Long Term Evolution of the Costs and Benefits of Business Groups: Korean Chaebols between weak premium, strong discount, and strong premium

Keun Lee[a]*, Ji Youn Kim[a], Oonkyu Lee[b]

* [a] *Department of Economics, Seoul National University, Shillim-dong, Seoul 151-746 Korea*
[b] *Techno-Economics and Policy Program (TEPP), Seoul National University, Seoul, Korea*

* Corresponding author: Tel. +82-2-880-6367; Fax 886-4231; E-mail kenneth@snu.ac.kr
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Abstract

This paper analyzes the long-term evolution of the costs and benefits associated with a chaebol, a South Korean diversified business group. Chaebol-affiliated firms in Korea have displayed dramatic changes in their costs and benefits along three time periods (1984-1988, 1990-1995, and 2001-2003). They did not suffer a value loss relative to non-affiliated firms in the 1980s, but did so in the 1990s. In the post-crisis period, however, they began to show value gains.

To identify the causes of these changes, we examine if chaebol firms prioritize profit stability over profit maximization, over-invest in less profitable industries, cross-subsidize the low performing affiliates of their group, and possess greater debt capacity, consequently enjoying lower tax burdens. We discover that in the 1980s, chaebol firms generally enjoyed various perks such as tax breaks, but shied away from excessive investment activities. In the 1990s, their performance worsened due to substantial over-investment, despite several advantages. However, after massive restructuring and sorting out following the 1997 Asian financial crisis, chaebols emerged as very profitable firms with less over-investment despite fewer tax perks.

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1. Introduction

Business groups are a staple in numerous economies, including India (Bertrand, Mehta, and Mullainathan 2002; Ghemawat and Khanna 1998), Chile (Khanna and Palepu 2000b; Khanna and Palepu 1999b), and China (Keister 1998), in addition to Japan and Korea where the keiretsu and chaebols, respectively, have been symbols of economic growth. Since the early works of scholars such as Leff (1978) and Goto (1982), there has been a surge of literature on the subject (Kock and Guillen 2001; Khanna 2000; Khanna and Palepu 2000a, 1999a, 1997; Feenstra and Hamilton 1995; Guillen 2000; Granovetter 1994; Powell and Smith-Doerr 1994; Joh 2003; LaPorta, Lopez-De-Silanes, and Shleifer 1999; Shin and Park 1999). Recently, a survey article has even appeared in the Journal of Economic Literature (Khanna and Yishay 2007).

While performance comparisons between group firms and stand-alone firms have been the central topic of recent academic research, the results have never been conclusive. For example, in earlier studies, such as those of Hoshi, Kashyap, and Scharfstein (1990, 1991) and Ferris, Kumar, and Sarin (1995) on the Japanese keiretsu, group affiliation is viewed as beneficial, owing to the reductions in agency, bankruptcy, and monitoring costs and relaxing of liquidity constraints. However, later studies on keiretsu, such as those of Weinstein and Yafeh (1998), Morck and Nakamura (1999), and Kang and Stulz (2000), report significant costs to group membership due to the presence of an affiliated bank.

Studies on Korean business groups have likewise revealed diverging results, although their ownership structures are fairly different from the Japanese keiretsu.[1] Korean chaebols are large corporate groupings of firms that are under family control and operate in several industries. An earlier work by Chang and Choi (1988) anchored on data from the 1970s and 1980s credits chaebols with higher profitability relative to non-chaebol firms. In contrast, a number of recent studies, with the exception of Chang and Hong (2000), associate chaebol firms with poorer relative efficiency.

Choi and Cowing (1999) and Joh (2003) compare group-affiliated firms to non-group firms in the mid-1990s and confirm that the relative financial efficiency of chaebol firms is lower. Using early to mid-1990s data, Ferris et al. (2003) conclude that chaebol-affiliated firms suffer a value loss relative to non-affiliated firms. Y. Kim (2006) is an exception, as the study yielded both negative and positive impacts of family ownership and higher debt ratio on firm behavior.

Based on the previous literature, it is obvious that a consensus does not exist with regard to the net advantages that may result from membership in a business group. It is our view that the key to resolving this performance divergence issue is to have a long-term perspective.

Majority of existing studies have utilized data for different or short periods and have produced varying results. However, we employ longer-term data to examine the long-term performance of

[1] Ferris et al. noted the following differences. First, chaebols use explicit centralized control, whereas the linkages within a keiretsu are more informal (Hattori, 1989; Shin and Park, 1999). Second, chaebols do not employ a “main” bank system (Hattori, 1989).

business groups in a consistent manner. For this purpose, Korean chaebols have been identified as an ideal choice for study as they underwent dramatic changes during the last two decades, including the Asian financial crisis of 1997.

Examination of the 1980s business landscape is interesting because chaebols in the said decade were inclined to have greater shares owned by families, and thus the gap between cash flow rights and control rights was smaller[2]. This gap or wedge has been argued to be the source of agency costs and associated excessive investment. Furthermore, we believe that examination of the post-crisis period is important as business groups underwent substantial reform and restructuring.

At present, there are a number of anecdotal stories and academic articles, such as the work of Choo et al. (2009; forthcoming), claiming that the surviving business groups are currently performing better than stand-alone companies. While Choo et al. (forthcoming in 2009) explains changing productive efficiency by estimating frontier production functions over the long term with focus on increased technological capabilities of chaebols, this paper taps financial performance indicators and focuses on several hypotheses regarding the behavior of chaebol firms.

Methodologically and conceptually, we follow the work of Ferris et al. (2003), whose study follows that of Berger and Ofek (1995), Lang and Stulz (1994), and Servaes (1996); the latter reports the existence of a "diversification discount" in the value of a diversified firm or business group. Specifically, these researchers posit that the diversified firm's market value is less than the sum of the imputed market values of its component single-segment firms. Ferris et al. (2003) report that chaebol-affiliated firms are valued at a discount relative to comparable firms that lack a chaebol affiliation, and that the chaebol as an aggregate is valued less than the sum of the imputed value of its component firms. These findings suggest that the discounted value of conglomerate firms is not merely a U.S. phenomenon, but a global occurrence. Adopting the same method, we have learned that the situation has changed following the crisis, with the chaebols faring better than stand-alone firms and valued at a premium to comparable firms, while during the 1980s there was no significant difference between the group firms and non-group firms.

As indicators of relative performance change, we examine the three hypotheses of over-investment, cross-subsidization, and related/unrelated diversification. The *over-investment hypothesis*, as maintained by Stulz (1990), claims that diversified firms will excessively invest in lines of business with poor investment prospects, thus adversely influencing their value. This behavior has been explained by agency costs of owners who actually own a negligible share but control the whole empire, owing to cross or circular shareholdings among affiliates (Bebchuk, Kraakman, and Triantis 2000). The *cross-subsidization hypothesis (*Meyer, Milgrom, and Roberts 1992) predicts that failing business segments create greater value loss as part of a conglomerate than as a stand-alone segment because

[2] Official data, released by the Fair Trade Commission of Korea as reported in Chang (2003, p. 164) show that the shares held by owner-families in the top 30 business groups in Korea steadily declined from 15.1 percent in 1987 to 8.5 percent in 1997, and to less than 5 percent in 2000.

independent firms cannot rely on a parent for operating subsidy. Regarding *diversification hypothesis*, we examine whether the business groups pursuing related, rather than unrelated, diversification incur less value losses.

While Ferris et al. (2003) attest to the validity of all three hypotheses for Korean chaebols and, subsequently, for explaining value losses, we arrive at somewhat different results, both for the post-crisis period and the 1980s. We discover that during the post-crisis period, or from 2001 to 2003, the over-investment and diversification hypotheses offer little explanation while cross-subsidization visibly weakens. More importantly, profitability improvement is now reflected in the value premium associated with group firms.

We further examine the *profit stability hypothesis* (Nakatani1984; Prowse 1992), which proposes that the business groups tend to value profit stability at the expense of profit levels. While Ferris et al. assert the soundness of this hypothesis for the 1990s business landscape, we find that after the crisis, the restructured chaebols boasted of higher profitability with less variations.

Following Ferris et al. (2003), we also examine the benefits arising from membership in a business group. The first is the high debt carrying capacity (Lewellen 1971), such that chaebols can combine affiliates with imperfectly correlated earnings and thus reduce the risk of the firm's debt, which tends to increase the firm's debt capacity. This is often called the "co-insurance effect," which can operate in business-affiliated firms. The firm's increased debt capacity subsequently generates increased tax shields and, correspondingly, less tax paid for the business conglomerate.

We examine chaebols' increased use of debt and whether any differences in leverage allow chaebols to reduce their tax expenditures. We discover that chaebols are significantly more levered than non-chaebol firms only during the 1990s, and thus chaebol firms' tax shield advantages receded from 2001 to 2003, whereas there were several in the pre-crisis period.

