Hitotsubashi Journal of Economics 48 (2007), pp.159-184.

VALUE DISCOUNT OF BUSINESS GROUPS SURROUNDING THE ASIAN FINANCIAL CRISIS: EVIDENCE FROM KOREAN CHAEBOLS

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Received September 2006; Accepted May 2007

Abstract

We examine the effect of business group membership on firm value in each pre- and postcrisis Korea. Consistent with prior studies, results show that group affiliated chaebol firms suffer value discount relative to non-chaebol firms in the precrisis period. However, we also find that chaebol firms experience an improvement in firm value relative to non-chaebol firms after the financial crisis. These findings imply that the value discount of business groups reported in prior studies is not an inevitable consequence of diversification, but can be alleviated or overcome by structural reforms in business practices or economic conditions

Keywords: Asian Financial Crisis, Business Group, Chaebol, Diversification, Firm Value
JEL Classification Code: G34

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I. *Introduction*

To maximize firm value, should firms stand alone concentrating on a business or organize diversified business groups? Results from previous studies on this long-standing question are mixed. Empirical studies on the effects of diversification on firm value using data from U.S. conglomerates, which often provide dissimilar and conflicting results, have painted a murky picture. Other studies have examined the Japanese keiretsu. Whereas a diversified firm in the United States is usually a single business entity, a keiretsu is a group of independent business entities operating in various industries but often making unified investment decisions. Because an independent firm usually discloses more detailed information than a segment of a firm, studies focusing on the keiretsu are able to assess an individual business unit in a certain industry more accurately than studies focusing on U.S. conglomerates. Nonetheless, findings using data from Japanese keiretsu are also mixed.

Korean business groups, called chaebols, provide several advantages in the attempt to identify the impact of diversification on firm value. First, member firms in a keiretsu are usually monitored, financed, and partly owned by a main bank that stands in the center of the business group. However, although similar to keiretsu in corporate structure, Korean chaebols' member firms, which are strictly prohibited from affiliating with a bank, are primarily under the direction of a controlling shareholder or founder's family who influences the investment or financing decisions of member firms. Therefore, the confounding effects of the presence of a main bank are eliminated. Second, without relying on a main bank, chaebols have extensively developed internal capital markets, similar to U.S. conglomerates. That is, just as U.S. conglomerates use internal capital markets to allocate funds according to each division's needs and corporate strategy, the equivalents in Korean chaebols distribute resources according to each member's needs and group strategy (Shin and Park, 1999). The presence of internal capital markets, which are absent from Japanese keiretsu, allow researchers to investigate more fully the effects of diversification on firm value (Ferris et al., 2003) For example, taking advantage of the similarities between Korean chaebols and U.S. conglomerates, Ferris et al. (2003) used a sample of Korean firms between 1990 through 1995 and found that firms that belong to the top 30 diversified chaebols (hereafter *chaebol firms*) suffer a value loss relative to their non-chaebol counterparts. In addition, Ferris et al. identified the possible causes of such value loss as the overinvestment in low-performing industries and cross-subsidization of the weaker members of the groups — both of which are frequently mentioned as the malfunctions of internal capital markets in diversified U.S. conglomerates.

In this study, consistent with Ferris et al. (2003), we confirm that chaebol firms suffered value discount relative to non-chaebol firms before the Asian financial crisis hit Korea in late 1997 and into 1998. Particularly, in the precrisis period, under the government-driven development policy, chaebol firms strategically sought external growth and diversification and, thus, did not pursue the maximization of shareholder value. Also, chaebol firms expropriated minority shareholders' wealth by arbitrarily shifting values from one affiliate to another. Further, they relied heavily on internal capital markets while practicing overinvestment and cross-subsidization.

After the financial crisis, however, various reforms resulted in significant changes in the Korean economy, which contributed to an increase in value of chaebol firms. For example, in

the postcrisis period, corporate governance was improved and transparency was enhanced. Internal capital markets were contracted, and arbitrary transactions among affiliates were more closely monitored. In addition, more advanced disclosure practices were adopted and shareholders' rights were strengthened.

This study examines the effect of the changes that took place in the business practices of both chaebol firms and the Korean economy after the financial crisis. Particularly, we test the hypothesis that the value discount found in Korean chaebols in the precrisis period disappears under the reforms of the postcrisis period. Building on Ferris et al.'s (2003) study, which used a sample of Korean firms during the precrisis period, we examine samples of both pre- and postcrisis Korean firms to determine whether the costs of diversification still dominate the benefits in the postcrisis period. In other words, by studying the group membership's effect on firm value in both the pre- and postcrisis periods, we investigate how the economic implications of diversification change as a country develops more market-driven business environments. Our results show that, unlike in the precrisis period, the costs of group membership no longer outweigh the benefits in the postcrisis period, which suggests that the value discount of business groups reported in prior studies is not an inevitable consequence of diversification. This study provides insight on the economic conditions necessary to alleviate the value discount of diversification and, thus, increase firm value through diversification.

This paper is organized as follows. Section 2 discusses the related literature on diversification and firm value. Section 3 describes Korean chaebols and their reforms after the financial crisis. Section 4 discusses the data and empirical results. Section 5 concludes.

II. *Diversification and Firm Value*

1. Benefits and Costs of Diversification

Compared with external capital markets, internal capital markets can reduce inefficiencies in resource allocation caused by information asymmetry (Gertner et al., 1994; Stein, 1997). In fact, studies have shown that resource allocation is more efficient when diversified firms use internal markets (Chandler, 1977; Weston, 1970). This efficiency is achieved by many means. For example, by coordinating their specialized divisions, multidivisional firms can produce greater profits than if each line of business operates as a separate firm (Chandler, 1977). Increased debt capacity and coinsurance are also benefits of diversification because they can increase interest tax shields and, thus, add value to the firms involved (Lewellen, 1971). In addition, Majd and Myers (1987) suggested that the tax code's asymmetric treatment of gains and losses also provides tax advantages to diversified conglomerates.

However, a number of studies have claimed that diversification can create such costs as overinvestment (Jensen, 1986; Stulz, 1990), cross-subsidization of failing business segments (Myer et al., 1992), and information asymmetry between central management and divisional managers (Harris et al., 1982; Myerson, 1982). These studies suggest that diversified firms are likely to invest more in negative net present value projects than their individual segments would if operated independently (Jensen, 1986). Studies on internal capital markets also report that internal capital markets could generate capital misallocation and, thus, inefficient investments because firms often subsidize their poorly performing divisions, which impedes other

divisions from financing more profitable investments (Lamont, 1997; Scharfstein and Stein, 2000; Shin and Stultz, 1998).

Because the empirical studies have produced mixed results, how the opposing benefits and costs of diversification influence the overall value of a firm is not clear. For example, whereas studies on U.S. firms during the 1960s reported the superior performance of diversified conglomerates (Copeland and Weston, 1979; Matsusaka, 1993), studies completed between the mid-1970s and mid-1980s showed no significant relation between diversification and performance (De, 1992). In addition, more recent studies using data from the 1980s reported a negative relation between diversification and firm value (Berger and Ofek, 1995; Comment and Jarrell, 1995; Lang and Stulz, 1994; Servaes, 1996). More recent studies have once again pointed to the benefits of diversification. For example, Campa and Kedia (2002), who take into account the endogeniety of the diversification decision, suggested that diversification can be a value-enhancing strategy. According to Campa and Kedia, an observed discount is not, per se, evidence that diversification destroys value; rather, they rather argue that the firm-specific characteristics causing a firm to diversify might also cause it to be discounted. Other studies of diversified business groups in emerging markets have reported that the benefits of the diversification exceed the costs because the internal markets achieve useful ends, such as market intermediation for products, financing, and labor (Chang and Choi, 1988; Ghemawat and Khanna, 1998; Khanna and Palepu, 1997, 2000).

2. Business Groups in Emerging Markets

In emerging markets with market imperfections, business groups are often considered efficient economic organizations because they minimize transaction costs through the use of their internal markets. In a business environment in which economic infrastructures such as external markets are underdeveloped, the internal markets in business groups can substitute for, or complement, the imperfect external markets. Specifically, by distributing scarce resources efficiently among affiliated firms within the same business group or by decreasing transaction costs between suppliers and purchasers using vertical integration, diversified business groups can help their affiliated firms overcome the market imperfections (Chang and Choi, 1988; Ghemawat and Khanna, 1998; Khanna and Palepu, 1997, 2000; Leff, 1978). Nonetheless, the costs of diversification reported in U.S. conglomerates can also be found in the business groups in emerging markets. In other words, like diversified U.S. firms, business groups in emerging markets have the potential either to offer benefits to member firms or to destroy their value (Khanna and Palepu, 2000).

