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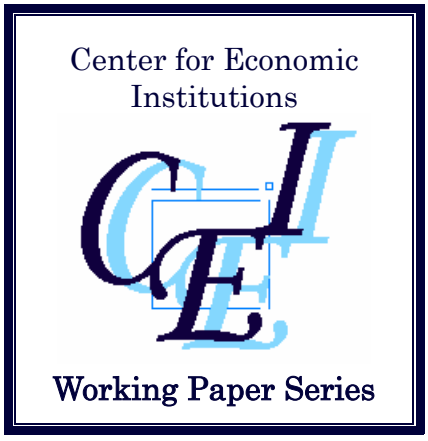

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Corporate Governance and Long Term Performance of the Business Groups:

The Case of Chaebols in Korea

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Abstract

The existence of the business groups has been associated with market failure in emerging economies, and thus their performance has been argued and found to have declined with development of market institutions surrounding them. This paper takes up this issue of long-term performance of the business groups but argues that it has also to do with the internal problems, such as changes in the ownership and governance structure. It finds, with the Korea data and new method and theoretical grounds, that the relative performance of the business groups, the Chaebols, had consistently declined over the 1980s and 1990s although they were more efficient than the non-Chaebol firms during the early 1980s. The results are robust to different estimation methods, and also to controls for the possible survivorship bias, industry composition, and scale effects. The paper explains the performance change by examining the decrease of the shares held by the controlling families and the associated aggravation of the agency problem leading to unjustifiable expansion drives.

JEL classification numbers: G32; D21; L20;
Key words: Business groups; Long Term performance; Corporate Governance; Chaebols

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1. Introduction

The existence and performance of the business groups has been one of the important issues in economic and business studies. Since the early works, such as Leff (1978) and Goto (1982), we have seen the surge of literature on the issue (Kock and Guillen 2001; Peng, Lee and Tan 2001; Khanna 2000; Khanna and Palepu 2000a, 1999a, 1997; Feenstra and Hamilton 1995; Guillen 2000; Granovetter 1994; Powell and Smith-Doerr, 1994; Joh 2003). Business groups exist in many countries with some variations. In Korea and Japan, Chaebols and Keiretsu, respectively, have been symbols of economic growth. Business groups play an important role in many other economies as well, including India (Bertrand, Mehta, & Mullainathan 2002; Ghemawat and Khanna, 1998), Chile (Khanna and Palepu 2000b; Khanna and Palepu 1999b), Hong Kong (Au, Peng, and Wang, 2000), and China (Peng, 2000; Keister, 1998).

The research on the business groups focuses on several themes, such as why they continue to exist in some countries whereas they have disappeared in other countries (largely in the advanced countries), and what is their performance relative to stand-alone companies. It was since as early as works by Leff (1978) an

d Goto (1982) that the existence of the business groups became associated with the underdeveloped nature of the market mechanism in developing countries. This 'market failure' story regarding the emergence of the business groups has further developed into the 'institutional voids' argument by Khanna and Palepu (1997; 2000a). The fact that so many emerging economies have seen and saw the development of various forms of business groups is evidence in support of this market or institutional failure argument. Also, there exist a large volume of empirical research that have confirmed the positive contribution of the business groups in terms of financial performance, internal capital market, and resource sharing in emerging markets, whereas the literature finds the opposite results with the American case (Berger & Ofek 1995; Lang and Stulz 1994).

If the business groups emerge to fill the institutional voids, then it is also natural to see the performance of the business groups decline as the institutions get mature over the course of economic development. As a matter of fact, Khana and Palepu (2000b) and Lee, Peng and Lee (2002) confirm this "institutional change" hypothesis by finding a negative coefficient of the interaction term between the business group dummy and the proxies for institutional changes, such as capital market development, product market opening, and labor market development. While it is very important to investigate this relationship between the institutional environment and the existence of business groups, this orientation misses another important dimension of the existence of business groups, that is, change in the internal structure of the business groups and its implications for performance of business groups. This paper try to contribute to the ever-

accumulating literature on the business groups by focusing on the ownership and corporate governance of the business groups and associate them with their long term performance.

For this purpose, we look at the business groups in Korea, so-called Chaebols. The Korean Chaebols are a adequate choice for our investigation since they are associated with both the past miracle and recent crisis in the Korean economy. Regarding the Korean Chaebols, although an earlier work using the 1970s and 1980s data by Chang and Choi (1988) reported a higher profitability of Chaebols relative to non-Chaebol firms, most of the more recent studies found a lower profitability or productive efficiency of Chaebol firms.[1] For example, using the 1996 to 1999 data, Lee and Kim (2000) find that Chaebol affiliates are inferior to non-Chaebol firms in terms of productive efficiency. Choi and Cowing (1999) and Joh (2003) confirm lower financial efficiency of Chaebol firms by comparing group-affiliated firms and non-group firms in the mid 1990s. Lee, Peng and Lee (2002) estimate group-affiliation premiums in terms of stock prices over the 1980s and 1990s, and finds that the premium has decreased from positive to negative values. Yoon (1998) estimates the long-term trends in profitability of the Korean firms by size, and finds that before the late 1980s, profitability of large sized firms is higher than smaller-sized firms, whereas the opposite has been true since the 1980s.