The paper is organized as follows. In the next section, we describe the nature of the data and identify important characteristics in comparison with non-chaebols. Section 3 provides a measurement of the excess values of the chaebols compared with non-chaebols. Section 4 examines the three sources for the chaining performance (excess values) of chaebol firms, namely, over-investment, cross-subsidization, and diversification. Section 5 examines the advantage of chaebols, such as debt capacity, tax advantages, and profit stability. Section 6 provides a synthesis of the overall results over the three sub-periods. The paper concludes in Section 7.

2. The Data and Characteristics of Chaebol Firms

The main sources of data for Korean firms are the Korea Information Service's (KIS) Value Plus and the Korea Securities Research Institute's (KSRI) Stock Database. Ferris et al. (2003) relied on the Financial Statements File and the Monthly Stock Returns File of the Pacific Capital Markets Research Center (PACAP) Databases-Korea.

The industry classifications are defined by the Korea Stock Exchange (KSE). In the literature, the term chaebol usually refers to the 30 largest business conglomerates, and since 1987, the Korea Fair Trade Commission (FTC) has released the list as well as information on the top 30 chaebols based on assets.[3] For the pre-1987 period, we simply select the top 30 based on their total asset ranking among Korea's fifty major financial groups. Further, in determining whether or not a firm belongs to a chaebol, we use the Annuals of the Korean Firms (*Hoe-sa-yon-gam*) published by the Maeil-Business Newspaper.

Using the Annuals, we made a list of the chaebol-affiliated firms and stand-alone firms every year, and adjusted them in view of mergers and acquisitions (M&A's), delisting or death, and name changes. For this kind of work, each firm's publicly released annual report was employed as additional material. This enabled us to compile the database of listed firms divided into chaebol-affiliated firms and non-chaebol firms during the periods 1984-1988, 1990-1995, and 1998-2003. We drew tables illustrating comparative results over the three periods.

Although we have also used our own data to produce similar results for the 1990-1995 period (available upon request), we only report on the basic descriptive tables using our own data in the Appendix (Table 1); we utilize the regression results by Ferris et al. (2003) to create the tables here. The periods chosen represent the different periods with some intervals between them, following similar divisions in Choo et al. (forthcoming in 2009). For the post-crisis period, we mainly refer to the results for the period covering 2001-2003 to arrive at clear-cut results because the period of 1998-2000 served as a transition period for post-crisis restructuring. Results for the whole period covering 1998-2003 – or just 1998-2000 – are occasionally presented whenever necessary, though full results are available upon request. Comparison of the results from the pre- and post-crisis period should be interpreted carefully because we are not dealing with the same samples of firms or balanced panel across the periods but different samples of firms after many of them disappeared after restructuring and bankruptcy processes.

Following the usual practices, we limit our study to non-financial firms belonging to industries with a certain size and at least five non-chaebol firms.[4] Naturally, these sample selection criteria tend to reduce sample sizes to a certain extent.[5] We also eliminate certain chaebol group-year

[3] There are some firms that are loosely affiliated with one another, but these "minor" chaebol firms do not belong to a major chaebol group. Similar to Ferris et al. (2003) and Shin and Park (1999), we eliminate these minor chaebol firms when we construct our sample.

[4] As stated in Ferris et al. (2003), this sample screening criteria has the following reasons. First, operating income for financial firms is not meaningful. Second, sales must be significantly greater than zero to avoid distorted valuation multiples. Third, each industry must have at least five non-chaebol firms to obtain statistically meaningful industry medians.

[5] For instance, Ferris et al. (2003) lose only 6.1 percent of our non-chaebol firm-year observations and only 1.8 percent of our chaebol firm-year observations in 1990-1995.

observations from our analysis because data is available for merely one member firm. In the case of the period covering 2001-2003, we eliminate 21 chaebol group-year observations from our analysis because data is available for only one member firm. For the 1998-2000 period, 14 observations are dropped, for the 1984-1988 period 40 group-year observations are dropped, while Ferris et al. (2003) dropped one chaebol. Our final sample consists of 295 chaebol firm-year observations (with 81 chaebol group-year observations) and 818 non-chaebol firm-year observations in the period covering 1984-1988. In the case of the period covering 1990-1995 (Ferris et al. 2003), the numbers are 759 chaebol firm-year observations (with 173 chaebol group-year observations) and 1,316 non-chaebol firm-year observations. We utilize 248 chaebol firm-year observations (with 57 chaebol group-year observations) and 1,369 non-chaebol firm-year observations in the period covering 2001-2003.[6]

In panel A of Table 1, we present comparative descriptive statistics between chaebol and non-chaebol affiliated firms. We first notice that chaebol firms are significantly larger than non-chaebol firms. Total assets of the chaebol firms quadrupled from 1984-1988, grew 10 times larger from 1990-1995, and five times larger from 2001-2003 compared to non-chaebol firms. Sales generated by chaebol firms were approximately seven times greater than those of non-chaebol firms from 1984-1988. The sales gap between chaebol and non-chaebol firms further expanded in the 1990s and 2000s. The table likewise demonstrates that chaebol firms have continued to spend more on capital expenditures (as measured by the change in total fixed assets and capital investment from the previous year) than non-chaebol firms during both pre- and post-crisis periods.

[table 1: descriptive statistics]

Despite chaebol firms' consistent characteristics, we notice several important changes that occurred on the heels of the crisis. First, in terms of financial leverage, chaebols had the higher ratio than the typical non-chaebol firm from 1990-1995. However, the situation changed after the crisis. Total debt-to-total assets ratio was pegged at 75% for chaebol-affiliated firms, but merely 63.3% for the non-chaebol firms from 1990-1995. During the 1998-2000 period, the leverage ratio of chaebol firms was 83% and non-chaebol firms, 73%. The gap, however, was drastically reduced from 2001-2003. In the same period, chaebol firm's leverage ratio reached 57% while non-chaebol firms' was 55%. We assume that the change was triggered by new regulatory rules, specifically when chaebols were compelled to reduce their debt-to-equity ratio to less than 200% after the crisis.

Second, chaebol firms possessed lower betas (as determined from the market model using monthly returns from our sample period) than non-chaebol firms from 1990-1995, and this is consistent with the interpretation that chaebol firms are likely to be less vulnerable to market movements because they belong to a diversified collection of businesses. However, in other periods,

[6] In case of 1998-2000, the numbers are 333 chaebol firm-year observations (with 72 chaebol group-year observations) and 1,388 non-chaebol firm-year observations.

chaebols were observed to have higher betas compared to non-chaebol firms. Chaebols' beta is 0.8995/ 0.831 in the 1984-1988/ 2001-2003 periods, whereas that of non-chaebol firms is 0.5759/ 0.606.

Third, a comparison of current ratios suggests that chaebol-affiliated firms were less liquid than non-chaebol firms during the pre-crisis period. However, they appear to have bounced back after the crisis.

Fourth, chaebol firms had barely matched non-chaebol firms in their dividend payout ratios, but after the crisis, chaebols have begun to pay significantly more than non-chaebols. Finally, two simple measures of stock market performance demonstrate that chaebol firms are now performing better than non-chaebol firms. Equity returns of chaebol firms measured as a long-run stock market performance are now higher than non-chaebol, whereas in the 1990-1995 period the reverse was true. Furthermore, market-to-book ratios are now significantly higher for chaebols firms, whereas it was lower in the 1990s.

We present descriptive statistics for chaebol groups in panel B of Table 1. One noticeable fact is the reduction of diversification tendency among chaebols. In the 1984-1988 period, chaebol groups' median number of firms is 2 and the median number of industries they conduct business in is 2. Further diversification was apparent from 1990-1995, as the median rose to 4 and 3, respectively. However, in the period covering 2001-2003, the median dropped to 3 and 2, respectively. Other financial characteristics of the chaebol addressing such issues as liquidity, size, dividend payout, capital expenditures and effective tax rates are likewise provided.

In summary, the results in Table 1 present the typical chaebol firm as significantly larger and predisposed to investing heavily compared to the non-chaebol firm; these tendencies have not changed over the crisis. However, in other respects, there are dramatic changes recorded over the crisis period. These reversals have happened in favor of chaebols in terms of debt-to-asset ratio, market-to-book value ratio, and dividends-to-net income ratio, although they are no longer enjoying tax advantages associated with debt ratios. Such performance improvement appears to be related to the reduction of diversification as shown in Panel B of the table, or correction of investment inefficiencies as confirmed by Choo et al. (2009; forthcoming). We will progress to a more rigorous analysis of this issue.

3. Measuring and Comparing the Excess Values

In Table 2, we estimate firm excess value by utilizing a method similar to Berger and Ofek (1995) and the method applied to Korean chaebols in Lee, Peng, and Lee (2008). Specifically, firm excess value is calculated as the natural log of the ratio of the firm's actual value (i.e., market value of the

firm's equity plus the book value of its debt) to its imputed value.[7]

Imputed value is calculated as the firm's total assets multiplied by the industry median capital-to-assets ratio.[8] For the group-level of analysis, the actual value of each group is estimated as the sum of the actual value of each member firm, following the method of Ferris et al. (2003). The imputed value for each chaebol is the sum of each member firm's imputed value.