Khanna and Palepu (2000) analyzed the performance of affiliates of diversified Indian business groups relative to that of unaffiliated firms. They found that accounting and stock market measures of firm performance initially decrease with group diversification but subsequently increase once the group diversification exceeds a certain threshold, suggesting that the most diversified Indian business groups increase their value by replicating the functions of the institutions that are missing in emerging markets. Similarly, Fauver et al. (2002), using a sample from 35 countries, examined whether the value of corporate diversification is related to the level of capital market development and found no value discount of diversification in countries with underdeveloped capital markets but a significant value discount of diversification in countries with advanced capital markets. Even though they did not find a value

premium of diversification in countries with underdeveloped capital markets, their results suggest that the benefits of diversification can offset the costs in emerging markets with market imperfection.

However, Lins and Servaes (2002) found that diversified firms in seven emerging markets (Hong Kong, India, Indonesia, Malaysia, Singapore, South Korea, and Thailand in 1995) traded at a discount of approximately 7% compared with single-segment firms and were also less profitable than their counterparts. Further, they found that such discount is more substantial in firms that are members of industrial groups, supporting the argument that the industrial group structure allows for the expropriation of minority shareholders by controlling shareholders. Consistent with Lins and Servaes, Ferris et al. (2003), using a sample of firms from 1990 to 1995, reported that group-affiliated firms in Korea suffer value loss relative to nonaffiliated counterparts. They identify the possible causes of such value loss as overinvestment in low performing industries and cross-subsidization for the weaker members of the groups — both of which are frequently mentioned as the primary malfunctions of internal capital markets in diversified conglomerates. Thus, their finding suggests that the value discount of diversification is not restricted to multisegment firms but is also present in diversified business groups (Ferris et al., 2003).

Although Japan is not usually classified as an emerging market, studies on Japanese keiretsu have also produced mixed results. For example, Hoshi et al. (1990, 1991), Prowse (1992), and Ferris et al. (1995) reported benefits of keiretsu affiliation, such as the reductions in agency costs, bankruptcy costs, monitoring costs, and liquidity constraints. In contrast, Weinstein and Yafeh (1998), Morck and Nakamura (1999), and Kang and Stulz (2000) reported significant costs to group membership caused by the presence of an affiliated bank. Further, Lins and Servaes (1999) found that keiretsu firms experience a value loss (but they do not identify whether this finding results from a main bank or a conglomeration effect) etc.

III. *Korean Chaebols and the Asian Financial Crisis*

Immediately following the Korea War, the Korean economy lacked various components of a sound business infrastructure, including efficient external capital markets, reliable suppliers, and competent managers. This situation forced Korean chaebols to make the most of their own internal markets (Sakong and Jones, 1980). Particularly, because the external capital markets in Korea were underdeveloped, chaebols formed pools of funds generated from affiliated companies and used them to finance new business ventures or rescue poorly performing affiliates, thus creating internal capital markets within the groups (Chang and Hong, 2000). Like other business groups that are ubiquitous in most emerging markets, chaebols take the form of pyramidal structures, where a small number of controlling shareholders or founding families exercise excessive voting rights relative to their cash flow rights.[1] Thus, controlling shareholders could often move capital across member firms within

[1] For instance, as of 2004, the largest shareholder of SK Co., the main affiliate of SK group which is one of the top five chaebols in Korea, is Sovereign Investment with 14.99% of shares. This figure is greater than the ownership of chairman Choi, who is a member of the founding family. However, chairman Choi can actually exercise up to 17.5% voting rights through relatives' shares and other affiliates' shares, which puts him in a position of effective ownership.

a group with minimal external monitoring (Khanna and Palepu, 1997; La Porta et al., 1999) to the detriment of minority shareholders' wealth. The recent economic crises in Asia and other emerging markets have also highlighted the concern that business groups are difficult to monitor because their disclosures are inadequate, particularly regarding the related party transactions among group firms.

However, in the period following the Asian financial crisis, under the course of International Monetary Fund-driven market reforms, Korean chaebols changed. Because the old business practices and corporate governance of chaebol firms were considered major causes of the financial crisis, certain reforms were targeted at chaebol firms in an attempt to correct their internal capital markets and improve their corporate transparency. For example, in April 1998, the government prohibited new cross-loan guarantees among affiliated companies in chaebols and also legislated chaebol firms to dissolve all existing cross-loan guarantees by March 2003, effectively contracting the function of internal capital markets in chaebols (Kim, 2000; Yoo, 2000). Further, the government's tacit pressure for chaebol firms to lower their debt-to-equity ratio to less than 200% prompted targeted firms to issue equities to meet the ratio, finally establishing the dependence of chaebol firms on the external stock market (Kim, 2000; Yoo, 2000). Under these postcrisis circumstances, chaebol firms were motivated to mitigate information asymmetry to receive more readily facile financing in external capital markets (Chang et al., 2005). In addition, combined financial statements were also adopted in 1999 to prevent arbitrary transactions among affiliated companies, thus improving the transparency of chaebol firms (Kim, 2000; Yoo, 2000).

In line with these reforms directly targeted at chaebols, other reforms in the financial sector also influenced chaebols to change their business practices in the postcrisis period. For example, during the precrisis period, commercial banks in Korea were controlled by the government, and the financial resources of the banks were distributed according to the policy of the government, rather than any market mechanism. Thus, chaebol firms, who enjoyed privileges under government-driven development policies, could easily finance their businesses using bank loans. In addition, because resource distribution was also based on outward firm size, chaebol firms — without consideration of profitability or shareholder value — pursued external growth by using debt, inflating assets, and through diversification.

However, after the financial crisis, business practices in the financial sector became more aligned with global standards, and government policy was replaced by market mechanisms in distributing resources in the financial sector.[2] As governmental financial support for chaebol firms of the past was no longer available after the financial crisis, the myth among Koreans that "a chaebol never collapses" was dispelled. As chaebols began to fall apart or their member firms faced bankruptcy, the surviving chaebols, who recognized the loss of their safety net, finally began to pursue the maximization of firm value rather than focusing solely on external

[2] After the financial crisis, commercial banks in Korea whose Bank for International Settlement (BIS) ratio was below 2% were given management improvement orders from the government, such as the complete write-off of equity capital, suspension of operation, merger with healthier financial institutions designated by the Financial Supervisory Service, and so on. In addition, the government also ordered that financial institutions have outside directors for more than half of their board members and also have audit committees and compliance officers to observe whether the institutions obey the law. Consequently, the soundness and profitability of financial institutions were enhanced in the postcrisis period, and the average BIS ratio of commercial banks increased from around 7.0% at the end of 1998 to 10.5% at the end of 2002 (Kim 2003).

growth.

Changes in the corporate sector also took place that affected chaebols. Particularly, the restructuring drive in the postcrisis period influenced chaebol firms to promote a shareholder-oriented management paradigm, and, consequently, shareholder activism increased in large firms. Shareholders began to voice their opinions more readily on matters of corporate management, and investors' rights received more protection. For example, the often-neglected property rights of minority shareholders and foreign investors were strengthened and rights such as the examination of financial accounts became easier for minority shareholders to exercise. Also, collective lawsuits against external auditors were permitted, and the governmental supervision of external auditing was reinforced.

In addition, the transparency of Korean firms was improved in the postcrisis period. The government forced all companies listed on the Korean Stock Exchange to have as much as one-fourth of their boards comprised of outside directors. Further, the boards of large companies (with assets worth over 2 trillion Korean won) were required to fill more than half their board with outside directors. Also, a more advanced disclosure system was implemented to increase companies' responsibility for their public announcements. (Chang et al., 2005). In addition, Chang and Shin (2003) reported that after the financial crisis chief executive officer turnover sensitivity to performance in chaebol firms exceeded performance sensitivity in stand-alone firms, indicating that the monitoring of chief executive officers in chaebol firms improved more than in non-chaebol firms. These improvements in the transparency and monitoring of chaebol firms likely contributed to subsequent improvements in efficiency and firm value during the postcrisis period.

In this study, we expand on Ferris et al. (2003). Consistent with Ferris et al., we suppose that chaebol firms suffer value discount relative to non-chaebol firms in the precrisis period because chaebol firms, benefiting from government-driven development policy, strategically pursued external growth and diversification to the detriment of maximizing shareholder value. However, after the financial crisis, chaebols' business practices changed. Therefore, we hypothesize that the value discount found in Korean chaebols in the precrisis period disappears under the changed business practices of the postcrisis period. If our hypothesis holds, our findings will indicate that in the Korean market the costs of business group membership no longer outweigh the benefits and, hence, suggest that diversification is not in itself a negative factor in determining firm value.

IV. *Data and Empirical Results*

1. Data

Our sample is comprised of companies listed on the Korean Stock Exchange in the precrisis period (1993-1996) and the postcrisis period (1999-2002). We exclude the years of the Korean financial crisis (1997-1998). In addition, because we want to compare chaebol and non-chaebol firms, we further exclude the companies that are not defined as either chaebol firms or non-chaebol firms. Specifically, for the purposes of this study, chaebol firms are defined as companies whose affiliated business groups are ranked in the top 30 on the basis of total assets (the sum of the total assets of all affiliated companies, each of which is a member

of the same business group), and non-chaebol firms are defined as companies whose affiliated business groups are ranked below the top 50 on the basis of total assets or as stand-alone companies that do not belong to any business group. We exclude the firms belonging to chaebols ranked between the top 31 and 50 because these middle-size business groups share characteristics of both larger chaebol firms and independent stand-alone firms. Finally, we exclude companies belonging to any industry-year sample that has less than five non-chaebol firms, financial institutions, and utility companies controlled by the government. We use the KISLINE database provided by the Korean Credit Evaluation Information Co. and the TS 2000 database serviced by the Committee of Listed Companies to collect financial information, stock prices, and chaebol affiliation information for each company in the sample.