While these researches are using the data for different or short period, we use long term data and apply a consistent methodology. Our hypothesis is that the performance of the business groups is expected to decline in the long run and the reason for this has to do with not only the changing or maturing external institutional environment but also with the changes in the internal ownership and governance structure. We test this hypothesis by comparing productive efficiency of Chaebols and non-Chaebol firms in Korea over the last two decades. We propose and estimate a stochastic production frontier model that allows technical efficiency to vary over time, which is an important improvement over the conventional method. The results show that, compared with non-Chaebol firms, the Chaebol firms' relative efficiency was initially higher and that it had consistently declined over the 1980s and 1990s. As a result, while the efficiency gap between the two types of firms was statistically significant in the early 1980s, but it became insignificant thereafter.

In explaining the declining performance of Chaebol firms, we examine mainly the internal factors such as the changes in the shares held by the owner-controllers and their investment behavior. We use the concept of controlling minority structure firms (CMS firms: Bebchuk, Kraakman, and Triantis 2000) to define Chaebols out of many business groups, and to argue that the CMS structure of the business groups leads to serious agency problems of the owner-controller with the consequence of unjustifiable investment drive.

The following section explains the methodology, conceptual issues and the data. Section 3 discusses the main results, and section 4 explores the question of why Chaebols' performance

has declined. Concluding remarks follow in the final section.

2. Methodology, Conceptual Issues and Data

The Concept of the CMS firm and Data

We use the data sets compiled by the Korea Investor's Information Service, which provide financial statements of all companies listed on the Korea Stock Exchanges from 1980 to present. We classify the firms into Chaebol firms or stand-alone firms according to whether they are affiliated to a Chaebol or not. For this classification purpose, we have to define what a Chaebol is.

Adopting a more broad criterion reaching beyond equity ties, Granovetter (1995) defines business groups as those collections of firms bound together in some formal and/or informal ways, characterized by an intermediate level of binding, namely neither bound merely by short term strategic alliances nor legally consolidated into a single entity. Strachan (1976) emphasizes the aspect that there are strong personal and operational ties among the member or affiliate firms in a Chaebol.[2] The Korean Chaebols fit into these definitions.

In this paper the term, Chaebol, is used to indicate the whole business group as a unit consisting of numerous member or affiliate companies. Then, the terms, Chaebol firms, Chaebol affiliates, or group firms are used interchangeably to refer to individual firms belonging to a Chaebol business group. These affiliate firms are legal persons, are often listed in the stock market, and are mostly inter-locked by circular share-holdings, whereas a business group or Chaebol itself is not a legal person.

In Korea, Chaebols are usually perceived as family-controlled business groups. The Korean Fair Trade Commission used to designate the top 30 business groups in terms of asset size and puts them under special monitoring and restrictions. These 30 groups are generally perceived as representing the so-called Chaebols. Then, what are the real differences between the top 30 "Chaebols" and the "non-Chaebols", given that most of the "non-Chaebols" are also family-owned and controlled? For example, how can we say the 30th business group is a Chaebol but the 31st is not, simply based on asset size? As a matter of fact, people sometimes talk about the top 60 or 75 business groups in Korea. In fact, many Korean firms are interlinked in the form of a business group. How can we conduct any meaningful comparison of Chaebol vs. non-Chaebol firms?

To tackle these problems, and to define Chaebols meaningfully, we rely on the concept of controlling minority structure (CMS hereafter) firms. One important feature of the Chaebols is that the actual share of the controlling families is quite small. It is usually around or less than

10 percent in the case of top 30 business groups. La Porta, de-Silanes, and Shleifer (1998) and Bebchuk, Kraakman, and Triantis (2000) find that such CMS firms, as in the case of Korean Chaebols, are widespread around the world. In the CMS firms, a shareholder exercises control while retaining only a small fraction of the equity claims on a company's cash flow. Such a radical separation of control and cash flow rights can occur in three principal ways: through a dual-class share structure, stock pyramids, and circular-ownership ties. These three ways are exactly what are used by the Korean Chaebols.[3] Bebchuk, Kraakman and Triantis (2000) note agency problems in the CMS firms arising from the combination of dispersed ownership and the controlling minority owners.

Typical agency cost in the CMS firms has to do with the fact that CMS firms tend to acquire, or enter into, businesses, which are often not justifiable in terms of returns on investment. A theoretical model presented in Bebchuk, Kraakman and Triantis (2000) provides a persuasive reason for this behavior. The model explains why inefficient projects are chosen and unprofitable expansions are pursued under CMS, and why these problems become acute as the controller's equity stake becomes smaller. The deciding factor is the magnitude of private benefits accruing to the controller when he keeps or acquires the asset. Often, private benefits tend to come from self-dealing or appropriation opportunities (Johnson, etc. 2000). In the Korean context, typical private benefits take the form of arbitrary and preferential borrowing from the firms and many kinds of outright cash payments to the controlling shareholders. These models suggest that CMS firms face distorted incentives to pursue growth.

The above discussion implies that firms with substantial owner-manager shares should not be taken as a Chaebol; they are firms of the controlling “majority” structure, and in this type of firms, the agency cost problem and the related expansion drive cannot be serious. Specifically, we take as Chaebols those business groups with a very high ratio of affiliate firms' shares relative to the owners'. In our empirical analyses, we adopt a ratio of 70 percent as the dividing line. According to this criterion, we classify the top 30 business groups in Korea into 22 Chaebols and 8 non-Chaebols. Although the actual estimation results do not change much, we will stick to this classification throughout the paper. Table 1 presents the shares held by the owner families and the affiliate firms in 1989. Among the 8 non-Chaebols, Dong-ah, Dong-yang, Mi-won, Halla, Kukdong Refinery, Tongil, Hanbo, and Poongsan, the owner’s shares typically range from 25 to 65 percent while the shares held by the affiliate firms range from negligible to 18 percent.

