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Internal capital markets, corporate investment, and the COVID-19 pandemic: Evidence from Korean business groups

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A B S T R A C T

This paper examines whether the investment of Korean business group (“chaebol”) affiliated firms behaved differently from that of non-chaebol firms in response to the COVID-19 outbreak. I show that chaebol firms cut back investment to a lesser degree than similar non-chaebol firms. Chaebol firms with higher-than-industry-median market-to-book ratios invested more and experienced less decline in their stock prices, while I do not find such relationships for non-chaebol firms. This paper provides evidence that chaebol internal capital markets helped mitigate the negative effects of the pandemic on firm investment and value.

1. Introduction

Business group affiliated firms in Korea (“chaebol” firms) maintained active and efficient internal capital markets during the Asian financial crisis in 1997 (see Almeida et al. (2015)). However, criticism about their poor corporate governance was raised after the crisis (see, e.g., Bae, Kang, and Kim (2002), Baek, Kang, and Park (2004), and Joh (2003)) and, in the 2000s, the Korean government carried out a series of corporate governance reform programs designed to prevent minority shareholder expropriation of the controlling owners of chaebols (see Choi, Han, and Lee (2014) and Choi, Park, and Yoo (2007)). Part of the reform (e.g., elimination of cross-debt guarantees) was focused on preventing cross-subsidization within a chaebol group and Lee, Park, and Shin (2009) provide evidence that chaebol internal capital markets have weakened after the Asian financial crisis. That is, although the corporate governance of chaebol-affiliated firms has been improved since the crisis, their internal capital markets may have been weakened.

Yet, few studies have examined the activeness and efficiency of chaebol internal capital markets after the completion of corporate governance reforms in the 2000s. This is despite the fact that recent studies examining U.S. conglomerates suggest that internal capital markets can function efficiently, especially when external financial markets are in distress (e.g., Matvos and Seru (2014) and Yan, Yang, and Jiao (2010)) and that there have been substantial improvements in chaebols’ corporate governance since the earlier crisis. This paper seeks to fill this void by examining whether the effects of the COVID-19 outbreak on firm investment and value vary between chaebol and non-chaebol firms in Korea.1

The COVID-19 pandemic heavily affected stock markets of many countries including those in Korea (Bannigidadmath, Narayan, Phan, & Gong, 2021).2 The Korea Composite Stock Price Index (KOSPI) plunged 35.2% between January 20, 2020 (the day the first COVID-19 case was confirmed in Korea) and March 19, 2020 (the day KOSPI reached its lowest point in 2020). There was also a substantial reduction in the investment of Korean firms. A median firm in my sample spent 52.83% less in investment (as a fraction of total assets) during the last three quarters of 2020 than its investment during the last three quarters of 2019. In order to examine whether chaebol internal capital markets helped mitigate the negative effects of the COVID-19 outbreak on firm investment, I hypothesize that chaebol firms made smaller changes

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2 The effect of COVID-19 on internal capital markets and corporate investment may vary between countries. In addition, as documented by Claessens, Djankov, and Lang (2000) and La Porta, Lopez-De-Silanes, Shleifer, and Vishny (2002), legal environments concerning corporations and business groups are often country-specific. Thus, focusing on one country has the advantage of controlling for the heterogeneity of countries.

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in their investment than their non-chaebol peers in response to the outbreak.

I adopt an empirical strategy that compares changes in investment of chaebol firms during the COVID-19 outbreak with those of closely-matched non-chaebol firms using the matching estimators of Abadie and Imbens (2006, 2011). Since it is unlikely that firms have chosen their chaebol-affiliation in anticipation of the COVID-19 outbreak, I select control firms using a matching procedure that minimizes the effect of observable pre-pandemic differences between treated (chaebol) firms and control (non-chaebol) firms. I analyze changes in a firm's investment from the last three quarters of 2019 ("Before" period) to the last three quarters of 2020 ("After" period), since the first confirmed COVID-19 case in Korea was reported and major stock markets in Korea reached their year-low points in the first quarter of 2020 ("Crisis" period). I also conduct a placebo test to rule out the possibility that unobservable time-varying factors derive my results.

I find evidence that chaebol firms, on average, were able to invest more than similar non-chaebol firms during the After period. In fact, while non-chaebol firms reduced their investment significantly in response to the COVID-19 outbreak, chaebol firms increased their investment in response to the COVID-19 outbreak, from 1.54% of assets to 1.02% of assets on average (from 1.41% of assets to 0.55% of assets for non-chaebol control firms). I do not find a statistically significant change in an average chaebol firm's investment. Both the difference-in-differences of investment between chaebol and non-chaebol control firms (0.85% of assets) and the average treatment effect on the treated firms of Abadie–Imbens' matching estimator (1.31% of assets) are economically and statistically significant. In a placebo test, I do not find statistically meaningful differences in investment between chaebol and non-chaebol control firms when I use the first quarter of 2018, instead of the first quarter of 2020, as a "pseudo" crisis period.

Assuming that my matching procedure reasonably controls for the effects of heterogeneous firm characteristics, my difference-in-differences results described above are likely driven mostly by firms' chaebol affiliation status. However, these results alone do not tell us whether the difference in investment policy reactions between chaebol and non-chaebol firms are driven by efficient resource allocation via chaebol internal capital markets or by other factors such as tunneling incentives of chaebol controlling owners (see, e.g., Bae et al. (2002)). It is often argued that an efficient internal capital market should transfer resources from businesses with (relatively) poor investment opportunities to those with good investment opportunities (e.g., Bernardo, Luo, and Wang (2006); Rajan, Servaes, and Zingales (2000)). Accordingly, I check for the existence of evidence that resources are transferred to chaebol-affiliated firms with higher-than-industry-median market-to-book ratios ("High Q" chaebol firms) from the other affiliated firms within the chaebol group. I find that, on average, High Q chaebol firms increased investment in response to the COVID-19 outbreak, while the other chaebol-affiliated firms decreased their investment. I do not find a statistically significant difference between the changes in average investment of High Q non-chaebols and that of the other non-chaebols. I also examine the related party transactions between affiliated firms within a chaebol group and find that High Q chaebol firms generated larger profits than the other chaebol-affiliated firms before and after the Crisis period. Combined with the findings from the difference-in-differences analysis above, these results suggest that chaebol firms operate active and efficient internal capital markets after the onset of the COVID-19 pandemic.