It must be noted that Table 2 depicts an interesting evolution of the excess values for chaebol firms. In the early period (1984-1988), the mean values are significantly positive, but in the 1990-1995 period, both the median and mean excess values are significantly *negative. Finally, in the post-crisis period of 2001-2003, the mean values are significantly positive again.* When we examine whether these values are significantly different from those we calculate for non-chaebol firms, we find that they do not greatly vary in the 1980s, but are significantly lower than non-chaebols in the 1990s and significantly higher than non-chaebols in the post-crisis period. The pattern holds in terms of the median excess value, though the levels of significance are different. We further observe that the evolutionary pattern is retained when measured at the group level, as illustrated at the bottom row of Table 2.

[table 2: measuring excess value at the firm and chaebol levels]

In Table 3, we provide more rigorous evidence on the relationship between value loss/premium in the firm and grouping strategy while controlling for several factors which, according to Berger and Ofek (1995), may influence the value loss level in a diversified firm. Specifically, we control for the firm's use of leverage, profitability, and growth opportunities.[9] In addition, we follow Ferris et al. (2003) in including beta to control the risk difference because chaebols are often hypothesized to experience a lower level of systematic risk relative to non-chaebol firms. The firm's use of financial leverage is measured by its total debt-to-total assets ratio, its profitability is estimated by the operating profit margin, and the firm's growth opportunities are proxied by the ratio of capital expenditures to sales.[10] The most important variable in this regression is a chaebol membership dummy variable

[7] We follow Ferris et al. (2003) to eliminate firms with extreme excess values from our sample. Extreme excess value is defined as actual value either more than four times the firm's imputed value or less than one-fourth of the imputed value.

[8] Following Ferris et al. (2003) and Berger and Ofek (1995), industry median is drawn from a sample of non-chaebol firms.

[9] Another possible explanatory variable on excess value is firm size, as suggested by Berger and Ofek (1995). However, following Ferris et al. (2003) we do not include this due to high correlation with the chaebol dummy. As noted there, the theoretical relationship between size and excess value is contentious and the empirical evidence is inconsistent with Lang and Stulz (1994) finding a negative relation, Berger and Ofek (1995) finding a positive one, and finally Lins and Servaes (1999) confirming the inconsistency of size as an explanatory variable on excess value.

which assumes a value of one if the firm belongs to a chaebol, and zero if otherwise.

[table 3: annual regressions of firm excess value]

The results in Table 3 again confirm the dramatic shift of discount and premium of the chaebol firm's performance. In the upper panel displaying the results of the three representative periods, the coefficient of the chaebol dummy variable during the 1984-1988 period is statistically insignificant. In the 1990-1995 period, the coefficient is a significant negative –0.080 and, finally after the crisis and restructuring, we get a significant premium of 6.6%. The annual regressions revealed at the bottom panel of Table 3 more closely trace the turnaround of the discount back to the premium of chaebol firms.

During the 1990s, the chaebol coefficients were commonly negative, which is consistent with the similar estimation in Lee, Peng, and Lee (2008). We discover a new and interesting trend after the financial crisis in 1997. In the years 1998, 1999, and 2000, the chaebol coefficients were all negative and significant, but the absolute size of the coefficient continued to decline slowly and consistently year by year. Thus, in the year 2001, it remained negative but insignificant. Finally, it started to turn positive from 2002. Since then, it has continued to expand to become significantly positive in 2003.

4. Sources for the Changes: Over-investment, Diversification, and Cross-Subsidization

In this section, we test if the value performance of chaebols can be attributed to over-investment, diversification, and/or cross-subsidization.

First, similar to Berger and Ofek (1995) and Ferris et al. (2003), we estimate a chaebol's over-investment as the sum of the capital expenditures of each of its member firms operating in industries whose median Tobin's q is in the lowest quartile as scaled by total sales. Thus, higher values of over-investment indicate greater investment by firms operating in declining or unprofitable industries.

Second, we measure relatedness as the inverse of the number of distinct three-digit industry classification codes in which the chaebol operates.[11] However, given a few objections to this measure, [12] we try other measures that take into account cross-subsidization behavior of chaebol firms. Thus, we estimate the mean (median) cross-correlations between capital expenditures and cash flow across

[10] Ferris et al. (2003) observe that the results remain qualitatively identical when they standardize profitability and growth opportunities by total assets, and that this holds true whenever they use profitability and growth opportunities in any of the reported regression analyses.

[11] The KSE constructs a series of four digit industry classification codes that spans all listings on the exchange. Our use of three digits is to prevent overestimation of the degree of diversity within the chaebol.

[12] As stated in Ferris et al. (2003), Maksimovic and Phillips (1999) and Khanna and Tice (2001) argue that segments operating in different industries might still be related through such linkages as common distribution channels or a vertical integration of production activity.

members of a given chaebol and use them as additional measures of the relatedness of diversification within a chaebol. It reflects the idea that a high correlation between an affiliate's level of capital expenditures and another affiliate's cash flows might better capture the degree of relatedness that exists within a business group.

We then include the measures of relatedness in our regression of chaebols' excess values. This is to test the argument proposed in Maksimovic and Phillips (1999) and Khanna and Tice (2001) that affiliated firms operating in related segments are functionally less diverse and, consequently, might not suffer a valuation loss to the same degree as conglomerates whose holdings are unrelated.

Another possible explanation for the value loss observed in chaebols is the subsidization of poorly performing affiliates by other members of the chaebol. This kind of subsidization behavior has been confirmed in terms of internal capital market argument in Shin and Park (1999). To validate this hypothesis, we use negative cash flow (i.e., EBIT<0) as the measure of a poorly performing firm and as the trigger for a likely cross-subsidy. We test whether the presence of a negative cash flow has a more negative effect on the value of a chaebol firm than on a non-chaebol firm. If confirmed, this implies that unprofitable chaebol affiliates drain value from other members of the chaebol through cross-subsidies.

We construct a conditional excess value measure similar to that of Ferris et al. (2003) and employ separate multipliers to estimate the imputed values of firms, depending on whether they experience negative or positive cash flows.

In Table 4A, we examine the impact of over-investment and related diversification on the excess value of a chaebol group while controlling for chaebol leverage, profitability, and capital expenditures. We observe in Table 4A that the coefficient on over-investment is positive but insignificant in the 1980s, but significantly negative in the 1990s and post-crisis period of 2001-2003. However, for the period of 2001-2003 the coefficient is only marginally significant at the level of 10%. Furthermore, in the same regressions for the transition period of 1998-2000, the coefficients are positive but insignificant. For the whole period of 1998-2003, the coefficient is negative and insignificant. These results merit further discussion.

While the results in the pre-crisis period confirms over-investment as a source of value loss in the diversified firm, the insignificance of this over-investment variable in the post-crisis periods suggest that the impact of this on firm values has become less important than before.

[tables 4A and 4B]

Furthermore, we notice a new variable rising as the important factor in value determination: real performance measured by operating income divided by sales. This variable, which was insignificant in the 1980s and 1990s, has become strongly significant in the post-crisis period.

This may be a reflection of the shift in investors' perception of chaebols. In the past, they did not

believe the trueness of this variable, or did not expect this profitability to result in added benefits to investors (in the form of dividends). With some restructuring to make firms more accountable and transparent, investors seem to perceive a linkage between firms' financial performance and valuations.

In some contrast to the results with over-investment hypothesis, cross-subsidization still seems to negatively affect the value of chaebols even in the post-crisis period, as demonstrated in Table 4B. The coefficients of the negative cash flow variables are negative at all times, with different levels of significance of either 1% or 5% when tried with different measures of related diversifications. We observe that the coefficient of the cash flow dummy variable is negative for chaebol groups in all time periods although not significant in the 1980s, and significantly negative for non-chaebols for the 1990s and the 2000s. This result suggests that the investors still believe that chaebol groups may attempt to help poor-performing firms in the same group.

Finally, we can discuss the impact of related diversification on the value based on the results presented in both Tables 4A and 4B. As the coefficients of related variables included in both regressions of over-investment and cross-subsidization demonstrate, the directions and size of the impacts are dubious to some extent.

In the 1980s, relatedness seems to contribute positively to the excess values as shown by the cases with two measures of relatedness, but in the 1990s the coefficient is not significant at all. In the post-crisis period, it becomes negative but insignificant in two correlation based measures of relatedness and significant in the number of industries based measure of relatedness. Overall, the results are inconclusive and do not support the claims of Whited (2001) and Khanna and Tice (2001) that the relatedness of operations between firms can temper the value reduction that often stems from a policy of corporate diversification.