[table 1: defining Chaebols]

This paper uses the panel data on a sample of 516 firms for the period from 1984 to 1997.

As we are interested in long-term performance, it is better to have a longer-term data. However, the data set of the Korea Investor's Information Service omits a lot of information on companies, especially for early 1980s. If we choose the sample period from 1981 to 1997, we get only 222 companies with complete data. Since the difference between 516 firms and 222 firms is substantial, we have decided to discard the first three yeas of data to cover more firms in a balanced panel format.

Out of 516 sample firms, 123 are Chaebol affiliates and the remaining 393 are independent firms. Table 2 shows selected statistics of the sample firms, for each of Chaebol affiliates and independent firms. Note that Chaebol affiliates and independent firms are quite different in terms of size. When we estimate production frontier functions, we use value-added as the output variable and number of employees and fixed asset as the input variables. We use total assets as a proxy for the firm size. All the relevant variables including total asset, fixed capital and value-added are measured in real terms by dividing the nominal values by the 'Producer Price Index.'

[table 2 here: sample statistics]

New Estimation Method

Many works follow Schmidt and Sickles' (1984) framework to estimate stochastic production frontier models using panel data. Schmidt and Sickles (1984) allow sample firms to have different intercepts to capture differing levels of productive efficiency. The level of efficiency is assumed to be time-invariant for each firm in their formulation. The Schmidt and Sickles model has advantages in that it require neither the specific assumptions about distributional properties of technical efficiency nor the assumption of independence between technical inefficiency and the input levels.

However, their model does not deal with the case that technical efficiency of firms varies with time. Therefore, it does not serve our purpose of investigating the change in productive efficiency of Chaebol and non-Chaebol firms over a longer time horizon. During the sample period from the 1980s to the 1990s, the Korean firms had faced substantial changes in the surrounding economic environments. The scope and extent of government's intervention, such as industrial policies using subsidies and entry control, had changed a lot as the country switched to a more open and market-oriented economy. Since each firm's response to, and their fitness to, the new environments would be different, it is reasonable to assume that the efficiency level is time-varying.

Cornwell, Schmidt and Sickles (1990) propose a model that allows technical efficiency to

vary over time. For each firm, they replace a constant by a parameterized function of time, with coefficients varying over firms. We propose a modified version of their model to compare technical efficiency level of Chaebol and non-Chaebol firms. In what follows, we explain how we modify the Cornwell, Schmidt and Sickles (1990) model for our purpose.

The following is a stochastic production frontier function of Schmidt and Sickles (1984) that applies to panel data.

$$y_{it} = \alpha + X_{it}\beta + v_{it} - u_i \qquad (1)$$

where y_{it} is log output, X_{it} are various log inputs, v_{it} is a pure statistical noise, and $u_i > 0$ represent technical inefficiency, capturing the difference between the production frontier and the actual production. This model can be rendered to the following form

$$y_{it} = \alpha_i + X_{it}\beta + v_{it} \qquad (2)$$

where $\alpha_i = \alpha - u_i$. The equation (2) is a familiar panel data model with firm-specific effects α_i.

Cornwell, Schmidt and Sickles (1990) propose to replace the α_i, with a firm-specific function of time. They choose a quadratic functional form to represent time-varying firm effect

$$\alpha_{it} = \alpha_{i1} + \alpha_{i2}t + \alpha_{i3}t^2 \qquad (3A)$$

This specification is not satisfactory for the following two reasons. First, it involves too many parameters. For each sample firm, one has to estimate three additional parameters. Second, the functional form is not quite flexible. Due to the nature of the quadratic function, the efficiency level at the initial and the terminal years would be heavily distorted. To mitigate these two problems, we propose the following functional form.

$$\alpha_{it} = \alpha_i + (\gamma_0 + \gamma_1 d_i)t + (\delta_0 + \delta_1 d_i)(t - t_1)^+ \qquad (3B)$$

where d_i is a Chaebol dummy variable which takes a value of one if firm i belongs to a Chaebol group, and zero otherwise; t_1 = 1989 is a mid year within the sample period; $(t-t_1)^+$ is the positive part of $(t-t_1)$ which is equal to $(t-t_1)$ if $t > t_1$ and zero otherwise. The firm-specific constant term α_i captures an initial efficiency level of firm i. Through the next two linear-spline terms, we model the changing pattern of the efficiency level over time for each of Chaebol and non-Chaebol firms in a parsimonious but flexible way. Non-Chaebol firms' efficiency level changes at the yearly rate of γ_0 initially, and then at the yearly rate of $\gamma_0 + \delta_0$ after t_1. The corresponding rates for the Chaebol firms are $\gamma_0 + \gamma_1$ initially, and then $\gamma_0 + \gamma_1 + \delta_0 + \delta_1$ after t_1.

By plugging in α_{it}, we rewrite the production frontier function as follows:

$$y_{it} = \alpha_i + (\gamma_0 + \gamma_1 d_i)t + (\delta_0 + \delta_1 d_i)(t - t_1)^+ + X_{it}\beta + v_{it} \qquad (4)$$

The model (4) allows technical efficiency levels to vary over time and over firms.