I then examine the effect of the COVID-19 outbreak on firm value measured by the holding period returns ("HPRs") from January 20, 2020 to March 19, 2020. I find that, although chaebol firms experienced a sharper decline in their stock prices than non-chaebol firms on average, High Q chaebol firms performed better, although the difference is not statistically significant, than High Q non-chaebol firms. A regression analysis of the HPRs reveals that chaebol firms' stock returns are strongly correlated with their market-to-book ratios, while there is no such correlation for non-chaebol firms. Unlike the earlier evidence from the Asian financial crisis in 1997 (e.g., Baek et al. (2004)), I do not find statistically meaningful effects of foreign ownership and board independence on the HPRs during the Crisis period. I also find that, on average, the negative effect of chaebol affiliation on firm value after the onset of the COVID-19 pandemic was only temporary. The mean difference between HPRs of chaebol firms and those of non-chaebol firms becomes statistically insignificant when I extend the end of the holding period to July 28, 2020 —the date the KOSPI recovered its pre-pandemic value for the first time since the COVID-19 outbreak.

Overall, this paper provides evidence that chaebol internal capital markets functioned efficiently shortly after the onset of the COVID-19 pandemic and partly mitigated the negative effects of the pandemic on firm investment and value. Unlike Lee et al. (2009) who argue that chaebol internal capital markets barely functioned during the 1999–2005 post-Asian-financial-crisis period, I provide evidence that chaebol firms have operated active and partially efficient internal capital markets at least since the early 2010s.

This paper contributes to the literature that examines Korean and international business group internal capital markets (e.g., Almeida et al. (2015); Bae, Cheon, and Kang (2008)), by providing evidence, from the early COVID-19 pandemic, that there are active chaebol internal capital markets functioning efficiently when the external capital markets are in distress. Unlike the earlier crisis episode, corporate governance may not be the reason behind my results given the substantial improvements in Korean firms' corporate governance after the completion of corporate governance reform programs in the 2000s.

As noted by many studies in this strand of literature, examining Korean chaebol's corporate governance reform programs in the 2000s banned most of the previously observable interactions between affiliated firms. Second, data on related party transactions is available only on an annual frequency and thus I cannot exclude the precise Crisis quarter from an analysis using this data. Third, it is ambiguous how the COVID-19 crisis has affected chaebol related party transactions. For example, it can be harder for chaebol-affiliated firms to subsidize other affiliated firms via observable related party transactions during the period of a crisis, although such a subsidization would add more value than it would do during a non-crisis period. See Hwang and Kim (2016) for the institutional features of Korean chaebol's related party transactions.
the identification strategy adopted in this study can be applied to studies on the effect of COVID-19 on other countries’ business groups and corporate investment.

The paper proceeds as follows. Section 2 discusses the institutional background of chaebols, i.e., business groups in Korea, and their internal capital markets. Section 3 describes my empirical strategy. Section 4 describes the data and sample selection procedures and provides variable definitions. In Section 5, I present and discuss the empirical results. Section 6 summarizes and concludes the paper.

2. Institutional background

2.1. Business groups in Korea

A business group in Korea (chaebol) consists of multiple legally independent companies, unlike a conglomerate in a Western country, such as the U.S., which combines the multiple segments or subsidiaries of a company. In the case of a chaebol, the expropriation of affiliated firm minority shareholders can be a significant concern because the controlling family has an incentive to make self-interested group-level decisions (see, e.g., Bae et al. (2002), Baek et al. (2004)). However, the controlling family can facilitate efficient resource transfers between legally independent affiliated companies within a chaebol (e.g., Bae et al. (2008)). In the case of a conglomerate in the U.S., minority shareholder expropriation is less likely to be a concern as resources can only be transferred between divisions within the firm. However, inefficiencies may arise from having multiple divisional managers competing with each other and a “socialism” in internal capital allocation, as suggested by Bernardo et al. (2006) and Scharfstein and Stein (2000), which are less likely to be a concern for a chaebol controlled by a single family.

As discussed in the introduction, examining Korean chaebols can be more advantageous than examining conglomerates in countries such as the U.S. because one can observe each chaebol-affiliated firm’s financial statements and market value. This is especially true when examining the effect of internal capital markets on corporate investment because one can compute an affiliated firm’s own market-to-book ratio or Tobin’s Q from observable prices and accounting variables. In addition, as Almeida et al. (2015) note, the role of business groups can be more significant in countries with weaker institutions and less developed financial markets and, thus, one may observe a stronger effect of internal capital markets on corporate investment in Korea than in the U.S.

Chaebol-affiliated firms are often compared with those affiliated with a Japanese business group, “keiretsu”. Despite their similarities, there are several notable differences between Korean chaebols and Japanese keiretsus (see, e.g., Bae et al. (2002) and Shin and Park (1999)). While a keiretsu is typically controlled by a professional corporate manager and centered on a large affiliated bank that controls financial activities within the group, a chaebol is typically controlled by a single family and is legally prohibited from having a commercial bank as an affiliate. Moreover, a chaebol typically includes a holding company with “central” staff, which makes centralized decisions for affiliated firms, unlike business groups in other countries such as the U.S. and Japan (Shin and Park (1999)). Thus, it is possible for chaebols to make more prompt centralized decisions than similar business groups in other countries.

Taken together, Korean chaebols, compared with Japanese keiretsus and U.S. conglomerates, have some unique features that can be advantageous when examining a business group’s internal capital allocation and affiliated firm investment. However, an empirical challenge remains because it is possible for firms (and their controlling families) to choose to form a chaebol. Almeida, Park, Subrahmanyam and Wolfenzon (2011) document evidence that a chaebol’s member firms and their location within the group are chosen by the controlling family based on firm characteristics such as profitability and investment opportunities. This possible selection may bias the result of an empirical analysis that compares a chaebol-affiliated firm with a non-chaebol firm. Hence, one may need to exploit an exogenous shock in such an analysis because the formation of a chaebol is likely endogenous to the group and affiliated firm characteristics.

2.2. How can resources be transferred within a business group in Korea?

There are multiple ways through which an affiliated firm can transfer resources to another within a chaebol. Prior to the corporate governance reform in the 2000s, cross-debt guarantees between affiliated firms were considered a means of cross-subsidization within a chaebol. Such guarantees may help reduce chaebol-affiliated firms’ risk of financial distress and bankruptcy (see Shin and Park (1999)) and, thus, financing costs. While explicit cross-debt guarantees have been prohibited since the corporate governance reform (Lee et al. (2009)), there is evidence that resources can still be transferred between firms affiliated with the same business group via multiple channels. For example, an affiliated firm can make an equity investment in another affiliated firm, which can be seen as an implicit guarantee between affiliated firms from the perspective of external stakeholders.