5. Advantages of Chaebols: Debt Capacity, Profit Stability, and Tax Advantage

5.1. Profit stability hypothesis

In this subsection, we test whether the profit objective of chaebols is similar to that of the Japanese keiretsu, which is profit stability over maximization. Overall, the results in Table 5 support the hypothesis for the 1990s strongly and less strongly for the 1980s. For the post-crisis period, however, results are rather contrary to the prediction by the hypothesis, as chaebols firms boast of higher performance with lower variations. More detailed discussion follows.

In panel A of Table 5, we examine the mean (median) industry-adjusted annual operating returns (EBIT) on assets and net income on assets for chaebol and non-chaebol firms. We find that chaebol-affiliated firms under-performed relative to non-chaebol firms in two periods, 1984-88 and 1990-95. Moreover, the standard deviation of these accounting-based profitability measures is lower for chaebol firms in all time periods.

Specifically in the 1990s, the standard deviation of operating income and net income is

significantly low for chaebol firms in the 1% level. Together, these findings are consistent with the claim that chaebols place greater emphasis on stability rather than the level of returns. This finding suggests a partial explanation of the value loss observed for chaebols. However, the situation is quite different after the crisis. In the 2001-2003 period, chaebols demonstrate higher profitability with lower variations although with varying levels of significance.

[table 5: chaebols and the profit stability hypothesis]

The changed behavior of chaebols after the crisis remains the same when gauged using market-based measures of profitability. In panel B, we present market-based measures of profitability by examining the mean (median) monthly abnormal returns for chaebol and non-chaebol firms. Similar to the results for the accounting-based profitability measures, we discover both a lower level of return and return variability for chaebol firms in the 1990s. However, in the post-crisis period, chaebols firms began to record higher rates of return with lower variance.

In panels C and D, we examine the long-term performance of chaebols relative to non-chaebol firms. Employing a methodological approach similar to that of Spiess and Affleck-Graves (1995), we first compare a mean (median) holding period return (HPR) over the entire sample period between chaebol and non-chaebol firms.[13] From this analysis, we note that the long-term performance of chaebol firms is significantly lower than that of non-chaebol firms in the period covering 1990-1995, but higher than that of the non-chaebol firms in the post-crisis periods. We likewise calculate a 60-month wealth relative based on HPRs and discover that it is merely 0.828 from 1990-1995, 1.132 from 1984-1988, and 1.533 from 2001-2003.[14]

In panel D, we sharpen our comparison of holding period returns by constructing a sample of non-chaebol firms matched on the basis of industry membership and firm size. The variance of the holding period returns is lower for chaebol member firms than for non-chaebol firms in the periods covering 1990-1995 and 2001-2003, although significantly lower only during the former period. The mean wealth relative was 1.102 in the 1980s, declined to 0.721, and resurfaced to 1.208 in the post-crisis period.

When these results are combined with those reported in panels A, B, and C, we can conclude that chaebols tend to show lower variations of accounting profits than non-chaebols but with higher or lower profitability. In terms of market-based measure of returns, chaebol firms demonstrate lower

[13] Holding period returns (HPR) are calculated as: $[\Pi_{t=1,2\ldots,\text{end-period}}(1 + \text{ret}_{i,t})]-1$ for each stock i, where $\text{ret}_{i,t}$ are monthly returns calculated from the first month to the last month of our sample period.

[14] The wealth-relative is estimated as the ratio of 1 plus the mean (median) HPR for chaebol firms divided by 1 plus the mean (median) HPR for non-chaebol firms. Therefore, the wealth relative indicates the magnitude of performance of chaebol firms as compared to non-chaebol firms.

return and variation only during the 1990s but conflicting results in the 1980s and 2000s. More specifically, in the short-term measures, chaebol firms display higher return and lower variations, and in the long-term measures, they show higher return with an ambiguous variance difference.

5.2. Debt Capacity and Advantage in Taxation

We now test for the existence of possible financial benefits that may be attributed to chaebol membership. One such possible benefit is a co-insurance effect (Ferris et al. 2003). If chaebol members are able to co-insure each other's debt because of an imperfect correlation between their cash flows, then the debt capacity of chaebol firms should increase. Further, any increased borrowing by chaebol firms likewise increases the size of the interest tax shields that are available to the firm.

In panel A of Table 6, we compare mean (median) debt ratios between chaebol and non-chaebol firms. In the 2001-2003 period, a simple comparison of unadjusted debt ratios shows that chaebol firms utilize 2.3 percent more debt to finance their assets than do non-chaebol firms. When we industry-adjust our debt ratios, the difference increased to 2.7 percent in the 1% significance level. These results are basically the same as those by Ferris et al. (2003) for the 1990-1995 period reported in the same table. The same results hold for the 1980s. This greater use of debt for chaebol firms is consistent with the predictions of the co-insurance hypothesis and suggests that membership in a chaebol increases a firm's debt capacity.

[table 6 and 7]

To further examine possible co-insurance effects in the capital structure decisions of chaebol-affiliated firms, we present the results from a multiple regression analysis in panel B. We regress industry-adjusted total debt-to-total assets against a chaebol dummy variable, firm size (log of total assets), firm profitability (operating profit margin), and firm growth (capital expenditures to sales).

Based on the estimated coefficient for the chaebol dummy variable, we observe that while chaebol firms borrow 4.7 percent more of their assets than do non-chaebol firms in 1990-1995, chaebol firms borrow 3.2 percent more of their assets than do non-chaebol firms in 2001-2003, although the coefficient is far from being significant. This result implies no more debt capacity advantage of chaebol firms after the crisis, which implies the possibility of their being subject to more scrutiny by the banks in lending. Further, it is related to the fact that chaebols firms were subject to the restructuring "order" from the government to reduce to the debt-to-equity ratio to lower than 200%.

An important implication of the debt-capacity hypothesis is that the increased use of debt will generate additional tax shields which, in turn, will result in less tax paid by chaebol-affiliated firms. In panel A of Table 7, we find that chaebol firms experience a tax rate that is close to half the tax rate incurred by non-chaebol firms (i.e., total tax expenditure scaled by total sales is 0.010 for chaebol firms versus 0.020 for non-chaebol firms in 1984-1988 and 0.008 for chaebol firms versus 0.014 for

non-chaebol firms in 1990-1995). After an industry-wide adjustment of these tax rates, the difference remains statistically significant.[15] This result indicates that chaebol firms enjoy lower effective tax rates than non-chaebol affiliated firms. However, in the period covering 2001-2003, tax shield advantages of chaebol firms have completely disappeared.

We provide results in panel B of Table 7 of a regression of industry-adjusted taxes paid against a chaebol dummy variable and the same set of control variables used in Table 6. We observe a significant negative coefficient for the chaebol dummy variable in the pre-crisis periods, and but positive in the 2001-2003 period. This result is consistent with the results with univariate calculations. This suggests that chaebol firms no longer enjoy tax savings from the higher interest tax shields.

6. A Synthesis: Dynamic and Evolving Nature of the Firms in Emerging Economies

Let us summarize the results of our analysis on the evolution of the business groups in Korea over the sub-periods 1984-1988, 1990-1995, and 2001-2003. Table 8 provides a summary of the main results. At the bottom of the table, we attempt to characterize the differences of the chaebols firms across the three periods.

[table 8: summary of the overall results]

In the 1980s, chaebols enjoyed benefits such as tax advantages but did not commit excessive investments, thus performing slightly better than non-chaebols in several aspects. However, in the 1990s, chaebols significantly underperformed compared to non-chaebol firms in almost every aspect despite strong advantages such as higher debt-carrying capacity and lower taxation because the costs of over-investment and cross-subsidization outweighed the benefits.

Their behavior could be typically characterized by lower profitability with lower variations. In the post-crisis period, the chaebols lost all the advantages, but their performance was better than non-chaebols. This turnaround was possible not because they were not over-investing but because their real performance (profitability) improved significantly, thanks to restructuring and re-focusing in the 1998-2001 transition period. Chaebol firms have also been found to improve productive efficiency significantly since the post-crisis reform (Choo et al. 2009; forthcoming).

In summary, it can be said that during the 1980s the costs and benefits of business groups structure was roughly equal, during the 1990s there were net costs, and finally after restructuring there were net gains. The over-investment in the 1990s may be related to agency costs of the minority, but the controlling owner as verified by numerous empirical studies focused on the gap between cash flow rights and control right of the controlling owner (Joh 2003, Bae, Kang, and Kim 2002, Lemmon and Lins 2003). The rough matching of the costs and benefits in the 1980s may be related to the smaller

[15] To calculate industry-adjusted taxes, we follow Ferris et al. (2003). They calculate the difference between a firm's actual taxes-paid and its imputed taxes-paid. Imputed taxes-paid is estimated as the firm's operating income multiplied by the industry's median taxes paid-to-operating income ratio.

gap between cash flow and control rights in this period, as the Korean chaebols evolved from family-owned firms to concentrated ownership in the 1960s and 1970s. However, the post-crisis turnaround may be explained by factors other than the ownership structure, as they still maintain basically the same ownership structure despite business restructuring. This phenomenon may stem from re-focusing, improved corporate governance (Black, Jang, and Kim 2006), or increased innovation capabilities (Choo et al. forthcoming in 2009), and suggest that ownership structure alone cannot explain performance of the firms.