To estimate the above model, we use both random effects approach and fixed effects approach regarding the specification of α_i. First, the random effects approach is advantageous in that the resulting model is far more parsimonious, but disadvantageous in that firm heterogeneity is reflected only through over-time changes in the efficiency level. To make the model more realistic under random effects approach, we will further specify α_i being equal to $\alpha_0 + \alpha_1 d_i + \alpha_i^*$ where α_i^* is the firm-specific random effects. The finalized random effect model is

$$y_{it} = \alpha_0 + \alpha_1 d_i + (\gamma_0 + \gamma_1 d_i)t + (\delta_0 + \delta_1 d_i)(t - t_1)^+ + X_{it}\beta + \alpha_i^* + v_{it} \qquad (4A)$$

We estimate the above model using GLS and Hausman-Taylor IV/GLS (Hausman and Taylor 1981). The advantage of IV/GLS over the GLS lies in that it can better address the endogeneity of the input variables. We will report both GLS and IV/GLS. Once we estimate the model, we will test the significance of α_1, γ_1, δ_1 individually, and also jointly. Then, we will also test the significance of $\alpha_1 + \gamma_1 * t + \delta_1 * (t - t_1)^+$ for selected values of t. This quantity shows the efficiency margin of a typical Chaebol firm relative to a typical non-Chaebol firm for year t.

Second, the fixed effects approach is advantageous in that the resulting model better addresses the inter-firm heterogeneity, but disadvantageous in that the resulting model is less parsimonious. The fixed effect model treats α_i in equation (4) as firm-specific constants. Here we write it again.

$$y_{it} = \alpha_i + (\gamma_0 + \gamma_1 d_i)t + (\delta_0 + \delta_1 d_i)(t - t_1)^+ + X_{it}\beta + v_{it} \qquad (4B)$$

We estimate γ, δ, and β using, so called within-estimation method. Once the within estimates are obtained, we compute the firm-specific efficiency level as the average of the residual values for each firm. We will test whether the initial efficiency level differs significantly across Chaebol and non-Chaebol firms. We will also test the significance of γ_1 and δ_1 individually and also jointly to see whether and how the relative efficiency of the Chaebol firms has changed over time. Then, we will plot $\overline{\alpha}_c - \overline{\alpha}_n + \gamma_1 t + \delta_1 (t - t_1)^+$ for selected values of t where $\overline{\alpha}_c - \overline{\alpha}_n$ is the average difference in the estimated values of α_i across Chaebol and non-Chaebol firms. This quantity shows the efficiency margin of a typical Chaebol firm relative to a typical non-Chaebol firm for year t.

Output and input variables need to be rescaled to handle the 'identification problem'. The reasoning is as follows. In our sample, Chaebol firms are very large, whereas non-Chaebol firms are small. This size difference can cause some problems in efficiency comparison. The reasoning is as follows. Let us suppose that Chaebol firms are more efficient than non-Chaebol firms.[4] In our sample, this means that large sized firms tend to produce more output per unit input relative to small sized firms. If this were the case, then, the production function estimation would find the technology to be of increasing returns to scale. Given that production technology shows increasing returns to scale (which is actually the case in our results), the larger firms, i.e. Chaebol firms, would not necessarily turn out to be efficient. So the size effect of technology and the different levels of efficiency are confounded, resulting in the 'identification problem.'[5]

Therefore, we have decided to rescale the size of individual firms so that they may be treated as if they are of a unit size. The rescaling eliminates the systematic size difference across Chaebol and non-Chaebol firms. Let s_i denote the size of firm i. The rescaled production frontier function becomes

$$\frac{y_{it}}{s_i} = \alpha_0 + \alpha_1 d_i + (\gamma_0 + \gamma_1 d_i)t + (\delta_0 + \delta_1 d_i)(t - t_1)^+ + \frac{L_{it}}{s_i}\beta_L + \frac{K_{it}}{s_i}\beta_K + \alpha_i^* + v_{it} \quad \text{(5A)}$$

for the random effect model, and it becomes

$$\frac{y_{it}}{s_i} = \alpha_i + (\gamma_0 + \gamma_1 d_i)t + (\delta_0 + \delta_1 d_i)(t - t_1)^+ + \frac{L_{it}}{s_i}\beta_L + \frac{K_{it}}{s_i}\beta_K + v_{it} \quad \text{(5B)}$$

for the fixed effect model.

By rescaling, the size difference has been eliminated. In terms of the rescaled variables, Chaebol firms no longer fall into the bigger group among the sample firms. We report both the results with rescaling (in tables 3 and 4) and without rescaling (in appendix tables 1 and 2). It will be shown that although the estimated parameter values of the production function do not change much by rescaling, it slightly affects the changing trend of the relative efficiency of Chaebol and non-Chaebol firms. We find that with rescaling, compared to non-Chaebols, Chaebols were more efficient in the 1980s and became less efficient in the 1990s, whereas we find that without rescaling they were less efficient throughout the 1980s and 1990s with the gap still widening over time. We believe that the results with scaling are more reasonable considering the previous studies (for example, Chang and Choi 1988) and identification issues.

3. Discussing the Results

Table 3 reports the estimation results obtained by using the rescaled data for equations (5A) and (5B) with log output as the dependent variable and the log of labor and capital inputs as

explanatory variables. Results using the un-scaled data are reported in the appendix tables 1 and 2.

[table 3 : Stochastic Production Frontier Estimation]

In the first step, we should select the appropriate one among different specifications reported in the table. The second column of table 3 shows the within-estimates of equation (5B), which are still consistent even in the case when all of the labor and capital inputs are correlated with the firm specific inefficiency level.