2. Univariate Analyses

Three measures are used to estimate firm value: Tobin's q, excess value by assets, and excess value by earnings before interest and taxes (EBIT). By definition, Tobin's q is the present value of future cash flows divided by the replacement cost of tangible assets. Because no risk adjustment or normalization is required to compare q across firms, we can easily use this measure to compare firm value (Lang and Stulz, 1994). Following Khanna and Palepu (2000), we use the market-to-book ratio as a proxy for Tobin's q; market-to-book ratio is equal to the sum of the market value of the common stock, the book value of the preferred stock, and the book value of any debt, divided by the book value of the total assets. We define the market value of the common stock as the closing price of the common stock at the fiscal year-end multiplied by the number of common shares outstanding.[3]

Table 1 provides descriptive statistics for all variables.[4] For the whole period (Panel A), the mean (median) of Tobin's q is 1.0877 (0.9990) for non-chaebol firms and 1.0196 (0.9827) for chaebol firms; for the precrisis period (Panel B), 1.1592 (1.0821) for non-chaebol firms and 1.0398 (1.0156) for chaebol firms; and for the postcrisis period (Panel C), 1.0239 (0.9021) for non-chaebol firms and 0.9914 (0.9188) for chaebol firms. Consistent with Ferris et al. (2003), the differences in the mean and median between the two groups are statistically significant in the precrisis period, implying that chaebol firms suffer value discount relative to non-chaebol firms during this period. However, the differences in the mean and median are not statistically significant in the postcrisis period, which is inconsistent with Ferris et al. (2003). This result does not provide evidence that chaebol firms continue to suffer value discount in the postcrisis period. Using multiple regression analyses that control for other factors possibly affecting Tobin's q, in the following section we address whether the value discount in chaebol firms actually disappears in the postcrisis period.

Similar to Berger and Ofek (1995) and Ferris et al. (2003), we construct excess value by assets, another measure of firm value, using an industry assets multiplier. Excess value by

[3] For consistent comparisons between the pre- and postcrisis periods, we subtract revaluation reserve from the total assets for the postcrisis period when estimating the proxy for Tobin's q because many firms in Korea increased their book value by reevaluating their assets right after the crisis, mainly to meet the government's radical demand for lowering debt-to-equity ratio.

[4] To minimize the effect of outliers, tobin's q, excess value by assets, excess value by EBIT, EBIT/sales, Capex/sales, and debt/assets lying in either the top 1% or bottom 1% of its distributions in the whole sample period are given as missing values.

assets is, in itself, industry-year adjusted and does not require assumptions about the firm's replacement value, as does the calculation for Tobin's q (Berger and Ofek, 1995). Excess value by assets is calculated as the natural log of the ratio of the firm's actual value (i.e., the sum of the market value of the common stock, the book value of the preferred stock, and the book value of any debt) to its imputed value using an assets multiplier. This imputed value is calculated as the firm's total assets times the industry-year median capital-to-assets ratio (i.e., actual value divided by assets). To make a direct comparison between chaebol and non-chaebol firms, the industry-year median capital-to-assets ratio is drawn only from the sample of non-chaebol firms (Berger and Ofek 1995; Ferris et al., 2003).

For the whole period, the mean (median) of excess value by assets is -0.0109 (-0.0308) for non-chaebol firms and -0.0611 (-0.0774) for chaebol firms (Table 1, Panel A); for the precrisis period, 0.0288 (0.0000) for non-chaebol firms and -0.0590 (-0.0709) for chaebol firms (Panel B); and for the postcrisis period,-0.0462 (-0.0969) for non-chaebol firms and -0.0640 (-0.0970) for chaebol firms (Panel C). The differences in the mean and median are statistically significant for both the whole period and the precrisis period, consistent with Ferris et al. (2003). This result suggests that chaebol firms suffer value discount relative to non-chaebol firms in the precrisis period. However, the differences in the mean and median are not statistically significant for the postcrisis period, which is inconsistent with Ferris et al. (2003) and does not provide evidence that the value discount in chaebol firms still exists after the financial crisis.

Similar to Berger and Ofek (1995) and Ferris et al. (2003), we construct excess value by EBIT using the industry EBIT multiplier. Even though the earnings number is more vulnerable to manipulation and, thus, less reliable than assets, the earnings multiplier has the advantage of imputing value directly from current profitability, which may be more directly linked to firm value than assets are (Berger and Ofek, 1995). Specifically, excess value by EBIT is calculated as the natural log of the ratio of the firm's actual value (i.e., the sum of the market value of the common stock, the book value of the preferred stock, and the book value of any debt) to its imputed value using the EBIT multiplier. This imputed value is calculated as the firm's operating income times the industry-year median capital-to-operating income ratio (i.e., actual value divided by operating income). To make a direct comparison between chaebol and non-chaebol firms, the industry-year median capital-to-operating income ratio is drawn exclusively from the sample of non-chaebol firms, which is consistent with Berger and Ofek and Ferris et al. When a firm has negative operating income, the variable is given as missing value.

For the whole period, the mean (median) of excess value by EBIT is 0.3002 (0.0996) for non-chaebol firms and 0.2318 (0.0889) for chaebol firms (Table 1, Panel A); for the precrisis period, 0.2074 (0.0465) for non-chaebol firms and 0.1087 (-0.0423) for chaebol firms (Panel B); and for the postcrisis period, 0.3951 (0.1893) for non-chaebol firms and 0.4151 (0.2223) for chaebol firms (Panel C). The differences in the mean and median are statistically significant for the precrisis period, consistent with Ferris et al. (2003). This result suggests that chaebol firms suffer value discount relative to non-chaebol firms in the precrisis period. However, the differences in the mean and median are not statistically significant for the postcrisis period, which is inconsistent with Ferris et al. (2003) and does not provide evidence that the value discount in chaebol firms still exists after the financial crisis. Using multiple regression analyses that control for other factors possibly affecting excess value by assets or by EBIT, in the following section we address whether the value discount in chaebol firms actually disappears

TABLE 1. DESCRIPTIVE STATISTICS FOR VARIABLES

	Non-chaebol Firms				Chaebol Firms				Difference	
	No. of Obs.	Mean	Median	Std. Dev.	No. of Obs.	Mean	Median	Std. Dev.	Mean	Median
Panel A. Whole period (1993-1996, 1999-2002)										
Tobin's q	3,184	1.0877	0.9990	0.3981	810	1.0196	0.9827	0.2457	−0.0680***	−0.0163
Excess value by assets	3,185	−0.0109	−0.0308	0.3022	809	−0.0611	−0.0774	0.2039	−0.0502***	−0.0466***
Excess value by EBIT	2,640	0.3002	0.0996	0.7950	722	0.2318	0.0889	0.7706	−0.0684**	−0.0107
Log(assets)	3,259	18.5051	18.4661	0.9984	816	20.4705	20.5297	1.2876	1.9654***	2.0637***
Firm age	3,259	30.3372	29.0000	12.1826	816	33.2770	32.0000	12.2034	2.9397***	3.0000***
EBIT/sales	3,180	0.0474	0.0560	0.0941	814	0.0605	0.0673	0.0692	0.0131***	0.0113***
Capex/sales	3,199	0.0383	0.0246	0.0695	796	0.0529	0.0319	0.0744	0.0146***	0.0073***
Debt/assets	3,183	0.6386	0.6018	0.3063	811	0.7291	0.7213	0.2257	0.0905***	0.1195***
Panel B. Precrisis period (1993-1996)										
Tobin's q	1,500	1.1592	1.0821	0.3272	472	1.0398	1.0156	0.1694	−0.1193***	−0.0665***
Excess value by assets	1,500	0.0288	0.0000	0.2204	472	−0.0590	−0.0709	0.1354	−0.0878***	−0.0709***
Excess value by EBIT	1,335	0.2074	0.0465	0.6789	432	0.1087	−0.0423	0.6724	−0.0987***	−0.0888**
Log(assets)	1,510	18.3556	18.3006	0.9365	473	20.2368	20.3085	1.1590	1.8812***	2.0080***
Firm age	1,510	28.2682	26.0000	11.6931	473	31.9979	29.0000	11.7171	3.7279***	3.0000***
EBIT/sales	1,496	0.0608	0.0614	0.0703	472	0.0659	0.0680	0.0569	0.0051	0.0066*
Capex/sales	1,490	0.0426	0.0232	0.0647	458	0.0609	0.0333	0.0790	0.0183***	0.0101**
Debt/assets	1,499	0.6637	0.6555	0.2303	473	0.7741	0.7774	0.1343	0.1104***	0.1218***
Panel C. Postcrisis period (1999-2002)										
Tobin's q	1,684	1.0239	0.9021	0.4424	338	0.9914	0.9188	0.3216	−0.0325	0.0167
Excess value by assets	1,685	−0.0462	−0.0969	0.3560	337	−0.0640	−0.0970	0.2725	−0.0179	−0.0001
Excess value by EBIT	1,305	0.3951	0.1893	0.8886	290	0.4151	0.2223	0.8665	0.0199	0.0330
Log(assets)	1,749	18.6342	18.6023	1.0319	343	20.7927	21.0052	1.3848	2.1585***	2.4029***
Firm age	1,749	32.1235	31.0000	12.3166	343	35.0408	34.0000	12.6502	2.9173***	3.0000***
EBIT/sales	1,684	0.0356	0.0499	0.1098	342	0.0531	0.0671	0.0827	0.0175***	0.0172***
Capex/sales	1,709	0.0345	0.0257	0.0732	338	0.0422	0.0307	0.0662	0.0077*	0.0050
Debt/assets	1,684	0.6162	0.5322	0.3593	338	0.6662	0.6250	0.3006	0.0500***	0.0928***
Panel D. Difference Between Precrisis and Postcrisis Period										
Tobin's q		−0.1352***	−0.1800***			−0.0484**	−0.0968***			
Excess value by assets		−0.0750***	−0.0969***			−0.0050	−0.0262**			
Excess value by EBIT		0.1877***	0.1427***			0.3063***	0.2646***			
Log(assets)		0.2786***	0.3017***			0.5558***	0.6966***			
Firm age		3.8553***	5.0000***			3.0429***	5.0000***			