Apart from the (implicit) guarantees backed by the business group, related party transactions (RPTs) can also be used as means of intragroup resource transfers. While chaebol-affiliated firms are often required to disclose their RPTs, there are few legal restrictions on how a chaebol-affiliated firm chooses its buyers and suppliers, and how much profit (or loss) it should generate from transactions, including RPTs. For example, in June 2021, the Samsung Group, one of the largest chaebols in Korea, was fined a record amount of 235 billion Korean Won (KRW) by the Korea Fair Trade Commission (KFTC) over alleged unfair support for the group’s food service affiliate, Samsung Welstory, by allowing the company to run the corporate catering business for large affiliated firms exclusively, including Samsung Electronics. The KFTC alleged that Samsung Welstory had been able to secure a profit margin of 25.27% from these RPTs, resulting in a firm-level operating margin of around 15.5% on average, which was significantly higher than the competitors’ average operating margin of 3.1% over the past nine years.

In contrast, earlier empirical studies on corporate diversification generally suggest that “diversification discount”, initially documented by Berger and Ofek (1995) and Lang and Stulz (1994), arises from the misallocation of investment capital resources within a conglomerate firm (see, e.g., Rajan et al. (2000) and Scharfstein and Stein (2000)).

5 To my knowledge, there is no conclusive evidence as to whether a conglomerate performs better than a similar chaebol in terms of making group-level decisions for affiliated firms from the perspective of external stakeholders.

6 Although one can obtain several segment-level variables for the U.S. conglomerates from the Compustat Segment database, they are subject to the strategic reporting incentives of management and, thus, are likely noisier than similar variables of an independent firm, such as those available in the Compustat Annual or Quarterly database (see Rajan et al. (2000)). Moreover, in the absence of such strategic reporting behavior, one cannot observe the market value of a segment in a conglomerate firm and, thus, cannot compute, at least directly, some key variables associated with corporate investment, such as Tobin’s Q.

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8 See the KFTC’s press release dated June 25, 2021. See also, Hwang and Kim (2016) for other empirical evidence on chaebol RPTs.

9 There are other possible ways to transfer resources directly from one affiliated firm to another within a chaebol. For example, a holding company may charge its affiliated companies royalties for using the group’s brand name on their products and services. LG Corp., the holding company of LG Group, comprised of companies such as LG Electronics, charged roughly 0.1%–0.3% of affiliated firm sales as royalties for “LG” brand licensing in 2020.
However, the question of whether chaebol internal capital markets are active and efficient is an empirical question that this study seeks to address. While a chaebol is required to report certain transactions between its affiliated firms, it is unlikely that those observable transactions represent all intragroup transactions. Accordingly, the approach adopted in this study to analyze chaebol internal capital markets is to compare the investment of a chaebol-affiliated firm with that of a very similar non-chaebol firm, similar to that adopted in Lee et al. (2009) and Shin and Park (1999). I also examine the reported RPT profits of chaebol-affiliated firms as an additional test in Section 5.

3. Empirical strategy

Firms may choose to form a business group (chaebol); this possibility creates a challenge for a study seeking to compare chaebol firms with non-chaebol firms. I attempt to control for the effect of this selection by employing difference-in-differences matching estimators. Specifically, I use the matching estimator approach proposed by Abadie and Imbens (2006, 2011) that allows one to correct for bias arising from inexact matches on continuous variables. I minimize the Mahalanobis distance between the vector of covariates of treated (chaebol) firms and that of non-treated (non-chaebol) firms. For each treatment firm, I match one control firm for which the distance between the covariate vectors is the smallest. I choose control firms with replacement, which lowers the estimation bias while possibly increasing the variance. I then estimate the average effect of the treatment on the treated ("ATT") using the main variable of interest, firm investment (Investment), in differenced form, i.e., "After" period average minus "Before" period average. The event period ("Crisis" period) is defined as the first quarter of 2020. As a standard practice, I compute Before period variables using the averages for the three quarters immediately preceding the Crisis period, i.e., Q2–Q4 of 2019. Similarly, variables for the After period are computed using the averages for the three quarters immediately following the Crisis period, i.e., Q2–Q4 of 2020. Investment is the ratio of negative cash flow from investment activity to total assets. I examine the changes in investment in response to the COVID-19 outbreak because it is unlikely that firms had anticipated such an exogenous event. The COVID-19 crisis was unprecedented not only in its scale and scope but also for the fact that it was triggered by a shock completely exogenous to financial markets. Its effect on the Korean stock markets was significant, as can be seen in the daily plots of KOSPI for 2020 presented in Fig. 1. It is notable that the KOSPI started to decline from mid-January and rebounded after mid-March. Accordingly, I set the beginning of the COVID-19 "crisis" period as January 20, 2020 (the day the first COVID-19 case was confirmed in Korea) and the end of the period as March 19, 2020 (the day both KOSPI and KOSDAQ Index, another major stock market index in Korea, reached their respective 2020 lows). However, since most of the analyses conducted in this paper rely on quarterly frequency data, I define the crisis period as the first quarter of 2020 (Crisis period) for those analyses.

I argue that the difference-in-differences matching estimator approach combined with the exogenous COVID-19 shock provides a reasonably reliable identification strategy to address the research question of this paper. To further alleviate concerns regarding potential effects of time-varying unobservable factors, I also conduct a placebo test that compares the changes in investment from the last three quarters of 2017 to the last three quarters of 2018 to see if I obtain similar results without the actual shock, i.e., the COVID-19 outbreak.

Within each industry (i.e., after imposing the "exact" match on the industry), I match a treated firm with a control firm based on the following covariates from the Before period: size, market-to-book ratio, cash flow, cash holding, leverage, and investment growth. Note that these covariates are typically considered as key determinants of firms' investment. As a standard practice, I compute these Before period variables using the averages for the three quarters immediately preceding the crisis period, i.e., Q2–Q4 of 2019. Similarly, variables for the After period are computed using the averages for the three quarters immediately following the Crisis period, i.e., Q2–Q4 of 2020. Investment is the ratio of negative cash flow from investment activity to total assets.

4. Data and variables

I obtain firms' financial information, corporate governance, and stock price data from the database of FnGuide's DataGuide, one of the leading data providers in Korea. I collect firms' chaebol-affiliation information from the KFTC's website and OpenAPI system. Specifically, I define a firm as a chaebol affiliate if its name appears on the OpenAPI system's list of "large business group" affiliated firms for 2019. Since I examine the effect of the COVID-19 outbreak on firm investment, I collect quarterly and annual data for the period from January 2019 to December 2020.