The third column reports the GLS estimates which are consistent only in the case when none of the labor and capital inputs is correlated with the inefficiency levels. By comparing the within and the GLS estimates, we can test the hypothesis that none of the labor and capital inputs is correlated with the firm specific effect α_i^*. Since Hausman's statistics reported in table 3 is 117.55, we reject the null hypothesis. It means that one or both of our input variables are endogenous.

In the forth column, we show a type of IV/GLS estimates assuming that labor is exogenous and capital is endogenous. The coefficients are very similar to the GLS estimates but different from the within estimates. Since Hausman's statistic, which tests the null hypothesis that labor is exogenous, is 113.23, we reject the null.

The fifth column shows the IV/GLS estimates assuming capital is exogenous and labor is endogenous. One should note that the results are very similar to the within ones. According to Hausman's statistic of 17.05, we still reject the null hypothesis that capital is uncorrelated with α_i^* (critical value is 3.84 at 5 percent level). From the above reasoning, we end up assuming that both inputs are endogenous. In this case, the model is 'just identified' and the resulting IV/GLS estimates are the same as the within estimates as reported in the sixth column. Hereafter, our discussion will be based on the within estimates.

Next, we compare the relative efficiency of Chaebols and non-Chaebols. The initial efficiency of Chaebols is higher than non-Chaebols' by 2.5% as is shown by the estimates of d_i. However, non-Chaebol firms' efficiency level improved at the yearly rate of 1.4% throughout the 1980s ($\hat{\gamma}_0$ = 0.014), whereas the corresponding rate for Chaebol firms is 1.1% ($\hat{\gamma}_0 + \hat{\gamma}_1$ = 0.011). The relative efficiency of Chaebols compared to non-Chaebols had declined at the yearly rate of 0.3% ($\hat{\gamma}_1$ = -0.003). As a result, the efficiency gap between Chaebols and non-Chaebols has constantly been reduced, and eventually their efficiency rankings have been reversed. In the 1990s, neither Chaebols nor non-Chaebols showed any improvement in

productive efficiency. Rather, the efficiency levels of Chaebols and non-Chaebols declined at a yearly rate of 0.2% and 0.1% in the 1990s, respectively. As a consequence, the relative efficiency of Chaebols relative to non-Chaebols decreased by 0.1% a year throughout the 1990s.

Using the above estimation results, we tested the significance of α_1, γ_1, δ_1 individually and jointly as well. First, t-values show that γ_1 and δ_1 are not individually significant. However the significance of α_1 is notable; therefore, we can say that the initial level of efficiency differed a lot across Chaebols and non-Chaebols. Chaebols were superior to non-Chaebols in the early 1980s in terms of productive efficiency.

Next, we carried out the joint significance test of α_1, γ_1, δ_1. In the last row in table 3, we report the chi-square test statistics. Under the null hypothesis, this test statistics is distributed according to a chi-square distribution with three degree of freedom. Since the value of the test statistic is 8.366, we reject the null hypothesis. Overall, the productive efficiency level and/or its changing pattern differ across the Chaebol firms and the non-Chaebol firms.

[table 4 : Efficiency Margin of Chaebols relative to non-Chaebols]

Finally, we are now ready to compare the efficiency of Chaebols and non-Chaebol firms. In table 4A, the second column reports the value of Chaebols' efficiency level, which is $\alpha_0 + \alpha_1 + (\gamma_0 + \gamma_1)t + (\delta_0 + \delta_1)(t - t_1)^+$ and the third column, non-Chaebols' efficiency level, which is $\alpha_0 + \gamma_0 t + \delta_0 (t - t_1)^+$. In fact we have defined and used the efficiency level such that the most efficient firm's level becomes zero. Except for the most efficient firm, the efficiency level takes a negative value accordingly. For example, in 1984, the value of –0.142 for Chaebols and –0.164 for non-Chaebols mean that a typical Chaebol firm is 14.2% less efficient that the most efficient firm whereas a typical non-Chaebol firm is 16.4% less efficient than the most efficient firm. The forth column reports the value of $\alpha_1 + \gamma_1 t + \delta_1 (t - t_1)^+$ which is the difference in the efficiency levels with the corresponding t-values reported in the fifth column. The value of 0.022 in the forth column for the year 1984 means that Chaebols are about 2.2% more efficient than non-Chaebols. In sum, the results in table 4A show that only during the early 1980s, Chaebols were significantly more efficient than non-Chaebols, and since then, Chaebols' relative efficiency declined so that the differences in the efficiency levels between the Chaebol and non-Chaebol firms have become insignificant in the late 1980s and 1990s.

Table 4B is to confirm this divergent trend of efficiency changes across Chaebols and non-

Chaebols. First, we report the value of $(\gamma_0 + \gamma_1)t + (\delta_0 + \delta_1)(t - t_1)^+$ in the second column of Table 4B, which represents the over-time efficiency change of Chaebols compared to their efficiency in the base year of 1984. For example, 0.022 in 1986 means that the Chaebols are 2.2 percent more efficient in 1986 than in 1984. The third column in table 4B represents $\gamma_0 t + \delta_0 (t - t_1)^+$, which measured the efficiency changes of the non-Chaebol firms relative to the year 1984. Since we are interested in the difference between the two groups, we report the difference in the efficiency change, $\gamma_1 t + \delta_1 (t - t_1)^+$ in the fourth column. The t-values in the fifth column confirm that Chaebols' efficiency loss has been significantly greater (or efficiency gain is significantly smaller) than that of non-Chaebols during the sample period.

