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## Credit ratings and corporate cash holdings: Evidence from Korea's corporate reform after the 1997 Asian financial crisis

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### ABSTRACT

We examine the extent to which credit ratings affect firms' cash holdings by investigating the circumstances in Korea after the 1997 Asian financial crisis. We find that, due to the costs and benefits associated with different rating levels, credit ratings are a major consideration for corporate cash management. Specifically, firms that become relatively sensitive to rating changes increase their cash holdings, either to improve the chances of an upgrade, or to avoid a downgrade. Furthermore, this effect is driven by chaebol business groups that increasingly rely on external financing that depends on credit ratings following the attenuation of their internal capital markets. Finally, we show that the impact of credit ratings on firms' cash holdings is more noticeable when firms are more prominent in the market.

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### 1. Introduction

Firms appear to take credit ratings into account when making their policy choices. For example, [Graham and Harvey \(2001\)](#) find that credit ratings are the second most important factor when managers determine capital structure. Moreover, the authors report that credit ratings are highly ranked in comparison with other traditional factors that can influence a firm's capital structure. In this regard, [Kisgen \(2006\)](#) provides empirical evidence that credit rating concerns directly affect capital structure decisions. [Begley \(2015\)](#) also shows that, when firms try to improve their credit ratings, they reduce their expenditure on research and development (R&D) as well as their selling, general, and administrative expenses (SG&A). This results in less innovation, lower profitability, and a fall in firm values. Additionally, [Bereskin et al. \(2015\)](#) note that credit rating concerns are beneficial because they provide an incentive for managers to improve their firms' corporate governance. However, although a number of studies examine the influence of credit ratings on firms' policy decisions, few have focused on the effect of credit ratings on firms' cash holdings. In this regard, this study examines whether sensitivity about credit ratings is significant for corporate cash policy decisions, given the discrete costs and benefits of rating changes.

The influence of credit ratings on firms' cash holdings has received much less attention, considering the common intuition that firms are safer when they hold more cash. However, it is reasonable to expect that when firms are sensitive to credit ratings they will increase their cash holdings, either to avoid a downgrade or to increase the chances of an upgrade. Moreover, if cash reserves were simply regarded as negative debt, it would be tempting to argue that an increase in cash holdings may imply a decrease in leverage ([Subrahmanyam et al., 2015](#)). In accordance with [Kisgen's \(2006\)](#) main results, which note that firms with credit rating concerns reduce their leverage, we would expect firms that become more sensitive to credit ratings to decide to retain more cash. Although [Kisgen \(2006\)](#) examines all firms with "notched" credit ratings regardless of when their ratings changed,<sup>1</sup> we focus on firms with credit ratings that became close to ratings upgrades or downgrades. In this context, it is reasonable to expect that managers deem credit ratings relatively more important immediately after changes to vulnerable credit ratings. Thus, we conduct detailed analyses of the effects of credit rating sensitivities on managers' actions.

The fundamental hypothesis of our study is that credit ratings are an important consideration for managers' corporate policy decisions because of the costs and benefits associated with different rating levels. Primarily, firms' credit ratings affect their costs of capital both

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<sup>1</sup> A notched credit rating means the "plus" high-grade or "minus" low-grade of a letter rating, as opposed to the mid-grade of the letter rating. For example, whereas BBB+, BBB-, and C- are notched credit ratings, BB, BBB, and C are not.

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directly and indirectly. Indeed, ratings have emerged as a major mechanism to correct the information asymmetry problem between firms and investors. In this regard, they act as signals of firm quality and as a possible source of information about such quality. Thus, a potential rating change should be an important element of a firm's strategic decisions. Besides, firms can directly incur discrete costs from different credit rating levels. For instance, rating changes could lead to changes in coupon rates when a firm issues debt, or could result in a necessary repurchase of bonds.

Additionally, several regulations on the universe of investment opportunities provide incentives for firms to improve their credit ratings. For example, financial institutions such as banks and pension funds are allowed to invest in financial instruments rated above investment-grade level. In other words, a credit rating is a critical criterion of whether market participants will invest their money. As a result, it is reasonable to assume that firms with lower credit ratings will try to improve their ratings or will work hard to maintain their current ratings.