EBIT/sales	−0.0252***	−0.0115***	−0.0127**	−0.0009
Capex/sales	−0.0081***	0.0025	−0.0187***	−0.0025
Debt/assets	−0.0475***	−0.1233***	−0.1079***	−0.1524***

Notes: Tobin's q is the sum of the market value of the common stock, the book value of the preferred stock, and the book value of any debt, the sum divided by the book value of the total assets, where the market value of the common stock is the closing price of the common stock at the fiscal year-end multiplied by the number of common shares outstanding. Excess value by assets is the natural log of the ratio of the firm's actual value to its imputed value using an assets multiplier. The firm's actual value is the sum of the market value of the common stock, the book value of the preferred stock, and the book value of any debt. The imputed value using an asset multiplier is the firm's total assets times the industry-year median capital-to-assets ratio (i.e., actual value divided by assets). Excess value by EBIT is the natural log of the ratio of the firm's actual value to its imputed value using the earnings before interest and taxes (EBIT) multiplier. The imputed value using the EBIT multiplier is the firm's operating income times the industry-year median capital-to-operating income ratio (i.e., actual value divided by operating income). Log(assets) is the natural log of total assets. Firm age is the difference between the current year and the firm's establishment year. EBIT/sales is the ratio of operating income to sales. Capex/sales is the ratio of capital expenditures to sales. Debt/assets is the ratio of total debt to total assets. The significance of the difference in means is assessed using the t-test. The significance of the difference in medians is assessed using the nonparametric median test.

* significance at the 5-10% level. ** significance at the 1-5% level. *** significance less than 1% level.

in the postcrisis period.

Log(assets) is a proxy for firm size. Table 1, Panel A shows that the mean (median) of log(assets) for the whole period is 18.5051 (18.4661) for non-chaebol firms and 20.4705 (20.5297) for chaebol firms. The differences in the mean and median between the two groups are statistically significant, implying that chaebol firms are, on average, larger than non-chaebol firms. Panel B and Panel C show similar results for the precrisis and postcrisis periods. Firm age is measured by a difference between current year and the firm's establishment year. Panel A shows that the mean (median) of firm age for the whole period is 30.3372 (29.0000) for non-chaebol firms and 33.2770 (32.0000) for chaebol firms. The differences in the mean and median between the two groups are statistically significant, indicating that chaebol firms are, on average, older than non-chaebol firms. Panel B and Panel C also show similar results for the precrisis and postcrisis periods.

EBIT/sales is a proxy of firm profitability and is measured by dividing operating income by sales. Table 1, Panel A shows that the mean (median) of EBIT/sales is 0.0474 (0.0560) for non-chaebol firms and 0.0605 (0.0673) for chaebol firms. The differences in the mean and median between the two groups are statistically significant, suggesting that chaebol firms are, on average, more profitable than non-chaebol firms in the whole period. Panel B shows that only the median has a weakly significant difference, but Panel C shows that both the mean and median have strongly significant differences.

The ratio of capital expenditures (capex) to sales is a proxy for a firm's growth opportunities and is measured by dividing capital expenditures by sales. Table 1, Panel A shows that the mean (median) of capex/sales is 0.0383 (0.0246) for non-chaebol firms and 0.0529 (0.0319) for chaebol firms. The differences in the mean and median between the two groups are statistically significant, implying that chaebol firms have, on average, more growth opportunities than non-chaebol firms in the whole period. Panel B shows similar results, but Panel C shows that only the mean has a weakly significant difference.

Debt/assets is a measure of leverage and is measured by dividing total debt by total assets. Table 1, Panel A shows that the mean (median) of debt/assets is 0.6386 (0.6018) and 0.7291 (0.7213) for chaebol firms. The differences in the mean and median between the two groups are statistically significant, suggesting that chaebol firms have, on average, higher leverage than non-chaebol firms in the whole period. Panel B and Panel C show similar results.

Table 1, Panel D shows the difference of each variable between the pre- and postcrisis periods. For both non-chaebol and chaebol firms, Tobin's q and excess value by assets in the postcrisis period are smaller than those in the precrisis period, but excess value by EBIT is greater in the postcrisis period than it is in precrisis period. Also, after the financial crisis, log (assets) and firm age, on average, increased, but EBIT/sales, capex/sales, and debt/assets decreased.

Table 2 demonstrates the Pearson correlations among the variables. Panel A shows the results of a correlation analysis using sample firms in the precrisis period. Tobin's q has a significantly positive correlation with excess value by assets, excess value by EBIT, and debt/assets and a significantly negative correlation with log(assets), firm age, capex/sales, and chaebol dummy. Excess value by assets has a significantly positive correlation with excess value by EBIT and debt/assets and a significantly negative correlation with log(assets), firm age, capex/sales, and chaebol dummy. Excess value by EBIT has a significantly negative correlation with log(assets), EBIT/sales, and chaebol dummy.

TABLE 2. PEARSON CORRELATIONS AMONG VARIABLES

	Excess Value by Assets	Excess Value by EBIT	Log(Assets)	Firm Age	EBIT/Sales	Capex/Sales	Debt/Assets	Chaebol Dummy
Panel A. Precrisis Period (1993-1996)								
Tobin's q	0.9055	0.0434	−0.3046	−0.1658	−0.0360	−0.0641	0.1961	−0.1689
	<0.0001	0.0687	<0.0001	<0.0001	0.1116	0.0048	<0.0001	<0.0001
Excess value by assets		0.0491	−0.2827	−0.1266	−0.0054	−0.0524	0.2728	−0.1813
		0.0396	<.0001	<0.0001	0.8113	0.0212	<.0001	<0.0001
Excess value by EBIT			−0.0949	−0.0051	−0.5772	−0.0246	−0.0036	−0.0626
			<0.0001	0.8295	<0.0001	0.3053	0.8800	0.0085
Log(assets)				0.2563	0.1601	0.1958	0.2049	0.6280
				<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Firm age					0.0728	0.0130	0.0802	0.1347
					0.0012	0.5675	0.0004	<0.0001
EBIT/sales						0.1220	−0.2106	0.0324
						<0.0001	<.0001	0.1508
Capex/sales							−0.0718	0.1127
							0.0016	<0.0001
Debt/assets								0.2178
								<0.0001
Panel B. Postcrisis Period (1999-2002)								
Tobin's q	0.8340	0.2247	−0.0957	−0.0689	−0.1971	−0.0446	0.5723	−0.0286
	<0.0001	<0.0001	<0.0001	0.0019	<0.0001	0.0472	<0.0001	0.1987
Excess value by assets		0.2090	−0.1154	−0.1330	−0.2199	−0.0886	0.6355	−0.0194
		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.3839
Excess value by EBIT			−0.0261	0.0009	−0.6203	−0.0180	0.3220	0.0087
			0.2979	0.9710	<0.0001	0.4758	<0.0001	0.7284
Log(assets)				0.2379	0.1778	0.0525	0.0345	0.5889
				<0.0001	<0.0001	0.0176	0.1209	<0.0001
Firm age					0.0716	−0.1039	0.0012	0.0870
					0.0013	<0.0001	0.9560	<.0001
EBIT/sales						0.1286	−0.3134	0.0621
						<0.0001	<0.0001	0.0052
Capex/sales							−0.1941	0.0395
							<0.0001	0.0743
Debt/assets								0.0532
								0.0168

Notes: Chaebol dummy takes the value of 1 when a firm's business group is ranked in the top 30 on a basis of total assets (the sum of the total assets of all affiliated companies belonging to the same business group) at the fiscal year-end, and zero when the firm's business group is ranked below the top 50 or when the firm is not a member of any business group. See Table 1 for definitions of all other variables.