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10 In addition, the effect of COVID-19 on corporate investment may vary with firm characteristics such as size and cash flow. Therefore, I select control firms using a matching procedure that controls for the effects of observable pre-pandemic firm characteristics.

11 Owing to the wide-ranging impact of COVID-19 on the Korean economy, I make an identifying assumption that the COVID-19 outbreak did not affect the investment of a chaebol-affiliated firm in a systematically different way than that of a very similar non-chaebol firm.

12 That is, I use the first quarter of 2018 as the pseudo crisis period. The reason for this is at least some global events related to the possibility of the COVID-19 pandemic were known to the market during the fourth quarter of 2019 and thus using the first quarter of 2019 as the pseudo crisis period may reflect some of the actual effects of the COVID-19 shock in the pseudo "after" period.

13 While Almeida et al. (2015) use investment in addition to these covariates for their matching procedure, I do not include investment since the main variable of interest for my difference-in-differences analysis is the changes in investment (see Almeida, Campbell, Laranjeira and Weisbenner (2011) for a similar approach). I obtain similar results when I include Investment in my matching covariates.

14 Large business groups listed on the OpenAPI system for 2019 are those whose respective combined total assets are greater than five trillion KRW and meet the ownership and control criteria imposed by the KFTC. See the KFTC's website and earlier studies, e.g., Almeida, Park et al. (2011), for further details regarding how chaebols and their affiliated firms are defined.
December 2020. I require my sample firms to have non-missing values for the variables used in the difference-in-differences analysis during the sample period.\textsuperscript{15}

Industries are classified using the two-digit Korean Standard Industry Codes (KSICs). Following the literature, I exclude firms in the financial services industry (KSICs 6400–6699). I also exclude firms in the pharmaceutical industry (2100–2199) and those in the information technology industry (5800–6399) since the effects of the COVID-19 outbreak on these industries were quite different from those on other industries.\textsuperscript{16} To ensure that each industry included in this study contains enough number of chaebol and non-chaebol firms for the matching analysis, I exclude industries with less than three chaebol or non-chaebol firms from my analysis.\textsuperscript{17}

The definitions of key variables used in this study are as follows. Firm size ($Size$) is defined as the natural logarithm of total assets. Market-to-book ratio ($\beta$) is defined as the ratio of market capitalization plus total assets minus book value of equity to total assets. Cash flow ($Cash\ Flow$) equals the ratio of earnings before interest and taxes plus depreciation to total assets, while cash holdings ($Cash$) equals the ratio of cash and cash equivalents to total assets. Leverage ($Leverage$) is defined as the ratio of total debt to total assets. Firm investment ($Investment$) is the ratio of negative cash flow from investment activity to total assets and investment growth ($InvGrowth$) is the difference between $Investment$ and lagged $Investment$. Following Baek et al. (2004), I define holding period return as follows: $HPR_{t}(a,b) = (1 + R_{a,t})(1 + R_{a+1,t})(1 + R_{a+2,t}) \ldots (1 + R_{b-1,t}) - 1$, where $R_{a,t}$ is the daily return of firm $i$ on date $t$ and date $a < date b$.\textsuperscript{18} Similar to Black, Kim, Jang, and Park (2015) and Hwang and Kim (2016), I collect chaebol-affiliated firms’ (intra-group) related party transactions data from the KIS-VALUE database provided by NICE Credit Information Service Co., Ltd. Note that this data is available only on an annual frequency. For each fiscal year, I define a firm’s profits from related party transactions as the difference between the revenues and expenses from related party transactions. All the continuous variables that I use in my analysis are winsorized at the 1st and the 99th percentiles.

\textsuperscript{15} Survival bias is unlikely to be a major concern for this study since the sample period used in this paper is relatively short, compared with those in studies examining the earlier crisis periods. My analysis is based on a comparison between chaebol firms, which are typically large and financially healthy, and their closely-matched peers.

\textsuperscript{16} These excluded industries mostly comprise non-chaebol firms. Since this study focuses on chaebol-affiliated firms and their closely matched non-chaebol peers, excluding industries dominated by non-chaebol firms is unlikely to derive the main findings of this study. Of the 453 firms excluded due to this sample requirement, only 13.25% are chaebol affiliates. Specifically, 25.93% of the financial services industry companies, 3.55% of the pharmaceutical industry companies, and 14.72% of the technology industry companies are chaebol-affiliated.

\textsuperscript{17} Thirteen companies in the following four industries are excluded because there are fewer than three non-chaebol firms in the industry that meet the sample selection criteria: agriculture (KSIC 100), manufacture of coke, briquettes, and refined petroleum products (1900), air transportation (5100), and food and beverage service activities (5600). Each of these industries has fewer than six observations. After this procedure, another 175 observations are excluded because there are fewer than three chaebol-affiliated firms that meet the sample selection criteria in their respective industries. Only 11.4% of these excluded companies are affiliated with chaebols.

\textsuperscript{18} I use the HPRs, rather than relying on the “market” model that weights the market return by the firm’s beta for two reasons other than following Baek et al. (2004). First, it has been shown that for a short-window event study, adjusting the market return using the firm’s beta does not improve the estimation of security price performance significantly (see, e.g., Brown and Warner (1980)). Second, a firm’s beta is likely to change after a large shock such as the COVID-19 outbreak and thus the HPRs may perform better in my empirical setting.

5. Empirical results

5.1. Descriptive statistics

There are 986 firms that meet my sample selection criteria described in the previous section, including 140 chaebol-affiliated firms and 846 non-chaebol firms. Table 1 presents the descriptive statistics of key variables for my sample firms.

Panel A of Table 1 shows descriptive statistics of the averages of key variables during the Before period, i.e., the last three quarters of 2019. As can be seen, the mean value of Before period Size is 2.49 trillion, while the median is only 0.25 trillion. This indicates that the distribution of my sample firm sizes is heavily skewed. Thus, I use the natural logarithm of firm size ($Size$) in my analysis and also match firms on $Size$ in my difference-in-differences analysis. Panel B of Table 1 presents the changes in the key variable averages, i.e., the difference between the average value of a variable during the After period and that during the Before period. While I observe an increase in an average firm’s size and market-to-book ratio ($\beta$) after the Crisis period, its investment decreased possibly because of exacerbated financial frictions after the COVID-19 outbreak. Additionally, my sample firms, on average, saw a decrease in their cash flows but increased leverage and cash holdings. These results suggest that the key firm characteristics that I use in this study varied over time during my sample period and thus I need to control for these time trends in my analysis. I do so by employing a difference-in-differences matching estimators approach.