The empirical work of this study examines the effects of credit ratings on corporate cash management by considering Korean firms after the 1997 Asian financial crisis. The Korean government introduced reforms of the corporate and financial systems in order to recover from this unanticipated crisis. The improvement of the credit rating system was one of the important goals among these reforms. Indeed, recent evidence (Bereskin et al., 2015; Lee, 2011; Oh, 2014) indicates that the Korean government's financial restructuring process within the credit rating industry was successful following the 1997 crisis, thereby increasing the reliability of credit ratings. Specifically, Bereskin et al. (2015) show that all Korean firms increased their exposure to non-guaranteed bonds. As a result, the circumstances in Korea after the financial crisis present a suitable opportunity to investigate the relationship between firms' credit ratings and their cash holdings.

Indeed, we find that firms whose credit ratings have just moved to ratings that are close to upgrades or downgrades are associated with increased corporate cash holdings, suggesting that credit ratings affect such holdings. The firms that we expect to become particularly sensitive to their credit ratings (i.e., those upgraded or downgraded to notch credit ratings) show an approximately 0.6% annual increase in their cash ratios (i.e., cash holdings to total assets) after controlling for firm-specific factors.

Another advantage of using Korean data instead of U.S. data is the opportunity to examine the differential effects of credit ratings on cash holdings according to whether firms are affiliated to business groups. Business groups are typically entities that manage various businesses. Although they can be founded all over the world, they play a prominent role in most emerging economies, outside North America (Khanna and Rivkin, 2001). We also examine the effects of credit ratings on corporate liquidity management by separating our samples into two subsamples, according to whether or not firms are in Korean business groups (i.e., chaebol groups). The vigorous reforms that were driven by the Korean government, including credit rating reforms, affected chaebol groups in particular (Almeida et al., 2015; Bae et al., 2008; Bereskin et al., 2015). Moreover, internal capital markets among chaebol firms have barely functioned since the 1997 crisis (Lee et al., 2009). Instead, public debt markets act as a substitute for internal capital markets. As a result, the increased reliance on external capital markets for raising money is more noticeable among chaebol firms. In accordance with this argument, the results of our study show that increased cash holdings driven by credit rating sensitivities are more dominant among firms in chaebol groups than among non-chaebol firms. Specifically, chaebol firms whose credit ratings have just been adjusted to vulnerable ratings are significantly associated with 0.9% increases in their cash ratios.

Finally, we extend our analyses by focusing on firms that receive more attention from market participants. Since a credit rating is

evaluated by reputable organizations (i.e., independent rating agencies) and is available to the public, it is reasonable to expect that the more prominent firms in the market are more concerned with the likelihood of changes to their credit ratings. The results of our study suggest that the effects of credit ratings on firms' cash holdings are more pronounced when a firm is prominent in the market. Specifically, we show that the relationship between credit rating sensitivities and increased cash holdings is stronger when a chaebol firm is investment-grade rather than speculative-grade, and when a chaebol firm is a leading firm rather than a non-leading firm within the same business group.<sup>2</sup>

The remainder of this paper is organized as follows: Section 2 presents a review of the related literature and describes the development of the hypotheses. Section 3 explains our empirical approach and the associated data. Section 4 discusses our results, and Section 5 presents the concluding remarks.

## 2. Related literature and development of the hypotheses

### 2.1. Credit ratings and corporate capital structure

Our paper contributes to the literature by considering how sensitivities to credit ratings affect corporate decision-making. Graham and Harvey (2001) show that credit ratings are one of the most important policy factors by conducting a survey that asks 392 chief financial officers (CFOs) about the cost of capital, capital budgeting, and capital structure. The survey shows that credit ratings receive higher scores than other variables traditionally supported by many capital structure theories. Kisgen (2006) finds that credit ratings directly affect capital structure decisions, and argues that a manager's concern for credit ratings is due to the discrete costs and benefits of rating changes. Kisgen's (2006) finding indicates that firms whose credit ratings are about to change issue less debt (relative to equity) than firms that are not close to credit rating upgrades or downgrades. Hovakimian et al. (2009) and Kisgen (2009) focus on leverage behavior following rating changes and present evidence that is consistent with firms targeting minimum credit rating levels. Extending Kisgen's (2009) studies, Agha and Faff (2014) examine the joint effects of financial flexibility and credit re-ratings on firms' cost of capital, investment, and financing decisions. Specifically, they demonstrate the asymmetric responses to credit re-ratings driven by firms' financial flexibility states. Faulkender and Petersen (2006) and Mitto and Zhang (2010) show that bond market access (measured by a credit rating change) is an important factor in decisions about leverage.<sup>3</sup> For example, firms that have access to the public bond markets have significantly more leverage, and the impact of this leverage is more pronounced for firms of low credit quality.