7. Summary and Concluding Remarks

This paper has extended earlier works on business groups to a longer period to test if the same findings still hold true, such as value loss for group firms associated with over-investment, diversification, and cross-subsidization. In general, we discover dramatic changes over the two decades from weak premium in the 1980s, strong discount in the 1990s, and back to strong premium during the post-crisis period.

Specifically, this paper finds that during the post-crisis period, the over-investment and diversification hypotheses fail to offer any explanations while cross-subsidization is visibly weakened. More importantly, profitability is the main cause for the value premium associated with group firms. We likewise discover that while profit stability hypothesis was valid for the 1990s, it was not so after the restructuring, as the survived chaebols boasted of higher profitability with less variation. Further, it is verified that chaebols are significantly more levered than non-chaebol firms only during the 1990s, and chaebol firm's tax shield advantages disappeared in 2001-2003, whereas there were several during the pre-crisis period.

The turnaround of chaebols' performance is not surprising as chaebols have both advantages and disadvantages. Ferris et al. (2003) predicted in their final remarks that if over-investment, cross-subsidy, and an emphasis on earnings stability are appropriately controlled, the chaebol structure can generate shareholder benefits. Given this, what we would like to emphasize is the ever-evolving or dynamic nature of the firms in emerging economies, which should be one of their most important differentiating factors, compared to the firms in more advanced economies. This implies that formulating conclusions based on analysis of data from a specific period of time can be dangerous in studies on firm behavior in emerging economies, where environment, institutions, and almost everything change quite rapidly.

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[Table 1] Descriptive statistics: Chaebol firms, non-chaebol firms and chaebol groups

Panel A: comparative firm-level characteristics

Time Period	1984-1988			1990-1995			2001-2003		
Characteristics	Chaebol firms	Non-chaebol firms	Difference	Chaebol firms	Non-chaebol irms	Difference	Chaebol firms	Non-chaebol firms	Difference
Total assets (billions of won)	379.989	79.287	300.703 ***	946.810	85.820	860.990 ***	2688.659	403.917	2282.742 ***
	[221.946]	[44.277]	177.669 ***	[458.258]	[55.126]	403.132 ***	[1189.772]	[135.03]	1054.729 ***
	(452.950)	(206.653)		(1401.866)	(87.288)		(4929.273)	(2591.990)	
Total dept-to-total asset	0.761	0.716	0.045 ***	0.752	0.633	0.119 ***	0.572	0.549	0.023
	[0.777]	[0.698]	0.079 ***	[0.754]	[0.620]	0.134 ***	[0.573]	[0.486]	0.086 ***
	(0.118)	(0.326)		(0.142)	(0.267)		(0.251)	(0.412)	
Sales (billions of won)	601.155	78.235	522.920 ***	1031.305	75.008	956.297 ***	3365.063	294.817	3070.245 ***
	[236.051]	[52.032]	184.020 ***	[409.967]	[48.730]	361.237 ***	[1103.195]	[121.583]	981.612 ***
	(1029.413)	(145.027)		(2031.982)	(77.180)		(6772.389)	(1127.491)	
capital expenditure/sales	0.082	0.038	0.043	0.094	0.052	0.042 ***	0.037	0.001	0.036
	[0.038]	[0.040]	-0.001	[0.051]	[0.033]	0.018 ***	[-0.003]	[-0.005]	0.002
	(0.228)	(1.266)		(0.321)	(0.318)		(0.636)	(0.482)	
Current assets/current liabilities	1.166	1.355	-0.189 ***	1.150	1.632	-0.482 ***	1.053	1.870	-0.816 ***
	[1.040]	[1.236]	-0.008 ***	[1.018]	[1.492]	-0.474 ***	[0.964]	[1.425]	-0.461 ***
	(0.543)	(0.552)		(0.855)	(0.846)		(0.600)	(1.642)	
Dividends paid/net incom	0.450	0.439	0.011	0.306	0.309	-0.003	0.223	0.179	0.043
	[0.362]	[0.327]	0.035 **	[0.155]	[0.122]	0.033	[0.167]	[0.098]	0.070 ***
	(1.072)	(2.298)		(0.583)	(1.109)		(0.465)	(0.381)	
Market-to-book ratio	1.000	0.989	0.011	1.016	1.076	-0.060 ***	0.907	0.840	0.067 **
	[0.974]	[0.937]	0.037 ***	[0.995]	[1.012]	-0.017 ***	[0.825]	[0.757]	0.068 ***
	(0.188)	(0.331)		(0.152)	(0.307)		(0.340)	(0.440)	
Taxes/sales	0.010	0.020	-0.010 ***	0.008	0.014	-0.006 ***	0.013	0.013	0.000
	[0.008]	[0.015]	-0.007 ***	[0.005]	[0.009]	-0.004 ***	[0.013]	[0.008]	0.005 **
	(0.011)	(0.018)		(0.012)	(0.017)		(0.025)	(0.171)	
Beta	0.899	0.576	0.323 ***	0.899	1.100	-0.201 ***	0.831	0.606	0.225 ***
	[0.887]	[0.622]	0.265 ***	[0.878]	[1.127]	-0.249 ***	[0.870]	[0.610]	0.260 ***
	(0.909)	(1.261)		(0.269)	(0.304)		(0.358)	(0.659)	
Number of observations	295	818		759	1316		248	1369	

Panel B: Chaebol-group-level statistics									
Time Period	1984-1988			1990-1995			2001-2003		
Group characteristics	median	mean	standard deviation	Median	mean	standard deviation	median	mean	standard deviation
Number of member firms	2.000	3.148	1.783	4.000	4.483	2.322	3.000	3.983	2.517
Number of industries	2.000	2.568	1.183	3.000	3.282	1.485	2.000	2.474	1.403
Number of firms with negative operating income	0.000	0.086	0.283	0.000	0.110	0.332	0.000	0.316	0.597
Total assets (billions of won)	594.548	1179.963	1385.453	1974.589	4160.306	4988.491	4257.829	10608.118	14472.653
Total dept-to-total asset	0.779	0.739	0.107	0.779	0.777	0.070	0.575	0.563	0.163
Sales (billions of won)	606.110	2006.965	2808.590	1817.438	4528.174	7202.699	3652.717	13763.155	20876.657
capital expenditure/sales	0.033	0.071	0.103	0.065	0.110	0.248	-0.018	-0.018	0.107
Current assets/current liabilities	1.130	1.173	0.355	0.977	1.007	0.262	0.886	0.953	0.450
Dividends paid/net income	0.444	0.746	2.155	0.242	0.215	0.403	0.131	0.077	0.463
Market-to-book ratio	0.970	0.973	0.170	0.984	0.990	0.091	0.830	0.887	0.267
taxes/sales	0.007	0.009	0.007	0.006	0.008	0.008	0.015	0.010	0.020
mean beta	0.883	0.827	0.556	0.920	0.989	0.456	0.825	0.798	0.228
Number of observations	81			173			57		

Panel A contains comparative means [medians] (standard deviations) between chaebol and non-chaebol firms. Differences are evaluated using a *t*-statistics and the Wilcoxon rank-sum test. Statistical significance at the 1%, 5%, and 10% levels are denoted by ***, **, and * respectively. In panel B chaebol group variables are aggregated across member firms and a mean (median) value is estimated. The figures for the 1990-1995 period are taken from Ferris et al (2003).

[Table 2] Measuring excess value at the firm and group levels [a]

Time Period	1984-1988						1990-1995						2001-2003					
	Med.	Mean	Quartile first	Quartile third	s.d.	Num. Of Obs.	Med.	Mean	Quartile first	Quartile third	s.d.	Num. Of Obs.	Med.	Mean	Quartile first	Quartile third	s.d.	Num. Of Obs.
Firm																		
Chaebol firms	0.007[10]	0.017[**, 1]	-0.056	0.084	0.144	295	-0.028[***, 1]	-0.016[***, 1]	-0.091	0.048	0.135	759	0.078[1]	0.112[***, 1]	-0.067	0.313	0.328	248
Non-chaebol firms	0.000	0.005	-0.082	0.067	0.186	818	-0.000	0.024[***]	-0.104	0.126	0.222	1316	0.000	0.019[*]	-0.191	0.191	0.372	1369
Chaebol																		
Chaebol-group	0.018	-0.003	-0.040	0.067	0.129	81	-0.036[***]	-0.029[***]	-0.080	0.010	0.081	173	0.073	0.107[***]	-0.024	0.278	0.298	57

Time Period	1998-2000						1998-2003					
	Median	Mean	Quartile first	Quartile third	Standard deviation	Number of observations	Median	Mean	Quartile first	Quartile third	Standard deviation	Number of Observations
Firm												
Chaebol firms	-0.059[1]	0.006[5]	-0.172	0.080	0.348	333	-0.006	0.051[***]	-0.132	0.175	0.343	581
Non-chaebol firms	0.000	0.063[***]	-0.156	0.200	0.376	1388	0.000	0.041[***]	-0.170	0.196	0.374	2757
Chaebol												
Chaebol-group	-0.045	-0.002	-0.155	0.072	0.274	72	0.005	0.046[*]	-0.111	0.165	0.289	129

[a] The chaebol's actual value is the sum of its member firms' actual value while the imputed value of the chaebol is the sum of each member firm's imputed value. The samples include firm-year observations and chaebol group-year observations. The Wilcoxon signed-rank test is used to evaluate statistical significance for median values and a t-test is used to assess statistical significance for mean values. Statistical significance at the 1%, 5% and 10% levels are indicated by ***, **, and *, respectively. Statistically significant differences at the 1%, 5% and 10% level between chaebol and non-chaebol firms are indicated by [1], [5], and [10], respectively. In table, Med., s.d., and Num. of obs. indicate median, standard deviation and number of observations respectively. The figures for the 1990-1995 period are taken from Ferris et al (2003).