Graph 1 shows the time trend of the Chaebols' and non-Chaebols' efficiency levels. In the graph, the efficiency levels are measured by scale in the left axis, and their difference by scale in the right axis. The declining pattern of Chaebols' efficiency is quite visible. To test the significance of this trend, we carry out the joint significance test of γ_1 and δ_1. Under the null hypothesis that both γ_1 and δ_1 are zero, this test statistics is distributed according to a chi-square distribution with two degrees of freedom. The value of the test statistic is 7.73, so we reject the null hypothesis to confirm that the declining trend is significant.

[Graph 1 : Time trend of relative efficiency]

Checking Survivorship Bias and Industry Composition Effects

One may argue that Chaebols' relative efficiency loss is an artifact arising from the possible survivorship bias and/or industry composition effect. More specifically, if Chaebol firms tend to survive longer possibly owing to group-level subsidies and protection, and thus if Chaebol firms become more heavily represented over time in mature or declining industries than in growing industries, then Chaebol's relative efficiency loss may simply reflect these age and industry composition effects. We address these issues by controlling for variables such as age of firms, industry dummies, and interaction terms between industry dummies and the time trend. For this purpose, we classify firms into 18 different industries. We use 17 industry dummies together with an overall constant.[6] Age is treated as a time constant variable as measured in the year 1990.[7]

The new estimation results are reported in appendix table 3. The results are basically the same as before. All the coefficients capturing the efficiencies of Chaebol and non-Chaebol firms stay almost the same. In appendix table 3, the age coefficient is negative but not

significantly so. The coefficient estimates of the industry dummies and the interaction terms between industry dummies and the time trend show that there are differences in the initial efficiency levels and their changing patterns across firms in different industries.

Based on Hausman's specification test, we prefer the specification where both labor and capital are treated as endogenous. According to results from this specification, construction industry (industry 14) was remarkably more efficient initially, having been 10% more efficient than the 'other manufacturing industry' (base industry). The construction industry, though, has not enjoyed any efficiency gain throughout the sample period. In contrast, electricity & gas industry (industry 13), was 17% less efficient than the base manufacturing industry initially, however, its efficiency level has improved at a yearly rate of 2.2% thereafter. Machinery (industry 8), distribution (industry 12), and transport & storage (industry 15) showed the same pattern as the electricity & gas industry.

Now using these new estimates, we test the significance of relative efficiency gain of Chaebol firms, and the results are reported in appendix table 4. The results are basically the same as those without age and industry dummies (table 4). These results imply that neither age effect nor industry composition effect explains why Chaebol's relative efficiency declined over time.[8] Further, we report in appendix table 5 the Chaebols' share in each industry in terms of total assets and sales. Consistent with the earlier findings, there is neither significant evidence that Chaebols' relative share has increased in stagnant industries such as iron & metal products, construction, services, and other manufacture, nor any significant evidence that it has decreased in growing industries such as electricity & gas, machinery, distribution, and transport & storage.

4. Discussing the Changing Performance of the Corporate Groups

Firm performance depends on many diverse factors, some of which are under the firms' control and others not. Thus, it is a difficult job to identify those factors responsible for the changing performance of the Chaebols, especially over a longer time horizon.

The factors responsible for the changing performance of the Chaebols, can be classified into (i) the institutional environments, (ii) the internal factors such as quality of the management, corporate governance, and strategy, and finally (iii) the destiny of the industries to which the Chaebol firms belong to.

Regarding the Chaebols in Korea, our results imply that the industry composition effects cannot explain the declining productive efficiency of Chaebol firms. The first factor, changing institutional environment must have been important, as we are seeing more researches along this line. This is understandable since it has long been argued that the business groups exist to fill

in the "institutional voids" in the emerging economies (Khana and Palepu 1997, 2000b; Peng, Lee, and Tan 2001). Along this line of thought, Lee (2002) and Lee, Peng and Lee (2002) argue that as the degree of market imperfection shrinks the relative advantage of the business group firms decline. Khana and Palepu (2000b) and Lee, Peng and Lee (2002) confirm this "institutional change" hypothesis by finding a negative coefficient of the interaction term between the Chaebol dummy and the proxies for institutional changes, such as capital market development, product market opening, and labor market development.

Actually, the period during the 1980s and 1990s (prior to the 1997 Asian economic crisis) witnessed significant changes in the capital, product, and labor markets, as the democratic era since the late 1980s facilitated "the free flow of information and the development of markets" (Khanna & Palepu, 2000b: 280). The number of listed companies increased 114% (from 355 in 1986 to 760 in 1996), and the stock capitalization/GDP ratio increased from 3.3% in 1984 to 29.1% in 1996. In addition, foreign investors, not allowed to own Korean equities until 1991, were able to rapidly expand their shares in the Korean companies as the legal ceiling on their Korean shareholdings increased from 10% in 1992 to 20% by the end of 1996. In the meantime, product and labor markets experienced significant changes as well. Korea was gradually transformed from a previously closed economy to an increasingly open one, as evidenced by the removal of restrictions on various import items (with the percentage of unrestricted import items rising from less than 85% in 1984 to almost 100% in 1996) and the attainment of OECD membership in 1996. Labor markets experienced strong upward surges for wages, as workers in the democratic era since the late 1980s became (i) more assertive for their rights and (ii) more qualified as evidenced by the rising percentage of secondary school enrollment (from 86.7% in 1984 to 98.7% in 1996).