However, even though a number of studies consider the effects of credit ratings on corporate capital structure, few have focused on the association between firms' credit ratings and their cash management. In the following section, we provide a review of the various motivations of firms for holding cash and the relations between credit ratings and cash holdings.

### 2.2. Cash holdings and credit ratings

The earlier literature on corporate liquidity management

<sup>2</sup> A leading firm is the chaebol firm that symbolically represents its group. It is generally characterized by its large assets and its highly profitable and mature nature. In general, the insiders of a chaebol group as well as outside investors regard the leading firm as the prominent firm within the group.

<sup>3</sup> The role of credit ratings is well recognized in not only the debt markets but also the equity IPO markets. For example, An and Chan (2008) find that IPO firms with credit ratings are underpriced less than those without credit ratings.

develops models of optimal cash holdings after considering the diverse motives for such holdings. First of all, the classic models in finance suggest that there are transaction motives for holding cash when a firm converts cash substitutes into cash and uses cash for payments (Baumol, 1952; Keynes, 1936).<sup>4</sup> An alternative explanation for a firm to hold cash is based on the agency motive. In the presence of agency costs of managerial discretion, managers would rather hold cash than increase payouts in order to pursue their own objectives (Dittmar and Mahrt-Smith, 2007; Dittmar et al., 2003; Gao et al., 2013; Harford et al., 2008; Jensen, 1986; Pinkowitz et al., 2006). Moreover, Foley et al. (2007) suggest the tax motive to explain why U.S. firms hold significant amounts of cash on their balance sheets. Lastly, the precautionary motive is also accepted as an important driver of cash policy. This is consistent with the idea that a firm holds cash in order to cope better with future adverse shocks when the cost of capital is relatively high (Acharya et al., 2007; Almeida et al., 2004; Bates et al., 2009; Han and Qiu, 2007; Opler et al., 1999).<sup>5</sup>

Although the association between credit ratings and cash holdings has been examined, the literature does not explicitly show the link between them. Acharya et al.'s (2012) theoretical model indicates that higher cash reserves reduce the probability of default (and a fall in credit rating) in the short term, but may be associated with a higher default probability over a longer period. Thus, the authors argue that firms maintain cash holdings to reduce the probability of a liquidity-driven default. Khieu and Pyles (2012) show that downgraded firms increase their excess cash holdings relative to firms that do not experience credit rating changes, consistent with the precautionary motive. Moreover, Davydenko (2013) examines the role of liquidity in triggering default and shows that the probability of default is strongly correlated with liquidity. In accordance with these studies, the generally accepted intuition is that cash-rich firms should be safer than firms that have smaller cash holdings in their assets, all other things being equal. Consequently, it is reasonable to expect that firms that are relatively sensitive to rating changes may consider increasing their liquidity assets, either to secure their current ratings or to upgrade to higher ratings.

### 2.3. Korea's credit rating reforms after the 1997 Asian financial crisis

In 1997, the Korean economy entered a crisis due to structural problems in its financial and corporate sectors (Balino and Ubide, 1999). To recover from this unanticipated crisis, the Korean government initiated vigorous reforms. One of the important goals of the reforms was to improve the credit rating system. The Presidential Commission for Financial Reform (PCFR) suggested that the government's accreditation of credit rating agencies should be made transparent and that new entrants should be allowed (Hahn, 1999). The PCFR also recommended that all marketable debts, including non-guaranteed bonds and commercial papers, should be rated by rating agencies accredited by the government. Moreover, the Korean government has gradually reduced limitation on foreign equity participation in order to encourage foreign investments. For example, foreign investors would be permitted to hold 100% ownership of any type of financial institution by December 1998 (Joe and Oh, 2017). Indeed, global credit rating agencies such as Moody's and Fitch have steadily increased their shares of Korea's domestic credit rating agencies (i.e., KIS and KR, respectively).

As a result, the importance of credit rating agencies was highlighted after the financial crisis. Bereskin et al. (2015) note that these reforms to the credit rating agencies made the credit rating

system more relevant, because the reforms caused indirect improvements to firm disclosure and monitoring systems. Oh (2014) also provides evidence that the Korean government's financial restructuring policy for increasing the competition level of the credit rating industry in the aftermath of the 1997 financial crisis was successful.