[Table 3] Annual regressions of firm excess value [a]

Sample	Number of Observations	Intercept	Chaebol dummy	Leverage	EBIT / Sales	Capex / sales	Beta
	(Adj. R^2)				(Operating income/sales)		
1984-1988	1089	-0.311 ***	-0.004	0.419 ***	0.107	-0.002	0.006
	(0.463)	(0.000)	(0.718)	(0.000)	(0.105)	(0.206)	(0.141)
1990-1995	2050	-0.189 ***	-0.080 ***	0.350 ***	0.008	-0.044 ***	-0.007
	(0.178)	(0.000)	(0.000)	(0.000)	(0.889)	(0.000)	(0.591)
2001-2003	1617	-0.340 ***	0.066 ***	0.603 ***	0.315 ***	-0.021	0.027
	(0.374)	(0.000)	(0.002)	(0.000)	(0.005)	(0.205)	(0.173)
1998-2000	1721	-0.176 ***	-0.082 ***	0.389 ***	-0.091	-0.062 ***	-0.060 ***
	(0.532)	(0.000)	(0.000)	(0.000)	(0.117)	(0.000)	(0.007)
1998-2003	3338	-0.243 ***	-0.027 **	0.433 ***	0.011	-0.034 ***	0.014
	(0.423)	(0.000)	(0.030)	(0.000)	(0.843)	(0.005)	(0.265)
1984	187	-0.541 ***	-0.034 **	0.670 ***	0.566 ***	-0.000	-0.005 *
	(0.713)	(0.000)	(0.013)	(0.000)	(0.000)	(0.873)	(0.070)
1985	193	-0.550 ***	-0.024 **	0.705 ***	0.282 **	-0.009	0.023 ***
	(0.635)	(0.000)	(0.089)	(0.000)	(0.032)	(0.862)	(0.000)
1986	201	-0.384 ***	0.013	0.463 ***	0.130	-0.067	0.051 ***
	(0.673)	(0.000)	(0.526)	(0.000)	(0.270)	(0.170)	(0.002)
1987	226	-0.244 ***	-0.027	0.404 ***	-0.023	-0.010	-0.027 **
	(0.494)	(0.000)	(0.159)	(0.000)	(0.754)	(0.869)	(0.012)
1988	282	-0.204 ***	0.003	0.314 ***	-0.042	-0.046	0.026 ***
	(0.318)	(0.000)	(0.905)	(0.000)	(0.837)	(0.347)	(0.007)
1990	324	-0.256 ***	-0.008	0.400 ***	-0.051	-0.023	-0.007
	(0.288)	(0.000)	(0.676)	(0.000)	(0.728)	(0.106)	(0.829)
1991	333	-0.319 ***	-0.019	0.446 ***	0.061	-0.076 **	-0.060 **
	(0.437)	(0.000)	(0.273)	(0.000)	(0.663)	(0.037)	(0.028)
1992	335	-0.227 ***	-0.078 ***	0.328 ***	-0.230 *	-0.039	0.037
	(0.249)	(0.000)	(0.000)	(0.000)	(0.068)	(0.128)	(0.192)
1993	338	-0.056	-0.120 ***	0.221 ***	-0.176	-0.124 *	0.034
	(0.119)	(0.312)	(0.000)	(0.000)	(0.294)	(0.063)	(0.359)
1994	386	-0.058	-0.141 ***	0.266 ***	0.152 *	-0.056	0.030

		(0.182)	(0.183)		(0.000)		(0.000)		(0.068)		(0.230)		(0.316)	
1995	334		-0.175	***	-0.069	***	0.297	***	0.498	***	-0.081	**	-0.064	**
		(0.127)	(0.000)		(0.000)		(0.000)		(0.002)		(0.023)		(0.011)	
1998	578		-0.238	***	-0.092	***	0.466	***	-0.044		-0.055	**	-0.059	**
		(0.576)	(0.000)		(0.000)		(0.000)		(0.312)		(0.002)		(0.049)	
1999	577		-0.208	***	-0.062	**	0.438	***	0.049		-0.020		-0.092	
		(0.433)	(0.000)		(0.037)		(0.000)		(0.702)		(0.563)		(0.117)	
2000	566		-0.139	**	-0.085	***	0.345	***	-0.231	**	-0.084	**	-0.047	
		(0.601)	(0.022)		(0.000)		(0.000)		(0.043)		(0.012)		(0.289)	
2001	548		-0.348	***	-0.004		0.596	***	0.253	**	-0.003		0.027	
		(0.534)	(0.000)		(0.881)		(0.000)		(0.016)		(0.903)		(0.542)	
2002	542		-0.360	***	0.031		0.633	***	0.579	***	-0.043		0.003	
		(0.332)	(0.000)		(0.350)		(0.000)		(0.000)		(0.306)		(0.872)	
2003	527		-0.475	***	0.141	***	0.701	***	0.120		-0.005		0.221	***
		(0.314)	(0.000)		(0.000)		(0.000)		(0.574)		(0.807)		(0.000)	

[a] Leverage is total liabilities divided by total assets. Firm profitability is calculated as operating income standardized by sales while firm growth is estimated by the capital expenditures to sales ratio. Beta is estimated from the market model using monthly returns. The p-values (parentheses) are reported. Statistical significance at the 1%, 5%, and 10% levels are indicated by ***, **, and * respectively. The figures for the 1990-1995 period are taken from Ferris et al (2003).

[Table 4] Panel A: Chaebols and the over-investment Hypothesis[a]

Time Period	**1984-1988**			**1990-1995**	**2001-2003**		
Variable	Coefficient (*p*-value)			Coefficient (*p*-value)	Coefficient (*p*-value)		
	(1)	(2)	(3)	(3)	(1)	(2)	(3)
intercept	−0.363 *	−0.462 **	−0.475 **	−0.398 ***	−0.204	−0.377 *	−0.379 *
	(0.081)	(0.024)	(0.018)	(0.000)	(0.398)	(0.071)	(0.072)
Over-investment	0.079	0.013	0.033	−0.347 ***	−1.168 *	−1.223 *	−1.286 *
	(0.777)	(0.961)	(0.900)	(0.003)	(0.086)	(0.076)	(0.059)
Leverage	0.537 **	0.582 **	0.597 ***	0.485 ***	0.463	0.581 *	0.592 *
	(0.019)	(0.013)	(0.010)	(0.000)	(0.177)	(0.085)	(0.084)
Operating income/sales	−0.028	0.045	0.039	0.091	2.994 ***	2.806 ***	2.763 ***
	(0.933)	(0.901)	(0.912)	(0.651)	(0.000)	(0.000)	(0.000)
Capex/sales	−0.015	0.042	0.040	−0.066 **	0.829 *	0.915 *	0.974 *
	(0.938)	(0.821)	(0.832)	(0.012)	(0.083)	(0.081)	(0.052)
Relatedness	−0.092	0.076 **	0.095 ***	0.029	−0.245 **	−0.082	−0.063
	(0.257)	(0.014)	(0.005)	(0.213)	(0.018)	(0.429)	(0.673)
Number of obs.	81	81	81	173	57	57	57
Adjusted R^2	0.177	0.200	0.206	0.195	0.367	0.313	0.308

[a] The over-investment measure is calculated as the sum of the capital expenditures of member firms operating in industries whose median Tobin's q is in the lowest quartile for each year, scaled by total sales. For the relatedness, (1)~(3) are 1/number of 3-digit industries, median cross-correlation and mean cross-correlation, respectively. The p-values are in parentheses. Statistical significance at the 1%, 5%, and 10% levels are indicated by ***, **, and * respectively. The figures for the 1990-1995 period are taken from Ferris et al (2003).

