political imposition, the more the labor input are hired.

From (19), we can notice that the operating costs of GCBs are larger than those of the PCBs. From (20), we can notice at glance the profits of GCBs are either larger or smaller than the PCBs' profits. However, Since ϕ is very small relative to N^* in fact, the effect of overemployment on the commercial loan production, $r_L g \phi$ is not likely to be greater than the reduced effect of political loans on income and the increasing effect of overemployment on cost, $(r_L - \bar{r}_p) s N^* + ((r_L - \bar{r}_p) s + r_D h + w) \phi$. Thus the GCBs' profits is likely to be smaller than the PCBs' profits, although it is empirical question. Using general cost and profit functions, we can express this relative efficiency of PCBs over GCB, as follows:

$$\begin{aligned} C_{PCB}(w, y, z) &< C_G(w, y, z) \\ \pi_{PCB}(w, y, z) &> \pi_G(w, y, z) \end{aligned} \tag{21}$$

where C measures variable costs of each bank, π is the profits of each bank, w is the vector of prices of variable inputs, y is the vector of quantities of variable outputs, and z indicates a set of other variables that may affect performance.

In sum, we can make several theoretical conclusions. First, there is overemployment in GCBs. Second, both manager's private activity and the political loans cause deleterious effects on the bank performance. Third, the PCBs are more efficiently operated than the GCBs in terms of costs and profits.

IV. Empirical Implementation

1) Data and Variables Used

Our empirical data consists of a panel of seven nationwide commercial banks of different ownership types over the period 1987-97. Because some banks were recently entered into the commercial banking sector and many banks were absorbed or sold out after the financial crisis in 1997, they cannot provide sufficient data. We thus consider the observation period from the year (1987) that it is available to collect data to the year (1997) when the financial crisis occurred.¹⁹ The banks relevant to this period are five government controlled banks (the Commercial Bank of Korea, the Chohung Bank, the Hanil Bank, the First Bank of Korea, and the Seoul Bank, which had operated from before 1980), and two privately controlled banks (the Shinhan Bank and the Koram Bank).

Employing this data set and relevant econometric techniques, we pursue the basic objectives stemming from our preceding analysis; (a) PCBs is relatively efficient over the GCBs in terms of total costs; (b) the political influence, resulting from the lack of ownership, severely aggravates costs of banks.

Table 1 describes the variables used in the cost function. The variable outputs, y , include consumer loans, business loans, and securities. The variable input prices, w , include the interest rates on borrowed funds and the price of labor. The Interest costs are

¹⁹ Bank of Korea published *Bank Management Statistics* from 1990 and it provides time series data from 1987.

the average interest rate of various deposits. The price of labor is obtained by dividing staff expenses by total number of employees (excluding CEOs).

The effect of the political influence on bank performance will be included in the cost function. The measurement of this political influence variable, B , is crucial work in this paper. In our previous analysis we hypothesized that if there is no dominant shareholder, then the principal-agent problems and the political influence on banks becomes larger. Based on this hypothesis, we thus use the political influence variable as B , where B is the index of politically imposed loans, by proxy.

To measure B we consider two possible proxies. Another possible proxy could be the ratio of bad loans to loan loss reserves. The more banks involved in political loans, the more failure of loan may be experienced. It is because the political banks are less likely to manage risk properly and be efficient. Also, if banks involved in political loans, banks may attempt to make loan loss reserves small, since they expect benefits or some protects from government of political influential person. Accordingly, we can assume that the ratio of bad loans to loan loss reserves is positively related to politically imposed loans. Another is the ratio of bad loans to the total loans. We also can assume that the ratio of bad loans to total loans is proportional to politically imposed loans.

Large old banks may have higher profits for given set of prices because of the size they gained over period of decades, but than new banks cannot achieve in the short-run. We normalize total costs and output variables by equity. Normalization by equity can reduce this scale bias.²⁰

Statistics of both data used in estimations of the cost function and major bank

²⁰ Capital may be an important variable to affect the bank performance. But, since we did not consider it in the theoretical framework, it will be ignored in this paper.

performance indicators are summarized in Table 2. It is found that, although total costs and output quantities, normalized by equity, and input prices of GCBs are much higher than those of PCBs, both returns on assets either including or excluding trust accounts and returns on equity of GCBs are much lower than those of PCBs. Thus, GCBs could not obtain benefits from the economy of scale or the experienced management skills, though GCBs are larger and older than PCBs. Moreover, efficiency in GCBs in terms of the averaged wage and interest rates of various deposits is much lower than PCBs. Also, it is shown that levels of political influence indices of GCBs are much higher than those of PCBs. Thus, two hypotheses in this paper, (a) PCBs is relatively efficient over the GCBs in terms of total costs and (b) the political influence, resulting from the lack of ownership, severely aggravates both costs and profits of banks, are very plausible. The results of the estimations for the cost function of bank will be presented in the next.