Given that the reliance on credit ratings has increased, the situation in Korea offers a good opportunity to investigate the influence of credit ratings on corporate policy decisions. Consequently, our work extends the findings of earlier studies by using Korean firms to examine whether those that are more sensitive to credit ratings (i.e., firms that have experienced rating changes to notch credit ratings) increase their cash holdings in order to secure high ratings. Based on the preceding literature review, we expect that the credit rating sensitivities of firms are positively associated with their cash holdings. This leads to our first hypothesis:

**Hypothesis 1.** The increased sensitivity of firms to credit ratings gives rise to an increase in their cash holdings.

### 2.4. Chaebols and Korea's credit rating reforms

Business groups are the dominant organizational form for managing large businesses outside North America. They are generally defined as a collection of legally independent firms that are linked by various business ties that include ownership, economic means, and social relations, through which they coordinate to achieve mutual objectives (Yiu et al., 2007). Korean business groups are large business conglomerates known as chaebols. They have several unique characteristics that have been reported in numerous studies. Primarily, the ownership structure of a chaebol is heavily concentrated in a small number of people such as owner-managers or founder families (Bae et al., 2008; Shin and Park, 1999; Song et al., 2012). This corporate structure enables the controlling shareholders to exercise complete control over affiliated firms within the same chaebol group, and allows such a group to act as one large firm. Within this structure, the individual firms share various financial and intangible resources (Bae et al., 2008; Chang and Hong, 2000). In accordance with these practices, many studies provide evidence of internal capital markets in chaebol groups (Almeida et al., 2015; Lee et al., 2009; Shin and Park, 1999). Because of these internal capital markets, chaebol firms have never been particularly interested in their credit ratings.

However, following the 1997 Asian financial crisis, the Korean government initiated reforms that included the improvement of the credit rating system and that focused on chaebol firms (Bae et al., 2008; Bereskin et al., 2015), because their corporate activities have been criticized as one of the primary reasons of the financial crisis (Joe and Oh, 2016). Moreover, the chaebols' use of internal capital markets was limited after the 1997 crisis (Bae et al., 2008; Lee et al., 2009). Specifically, the government's vigorous implementation of chaebol reforms attenuated the function of internal capital markets. For example, the government blocked the channel of resource transfer between group member firms within a same chaebol group. As a result, chaebol firms had to turn to alternative sources of financing (e.g., public debt markets) to raise money. In such an environment credit ratings have been increasingly important for chaebol-affiliated firms, with the effect of credit ratings on cash holdings focused particularly on chaebols. Thus, based on the results of the preceding literature review, we posit our second hypothesis:

**Hypothesis 2.** The increased cash holdings induced by credit rating sensitivities are concentrated among firms in chaebol groups.

<sup>4</sup> Such models assume that there are costs involved in buying and selling firm assets (see also Miller and Orr, 1966; Mulligan, 1997; Opler et al., 1999).

<sup>5</sup> Ang and Smedema (2011), however, argue that financially constrained and cash poor firms may not prepare for future recessions.

### 3. Data and empirical methods

Our study closely follows the empirical approach used by [Kisgen \(2006\)](#). The key explanatory variable of interest in this study is  $CR^{POM}$ , which is defined as an indicator variable that is equal to one if the credit rating of a firm changes to a notch credit rating (i.e., the “plus” high-grade or “minus” low-grade of a letter rating, as opposed to the mid-grade of the letter rating), and zero otherwise. For example, if LG’s credit rating is raised from AA at year  $t-2$  to AA+ at year  $t-1$ , the variable  $CR^{POM}$  of LG at year  $t-1$  is equal to one. Otherwise, if LG’s credit rating is raised from AA- at year  $t-2$  to AA at year  $t-1$ , it is equal to zero.

Unlike [Kisgen \(2006\)](#), we conduct a detailed analysis of each firm’s cash holding policy according to its credit rating by focusing on firms whose credit ratings have just been transferred to ratings with a “+” or “-” notch.<sup>6</sup> Cash holdings (i.e., *Cash*) in our study are measured by the ratio of cash and cash equivalents to the book value of total assets ([Opler et al., 1999](#)). Our approach is based on the idea that credit ratings are highly regarded by managers when firms have recently experienced rating changes to notch credit ratings, rather than when firms have experienced such changes some time ago. Adopting this approach, rather than examining all firms that are close to rating changes, enables us to consider these phenomena more clearly.