I then compare the averages of treated, non-treated, and control firms for the last three quarters of 2019, i.e., Before period. The treated firms consist of 140 chaebol firms and the non-treated firms consist of 846 non-chaebol firms. Since the matching procedure I adopt is done with replacement, there are 88 unique non-chaebol firms in the control group.\textsuperscript{19}

Table 2 shows the mean differences of the matching covariates that I use—$Size$, $Q$, $Cash\ Flow$, $Leverage$, $Cash$, and $InvGrowth$. As can be seen, chaebol firms are larger in size, have lower market-to-book ratio and leverage, feature higher cash flow but lower level of cash holdings, and are characterized by higher investment growth rates than non-chaebol (non-treated) firms over the Before period. All these differences, except for $InvGrowth$ are statistically significant, indicating that a matching approach can be useful when comparing investment between these two groups. I form the control group using the matching procedure of Abadie and Imbens (2006, 2011), as discussed in Section 3. Note that this nonparametric matching procedure possibly controls for differences that may affect both the firm’s self-selection of business group affiliation and its investment policy response to the COVID-19 outbreak. The mean differences between the treated and the matched control groups are statistically insignificant, indicating that the matching procedure performs well with the covariates, except for $Size$.\textsuperscript{20} I conduct robustness tests in the following section to alleviate the concern that the difference in $Size$s may derive my results.

\textsuperscript{19} See Almeida, Campello et al. (2011) for an application of a similar matching procedure.

\textsuperscript{20} Almeida et al. (2015) have the same issue, i.e., treated and control groups are significantly different in terms of size, in examining the Asian financial crisis. This is inevitable as chaebol firms are typically larger than non-chaebol firms and the matching procedure that I adopt attempts to minimize distance between the two vectors of covariates, not just the sizes. The distribution of $Size$ in the treated group is more skewed than that in the control group. The median and the 25th and 75th percentile values of $Size$ in the treated group are 22.11, 20.90, and 23.07, respectively, while those in the non-treated group are 19.13, 18.51, and 19.96, and those in the control group are 21.02, 20.40, and 21.60, respectively. Accordingly, in the following section, I check the robustness of my results to excluding the top 5%, 10%, or 20% chaebol-affiliated firms in terms of size, and find that my results are not sensitive to this exclusion.
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Standard errors are reported in parentheses. Asterisks denote significance at the 1% level. "(A)–(B)" denotes the mean difference between treated and control firms. For mean differences, I report my main difference-in-differences matching estimator re-estimated under Abadie–Imbens’ matching procedure, as described in Abadie and Imbens (2006, 2011).

Table 2

| Variable | Observations | Mean | StdDev | P25 | Median | P75 |
|----------|--------------|------|--------|-----|--------|-----|
| Size     | 986          | 2.04 | 0.18   | −0.03| 0.026  | 0.087|
| Q        | 986          | 0.066| 0.019  | −0.008| 0.001  | 0.005|
| CashFlow | 986          | 0.013| 0.052  | −0.007| 0.011  | 0.037|
| Leverage | 986          | 0.001| 0.099  | −0.029| 0.001  | 0.027|
| Cash     | 986          | 0.031| 0.052  | −0.007| 0.011  | 0.037|
| Investment| 986         | 0.000| 0.040  | −0.012| 0.000  | 0.011|

Table 3

| Variable | Observations | Mean | StdDev | P25 | Median | P75 |
|----------|--------------|------|--------|-----|--------|-----|
| Size     | 986          | 2.02 | 0.14   | −0.10| 0.001  | 0.22|
| Q        | 986          | 0.044| 0.07   | −0.14| 0.005  | 0.14|
| CashFlow | 986          | 0.50 | 0.13   | 0.07 | 0.09   | 0.11|
| Leverage | 986          | 0.002| 0.08   | −0.004| 0.08   | 0.22|
| Cash     | 986          | 0.001| 0.02   | −0.004| 0.08   | 0.23|
| Investment| 986         | 0.000| 0.01   | −0.012| 0.000  | 0.011|

5.2. The effects of the COVID-19 outbreak on firm investment

I report my main difference-in-differences matching estimator results in Panel A of Table 3. As a benchmark, I also report the differences between treated and non-treated (i.e., all non-chaebol firms) in the table. As can be seen, on average, the treated (chaebol) firms invested less than the control firms as well as the non-treated firms during the Before period. However, the average investment of matched control sample is statistically indifferent from that of the treated sample, although Investment is not directly used as a matching covariate.

The mean difference between the investment of treated firms and that of control firms during the After period is striking. In terms of the changes in investment, i.e., After – Before, while the treated firms barely changed their investment policy in response to the COVID-19 outbreak, there was, on average, a 60.63% decrease in the control firm’s ratio of investment to total assets (from 1.407% to 0.554%). The difference-in-differences of investment is also large in magnitude at 0.853%, and the matching estimator’s average effect of treatment on the treated (ATT) is even larger in magnitude at 1.313%. Both are statistically significant at less than 1% level. There was no statistically significant difference between the investment of treated and that of non-treated firms, highlighting the importance of matching, i.e., comparing apples-to-apples, when comparing investment policies between chaebol and non-chaebol firms. Combined together, these results indicate that, on average, while chaebol firms barely changed their investment policy in response to the COVID-19 pandemic, similar (control) non-chaebol firms reduced their investment substantially, consistent with the prediction that chaebol internal capital markets helped mitigate the negative effect of the COVID-19 outbreak on firm investment.

Nevertheless, the ineffect matches on Size may derive this result since my matching procedure yields a control group whose average size is significantly different from that of the treated group (see Footnote 20 for further discussion on this issue). Moreover, it is a possibility that the Korean government’s stimulus packages rolled out shortly after the COVID-19 outbreak had a different effect on big (chaebol affiliated) firms than on small firms.

Therefore, to alleviate this concern, I repeat estimation of the Abadie–Imbens matching estimator’s ATT after I exclude the bottom 5% chaebol firms, in terms of Size, from my sample (see Almeida et al. (2015) for a similar approach). My results are not sensitive to this exclusion. The ATT from this sample is 1.19% with Z-statistic of 3.31. Further, I repeat estimating the ATT after I exclude the top 10% (20%) chaebol firms, in terms of size, and obtain similar results—ATT of 1.07% (1.01%) with Z-statistic of 2.95 (2.73). Therefore, the results in Panel A of Table 3 are not likely driven only by the differences in Size between treated and control firms.