Panel B of Table 2 shows the results of a correlation analysis using sample firms in the postcrisis period. Tobin's q has a significantly positive correlation with excess value by assets, excess value by EBIT, and debt/assets and a significantly negative correlation with log(assets), firm age, EBIT/sales, and capex/sales. Excess value by assets has a significantly positive correlation with excess value by EBIT, and debt/assets and a significantly negative correlation with log(assets), firm age, EBIT/sales, and capex/sales. Excess value by EBIT has a significantly positive correlation with debt/assets and a significantly negative correlation with EBIT/sales.

3. Multivariate Analyses

In multivariate analyses, we define the new variable, postcrisis dummy, which takes the value of 1 in the case of post crisis period and, zero otherwise. In addition, we also define the variable chaebol*postcrisis dummy, which is the product of chaebol dummy and postcrisis dummy and, thus, represents the interaction between the two variables.

Table 3 shows the results of the regression of Tobin's q. Consistent with Khanna and Palepu (2000), we construct the regression model of Tobin's q as follows.

Model 1: Tobin's $q = a + b_1$Chaebol Dummy $+ b_4$Residual of Log(Assets) $+ b_5$Firm Age + Industry Dummies + e

Model 2: TTobin's $q = a + b_1$Chaebol Dummy $+ b_2$Chaebol * Postcrisis Dummy $+ b_3$Postcrisis Dummy $+ b_4$Residual of Log(Assets) $+ b_5$Firm Age + Industry Dummies + e

To control for firm size in these regression models, we use residual of log(assets), which is the residual of the regression of log(assets) on chaebol dummy, so that the effect of chaebol dummy on Tobin's q may be clearly separated from that of log(assets). As shown in Table 2, the correlation coefficient between chaebol dummy and log(assets) is about 60%. Because chaebol firms in Korea are mostly large firms, it exacerbates the problem of multicollinearity to use both chaebol dummy and log(assets) as independent variables concurrently in a regression equation. Thus, we attempt to mitigate this problem by using residual of log(assets), which is orthogonal to chaebol dummy, instead of log(assets) to provide a purer measure of the effect of firm size on firm value, net of any chaebol affiliation effect.

In Panel A of Table 3, Model 1 shows that chaebol dummy is significantly negatively associated with Tobin's q for the whole sample period, which indicates that chaebol firms suffer value discount relative to non-chaebol firms during the whole period. This result is consistent with Berger and Ofek (1995) and Ferris et al. (2003), who reported that diversified or group-affiliated firms suffer value discount. Model 2 shows the same result for chaebol dummy during the whole period. However, Model 2 also shows that chaebol*postcrisis dummy is significantly positively associated with Tobin's q. This result provides evidence that chaebol firms experience an improvement in firm value in the postcrisis period relative to non-chaebol firms.[5] Postcrisis dummy in Model 2 is significantly negatively associated with Tobin's q,

[5] However, additional tests show that the sum of the two coefficients, chaebol dummy and chaebol*postcrisis dummy, is 10% significantly different from zero. Thus, we cannot directly conclude from Table 3 that the value discount of chaebol firms in the precrisis period clearly disappears in the postcrisis period.

TABLE 3. REGRESSION RESULTS OF TOBIN'S Q

Panel A. Whole period (1993-1996, 1999-2002)

	Model 1		Model 2	
	Coefficient	*t*-value	Coefficient	*t*-value
Chaebol dummy	−0.0721	−4.95***	−0.1222	−6.34***
Chaebol*postcrisis dummy			0.0865	3.04***
Postcrisis dummy			−0.1106	−8.58***
Residual of log(assets)	−0.0530	−9.21***	−0.0474	−8.21***
Firm age	−0.0021	−4.12***	−0.0015	−2.87***
Industry dummy	Included		Included	
Adjusted R^2	0.0835		0.0999	
No. of Obs.	3,994		3,994	

Panel B. Precrisis period (1993-1996)

	1993		1994		1995		1996		1993-1996	
	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value
Chaebol dummy	−0.1081	−3.78***	−0.1958	−5.72***	−0.0855	−3.25***	−0.1433	−4.45***	−0.1339	−8.79***
Residual of log(assets)	−0.0511	−3.90***	−0.0778	−5.05***	−0.0453	−3.92***	−0.0910	−6.61***	−0.0675	−10.00***
Firm age	−0.0021	−1.89*	−0.0019	−1.43	−0.0010	−1.00	−0.0022	−1.80*	−0.0018	−3.05***
Industry dummy	Included		Included		Included		Included		Included	
Year dummy									Included	
Adjusted R^2	0.1138		0.1792		0.0978		0.1712		0.1873	
No. of Obs.	469		479		501		523		1,972	

Panel C. Postcrisis period (1999-2002)

	1999		2000		2001		2002		1999-2002	
	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value
Chaebol dummy	−0.0127	−0.27	−0.1024	−1.98**	−0.0851	−1.48	0.0427	0.95	−0.0442	−1.78*
Residual of log(assets)	−0.0015	−0.09	−0.0396	−2.06**	−0.0473	−2.43**	−0.0392	−2.56**	−0.0310	−3.48***
Firm age	−0.0047	−2.83***	0.0003	0.16	0.0005	0.27	−0.0002	−0.17	−0.0010	−1.25
Industry dummy	Included		Included		Included		Included		Included	
Year dummy									Included	
Adjusted R^2	0.1295		0.0505		0.0482		0.0596		0.0901	
No. of Obs.	508		518		512		484		2,022	

Notes: Tobin's q is the sum of the market value of the common stock, the book value of the preferred stock, and the book value of any debt, with this sum being divided by the book value of the total assets, where the market value of the common stock is the closing price of the common stock at the fiscal year-end multiplied by the number of common shares outstanding. Chaebol dummy takes 1 when a firm's business group is ranked in the top 30 on a basis of total assets (the sum of the total assets of all affiliated companies belonging to the same business group) at the fiscal year-end, and zero when the firm's business group is ranked below the top 50 or when the firm is not a member of any business group. Chaebol* postcrisis dummy is the product of chaebol dummy multiplied by postcrisis dummy. Postcrisis dmmy takes the value 1 when the observation is in the postcrisis period (1999-2002) and zero when it is in precrisis period (1993-1996). Residual of log(assets) is the residual of the regression of log(assets) on chaebol dummy. Log(assets) is the natural log of the total assets. Firm age is the difference between the current year and the firm's establishment year.

* significance at the 5-10% level. ** significance at the 1-5% level. *** significance less than 1% level.

suggesting that Korean firms generally experienced a decrease in Tobin's q after the financial crisis but that chaebol firms were less influenced by this general negative trend. Residual of log (assets) is significantly negatively associated with Tobin's q in both Model 1 and Model 2, implying that the larger the firm size is, the smaller is the firm value. Firm age is also negatively associated with Tobin's q in both models, suggesting that the older the firm is, the smaller the firm value is.

In Panel B and Panel C of Table 2, we run the same regression but use the subperiod samples. Panel B shows that in each year in the precrisis period chaebol dummy has a significantly negative association with Tobin's q. Further, when aggregating the 4-year precrisis sample, chaebol dummy also has a significantly negative association with Tobin's q. These results are consistent with Ferris et al. (2003), who report that chaebol firms suffer value loss in the 1990 through 1995 sample period. However, Panel C shows that in each year except year 2000 in the postcrisis period chaebol dummy does not have a significantly negative association with Tobin's q. Even though this finding is not direct evidence that the value discount in chaebol firms disappeared after the financial crisis, it illustrates changes in the firm value of chaebols in each year in the postcrisis period and helps explain the results in Table 3, Panel A.

Table 4 shows the results of the regression of excess value by assets. Consistent with Berger and Ofek (1995), the regression model of excess value by assets is constructed as follows.

Model 1: Excess Value by Assets $= a + b_1$Chaebol Dummy $+ b_4$Residual of Log(Assets) $+ b_5$EBIT/Sales $+ b_6$Capex/Sales $+ e$

Model 2: Excess Value by Assets $= a + b_1$Chaebol Dummy $+ b_2$Chaebol*Postcrisis Dummy $+ b_3$Postcrisis Dummy $+ b_4$Residual of Log(Assets) $+ b_5$EBIT/Sales $+ b_6$Capex/Sales $+ e$

Following Berger and Ofek (1995), in this regression we control for the firm size, profitability, and growth opportunity as factors that may affect the excess value by assets. Residual of log(assets), EBIT/sales, and capex/sales are used as proxies for the firm size, profitability, and growth opportunity, respectively.