Our main regressions examine the effects of a change in cash holdings regressed against  $CR^{POM}$  and other explanatory variables of interest. In particular, we model the following:

$$(A) \quad \Delta Cash_{i,t} = \beta_0 + \beta_1 CR_{i,t-1}^{POM} + \varepsilon_{i,t};$$

$$(B) \quad \Delta Cash_{i,t} = \beta_0 + \beta_1 CR_{i,t-1}^{POM} + \beta_2 Leverage_{i,t-1} + \beta_3 Profit_{i,t-1} \\ + \beta_4 Size_{i,t-1} + \beta_5 M/B_{i,t-1} + \beta_6 NWC_{i,t-1} \\ + \beta_7 Investment_{i,t-1} + \beta_8 Dividend_{i,t-1} + \beta_9 R\&D_{i,t-1} \\ + \beta_{10} Board\ Size_{i,t-1} + \beta_{11} SEO_{i,t-1} + \varepsilon_{i,t}.$$

These regressions show whether firms whose credit ratings change to ones that are close to a rating upgrade or downgrade (i.e.,  $CR^{POM}$ ) are significantly associated with increased levels of cash reserves (i.e.,  $\beta_1 > 0$ ). *Leverage* is the firm’s leverage (i.e., total debt scaled by the market value of equity); *Profit* is the return on assets (i.e., EBITDA scaled by total assets); *Size* is the natural log of the firm’s sales; *M/B* is the ratio of the market value of equity to the book value of equity; *NWC* is the firm’s net working capital (i.e., assets that substitute for cash scaled by total assets); *Investment* is the firm’s capital expenditure (i.e., capital expenditure (CAPEX) scaled by total assets); *Dividend* is the dummy variable that is equal to one if a firm pays a common dividend in year  $t-1$ <sup>7</sup>; *R&D* is the firm’s R&D expenditure (i.e., R&D scaled by total sales); *Board Size* is the natural log of the total number of directors on the board; and *SEO* is the dummy variable that is equal to one if a firm uses a secondary offering in year  $t-1$ . Consistent with prior studies, we expect that *Profit*, *M/B*, *Investment*, and *R&D* are positively associated with corporate cash holdings. However, we predict that *Leverage*, *Size*, *NWC*, and *Dividend* are negatively related to corporate cash holdings ([Bates et al., 2009](#); [Harford et al., 2008](#); [Opler et al., 1999](#)). We employ *SEO* to take into account the net cash

inflows from SEOs ([Fama and French, 2005](#)), expecting the positive relationship between *SEO* and  $\Delta Cash$ .<sup>8</sup> Finally, to control for the corporate governance structure, we use *Board Size* as a corporate governance proxy.<sup>9</sup> Indeed, [Harford et al. \(2008\)](#) show that firms with weak corporate governance structures have smaller cash reserves. As a result, we expect that *Board Size* is positively related to corporate cash holdings.

In subsequent regressions, we separately examine the effects of credit ratings on chaebol firms by dividing our sample into chaebol firms and non-chaebol firms. One of the unique features of using Korean data is that we can examine the differential effects of credit rating sensitivities on chaebol and non-chaebol firms. This procedure enables us to investigate whether our results are concentrated in chaebol firms because such firms were particularly influenced by the vigorous reforms initiated by the Korean government following the 1997 Asian financial crisis. Moreover, credit ratings became more important to chaebol firms because their use of internal capital markets reduced significantly following the 1997 crisis. This analysis follows from *Hypothesis 2*.

Finally, in order to focus on firms that are more concerned with their market evaluations, we repeat the prior regression analyses by splitting our chaebol sample into two subsamples along the following lines: (1) whether a firm is an investment-grade firm or a speculative-grade firm; and (2) whether or not a firm is a “leading firm.” A leading firm is a symbolically representative firm of a chaebol group and is characterized by its large assets and its relatively profitable and mature nature. For example, in the case of the Samsung Group, Samsung Electronics is the leading firm because it is the largest and most prominent firm in the group. In our study, we define a leading firm simply as the largest firm (based on the book value of total assets) in a business group ([Joe and Oh, 2016](#)).

Our data are collected from numerous sources, including the following: the FnGuide for credit ratings data, and stock market data; the TS2000 database provided by the Korea Listed Companies Association for financial and accounting data; and the Korea Fair Trade Commission (KFTC) for chaebol data.

The primary data set that we examine is the credit rating data set, which is taken from all firms with a credit rating in the FnGuide at the beginning of a particular year. There are four local credit rating agencies in Korea: National Information & Credit Evaluation (NICE), Korea Investor Services (KIS), Korea Ratings (KR), and Seoul Credit Rating & Information (SCI). However, NICE, KIS, and KR account for almost 99% of total sales in Korea’s credit rating industry. Thus, we focus on the credit ratings evaluated by these three agencies. Following the literature, including [Fama and French \(2002\)](#) and [Frank and Goyal \(2003\)](#), we exclude financial firms and firms that do not provide financial data (i.e., those with Korean standard industrial classification (SIC) code K). The sample period is 1999 to 2014.<sup>10</sup> As a result, the tests in this study involve 4849 firm-year observations.