Having discussed the institutional change, we would like to pay attention to the possible internal reasons for the changing performance. We have already observed a long-term decline of Chaebols' productive efficiency. If you look at table 2, you notice that labor productivity in Chaebols is much higher than in non-Chaebols, whereas capital productivity is lower in Chaebols than in non-Chaebols. Table 2 also shows that capital productivity in Chaebols had declined by 9% per annum over the sample period, whereas that in non-Chaebols, by 7% per annum. The above figures indicate that Chaebols' inefficiency is associated with inefficient usage of capital inputs. This observation is consistent with the typical perception that one of the causes of the 1997 economic crisis in Korea was excessive and inefficient investment of the Korean Chaebols.

Then why Chaebols did that? Motivations for excessive investments, even including inefficient ones, arise from Chaebols being CMS firms as explained in section 2. CMS firms like the Korean Chaebols tend to pursue "unjustifiable" growth since the actual share of the

controller is very small. Such investment drive should lead to over-capacity and decreasing productive efficiency (using too much capital per output) as confirmed by the preceding empirical results.

[table 5: owner's share]

Table 5 examines the controller's share in the Chaebol and non-Chaebol firms using the data of the sample firms in our database. It shows that the owner-controller's shares are significantly lower among the Chaebol firms, and it confirms that in the Chaebol firms the owners' shares continued to decline over the sample period. We can thus infer that the decreasing shares of the owner-controller aggravated the inefficient investment drive in the Chaebol firms. To explore this possibility, we estimate the investment functions.[9]

We have used the following regression model, following Scharfstein (1998) and Kim (2002).[10]

$$I_{it}^{c} - I_{it}^{m} = \beta_0 + \beta_1 Q_{it} + \beta_2 DCASH_{it} + \beta_3 DOWN_{it} + v_i + l_t + \varepsilon_{it} \qquad (8)$$

Here, investment rate is measured by the increase in the fixed asset plus depreciation divided by the fixed asset, and I_{it}^{c} stands for the investment rate of a Chaebol firm, and I_{it}^{m} for the median investment rate of the non-Chaebol firms in the same industry as the Chaebol firm. Q_{it} is a proxy for Tobin's Q measured by the market value divided by the book value. We take the median value of this variable for each industry segment (2-digit industry classification along the Korea Standard Industry Classification). $DCASH_{it}$ stands for the difference between the Chaebol firms' cash flow rate and the median value of the non-Chaebol firms' cash flow rate. The cash flow rate is measured by 'earnings before tax' plus depreciation divided by the fixed asset. $DOWN_{it}$ is the difference between the Chaebol and non-Chaebol firms in terms of the share of the owner-controller.

The estimation results are presented in table 6. The coefficient of the ownership variable is negative and significant in the 1990s, while it is negative and not significant in the 1980s. It shows that the investment rate difference between Chaebol and non-Chaebol firms in the 1990s can be explained by the difference in the shares held by the owner-controller, and that the smaller the owner-controller's shares is in each firm belonging to a Chaebol, the more the firms invest. As a matter of fact, the Chaebol firms started to invest more in the 1990s, compared to the non-Chaebol firms. The difference in the cash flow is also one of the significant determinants of the investment rate difference between Chaebol and non-Chaebol firms.

However, the coefficient of Tobin's Q variable is not significant, implying that this variable is not a relevant explanatory variable for the Chaebols' investment behavior.

[table 6: investment regression]

The above results support an interpretation that the declining performance of the Chaebols has to do with the intrinsic problem of the expansion drive associated with the CMS nature of the Korean Chaebols, which is consistent with the results in Kim (2002), and Lee, Lee, and Yoo (2002).[11] Joh (2003) also finds that the higher share by the owner-controller is positively associated with higher financial efficiency, and the gap between cash flow right (owner's share) and control rights in the business groups is negatively related to financial efficiency of the firm. What we have shown is that the lower share by the owner-controller leads to more unjustifiable investment, which translates into over-employment of capital and hence lower productive efficiency as confirmed by the estimation in the preceding section.

Another internal sources for the declining performance might be related with the limited capability of the owner-controller. As is well known, the Chaebols used to have a very centralized control system over the affiliates and at the top of the hierarchy stands the owner-controller. While he/she has preference for expansion of the firm, his/her capability to manage the ever-growing empire is not growing. He/she is doomed to fail. As a matter of fact, table 7 shows that the average number of affiliates in each Chaebol had been growing, from 16.4 in 1987 to 27.2 in 1997. The situation implies that unless they had found effective organizational devices for control over and management of the entire empire, Chaebol affiliated firms would not have been managed effectively.

[table 7 here: number of affiliates]

So far we have pointed out two internal reasons for the declining performance of the Chaebols. One is the decreasing share of the owner-controller and the other is the limited capability of the owner-controller. Can we accept these facts as a general tendency? In other words, what makes the share of the owner-controller to decline over the long time horizon? Regarding the "institutional voids" hypothesis, one can easily believe that institutions will get mature over time and thus the superiority of the business groups will decline in the long run. Then, how about the internal weakness of the business groups? We believe that as long as the groups are growing bigger and bigger, it is almost certain that the share of the owner-controller declines because the groups need to finance their expansion by issuing more stocks while the owner-controller has limited supply of his/her own financial resources to buy the stocks. Berle

and Means (1932) described this phenomenon as separation of ownership and management, and as the emergence of managerial capitalism. The CMS structure of business groups has been used as a device for the owner-controller to maintain control over the group affiliated firms while financing their growth at the same time. According to Figure 2, based on the official release by the Fair Trade Commission of Korea reported in Chang (2003, p. 164) and Jwa (2002, Table 3.5), the shares held by owner-families in the top 30 business groups in Korea declined steadily from 15.1% in 1987 to 8.5% in 1997, and to less than 5% in 2000, whereas the shares held by the affiliated firms ranged between 30 % to 40% over the same period. Of course, the reason for the founder-family to wish to keep their control over the firm by resorting to the CMS form is the private benefits accruing to the owner-controller as pointed out by Bebchuk, Kraakman, and Triantis (2000).