Note that, however, the stimulus packages were mainly for households and small and medium-sized enterprises. Those for households were mostly provided via vouchers redeemable at small local businesses. Thus, it is more likely that the stimulus packages aided non-chaebol firms rather than large chaebol affiliates at least during the early COVID-19 crisis period. This possibility works against finding statistically significant results in my setting.
Table 3

|                  | Before | After | After − Before |
|------------------|--------|-------|----------------|
| Treated (A)      | 1.068*** | 1.067*** | −0.001**       |
|                  | (0.14)  | (0.15) | (0.14)         |
| Non-treated (B)  | 1.541*** | 1.518*** | −0.023***      |
|                  | (0.11)  | (0.10) | (0.15)         |
| Control (C)      | 1.407*** | 1.554*** | −0.031***      |
|                  | (0.16)  | (0.14) | (0.20)         |
| (A)−(B)          | −0.473 | 0.049 | 0.522          |
|                  | (0.27)  | (0.25) | (0.36)         |
| (A)−(C)          | −0.339 | 0.512** | 0.851***       |
|                  | (0.22)  | (0.20) | (0.25)         |
| Matching Estimator (ATT) | 1.313**  |       |                  |
|                  |         |       | (0.36)         |

Panel B. Placebo test

|                  | Before | After | After − Before |
|------------------|--------|-------|----------------|
| Treated (A)      | 1.344*** | 1.179*** | −0.165***      |
|                  | (0.17)  | (0.16) | (0.15)         |
| Control          | 1.382*** | 1.286*** | −0.096***      |
|                  | (0.13)  | (0.16) | (0.15)         |
| Difference       | −0.038 | −0.107 | 0.069          |
|                  | (0.21)  | (0.23) | (0.25)         |
| Matching Estimator (ATT) | 0.012  |       | (0.30)         |

In Panel B of Table 3, I present the results of my placebo test that uses the first quarter of 2018 as a “pseudo” Crisis period, instead of the first quarter of 2020. As discussed above, I use the first quarter of 2018, instead of the first quarter of 2019, to prevent the actual effects of the COVID-19 outbreak during the first quarter of 2019 from contaminating my difference-in-differences estimates. Accordingly, the pseudo Before period includes the last three quarters of 2017 and the pseudo After period includes the last three quarters of 2018 in this placebo test. None of the differences, including the difference-in-differences and ATT, are statistically significant. This result suggests that it is unlikely that my findings from Panel A of Table 3 are driven by some unobservable time-varying factors.

5.3. The effects of a firm’s investment opportunities on its investment during the early COVID-19 pandemic

The COVID-19 outbreak was an exogenous, and seemingly temporary shock to both chaebol and non-chaebol firms. Given this context, it was unlikely for a matched control firm to voluntarily cut back investment when the treated firm retained the same level of investment during the pre-pandemic period, if not for some external market frictions. That is, the results from Table 3 provide evidence that chaebol internal capital markets weakened the negative effect of the COVID-19 outbreak on firm investment, possibly by mitigating external capital market frictions. However, this does not necessarily mean that chaebol internal capital markets operated efficiently after the onset of the COVID-19 pandemic. An efficient internal capital market should ensure that a member firm with good investment opportunities gets the resources it needs to make a profitable investment, even when those resources need to be transferred from other member firms with less attractive investment opportunities (see, e.g., Bernardo et al. (2006) and Rajan et al. (2000)). Accordingly, using a firm’s market-to-book ratio (Q) as a proxy of its investment opportunities, I test whether the chaebol internal capital markets were efficient after the onset of the COVID-19 pandemic by examining whether chaebol firms with higher-than-industry median Q (“High Q”) were able to invest more than those with lower-than-industry median Q (“Low Q”). Table 4 reports the results.

Table 4

|                  | Low Q       | High Q      | High Q−Low Q |
|------------------|-------------|-------------|--------------|
|                  | (1)         | (2)         | (3)          |
| Treated (A)      | −0.21       | 0.33        | 0.54**       |
|                  | (0.17)      | (0.23)      | (0.26)       |
| Non-treated (B)  | −0.042**    | −0.62**     | −0.20        |
|                  | (0.18)      | (0.23)      | (0.29)       |
| Control (C)      | −0.84***    | −0.87*      | −0.02        |
|                  | (0.21)      | (0.44)      | (0.44)       |
| (A)−(B)          | 0.20        | 0.95        |              |
|                  | (0.40)      | (0.65)      |              |
| (A)−(C)          | 0.63**      | 1.20**      |              |
|                  | (0.27)      | (0.47)      |              |

Consistent with the view that efficient internal capital markets should allow High Q member firms to invest more than Low Q firms, the mean difference in changes in investment, ΔInvestment, between High Q chaebol (0.33%) and Low Q chaebol firms (−0.21%) is positive and statistically significant. I do not find evidence that High Q non-chaebol firms were able to invest more than Low Q non-chaebol firms. Taken together, the results in Table 4 suggest that chaebol internal capital markets after the onset of the COVID-19 pandemic were at least partly efficient in allowing chaebol firms with good investment opportunities to invest more than those without such opportunities.

I also examine related party transactions between affiliated firms within a chaebol group to check for evidence of active resource transfers via chaebol internal capital markets before and after the COVID-19 Crisis period. As discussed above, since the data on RPTs is available on an annual basis, I use the annual RPT profits in 2019 and those in 2020 for the corresponding Before and After period values, respectively. As can be seen in Table 5, in both 2019 and 2020, High Q chaebols
22 See Hwang and Kim (2016) for an example of examining Korean chaebol RPTs and for detailed institutional features of firms’ RPT reporting.

As evident, the effect of the COVID-19 outbreak on treated firm valuation was not statistically different from that on non-treated firm valuation (A)–(B). However, the difference in HPRs between treated and control firms ((A)–(C)) and ATT indicate that chaebol firms experienced a sharper decline in their stock prices than similar non-chaebol peers. This is partly consistent with the findings from earlier studies examining the effects of the Asian financial crisis in 1997 on firm value (e.g., Baek et al. (2004)). However, unlike in the earlier crisis episode, poor corporate governance may not be the reason behind my results given the substantial improvements in chaebols’ corporate governance after the completion of corporate governance reforms in the 2000s. Below in Panel C of Table 6, I examine whether the HPRs vary with firm characteristics such as board independence, one of the key metrics used in studies examining the corporate governance of Korean firms.

Columns (2) and (3) in Panel A of Table 6 show that the valuation difference between treated and control firms was only temporary. Column (2) reports the results with HPRs from January 20, 2020 to July 28, 2020 (the day Kospi index recovered its January 20 level for the first time since the COVID-19 outbreak) and column (3) reports the result with HPRs from January 20, 2020 to December 31, 2020. As can be seen, the difference in HPRs between the two groups becomes statistically insignificant when the holding period is extended from January 20, 2020 to July 28, 2020 after the COVID-19 period is extended to July 28, 2020.