In Table 4, Panel A, Model 1 shows that chaebol dummy is significantly negatively associated with excess value by assets in the whole sample period. This result is consistent with Berger and Ofek (1995) and Ferris et al. (2003), who reported that diversified or group-affiliated firms suffer value discount. Model 2 shows the same result for chaebol dummy for the whole period. However, Model 2 also shows that chaebol*postcrisis dummy is significantly positively associated with excess value by assets, which provides evidence that in the postcrisis period chaebol firms experience an improvement in firm value relative to non-chaebol firms. Also, additional testing (not reported in the table) shows that the sum of the two coefficients, chaebol dummy and chaebol*postcrisis dummy, is not significantly different from zero, indicating that the value discount of chaebol firms in the precrisis period clearly disappears in the postcrisis period. Postcrisis dummy in Model 2 is significantly negatively associated with excess value by assets, suggesting that Korean firms generally experienced a decrease in excess value by assets after the financial crisis but that chaebol firms in particular were less influenced by this general negative trend. Residual of log(assets) is significantly negative in both Model

TABLE 4. REGRESSION RESULTS OF EXCESS VALUE BY ASSETS

Panel A. Whole period (1993-1996, 1999-2002)

	Model 1		Model 2	
	Coefficient	*t*-value	Coefficient	*t*-value
Chaebol dummy	−0.0405	−3.71***	−0.0856	−5.91***
Chaebol*postcrisis dummy			0.0915	4.20***
Postcrisis dummy			−0.0846	−8.53***
Residual of log(assets)	−0.0365	−8.71***	−0.0311	−7.32***
EBIT/sales	−0.3493	−6.85***	−0.4077	−7.99***
Capex/sales	−0.1156	−1.84*	−0.1391	−2.22**
Adjusted R^2	0.0406		0.0580	
No. of Obs.	3,858		3,858	

Panel B. Precrisis period (1993-1996)

	1993		1994		1995		1996		1993-1996	
	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value
Chaebol dummy	−0.0608	−3.29***	−0.1420	−6.50***	−0.0646	−3.22***	−0.1040	−4.39***	−0.0944	−8.91***
Residual of log(assets)	−0.0375	−4.46***	−0.0552	−5.78***	−0.0321	−3.71***	−0.0669	−6.73***	−0.0463	−10.09***
EBIT/sales	0.0627	0.55	0.5370	3.51***	0.1954	1.53	0.0865	0.56	0.1782	2.60***
Capex/sales	0.1869	0.44	0.1395	0.95	−0.1152	−1.02	−0.2104	−1.61	−0.0086	−0.13
Adjusted R^2	0.0494		0.1279		0.0413		0.1182		0.0786	
No. of Obs.	464		469		492		500		1,925	

Panel C. Postcrisis period (1999-2002)

	1999		2000		2001		2002		1999-2002	
	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value
Chaebol dummy	−0.0142	−0.39	−0.0419	−1.10	0.0272	0.64	0.0761	1.90*	0.0105	0.54
Residual of log(assets)	−0.0220	−1.66*	−0.0219	−1.58*	−0.0259	−1.83*	−0.0247	−1.74*	−0.0211	−3.05***
Firm age	−0.7491	−5.51***	−0.8207	−5.75***	−0.5878	−3.92***	−0.3381	−2.11**	−0.6478	−8.89***
Industry dummy	0.0433	0.21	−0.6928	-3.28***	−0.4311	−1.94*	−0.0486	−0.25	−0.2504	−2.42**
Adjusted R^2	0.0588		0.0975		0.0469		0.0201		0.0532	
No. of Obs.	491		494		486		462		1,933	

Notes: Excess value by assets is the natural log of the ratio of the firm's actual value to its imputed value using an assets multiplier. The firm's actual value is the sum of the market value of the common stock, the book value of the preferred stock, and the book value of any debt. The imputed value using assets multiplier is the firm's total assets times the industry-year median capital-to-assets ratio (i.e., actual value divided by assets). Chaebol dummy takes the value of 1 when a firm's business group is ranked in the top 30 on a basis of total assets (the sum of the total assets of all affiliated companies belonging to the same business group) at the fiscal year-end, and zero when the firm's business group is ranked below the top 50 or when the firm is not a member of any business group. Chaebol*postcrisis dummy is the product of chaebol dummy multiplied by postcrisis dummy. Postcrisis dummy takes the value 1 in the case that the observation is in the postcrisis period (1999-2002), and zero when it is in precrisis period (1993-1996). Residual of log(assets) is the residual of the regression of log(assets) on chaebol dummy. Log(assets) is the natural log of the total assets. EBIT/sales is the ratio of operating income to sales. Capex/sales is the ratio of capital expenditures to sales.
* significance at the 5-10% level. ** significance at the 1-5% level. *** significance less than 1% level.

1 and Model 2, implying that the larger the firm size is, the smaller the firm value is. Both EBIT/sales and capex/sales are significantly negatively associated with excess value by assets in both models.

We run the same regression but use the subperiod samples. Panel B shows that, in each year in the precrisis period, chaebol dummy has a significantly negative association with excess value by assets. In addition, when aggregating the 4-year precrisis sample, chaebol dummy also has a significantly negative association with excess value by asset. However, Panel C shows that in each year in the postcrisis period chaebol dummy does not have a significantly negative association with excess value by assets. In fact, in 2002, chaebol dummy has a 10% significantly positive association with excess value by assets. In addition, when aggregating the 4-year postcrisis sample, chaebol dummy does not have a significant association with excess value by assets. Although this finding is not direct evidence that the value discount of chaebol firms disappeared after the financial crisis, it illustrates changes in the firm value for chaebols in each year in the postcrisis period and also explains the results in Panel A.

Table 5 shows the results of the regression of excess value by EBIT. Consistent with the regression of excess value by assets, the regression model of excess value by EBIT is constructed as follows.

Model 1: Excess Value by EBIT $= a + b_1$Chaebol Dummy $+ b_4$Residual of Log(Assets) $+ b_5$EBIT/Sales $+ b_6$Capex/Sales $+ e$

Model 2: Excess Value by EBIT $= a + b_1$Chaebol Dummy $+ b_2$Chaebol*Postcrisis Dummy $+ b_3$Postcrisis Dummy $+ b_4$Residual of Log (Assets) $+ b_5$EBIT / Sales $+ b_6$Capex/Sales $+ e$

The results in Table 5 also support our hypothesis. In Panel A, Model 1 shows that chaebol dummy is significantly negatively associated with excess value by EBIT in the whole sample period, which implies that chaebol firms suffer value discount relative to non-chaebol firms during the whole period. Model 2 shows the same result for chaebol dummy during the whole period. However, Model 2 also shows that chaebol*postcrisis dummy is significantly positively associated with excess value by EBIT, which provides evidence that in the postcrisis period chaebol firms experience an improvement in firm value relative to non-chaebol firms. Also, additional testing (not reported in the table) shows that the sum of the two coefficients, chaebol dummy and chaebol*postcrisis dummy, is not significantly different from zero, indicating that the value discount of chaebol firms in the precrisis period clearly disappears in the postcrisis period. Postcrisis dummy in Model 2 in Table 5, Panel A (unlike the same variable in Table 4) is significantly positively associated with excess value by EBIT, suggesting that Korean firms generally experience an increase in excess value by EBIT after the financial crisis. Residual of log(assets) is not significant in Model 1 and Model 2. EBIT/sales is significantly negative in both models. Capex/sales is not significant in Model 1 but is significantly positive in Model 2.

In Panels B and C of Table 5 we run the same regression using the subperiod samples. Panel B shows that in each year except 1993 in the precrisis period chaebol dummy has a significantly negative association with excess value by EBIT. In addition, when aggregating the 4-year precrisis sample, chaebol dummy also has a significantly negative association with excess value by EBIT. However, Panel C shows that in each year in the postcrisis period

TABLE 5. REGRESSION RESULTS OF EXCESS VALUE BY EBIT

Panel A. Whole period (1993-1996, 1999-2002)

	Model 1		Model 2	
	Coefficient	*t*-value	Coefficient	*t*-value
Chaebol dummy	−0.0916	−3.42***	−0.1359	−3.90***
Chaebol*postcrisis dummy			0.1353	2.54**
Postcrisis dummy			0.1836	7.44***
Residual of log(assets)	0.0148	1.38	−0.0081	−0.75
EBIT/sales	−9.9644	−42.60***	−9.9000	−42.91***
Capex/sales	0.2686	1.63	0.4203	2.58**
Adjusted R^2	0.3571		0.3751	
No. of Obs.	3,291		3,291	

Panel B. Precrisis period (1993-1996)

	1993		1994		1995		1996		1993-1996	
	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value
Chaebol dummy	0.0143	0.23	−0.2164	−3.49***	−0.1562	−2.77***	−0.2211	−3.39***	−0.1380	−4.47***
Residual of log(assets)	−0.0388	−1.36	−0.0321	−1.16	0.0050	0.20	−0.0506	−1.78*	−0.0321	−2.34**
EBIT/sales	−8.4992	−14.56***	−7.6467	−13.16***	−9.0050	−16.98***	−9.3244	−15.13***	−8.5131	−29.45***
Capex/sales	1.9859	1.45	0.2588	0.60	0.7760	2.21**	0.9361	2.54**	0.3254	1.62
Adjusted R^2	0.3432		0.3054		0.3952		0.3471		0.3402	
No. of Obs.	412		428		444		447		1,731	