2) Estimation Methodology

To estimate the cost function of bank, we employ a standard translog functional form, which is a second-order approximation of any general cost function.²¹

²¹ The most widely used technique for estimating efficiency in banking literature is the efficient frontier approach. The approach constructs a frontier based on the distance of the best-practice banks from the rest in the sample, and then compares the relative efficiency of each bank. This approach has been developed in two streams of technique: the nonparametric technique and the parametric method. The nonparametric techniques, such as data envelopment analysis (DEA) and free disposable hull analysis generally ignore prices and thus only focus on technical efficiencies rather than economic efficiencies. Therefore, this is not relevant our objectives. The parametric approach, such as the stochastic frontier approach, the thick frontier approach, and the distribution-free approach, can measure economic efficiencies as well as technical efficiencies, and so they are more corresponding to our objectives discussed above. However, the parametric methods technically require the large number of firms because it involves in estimating the efficient frontier each year. If the number of firms is small, using this method faces the small sample problems, and so our data set with only seven banks do not fit to this method. See Berger and Mester (1997) for more discussion about these techniques.

$$\begin{aligned}
\ln C = & \alpha_0 + \sum_{k=1}^2 \alpha_k \ln y_k + \sum_{l=1}^2 \beta_l \ln w_l + \eta_b \ln B \\
& + \frac{1}{2} \sum_{k=1}^2 \sum_{j=1}^2 \gamma_{kj} \ln y_k \ln y_j + \frac{1}{2} \sum_{l=1}^2 \sum_{h=1}^2 \delta_{lh} \ln w_l \ln w_h + \frac{1}{2} \eta_{bb} (\ln B)^2 \\
& + \sum_{k=1}^2 \sum_{l=1}^2 f_{kl} \ln y_k \ln w_l + \sum_{k=1}^2 g_{kb} \ln y_k \ln B + \sum_{l=1}^2 h_{lb} \ln w_l \ln B + dS + e,
\end{aligned} \tag{22}$$

where S is a dummy variable for ownership type ($S = 1$ if GCB and $S = 0$ otherwise), e is an error term, and the time and bank subscripts are deleted for simplicity. Homogeneity of degree one in input prices and symmetry require that

$$\begin{aligned}
\sum_l \beta_l = 1, \gamma_{kj} = \gamma_{ki} (\forall k, l), \delta_{lh} = \delta_{hl} (\forall l, h), \\
\sum_l \delta_{lh} = 0 (\forall l), \sum_l f_{kl} = 0 (\forall l), \sum_l h_{lb} = 0 (\forall l).
\end{aligned} \tag{23}$$

And the cost share equations are obtained from the cost function using Shepherd's lemma as follows:

$$C_l = \frac{\partial \ln C}{\partial \ln w_l} = \beta_l + \sum_{h=1}^2 \delta_{lh} \ln w_h + \sum_{k=1}^2 f_{kl} \ln y_k + h_{lb} \ln B + u_l, \tag{24}$$

where u_l is an error term and C_l is the cost share of l th factor of total cost. Thus, we could estimate the cost function jointly with the cost share equations by the method of seemingly unrelated regressions (SUR).

The joint estimations of the cost function with the cost share equation are presented in Table 3. The centered R^2 s for the estimated SUR equations with B_1 and B_2 are 0.92 and 0.94, respectively.

At first, it is shown that estimates of η_b , showing the relationship between total costs and political influence indices, are positive and statistically significant at the 1 percent level. It implies that the political influence indices significantly increase total costs of banks.

It is also found that estimates of d , indicating the relationship between total costs and ownership type, in equations with B_1 and B_2 are positive and statistically significant at the 1 percent level. This implies that PCBs is relatively efficient over the GCBs in terms of total costs since a dummy intercept for the GCBs has a distinct and positive influence on total costs of bank.

Thus, two hypotheses in this paper, (a) PCBs is relatively efficient over the GCBs in terms of total costs and (b) the political influence, resulting from the lack of ownership, severely aggravates costs of banks, hold.