In Panel B of Table 6, I examine whether the negative effect of the COVID-19 outbreak on HPRs (from January 20, 2020 to March 19, 2020) varied between High Q and Low Q firms. Consistent with the internal capital markets argument discussed above, High Q chaebol firms experienced substantially lower decline in their stock prices than Low Q chaebol firms while I do not find statistically meaningful differences between High Q non-chaebols and Low Q non-chaebols. The mean differences between chaebol and control firms ((A)–(C)) indicate that while the average HPR of Low Q chaebol firms is significantly lower than that of Low Q control firms, there is no statistically significant difference in average HPRs between High Q chaebols and High Q control firms. Although the difference is statistically insignificant, High Q chaebol firms’ average HPR is higher (~40.04%) than that of High Q control firms (~42.41%). This result indicates that Low Q chaebol firms were hit harder than the other chaebol and non-chaebol firms by the COVID-19 outbreak, and the negative effect of a firm’s chaebol affiliation reported in Panel A of Table 6 is likely to be driven at least partly by the Low Q chaebol firms.

Panel C of Table 6 reports the results of regressions of HPRs (from January 20 to March 19, 2020) on firms’ chaebol affiliation, changes in foreign ownership, pre-pandemic board independence, and Q. Specifically, the key variables that I include in the regressions are whether a firm belongs to a chaebol group (I(Chaebol)), whether its foreign ownership during the After period is lower than that during the Before period (I(Foreign Ownership < 0)), whether its board independence is higher than the sample median 25% in 2019 (I(Board Independence > 25%)), where board independence is calculated as the ratio of number of independent directors to the total number of directors, and High Q dummy (I(Q > Industry-median Q)). Column (1) shows that chaebol firms and firms whose foreign ownership decreased after the COVID-19 outbreak have lower HPRs. Consistent with the findings from Panel B of Table 6, the results in columns (4) and (5) indicate that a firm’s Q is positively and statistically significantly correlated with its HPR only when the firm belongs to a chaebol group and the negative effect of a firm’s chaebol affiliation on its HPR is confined to Low Q chaebol firms. The interaction term (“A))×(B)” in column (5) is also statistically significant, although it is not significant in column (2), providing weak evidence that foreign ownership has a stronger impact on the valuation of chaebol firms than on that of non-chaebol firms during the Crisis period. Unlike the earlier studies’ findings that corporate governance is the main driver of valuation difference between chaebol and non-chaebol firms before and during the Asian financial crisis in 1997 (e.g., Baek et al. (2004) and Jh (2003)), I do not find any statistically meaningful effect of a firm’s board independence and its interaction with the firms’ chaebol affiliation.
Holding period returns for treated, non-treated, and control firms. This table reports the results of difference-in-differences and regression analyses that examine holding period returns (HPRs) from January 20, 2020 to various holding period ending dates. In Panel A, I report the results of difference-in-differences of various holding period returns in percentage terms. The sample includes 140 chaebol firms and 846 non-chaebol firms. Control firms are selected using Abadie–Imbens' matching procedure, as described in Abadie and Imbens (2006, 2011). For each treated firm, I match one non-chaebol control firm closest to the treated firm in terms of Industry FEs Yes Yes Yes Yes Yes

| Variables                        | HPR from January 20, 2020 to: | March 19 | July 28 | December 31 |
|----------------------------------|-------------------------------|----------|---------|-------------|
| Treated (A)                      | −43.93***                    | −3.14    | 22.78***|
| Non-treated (B)                  | −43.99***                    | 0.46     | 23.77   |
| Control (C)                      | −40.62***                    | 2.89     | 24.84***|
| (A)–(B)                          | 0.06                         | −3.60    | −0.99   |
| (A)–(C)                          | −3.31**                      | −6.03*   | −2.06   |
| Matching Estimator (ATT)         | −6.73***                     | −1.97    | 0.72    |
| (1)                              | (2)                          | (3)      |         |
| Low Q                           |                               |          |         |
| Treated                          | −46.44***                    | −40.04***| 6.39*** |
| Non-treated                      | −44.02***                    | −43.96***| −0.06   |
| Control                          | −39.74***                    | −42.41***| −2.67   |
| (A)–(B)                          | −2.42                        | 3.92     | (2.39)  |
| (A)–(C)                          | −6.70***                     | −2.37    | (2.40)  |
| High Q                           |                               |          |         |
| Treated                          | −0.028*                      | −0.009   | −0.024  |
| Non-treated                      | −0.026**                     | −0.021*  | (0.012) |
| Control                          | 0.006                        | 0.007    | (0.013) |
| (A) × (B)                        | −0.029                       | (0.023)  | (0.023) |
| (A) × (C)                        | −0.006                       | (0.024)  | 0.000   |
| Constant                         | −0.652***                    | −0.653***| −0.671***|
| (0.095)                          | (0.095)                      | (0.098)  | (0.094) |
| Controls                         |                               |          |         |
| Industry FEs                     | Yes                          | Yes      | Yes     |
| R²                               | 0.053                        | 0.055    | 0.053   |
| N                                | 978                          | 985      | 986     |
5.5. Were chaebol internal capital markets active before the COVID-19 pandemic?

Lee et al. (2009) provide evidence that chaebol internal capital markets, i.e., cross-subsidization within a chaebol group, barely functioned during the 1999–2005 post-Asian-financial-crisis period. The results of my study appear to contradict this finding, as they indicate that chaebol internal capital markets were active after the onset of the COVID-19 pandemic. Thus, despite concerns regarding the identification of an investment-cash flow sensitivity regression approach (see, e.g., Chen and Chen (2012), Erickson and Whited (2000), and Kaplan and Zingales (1997)), I re-estimate the investment-cash flow sensitivity regressions of Lee et al. (2009) using more recent data from 2010 to 2019 to possibly find evidence that chaebol firms had active internal capital markets functioning even before the COVID-19 outbreak. Specifically, I estimate regressions of firm investment on $\text{Cash Flow}$, $\text{Q}$, and $\text{Other Cash Flow}$ with year dummies included. The key variable in this analysis is $\text{Other Cash Flow}$, which is defined only for chaebol firms as the ratio of the sum of cash flows of all other group affiliated firms to the sum of total assets of all other group affiliated firms. That is, this variable, from the perspective of a chaebol firm, measures how much of the resources are available at the level of the chaebol group that can be transferred for its investment. The results are shown in Table 7.