Panel C. Postcrisis period (1999-2002)

	1999		2000		2001		2002		1999-2002	
	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value
Chaebol dummy	0.1388	1.69*	−0.0946	−1.13	−0.0783	−0.80	−0.0010	−0.01	−0.0006	−0.01
Residual of log(assets)	0.0413	1.34	0.0307	0.98	0.0206	0.57	−0.0292	−0.80	0.0177	1.06
EBIT/sales	−12.9670	−18.57***	−12.0739	−17.27***	−10.0400	−13.75***	−10.2014	−13.81***	−11.2676	−31.37***
Capex/sales	1.1283	2.30**	0.1034	0.23	0.6086	0.97	0.6178	1.09	0.5942	2.29**
Adjusted R^2	0.4621		0.4255		0.3405		0.3317		0.3871	
No. of Obs.	403		403		361		393		1,560	

Notes: Excess value by EBIT is the natural log of the ratio of the firm's actual value to its imputed value using the EBIT multiplier. The firm's actual value is the sum of the market value of the common stock, the book value of the preferred stock, and the book value of any debt. The imputed value using the EBIT multiplier is the firm's operating income times the industry-year median capital-to-operating income ratio (i.e., actual value divided by operating income). Chaebol dummy takes the value of 1 when a firm's business group is ranked in the top 30 on a basis of total assets (the sum of the total assets of all affiliated companies belonging to the same business group) at the fiscal year-end, and zero when the firm's business group is ranked below the top 50 or when the firm is not a member of any business group. Chaebol*postcrisis dummy is the product of chaebol dummy multiplied by postcrisis dummy. Postcrisis dummy takes the value 1 when the observation is in the postcrisis period (1999-2002), and zero when it is in precrisis period (1993-1996). Residual of log(assets) is the residual of the regression of log(assets) on chaebol dummy. Log(assets) is the natural log of the total assets. EBIT/sales is the ratio of operating income to sales. Capex/sales is the ratio of capital expenditures to sales

* significance at the 5-10% level. ** significance at the 1-5% level. *** significance less than 1% level.

chaebol dummy does not have a significantly negative association with excess value by EBIT. In fact, in 1999, chaebol dummy has a 10% significantly positive association with excess value by EBIT. In addition, when aggregating the 4-year postcrisis sample, chaebol dummy does not have a significant association with excess value by EBIT.

4. Robustness Tests

Building on the results in Table 4, Table 6 shows the results of the regression of excess value by assets. However, in Table 6, we follow Ferris et al. (2003) by including debt/assets ratio in the regression model as an additional control variable. The regression model in Table 6 is constructed as follows.

Model 1: Excess Value by Assets $= a + b_1$Chaebol Dummy $+ b_4$Residual of Log(Assets) $+$ b_5EBIT/Sales $+ b_6$Capex/Sales $+ b_7$Debt/Assets $+ e$

Model 2: Excess Value by Assets $= a + b_1$Chaebol Dummy $+ b_2$Chaebol*Postcrisis Dummy $+ b_3$Postcrisis Dummy $+ b_4$Residual of Log(Assets) $+ b_5$EBIT/Sales $+$ b_6Capex/Sales $+ b_7$Debt/Assets $+ e$

In Table 6, Panel A, both Model 1 and Model 2 show that chaebol dummy is significantly negatively associated with excess value by assets in the whole sample period, which indicates that chaebol firms suffer value discount relative to non-chaebol firms during the whole period. However, Model 2 also shows that chaebol*postcrisis dummy is significantly positively associated with excess value by assets. This result provides evidence that in the postcrisis period chaebol firms experience an improvement in firm value relative to non-chaebol firms.[6] Postcrisis dummy in Model 2 is significantly negatively associated with excess value by assets. This result suggests that Korean firms generally experienced a decrease in excess value by assets after the financial crisis but that chaebol firms were less influenced by this general negative trend. Residual of log(assets) is significantly negative in Model 1 and Model 2. EBIT/sales, capex/sales, and debt/assets are all significantly positive in both models.

In Panels B and C of Table 6 we run the same regression using the subperiod samples. Panel B shows that in each year in the precrisis period chaebol dummy has a significantly negative association with excess value by assets. In addition, when aggregating the 4-year precrisis sample, chaebol dummy also has a significantly negative association with excess value by assets, which is consistent with Ferris et al. (2003). However, Panel C shows somewhat mixed results. Chaebol dummy has a significantly negative value in 1999 and 2000 but not in 2001 and 2002. When aggregating the 4-year postcrisis sample, unlike earlier results, chaebol dummy is significantly negative.

Building on the results in Table 5, Table 7 shows the results of regression of excess value by EBIT, including debt/assets as an additional control variable (Ferris et al., 2003). The regression model in Table 7 is constructed as follows.

Model 1: Excess Value by EBIT $= a + b_1$Chaebol Dummy $+ b_4$Residual of Log(Assets) $+$

[6] However, because the sum of the two coefficients, chaebol dummy and chaebol*postcrisis dummy, is significantly different from zero, we cannot directly conclude from Table 6, where debt/assets ratio is included in the regression, that the value discount of chaebol firms in the precrisis period clearly disappears in the postcrisis period.

TABLE 6. REGRESSION RESULTS OF EXCESS VALUE BY ASSETS ON DEBT/ASSETS AND OTHER CONTROL VARIABLES

Panel A. Whole period (1993-1996, 1999-2002)

	Model 1		Model 2	
	Coefficient	*t*-value	Coefficient	*t*-value
Chaebol dummy	−0.1004	−11.15***	−0.1555	−13.04***
Chaebol*postcrisis dummy			0.1231	6.94***
Postcrisis dummy			−0.0372	−4.54***
Residual of log(assets)	−0.0479	−13.95***	−0.0479	−13.67***
EBIT/sales	0.1810	4.17***	0.1632	3.72***
Capex/sales	0.1543	2.99***	0.1608	3.11**
Debt/assets	0.5456	40.24***	0.5453	39.75***
Adjusted R^2	0.3249		0.3335	
No. of Obs.	3,816		3,816	

Panel B. Precrisis period (1993-1996)

	1993		1994		1995		1996		1993-1996	
	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value
Chaebol dummy	−0.0909	−5.34***	−0.1706	−7.83***	−0.1138	−6.15***	−0.1534	−7.34***	−0.1358	−13.79***
Residual of log(assets)	−0.0468	−6.25***	−0.0613	−6.57***	−0.0431	−5.53***	−0.0734	−8.51***	−0.0558	−13.36***
EBIT/sales	0.2592	2.52**	0.6219	4.20***	0.4559	3.91***	0.5363	3.92***	0.4347	6.89***
Capex/sales	0.0894	0.24	0.2405	1.69*	−0.0071	−0.07	−0.0271	−0.24	0.0985	1.65*
Debt/assets	0.2656	6.50***	0.2437	5.29***	0.3882	11.04***	0.4313	11.04***	0.3518	17.52***
Adjusted R^2	0.1325		0.1709		0.2319		0.2894		0.2050	
No. of Obs.	462		468		492		498		1,920	

Panel C. Postcrisis period (1999-2002)

	1999		2000		2001		2002		1999-2002	
	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value
Chaebol dummy	−0.0520	−1.69*	−0.0890	−3.58***	−0.0138	−0.43	0.0235	0.71	−0.0361	−2.38**
Residual of log(assets)	−0.0311	−2.78***	−0.0399	−4.37***	−0.0505	−4.69***	−0.0421	−3.57***	−0.0393	−7.26***
EBIT/sales	−0.0906	−0.73	0.1339	1.33	0.0741	0.63	0.2384	1.71*	0.0720	1.19
Capex/sales	0.5257	2.94***	0.1838	1.30	0.2924	1.69*	0.2257	1.38	0.2369	2.89***
Debt/assets	0.5336	13.43***	0.7032	23.96***	0.6235	17.40***	0.7278	14.26***	0.6221	33.11***
Adjusted R^2	0.3149		0.5831		0.4163		0.3272		0.3983	
No. of Obs.	486		486		472		452		1,896	

Notes: Excess value by assets is the natural log of the ratio of the firm's actual value to its imputed value using an assets multiplier. The firm's actual value is the sum of the market value of the common stock, the book value of the preferred stock, and the book value of any debt. The imputed value using assets multiplier is the firm's total assets times the industry-year median capital-to-assets ratio (i.e., actual value divided by assets). Chaebol dummy takes the value of 1 when a firm's business group is ranked in the top 30 on a basis of total assets (the sum of the total assets of all affiliated companies belonging to the same business group) at the fiscal year-end, and zeri when the firm's business group is ranked below the top 50 or when the firm is not a member of any business group. Chaebol*postcrisis dummy is the product of chaebol dummy multiplied by postcrisis dummy. Postcrisis dummy takes the value 1 when the observation is in the post crisis period (1999-2002), and zero when it is in precrisis period (1993-1996). Residual of log(assets) is the residual of the regression of log(assets) on chaebol dummy. Log(assets) is the natural log of the total assets. EBIT/sales is the ratio of operating income to sales. Capex/sales is the ratio of capital expenditures to sales. Debt/assets is the ratio of total debt to total assets.