[Table 4] Panel B: Chaebols and the cross-subsidization hypothesis[a]

Time Period	**1984-1988**				**1990-1995**		**2001-2003**			
Variable	Chaebol groups (1)	(2)	(3)	Non-chaebol firms	Chaebol-groups (3)	Non-chaebol firms	Chaebol groups (1)	(2)	(3)	Non-chaebol firms
intercept	-0.360 *	-0.453 ***	-0.466 ***	-0.289 ***	-0.321 ***	-0.118 ***	0.170	-0.049	-0.063	-0.255 ***
	(0.052)	(0.006)	(0.005)	(0.000)	(0.000)	(0.000)	(0.551)	(0.847)	(0.807)	(0.000)
negative cashflow dummy	-0.027	-0.017	-0.008	0.046 *	-0.050 **	-0.048 *	-0.226 **	-0.188 *	-0.180 *	-0.133 ***
	(0.512)	(0.665)	(0.846)	(0.076)	(0.027)	(0.086)	(0.016)	(0.055)	(0.061)	(0.000)
leverage	0.538 **	0.577 ***	0.590 ***	0.408 ***	0.410 ***	0.227 ***	0.254	0.401	0.427	0.538 ***
	(0.011)	(0.005)	(0.004)	(0.000)	(0.000)	(0.000)	(0.559)	(0.352)	(0.334)	(0.000)
Capex/sales	0.040	0.055	0.062	-0.001	-0.059 **	-0.041 **	0.514	0.574	0.606	-0.018
	(0.792)	(0.736)	(0.703)	(0.438)	(0.011)	(0.047)	(0.274)	(0.230)	(0.201)	(0.373)
Relatedness	-0.100	0.076 ***	0.094 ***		0.013		-0.259 **	-0.087	-0.025	
	(0.192)	(0.008)	(0.004)		(0.599)		(0.032)	(0.414)	(0.889)	
Number of observations	81	81	81	818	172	1065	57	57	57	1369
Adjusted R^2	0.190	0.212	0.217	0.529	0.119	0.177	0.143	0.093	0.086	0.360

[a] For the chaebol group-level analysis, the negative cash flow dummy=1 when one of the chaebol's member firms has negative operating income. For the non-chaebol firm analysis, the negative cash flow indicator = 1 when the firm has negative operating income. For the relatedness, (1)~(3) are 1/number of 3-digit industries, median cross-correlation and mean cross-correlation, respectively. The p-values are in parentheses. Statistical significance at the 1%, 5%, and 10% levels are indicated by ***, **, and * respectively. The figures for the 1990-1995 period are taken from Ferris et al (2003).

[Table 5] Chaebols and the profit stability Hypothesis[a]

Time Period		**1984-1988**			**1990-1995**			**2001-2003**		
Characteristics		Chaebol firms	Non-chaebol firm	Difference	Chaebol firms	Non-chaebol firm	Difference	Chaebol firms	Non-chaebol firm	Difference
Panel A: Accounting measures of profitability										
Operating income /total assets		-0.013	0.000	-0.013 ***	-0.002	0.002	-0.004 **	0.015	-0.012	0.027 ***
		[-0.013]	[0.000]	-0.013 ***	[-0.001]	[0.000]	-0.001 ***	[0.013]	[0.000]	0.013 ***
		(0.002)	(0.003)	-0.001	(0.001)	(0.002)	-0.001 ***	(0.004)	(0.014)	-0.009
Net income/total assets		-0.004	0.000	-0.004	-0.003	0.005	-0.008 ***	-0.011	-0.020	0.009
		[-0.005]	[0.000]	-0.005 ***	[-0.003]	[0.002]	-0.006 ***	[0.003]	[0.000]	0.003
		(0.001)	(0.003)	-0.002	(0.001)	(0.003)	-0.002 ***	(0.013)	(0.234)	-0.221
Number of observation		295	818		759	1316		248	1369	
Panel B: Monthly stock market measures of return										
AR(E)	mean	0.005	0.001	0.004	-0.002	0.004	-0.006 ***	0.013	0.007	0.006
	[median]	[-0.012]	[-0.016]	0.003 *	[-0.011]	[-0.008]	-0.002 **	[-0.005]	[-0.026]	0.021 ***
	(variance)	(0.018)	(0.017)	0.001 **	(0.010)	0.013	-0.003 ***	(0.056)	(0.254)	-0.198
AR(V)	mean	0.007	0.003	0.004	0.001	0.007	-0.006 ***	0.017	0.011	0.006
	[median]	[-0.010]	[-0.014]	0.005 **	[-0.005]	[-0.003]	-0.002 *	[-0.002]	[-0.022]	0.202 ***
	(variance)	(0.019)	(0.019)	-0.000	(0.011)	(0.019)	-0.008 ***	(0.058)	(0.256)	-0.198
Number of observation		3461	9116		8775	14867		2915	16282	

Panel C: Long-run stock market performance: Chaebol firms versus all non-chaebol firms											
HPR	mean	6.939	6.010	0.929	-0.050	0.148	-0.198 **	1.424	0.581	0.843 ***	
	[median]	[6.419]	[4.935]	1.484 **	[-0.258]	[-0.119]	-0.139 **	[0.866]	[0.068]	0.797 ***	
	(variance)	(17.956)	(14.590)	3.366	(0.452)	(0.956)	-0.504 ***	(4.663)	(3.290)	1.373 **	
Wealth relative	mean	1.132			0.828			1.533			
	[median]	[1.250]			[0.842]			[1.746]			
Number of observation		63	126		124	222		86	401		
Panel D: Long-run stock market performance: Chaebol firms versus matched non-chaebol firms											
HPR	mean	6.939	6.206	0.733	-0.050	0.318	-0.368 ***	1.424	1.001	0.417	
	[median]	[6.419]	[5.228]	1.191	[-0.258]	[-0.006]	-0.264 ***	[0.866]	[0.125]	0.740 ***	
	(variance)	(17.956)	(15.468)	2.488	(0.457)	(1.425)	-0.968 ***	(4.663)	(7.056)	-2.393	
Wealth relative	mean	1.102			0.721			1.208			
	[median]	[1.191]			[0.738]			[1.658]			
Number of observation		63	61		124	103		86	60		

[a]. Means, medians [brackets], and variances (parentheses) are reported. A negative difference indicates that chaebol firms are less profitable than non-chaebol firms. The statistical significance of the difference in means, medians, and variances is assessed using a t-test, a nonparametric median test, and an F-test, respectively. Statistical significance at the 1%, 5% and 10% levels are indicated by ***, **, and * respectively. Stock market returns (Panel B) are market-adjusted abnormal returns (i.e., stock returns in excess of market returns). AR(E) and AR(V) are abnormal returns using equally-weighted and value-weighted market returns, respectively. HPR denotes holding period return (Panel C). $HPR_i=\left[\prod_{t=1,2,...,\text{end-period}}(1+\text{ret}_{i,t})\right]-1$ for each stock *i*, where $\text{ret}_{i,t}$ are monthly returns from the first month of the sample period to the last month of the sample period. Panel D also reports HPR, but contrasts chaebol firms to a matched sample of non-chaebol firms based on industry membership and market capitalization. We calculate a wealth relative (Panels C and D) as the ratio of 1 plus the mean (median) HPR for chaebol firms divided by 1 plus the mean (median) HPR for non-chaebol firms. The figures for the 1990-1995 period are taken from Ferris et al (2003).

[Table 6] Chaebols and the Debt-capacity [a]

Panel A: Financial leverage summary statistics									
Time Period	**1984-1988**			**1990-1995**			**2001-2003**		
Characteristics	Chaebol firms	Non-chaebol firms	Difference	Chaebol firms	Non-chaebol firms	Difference	Chaebol firms	Non-chaebol firms	Difference
Total debt-to-assets	0.761	0.716	0.045 **	0.752	0.633	0.119 ***	0.572	0.549	0.023
	[0.777]	[0.698]	0.079 ***	[0.754]	[0.620]	0.134 ***	[0.573]	[0.486]	0.086 ***
	(0.118)	(0.326)		(0.142)	(0.267)		(0.251)	(0.412)	
Industry-adjusted leverage	0.038	0.015	0.024	0.108	-0.004	0.112 ***	0.015	-0.012	0.027 ***
	[0.055]	[0.000]	0.055 ***	[0.109]	[-0.001]	0.110 ***	[0.013]	[0.000]	0.013 ***
	(0.110)	(0.322)		(0.127)	(0.159)		(0.065)	(0.118)	
Number of observations	295	818		759	1316		248	1369	

Panel B: Regression result on industry-adjusted leverage						
	Number of observations (Adj. R2)	Intercept	Chaebol dummy	Log of total assets	Operating income/sales	Capex/sales
1984~1988	1113	0.093	0.008	-0.000	-0.773 ***	0.000
	(0.034)	(0.726)	(0.602)	(0.984)	(0.000)	(0.890)
1990-1995	2052	-0.319 ***	0.047 ***	0.030 ***	-0.272 ***	0.016
	(0.165)	(0.000)	(0.000)	(0.000)	(0.000)	(0.113)
2001-2003	1617	-0.011	0.032	0.006	-1.193 ***	0.030
	(0.180)	(0.956)	(0.215)	(0.601)	(0.001)	(0.389)

[a] The leverage ratio is calculated as total debt-to-total assets. The industry-adjusted leverage ratio is the difference between a firm's actual leverage ratio and its imputed leverage ratio. Imputed leverage is calculated as the firms total assets multiplied by the industry's median leverage ratio. For the summary statistics, we report means, medians (in brackets), and standard deviations (in parentheses) for chaebol firms and non-chaebol firms separately. Differences between chaebol firms and non-chaebol firms are assessed using a t-statistic (for means) and a nonparametric median test (for medians), respectively. Statistical significance at the 1%, 5% and 10% levels are indicated by ***, ** and * respectively. The total sample includes all chaebol and non-chaebol firm-years. The p-values are in parentheses. Statistical significance at the 1%, 5% and 10% levels are indicated by ***, ** and * respectively. The figures for the 1990-1995 period are taken from Ferris et al (2003).