Thus, we believe this separation of cash flow rights and control rights as a tendency intrinsic to the business groups, and that this separation gets wider over the long period of time unless there is reform to reduce the private benefits of the owner-controller. The same is true of the limited capacity of the owner-controller. As the number of affiliated firms increases and the firms grow, the managerial burden of the owner-controller is bound to increases as well.

5. Summary and Concluding Remarks

Based on the new and improved method to estimate the changing economic efficiency of the firms and also based on the new definition of the Chaebols in Korea, this paper has examined the long term performance of the corporate groups in Korea. Compared with non-Chaebol firms, the Chaebol firms' relative efficiency had consistently declined over the 1980s and 1990s although the Chaebol firms were more efficient than the non-Chaebol firms during the early 1980s. As a result, the Chaebols' relative advantage in terms of productive efficiency had disappeared since the late 1980s. This finding does not change even after we take into account the possible age effect, industry composition effect, and scale effect. In empirical estimation, we have rescaled both input and output variables. If we do not adopt the rescaling method, we get a slightly different result showing that Chaebol firms were consistently less efficient throughout the 1980s and 1990s with the gap widening in the 1990s. These findings should be taken as the major contribution of this study in that no other study provides a rigorous examination of the long-term productive performance of the business groups in Korea.

Trying to find clues to why Chaebols' comparative advantage declined over time, we have emphasized the internal reasons such as the changes in the shares held by the owner-controllers and their investment behavior while other researches focus on the external institutional changes. Our results point out the fact that the problem of unjustifiable expansion drive got more and

more serious in the 1990s.

The often-acknowledged advantages of the business group firms may still exist whether they are of CMS feature or not. Chang and Hong (2000) find that using the 1990s data, Chaebol firms tend to be associated with superior financial performance (profitability) owing to its advantage such as group-level sharing of technology skills, advertising, and internal transactions. In light of this, we conjecture that the Korean Chaebols in the 1990s suffer from the productive inefficiency arising from inefficient investment drives while they enjoy the financial efficiency arising from resource sharing among the affiliates.

The findings is consistent with the view that the Chaebols had better try to reform or improve their internal governance structures on their own, whereas the government policies should focus on legal and institutional reforms with a view to reduce the private benefits accruable to the owner-controllers. Without private benefits, the owner-controllers would face neither the incentive to devise and maintain the CMS form nor the incentive to drive excessive investments. In fact, the post-crisis reforms in Korea have focused on these issues, and the representative Korean Chaebols, like Samsung and Hyundai, are still prospering while implementing substantial changes in their management styles, especially corporate governance.

Endnotes

[1] One exception would be Chang and Hong (2000), which, however, focus on the advantage of Chaebol firms in terms of resource sharing among the affiliates.

[2]. This is how Strachan (1976) distinguishes a typical American conglomerate from business groups. In the case of the former, component companies are acquired and divested mainly on financial grounds and there are few operational or personal ties among the member firms. Thus, conglomerates are inherently unstable. Recited from Granovetter (1995). For a nice review of the definition problem, see Khanna (2000).

[3] . Joh (2003) and Bae, Kang, and Kim (2002) examine the Korean Chaebols focusing on this separation of cash flow and control rights.

[4] . The same logic holds even if we suppose the opposite that Chaebols are less efficient than non-Chaebols.

[5] Even though we use log-transformed data, the difference in size still remains and makes a significant effect.

[6]. Appendix table 5 shows the industry classification.

[7]. As we use time trend as an explanatory variable in the regression, the age variable only adds cross-sectional variation. It is because the over-time variation in age is perfectly correlated with the time trend. Thus, the estimation results remain the same, whether we use the age variable as a time varying variable or not.

[8]. As we use a balanced panel data in our study, we have not considered entry/exit effects in appendix table 3 in a perfect way. Adding age variable is one device to control this effect within the limit of the balanced panel data.

[9] . There is some problem with the variable measuring controller's share in out database, which is originally provided by the Association of the Listed Companies in Korea. The variable is supposed to represent the shares held by the largest shareholder and his/her relatives. But, the database does not distinguish whether the largest shareholder is a person or a legal person. Thus, in the latter case, this variable measures the shares held together by the largest legal person shareholder, its affiliated companies, and the controlling shareholding person (owner) and his/her relatives. Given this, what we have proved is that the share held by the controlling "group" has declined and it also explains investment behavior. To check validity of the results here, we have also tried the same regressions with an alternative estimates of the controller's share, which is provided by Dr. Sung wook Joh. She got this estimation by digging into the original company reports to the Association, but this job was only done for the 1993-97 period. The results with this alternative estimates are reported in appendix table 6 and are basically the same as the results reported in the main text, table 6.

[10]. Kim (2002) used the data for the 1996-99 period to find that Chaebol firms invest too much in low Q sectors and too little in high Q sectors. Our study uses a data set covering a longer time span and uses the difference in the owners' shares rather than the level of owners' share.

[11]. Lee, Lee, and Yoo (2001) also find that Chaebols' investment was inefficient compared to non-Chaebols, which , as they found, has to do with the ownership problem.