Consistent with Lee et al. (2009), the coefficient of $\text{Other Cash Flow}$ in column (3) is statistically insignificant, providing evidence that chaebol internal capital markets were not very active during the 2000–2009 period. However, I find positive and statistically significant coefficients of $\text{Other Cash Flow}$ upon estimating the same regression for the 2010–2019 period, suggesting that there were somewhat active internal capital markets even before the COVID-19 outbreak in 2020.

6. Conclusion

The findings of this study provide evidence that chaebol internal capital markets partly mitigate the negative effects of the COVID-19 outbreak on firm investment and value. I find that chaebol firms did not change their investment policy much in response to the outbreak, while non-chaebol firms cut back their investment substantially. Chaebol firms with good investment opportunities suffered less, in terms of stock prices, shortly after the onset of the pandemic, further strengthening the argument that chaebol internal capital markets functioned efficiently during this period. I also find evidence that related party transactions were used as means of intragroup resource transfer between affiliated firms. Unlike in the earlier Asian financial crisis in 1997, corporate governance did not appear to have played a significant role during the early COVID-19 pandemic period, possibly because of a series of corporate governance reform programs mandated by the Korean government in the 2000s. Further analysis suggests that there were somewhat active chaebol internal capital markets even before the COVID-19 outbreak, at least since the end of the global financial crisis in the late 2000s. This paper, using the Korean sample (which has advantages over the U.S. conglomerate sample when examining internal capital markets), documents evidence on the “bright side” of internal capital markets from the early COVID-19 pandemic period.

Although this study examines the existence and efficiency of chaebol internal capital markets shortly after the COVID-19 outbreak, it does not investigate the long-term effects of the pandemic on non-chaebol firms that had to invest less than similar chaebol-affiliated firms. In addition, further evidence on the efficient operations of internal capital markets in other countries would be helpful for generalizing the findings of this study. More studies to answer these questions are warranted.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix. Definitions of variables

Information on firms’ chaebol-affiliation is obtained from the Korea Fair Trade Commission’s website and OpenAPI system. I obtain firms’ financial information, corporate governance, and stock price data from the database of FnGuide’s DataGuide and related party transactions data from the KIS-VALUE database provided by the NICE Credit Information Services. The below variables are defined following Almeida et al. (2015) unless specified otherwise.

- **Cash** equals the ratio of cash and cash equivalents to total assets, i.e., $\frac{\text{cash and cash equivalents}}{\text{total assets}}$.
- **Cash Flow** equals the ratio of earnings before interest and taxes (EBIT) plus depreciation to total assets, i.e., $\frac{\text{EBIT + depreciation}}{\text{total assets}}$.
- **Chaebol** ($\text{Chaebol}$) is a dummy variable that equals one if the KFTC defines the firm as a “large business group” affiliate and zero otherwise.
- **High Q ($\text{Q}$)** denotes the subsample of firms with above-industry-median $\text{Q}$.
- **Holding Period Return (HPR)** is defined as follows: $HPR_i(t = a, b) = (1 + R_{ja})(1 + R_{ja})(1 + R_{ja}) \ldots (1 + R_{ja}) - 1$, where $R_{ja}$ is the daily return of firm $i$ on date $t$ and date $a < date b$, defined following Baeck et al. (2004).

### Table 7

Re-examination of investment-cash flow sensitivity regressions of Lee et al. (2009). This table reports the results of regressions of annual firm investment on the firm’s annual $\text{Cash Flow}$, $\text{Q}$, and $\text{Other Cash Flow}$, i.e., market-to-book ratio, is equal to the ratio of market capitalization plus total assets minus book value of equity to total assets and $\text{Cash Flow}$ is the ratio of earnings before interest and taxes plus depreciation to total assets. $\text{Other Cash Flow}$ is defined (only for chaebol firms) as the ratio of the sum of cash flows of all other group affiliated firms to the sum of total assets of all other group affiliated firms. “Sample Period” indicates which fiscal years are included in the regression and “Firms Included” indicates which firms are included in the regression. All the regressions include year dummies. Standard errors reported in parentheses are two-way clustered at the firm and year levels. Asterisks denote significance at the 1% (***) , 5% (**), and 10% (*) level.

| Sample period: | 2000–2009 | 2010–2019 |
|---------------|-----------|-----------|
| Firms included: | Non-chaebol | Chaebol | Non-chaebol | Chaebol |
| (1) | (2) | (3) | (4) | (5) | (6) |
| Cash Flow | 0.133** | 0.484*** | 0.484*** | 0.179* | 0.293*** | 0.271*** |
| (0.049) | (0.113) | (0.118) | (0.096) | (0.048) | (0.049) |
| Q | 0.021** | 0.034** | 0.034** | 0.012*** | 0.012** | 0.011* |
| (0.009) | (0.014) | (0.014) | (0.001) | (0.005) | (0.005) |
| Other Cash Flow | 0.003 | 0.083 | 0.066*** | 0.040 | 0.040 |
| (0.013) | (0.021) | (0.020) | (0.004) | (0.007) | (0.007) |
| Constant | 0.046*** | 0.021 | 0.021 | 0.039*** | 0.018** | 0.012 |
| (0.013) | (0.021) | (0.020) | (0.004) | (0.007) | (0.007) |
| $R^2$ | 0.037 | 0.159 | 0.159 | 0.045 | 0.095 | 0.100 |
| N | 24,184 | 1903 | 1902 | 16,565 | 2502 | 2501 |
• (Board Independence > 25%) is a dummy variable equal to one if the firm’s board independence, i.e., the ratio of number of independent directors to the total number of directors, is higher than the sample median 25% in 2019.

• (Foreign Ownership < 0) is a dummy variable that equals one if the firm’s foreign ownership during the After period, i.e., Q2–Q4.2020, is lower than that during the Before period, i.e., Q2–Q4.2019.

• Investment is the ratio of the negative cash flow from investment activity to total assets, i.e., cash flow from investment activity / total assets.

• InvGrow is the difference between Investment and lagged Investment.

• Leverage is equal to the ratio of total debt to total assets, i.e., total debt / total assets.

• Low Q denotes the subsample of firms not classified as High Q firms.

• Q is defined as the ratio of market value of equity plus total assets minus book value of equity to total assets, i.e., market value of equity/total assets – book value of equity / total assets.

• Related Party Transaction (RPT) Profits are defined as the difference between related party transaction revenues and expenses. Following Hwang and Kim (2016), related party transaction revenues and expenses are scaled by the firm’s total revenue.

• Size is the natural logarithm of total assets.

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