Our other major data set is the list of chaebol-affiliated firms. We define a chaebol according to the guidelines of the KFTC, which has announced the list of chaebol groups annually since 1986 under the terms of the Fair Trade Act. The KFTC defines a chaebol in

<sup>6</sup> By employing an indicator variable that is equal to one if the credit rating of a firm has a notch credit rating, and zero otherwise, [Kisgen \(2006\)](#) shows that firms close to a credit rating upgrade or downgrade issue less debt relative to equity.

<sup>7</sup> We use a dummy variable to measure a firm’s dividend payout following prior studies such as [La Porta et al. \(2000\)](#) and [Opler et al. \(1999\)](#). However, in order to check the robustness of our results, we repeat our analyses with a dividend payout ratio (i.e., dividend to net income) instead of the dummy variable. The results are intact.

<sup>8</sup> Similarly, [Lee and Suh \(2011\)](#) provide international evidence that cash holdings are significantly associated with share repurchase behaviors.

<sup>9</sup> We also use other corporate governance measures such as the ratio of outside directors to board size and the corporate governance scores in the ESG (i.e., Environmental, Social, and Governance) index provided by the Korea Corporate Governance Service (KCGS). The results are intact.



**Table 1**  
Sample Summary Statistics.

The panels below show the sample summary statistics of our study. Panel A reports the number of firms with each credit rating, organized by year. Panel B summarizes the distributions of the total samples and two subsamples separated by chaebol and non-chaebol firms. Panel C shows the summary statistics of the firms in our sample.  $\Delta$ Cash is the change in firms' cash holdings, which is scaled by total assets. *Leverage*, *Profit*, *Size*, *M/B*, *NWC*, *Investment*, *R&D*, and *Board Size* are calculated by total debt scaled by the market value of equity, EBITDA scaled by total assets, the natural log of total sales, the ratio of the market value of equity to the book value of equity, assets that substitute for cash scaled by total assets, CAPEX scaled by total assets, R&D expenditure scaled by total sales, and the natural log of the total number of directors on the board, respectively. *Dividend* is an indicator variable equal to one if a firm pays a common dividend in year  $t-1$  and zero otherwise. *SEO* is an indicator variable equal to one if a firm uses a secondary offering in year  $t-1$  and zero otherwise. The symbols \*\*\*, \*\*, and \* denote significance of the parameter estimates at the 1%, 5%, and 10% levels, respectively.

Credit Rating	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
AAA	1	1	3	4	5	7	7	7	6	7	7	7	7	8	8	8
AA+	2	0	1	2	1	0	1	1	2	3	6	8	10	11	13	15
AA	1	0	1	1	1	2	4	5	8	10	7	8	11	21	21	19
AA-	6	3	4	8	8	9	7	9	10	14	14	18	26	25	31	37
A+	4	12	11	11	15	14	22	22	17	12	15	26	25	26	29	30
A	4	15	19	16	15	17	17	17	20	20	27	27	26	33	40	33
A-	4	22	18	17	20	18	20	27	30	28	31	30	27	28	32	37
BBB+	3	17	17	24	25	22	25	30	32	31	28	25	28	27	30	29
BBB	4	27	39	38	45	39	37	37	41	43	45	38	34	34	32	32
BBB-	1	23	46	54	38	36	36	42	37	40	30	30	32	28	30	30
BB+	2	21	25	24	33	28	26	25	20	17	15	17	16	17	20	25
BB	10	17	24	33	42	45	38	36	32	31	36	37	35	36	37	46
BB-	0	20	29	23	21	25	23	18	19	20	24	26	28	33	36	38
B+	0	0	0	0	4	4	2	6	5	3	10	10	15	17	11	10
B	1	4	4	0	5	2	4	5	5	10	18	18	13	11	14	14
B-	0	0	0	0	0	5	6	4	9	8	20	18	18	16	16	13
CCC+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CCC	0	1	2	3	4	3	2	3	4	6	5	9	12	16	13	12
CCC-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CC	0	0	1	1	0	0	0	0	1	1	0	0	2	2	2	2
C	0	3	4	6	11	10	9	6	6	5	4	4	4	4	4	5
D	0	0	0	0	0	0	0	0	0	0	0	1	2	2	4	6
Total	43	186	248	265	293	286	286	300	304	309	342	357	371	395	423	441