[Table 7] Interest tax shields and taxes paid [a]

Panel A: Taxes-paid summary statistics									
Time Period	**1984-1988**			**1990-1995**			**2001-2003**		
Characteristics	Chaebol firms	Non-chaebol firms	Difference	Chaebol firms	Non-chaebol firms	Difference	Chaebol firms	Non-chaebol firms	Difference
Taxes/sales	0.010	0.020	-0.010 ***	0.008	0.014	-0.006 ***	0.013	0.013	0.000
	[0.008]	[0.015]	-0.007 ***	[0.005]	[0.009]	-0.004 ***	[0.013]	[0.008]	0.005 **
	(0.011)	(0.018)		(0.012)	(0.017)		(0.025)	(0.171)	
Industry-adjusted taxes	-0.005	0.002	-0.007 ***	-0.003	0.003	-0.006 ***	-0.000	0.000	-0.000
	[-0.005]	[0.000]	-0.005 ***	[-0.004]	[0.000]	-0.004 ***	[0.000]	[0.000]	0.000
	(0.012)	(0.015)		(0.011)	(0.016)		(0.024)	(0.170)	
Number of observations	295	818		759	1316		248	1369	

Panel B: Regression result on industry-adjusted taxes-paid						
	Number of observations (Adj. R2)	Intercept	Chaebol dummy	Log of total assets	Operating income/sales	Capex/sales
1984~1988	1113	0.008	-0.004 ***	-0.001 *	0.067 ***	0.000 ***
	(0.141)	(0.245)	(0.000)	(0.070)	(0.000)	(0.000)
1990-1995	2052	0.016 ***	-0.004 ***	-0.001 ***	-0.092 ***	0.000
	(0.063)	(0.000)	(0.000)	(0.002)	(0.000)	(0.838)
2001-2003	1617	0.129 **	0.009	-0.008	0.373	-0.070 *
	(0.114)	(0.270)	(0.387)	(0.289)	(0.339)	(0.085)

[a] All taxes paid calculations are standardized by total sales. Industry-adjusted taxes-paid is the difference between a firm's actual taxes-paid and its imputed taxes-paid. Imputed taxes-paid is calculated as the firm's operating income multiplied by the industry's median taxes-paid to operating income ratio. For the summary statistics, we report means, [medians], and (standard deviations) separately for chaebol and non-chaebol firms. Differences between chaebol and non-chaebol firms are measured with a t-statistic and a nonparametric median test. Statistical significance at the 1%, 5% and 10% levels are indicated by ***, ** and * respectively. In Panel B the regression analysis, the dependent variable is industry-adjusted taxes-paid. The p-values are in parentheses. Statistical significance at the 1%, 5% and 10% levels are indicated by ***, ** and * respectively. The figures for the 1990-1995 period are taken from Ferris et al (2003).

[Table 8] Summary of the Overall Results

	1984-88	1990-95	2001-2003	1998-2000	1998-2003
Excess value (firms : simple mean) [group : regression chaebol dummy]	+** -	-*** -***	+*** +***	+** -***	+*** -**
Profit stability hypothesis operating income / total asset(variance) net income / total asset(variance) short-run equity return(monthly weighted variance) long-run equity return(HPR matched variance) long-run wealth relative(matched)	 lower variance lower variance indifference higher variance over-performance	 lower variance*** lower variance*** lower variance*** lower variance*** underperformance	 lower variance lower variance lower variance lower variance over-performance	 lower variance higher variance*** lower variance*** higher variance over-performance	 lower variance higher variance*** lower variance higher variance*** over-performance
Over-investment hypothesis	No	Yes***	Yes*	No	Yes
Performance hypothesis	- / +	+	+***	-	+*
Cross-subsidization hypothesis (NCF)	Yes	Yes**	Yes*	Yes	Yes*
Debt-capacity advantage (regression result)	Yes	Yes***	Yes	Yes**	Yes***
Tax advantage (regression result)	Yes***	Yes***	No	Yes*	No
Characteristics of Chaebol firms	- Higher Stock Return, lower accounting profitability with lower Variance - Some Chaebol Advantage - No Overinvestment -No Performance Impact => Plus Excess value	- Lower Stock Return & accounting profitability with lower Variance - Strong Chaebol Advantage - Strong Overinvestment - No Performance Impact =>Negative Excess Value	- Higher Stock Return & accounting profitability With Lower Variance - No Chaebol Advantage - Mild Overinvestment - Strong Performance Impact => Plus Excess Value	Restructuring & Transition Period	Overall Results for the Post-crisis Periods

In excess value, +(-) indicates chaebol levels' values higher (lower) than non-chaebol groups. In diversification effect, we separate our sample of chaebols into a 'high" and "low" subsample relative to the median value of the relatedness measure. Therefore, +(-) indicates chaebols with a higher degree of relatedness have higher(lower) value than chaebols with a lower degree of relatedness. And for the relatedness, (1)~(3) are 1/number of 3-digit industries operating in the group, median cross-correlation and mean cross-correlation between the capital expenditures and cashflow of member firms within the chaebol, relatively. Statistical significance at the 1%, 5% and 10% levels are indicated by ***, **, and *, respectively. The figures for the 1990-1995 period are taken from Ferris et al (2003).

[Appendix Table 1] Descriptive statistics for the 1990s using different dataset:
Chaebol firms, non-chaebol firms and chaebol groups

Panel A: comparative firm-level characteristics			
Characteristics	Chaebol firms	Non-chaebol firms	Difference
Total assets (billions of won)	876.179	167.315	708.864 ***
	[465.855]	[76.433]	389.422 ***
	(1320.468)	(633.123)	
Total debt-to-total asset	0.759	0.672	0.087 ***
	[0.762]	[0.660]	0.102 ***
	(0.131)	(0.371)	
Sales (billions of won)	1028.139	130.105	898.034 ***
	[414.898]	[68.241]	346.656 ***
	(2200.217)	(369.645)	
Capital expenditure/sales	0.114	0.086	0.028 ***
	[0.058]	[0.053]	0.005 ***
	(0.243)	(0.213)	
Beta	0.922	1.503	-0.58
	[0.839]	[0.677]	0.162 ***
	(8.238)	(17.440)	
Current assets/current liabilities	1.077	1.511	-0.434 ***
	[1.033]	[1.346]	-0.313 ***
	(0.425)	(0.823)	
Dividends paid/net income	0.602	0.578	0.024
	[0.398]	[0.315]	0.083 ***
	(3.072)	(2.515)	
Market-to-book ratio	1.038	1.093	-0.055 ***
	[1.020]	[1.032]	-0.013 **
	(0.147)	(0.382)	
Taxes/sales	0.007	0.014	-0.007 ***
	[0.004]	[0.009]	-0.004 ***
	(0.008)	(0.018)	
Number of observations	700	2135	

Panel B: Chaebol-group statistics			
Group characteristics	median	mean	sd.
Number of member firms	4	4.21	2.397
Number of industries	3	3.099	1.45
Number of firms with negative operating income	0	0.222	0.486
Total assets (billions of won)	1964.293	3690.908	4703.509
Total debt-to-total asset	0.781	0.776	0.066
Sales (billions of won)	1701.823	4394.722	7370.509
Capital expenditure/sales	0.069	0.109	0.236
Mean beta	0.841	0.82	3.194
Current assets/current liabilities	0.993	1.014	0.274
Dividends paid/net income	0.392	0.473	5.753
Market-to-book ratio	1.014	1.02	0.084
taxes/sales	0.005	0.007	0.006
Number of observations	162		

Notes: See the notes to the table 1. Differences are evaluated using a t-statistics and the Wilcoxon rank-sum test. Statistical significance at the 1%, 5%, and 10% levels are denoted by ***, **, and * respectively. In panel B chaebol group variables are aggregated across member firms and a means(median) value is estimated.