Table 1. Definitions of Variables

Variables	Definitions
Dependent variables	
C	Total costs
Variables output quantities	
y_1	All forms of loans to customers
y_2	Securities (all non-loan financial assets)
Variable input prices	
w_1	Price of borrowed funds (demand deposits, time and savings deposits, bank deposits, short-term borrowings, and long-term borrowings, CDs, all other liabilities)
w_2	Price of labor (average wage to employee except CEOs)
Environment variables	
B_1	Ratio of bad loans to loan loss reserves as political influence index
B_2	Ratio of bad loans to total loans as political influence index
S	Dummy for ownership type
$S = 1$	if GCB
$S = 0$	otherwise

Table 2. Statistics of Data and Major Bank Performance Indices by Ownership Type

	All Banks		GCB		PCB	
	<u>mean</u>	<u>std. dev.</u>	<u>mean</u>	<u>std. dev.</u>	<u>mean</u>	<u>std. dev.</u>
C	0.104	0.570	0.210	0.545	-0.163	0.556
y_1	2.572	0.437	2.623	0.424	2.444	0.452
y_2	1.467	0.612	1.499	0.621	1.386	0.596
w_1	0.685	0.989	0.726	0.698	0.603	1.424
w_2	-2.155	0.499	-2.031	0.420	-2.465	0.555
B_1	1.014	1.216	1.391	1.059	0.028	1.049
B_2	0.326	1.263	0.862	0.757	-1.077	1.255
ROAIT	0.317	0.816	0.149	0.877	0.739	0.416
ROAET	0.434	1.010	0.206	1.062	1.006	0.561
ROE	3.544	12.794	1.548	14.369	8.535	4.992

Note: C denotes log of total costs. Output quantities are y_1 , log of total loans to customers, and y_2 , log of securities (all non-loan financial assets). Total costs and output quantities are normalized by equity. Input prices are w_1 , price of borrowed funds, and w_2 , price of labor. Political Influence indices are B_1 , the ratio of bad loans to loan loss reserves, and B_2 , bad loans divided by total loans. ROAIT is returns on assets including trust accounts, ROAET is returns on assets excluding trust accounts, and ROE is returns on equity.

Table 3. Estimations of the Cost Function using Seemingly Unrelated Regressions

	B_1	B_2
	Coefficients (<i>t</i> -statistics)	Coefficients (<i>t</i> -statistics)
α_0	-2.7813 (-3.3920)***	-1.8651 (-2.5647)***
α_1	0.9078 (1.0014)	0.1865 (0.2506)
α_2	-0.1723 (-0.3084)	0.2186 (0.4882)
β_1	0.4905 (4.3230)***	0.4567 (3.9717)***
β_2	0.5095 (4.4905)***	0.5433 (4.7253)***
η_b	0.3569 (3.2323)***	0.3477 (4.1592)***
γ_{11}	0.0917 (0.3580)	0.2082 (1.0745)
γ_{12}	-0.2125 (-0.6406)	-0.3028 (-1.2431)
γ_{22}	0.2876 (2.0941)**	0.2768 (2.5413)***
δ_{11}	0.0286 (1.8638)*	0.0296 (1.8986)*
η_{bb}	0.0505 (5.0588)***	0.0404 (6.6314)***
f_{11}	-0.0203 (-0.6698)	0.0036 (0.1301)
f_{21}	-0.0440 (-1.6441)	-0.0619 (-2.5209)***
g_{1b}	-0.1767 (-2.4911)**	-0.0708 (-1.4469)
g_{2b}	0.0376 (0.5882)	-0.0268 (-0.5752)
h_{1b}	0.0082 (1.4060)	-0.0018 (-0.7167)
d	0.2626 (7.0323)***	0.1678 (4.4320)***
Centered R^2	0.92	0.94

Note: * denotes significant at 10% level, ** denotes significant at 5% level, and *** denotes significant at 1% level.

V. Conclusion

In this paper, we investigated the effect of ownership restrictions on Korean banks by comparing the cost efficiency of government control banks (GCB) with that of privately control banks (PCB). The ownership restrictions made the most Korean banks *de facto* owned and controlled by government and thus them subject to the political pressure. On the other hand, banks owned and controlled privately by foreigners were not subject to the government and political pressure. Our empirical results verify the fact that the GCBs usually assumed the political imposed loans and so experienced bad performance. GCBs were relatively inefficient over PCBs in terms of total costs. The political influence severely aggravated costs of the banks. We may deduct that the political imposed loans were the major factor of Korean financial crisis in 1997, and thus the ownership restriction on commercial banks was the fundamental factor of the weak and unstable banking system in Korea.

These results give us the following policy recommendation. The ownership restriction, which regulates that a same person can not possess more than 4 % of stocks, should be abolished. Government should allow the private control of the banks. To secure the stability of the financial system, it is more desirable to rely on the market power than to depend on the government power. It is also necessary to eliminate most of all financial regulations and to subject them to open competition with foreign institutions, and to assign them full responsibility for meeting their own obligations to their customers.

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