Credit Rating	Full Sample	Chaebols	Non-Chaebols
AAA	93	76	17
AA+	76	54	22
AA	120	93	27
AA-	229	155	74
A+	291	155	136
A	346	171	175
A-	389	137	252
BBB+	393	95	298
BBB	565	138	427
BBB-	533	94	439
BB+	331	23	308
BB	535	33	502
BB-	383	9	374
B+	97	1	96
B	128	2	126
B-	133	0	133
CCC+	0	0	0
CCC	95	10	85
CCC-	0	0	0
CC	12	0	12
C	85	6	79
D	15	1	14
Total	4849	1253	3596

Variable	Full Sample		Chaebols		Non-Chaebols		Difference: <i>t</i> -test [Wilcoxon's Z test]
	Mean	Median	Mean	Median	Mean	Median	
$\Delta$ Cash	0.004	0.000	0.004	0.000	0.004	0.000	0.40*** [0.11]***
Leverage	0.511	0.527	0.540	0.565	0.501	0.511	6.67*** [7.02***]
Profit	0.100	0.100	0.120	0.113	0.093	0.095	10.39*** [8.51***]
Size	19.849	19.594	21.542	21.524	19.249	19.139	49.69*** [40.04***]
M/B	1.176	0.746	1.302	0.917	1.131	0.691	2.82*** [7.70***]
NWC	0.017	0.010	-0.025	-0.041	0.033	0.033	10.89*** [11.30***]
Investment	0.060	0.023	0.067	0.036	0.057	0.019	3.38*** [5.86***]
Dividend	0.655	1.000	0.793	1.000	0.606	1.000	13.47*** [12.01***]
R&D	0.010	0.001	0.010	0.001	0.010	0.001	0.38*** [2.18***]
Board Size	2.107	2.079	2.261	2.197	2.066	2.079	15.84*** [16.55***]
SEO	0.143	0.000	0.123	0.000	0.154	0.000	2.76*** [2.64***]

**Table 2**

Effects of Credit Ratings on Cash Holdings by Year.

This table shows the effects of credit ratings on corporate cash holdings by presenting the mean changes of corporate cash holdings every year after the 1997 Asian Financial Crisis. We regard firms as Firms with Credit Rating Sensitivities if their credit ratings have just moved to plus or minus levels, and Firms without Credit Rating Sensitivities otherwise. All numbers are in percentage terms.

Year	Firms with Credit Rating Sensitivities	Firms without Credit Rating Sensitivities	Differences
1999	-0.02	-0.08	0.06
2000	0.25	0.17	0.07
2001	0.25	0.18	0.07
2002	0.14	0.63	90.49
2003	0.19	-0.03	0.22
2004	0.49	0.24	0.25
2005	4.65	1.43	3.23
2006	-0.39	0.05	-0.44
2007	1.55	0.72	0.83
2008	2.62	0.29	2.32
2009	0.01	1.26	-1.25
2010	0.56	-0.16	0.72
2011	-0.07	0.46	-0.53
2012	1.71	0.05	1.66
2013	-0.94	-0.01	-0.93
2014	0.23	0.67	-0.44
Average	0.70	0.37	0.33

two steps: (1) stock ownership by controlling shareholders with the proportion of relevant persons greater than 30%; and (2) the total assets of the affiliated firms in the group (Almeida et al., 2015; Joe and Oh, 2016).<sup>11</sup>

## 4. Results

### 4.1. Sample statistics

Summary statistics for the sample are shown in Table 1. The sample contains 4849 firm-year observations. Panel A of Table 1 indicates the number of firm-years by rating and shows that the sample is reasonably well distributed. Although the range is from 0 CCC+ firm-years to 565 BBB firm-years, 15 of the 22 rating categories have between 70 and 500 firm-years. This suggests that the empirical analyses in our study are not biased by any particular rating category. Moreover, in Panel B of Table 1, we summarize the distributions of chaebol firms and non-chaebol firms. We find that the credit rating levels of chaebol firms are generally higher than those of non-chaebol firms.