* significance at the 5-10% level. ** significance at the 1-5% level. *** significance less than 1% level.

b_5EBIT/Sales + b_6Capex/Sales + b_7Debt/Assets + e

Model 2: Excess Value by EBIT = a + b_1Chaebol Dummy + b_2Chaebol*Postcrisis Dummy + b_3Postcrisis Dummy + b_4Residual of Log (Assets) + b_5EBIT / Sales + b_6Capex/Sales + b_7Debt/Assets + e

The results in Table 7 support our hypothesis. In Panel A, both Model 1 and Model 2 show that chaebol dummy is significantly negatively associated with excess value by EBIT in the whole sample period, which indicates that chaebol firms suffer value discount relative to non-chaebol firms during the whole period. However, Model 2 also shows that chaebol* postcrisis dummy is significantly positively associated with excess value by assets, providing evidence that in the postcrisis period chaebol firms experience an improvement in firm value relative to non-chaebol firms. Also, additional testing (not reported in the table) shows that the sum of the two coefficients, chaebol dummy and chaebol*postcrisis dummy, is not significantly different from zero, indicating that the value discount of chaebol firms in the precrisis period clearly disappears in the postcrisis period. In addition, postcrisis dummy in Model 2 is significantly positively associated with excess value by EBIT, suggesting that Korean firms generally experience an increase in excess value by EBIT after the financial crisis. Residual of log(assets) is not significant in Model 1 but is significantly negative in Model 2. In both models, EBIT/sales is significantly negative and capex/sales and debt/assets are significantly positive.

In Panels B and C of Table 7 we run the same regression using the subperiod samples. Panel B shows that in each year except 1993 in the precrisis period chaebol dummy has a significantly negative association with excess value by EBIT. In addition, when aggregating the 4-year precrisis sample, chaebol dummy also has a significantly negative association with excess value by EBIT, which is consistent with Ferris et al. (2003), who report that chaebol firms suffer value loss using a 1990 through 1995 sample period. However, Panel C shows that in each year except 2000 in the postcrisis period chaebol dummy does not have a significant association with excess value by EBIT. In addition, when aggregating the 4-year postcrisis sample, chaebol dummy does not have a significant association with excess value by EBIT.

V. *Conclusion*

Unlike a diversified U.S. conglomerate with multiple divisions operating in various industries within a firm, a Korean chaebol is a group of independent business entities operating in various industries but acting like a single firm in many cases, including investment decisions. Thus, studies on Korean chaebols provide more accurate valuations of each industry unit and, hence, can measure more accurately the effect of diversification on firm value as compared with studies on U.S. conglomerates. Also, unlike a Japanese keiretsu, which has a main bank in the center of the group, studies on Korean chaebols — which are prohibited from having a bank as a firm member — make it possible to estimate the effect of diversification without the confounding effect of a main bank.

Although prior studies on diversified conglomerates in the U.S. market and on business groups in emerging markets have produced mixed results regarding the effect of diversification on firm value, Ferris et al. (2003), using a sample of Korean firms during 1990 through 1995,

TABLE 7. REGRESSION RESULTS OF EXCESS VALUE BY EBIT ON DEBT/ASSETS AND OTHER CONTROL VARIABLES

Panel A. Whole period (1993-1996, 1999-2002)

	Model 1		Model 2	
	Coefficient	*t*-value	Coefficient	*t*-value
Chaebol dummy	−0.1340	−5.01***	−0.2098	−6.12***
Chaebol*postcrisis dummy			0.1728	3.34***
Postcrisis dummy			0.2461	10.01***
Residual of log(assets)	0.0092	0.87	−0.0250	−2.35**
EBIT/sales	−9.6630	−41.93***	−9.5111	−42.25***
Capex/sales	0.4629	2.85***	0.7312	4.58***
Debt/assets	0.4290	9.10***	0.5930	12.43***
Adjusted R^2	0.3719		0.4025	
No. of Obs.	3,254		3,254	

Panel B. Precrisis period (1993-1996)

	1993		1994		1995		1996		1993-1996	
	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value
Chaebol dummy	0.0393	0.60	−0.2224	−3.44***	−0.1770	−2.97***	−0.2318	−3.43***	−0.1412	−4.38***
Residual of log(assets)	−0.0322	−1.11	−0.0297	−1.06	−0.0007	−0.03	−0.0572	−2.01**	−0.0333	−2.39**
EBIT/sales	−8.3121	−14.48***	−7.7435	−13.39***	−9.0096	−16.98***	−9.1377	−15.02***	−8.4385	−29.48***
Capex/sales	1.9195	1.43	0.3186	0.73	0.8457	2.37**	1.0472	2.85***	0.3782	1.89*
Debt/assets	−0.0923	−0.54	0.1073	0.74	0.1529	1.12	0.1315	0.83	0.0699	0.92
Adjusted R^2	0.3410		0.3106		0.3959		0.3458		0.3410	
No. of Obs.	410		426		443		445		1,724	

Panel C. Postcrisis period (1999-2002)

	1999		2000		2001		2002		1999-2002	
	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value
Chaebol dummy	0.0870	1.14	−0.1504	−1.99**	−0.1155	−1.33	−0.0475	−0.48	−0.0545	−1.28
Residual of log(assets)	0.0292	1.01	0.0292	1.02	−0.0186	−0.57	−0.0484	−1.29	0.0003	0.02
EBIT/sales	−12.0817	−18.40***	−10.8278	−16.96***	−8.9218	−13.45***	−9.9159	−13.05***	−10.4172	−30.24***
Capex/sales	1.9138	4.13***	1.0567	2.54**	1.5327	2.69***	0.7414	1.29	1.1802	4.74***
Debt/assets	0.9441	7.94***	0.8955	8.49***	0.9743	8.75***	0.4163	2.16**	0.8241	13.11***
Adjusted R^2	0.5372		0.5131		0.4540		0.3354		0.4468	
No. of Obs.	397		397		353		383		1,530	

Notes: Excess value by EBIT is the natural log of the ratio of the firm's actual value to its imputed value using the EBIT multiplier. The firm's actual value is the sum of the market value of the common stock, the book value of the preferred stock, and the book value of any debt. The imputed value using the EBIT multiplier is the firm's operating income times the industry-year median capital-to-operating income ratio (i.e., actual value divided by operating income). Chaebol dummy takes the value of 1 when a firm's business group is ranked in the top 30 on a basis of total assets (the sum of the total assets of all affiliated companies belonging to the same business group) at the fiscal year-end, and zero when the firm's business group is ranked below the top 50 or when the firm is not a member of any business group. Chaebol*postcrisis dummy is the product of chaebol dummy multiplied by postcrisis dummy. Postcrisis dummy takes the value 1 when the observation is in the postcrisis period (1999-2002) and zero when it is in precrisis period (1993-1996). Residual of log(assets) is the residual of the regression of log(assets) on chaebol dummy. Log(assets) is the natural log of the total assets. EBIT/sales is the ratio of operating income to sales. Capex/sales is the ratio of capital expenditures to sales. Debt/assets is the ratio of total debt to total assets.

* significance at the 5-10% level. ** significance at the 1-5% level. *** significance less than 1% level.

found conclusive evidence that chaebol firms in Korea suffer value loss relative to their non-chaebol counterparts. Particularly, in the precrisis period, under a government-driven development policy, chaebol firms strategically sought external growth and diversification and, thus, did not pursue the maximization of shareholder value. Also, chaebol firms expropriated minority shareholders' wealth by arbitrarily shifting values from one affiliate to another. Ferris et al. further reported that precrisis chaebols relied heavily on internal capital markets, practicing overinvestment and cross-subsidization.

However, after the financial crisis, various reforms created significant changes in the Korean economy that resulted in an increase in the firm value of chaebols. For example, in the postcrisis period, corporate governance was improved and transparency was enhanced. Internal capital markets were contracted and arbitrary transactions among affiliates were more closely monitored. Also, more advanced disclosure policies were adopted and shareholders' rights were strengthened.

As an extension of Ferris et al.'s (2003) use of Tobin's q, excess value by EBIT, and excess value by assets as measures of firm value, this study examines and compares the effect of group membership on firm value in both the precrisis (1993-1996) and postcrisis (1999-2002) periods in Korea. Results show that chaebol firms suffered value discount relative to non-chaebol firms in the precrisis period, which is consistent with Ferris et al. However, we also find that the value discount found in Korean chaebols in the precrisis period disappears under the reformed business practice of the postcrisis period, implying that the benefits of diversification dominate its costs in postcrisis Korea. These results suggest that the value discount of business groups reported in prior studies is not an inevitable consequence of diversification. Thus, this study contributes to the understanding of certain economic conditions under which the value discount of diversification is alleviated, enabling firms to increase firm value through diversification.

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