We report the descriptive statistics in Panel C of Table 1, including the means and medians for each variable used in our tests. The means (medians) for  $\Delta$ Cash, Leverage, Profit, Size, M/B, NWC, Investment, R&D, and Board Size are 0.4% (0.0%), 51.1% (52.7%), 10.0% (10.0%), 19.8 (19.6), 1.2 (0.7), 1.7% (1.0%), 6.0% (2.3%), 1.0% (0.1%), and 2.1 (2.1), respectively. Panel C of Table 1 also presents the summary statistics for our sample firms in the two subsamples: chaebol firms and non-chaebol firms. As expected, chaebol firms are larger, more profitable, use more leverage, invest more in R&D, have a larger board size, and pay more dividends to investors than non-chaebol firms.

<sup>10</sup> 1997 is the first year for which the financial data of firms in the Korean Securities Dealers Automated Quotations (KOSDAQ) is available in TS2000. However, our study excludes firm-years in 1997 and 1998 to control for the effect of the 1997 Asian financial crisis.

<sup>11</sup> The KFTC announced the 30 largest chaebol groups each year from 1986 to 2001, but then started to use a new criterion by including any group with total assets greater than a specific amount. This amount was two trillion won from 2002 to 2007 and five trillion won from 2008 onwards.

### 4.2. Effects of credit rating sensitivities on cash holdings

In this section, we demonstrate the effects of credit rating sensitivities on corporate cash holdings. First of all, in Table 2, we report the mean annual changes of corporate cash holdings after the 1997 Asian Financial Crisis separately for firms with credit rating sensitivities and firms without credit rating sensitivities. The results show that the differences are positive for 10 of 16 years and the average of these differences is 0.33%. This indicates that the firms that experience credit rating changes to plus or minus levels, increase their cash holdings on average by 0.33% relative to the firms that do not, suggesting economic significance across years as well.

Table 3 shows that a firm whose credit rating is changed to one that is close to a rating upgrade or downgrade (i.e.,  $CR^{POM}$  is equal to one) increases its cash holdings. Thus, a significant positive association exists between our key variable of interest ( $CR^{POM}$ ) and the change in cash holdings ( $\Delta$ Cash). The coefficients for  $CR^{POM}$  of Regressions (2) and (4) (i.e., when controlling firm-specific characteristics) are significantly positive at the 5% level. Based on Regression (4), a firm that is more likely to be upgraded or downgraded is associated with an approximately 0.6% increase in cash holdings after controlling for additional explanatory variables. Moreover, the coefficients for Size are significant among the control variables. This indicates that the firms increase cash holdings to a greater extent when they are small, which is consistent with our expectation for this variable. However, other control variables are not statistically significant. Overall, the results of Table 3 suggest that, when firms are more sensitive to credit rating changes, they increase their cash holdings relative to firms that are not sensitive. This evidence is consistent with managers' concern to maintain better ratings (i.e., to avoid downgrades or achieve upgrades) because of the costs and benefits associated with different rating levels.<sup>12</sup>

In Table 4, we further extend our regression analyses by examining the extent to which our results are driven by chaebol firms. The results of Table 4 indicate that this effect is not present among non-chaebol firms.<sup>13</sup> The coefficients for  $CR^{POM}$  of Regressions (1) and (2) (i.e., chaebol firms) are significantly positive at the 5% level; however, for Regressions (3) and (4) (i.e., non-chaebol firms), the coefficients' magnitudes are more than

**Table 3**  
Effects of Credit Ratings on Cash Holdings: All Firms.

This table shows the effect of credit ratings on corporate cash holdings by presenting the estimation results of regressions. The dependent variable is the following year's change in firms' cash holdings,  $\Delta Cash$ . The independent variables are  $CR^{POM}$  (i.e., an indicator variable equal to one if the credit rating of a firm changes to a plus or minus level, and zero otherwise), and a set of firm characteristics defined in Panel C of Table 1 (i.e., *Leverage*, *Profit*, *Size*, *M/B*, *NWC*, *Investment*, *Dividend*, *R&D*, *Board size*, and *SEO*). Intercepts are not reported. The industry is defined by the single digit of the Korea Standard Industry Code (KSIC). The standard errors are adjusted for clustering at the firm-level. The numbers in parenthesis represent t-statistics. The symbols \*\*\*, \*\*, and \* denote significance of the parameter estimates at the 1%, 5%, and 10% levels, respectively.

	$\Delta Cash$			
	(1)	(2)	(3)	(4)
$CR^{POM}$	0.005*	0.006**	0.004	0.006**
<i>Leverage</i>	(1.772)	(2.198)	(1.629)	(2.020)
<i>Profit</i>		0.002		0.008*
		(0.514)		(1.889)
<i>Size</i>		0.004		0.006
		(0.298)		(0.392)
<i>M/B</i>		-0.001***		-0.002***
		(-3.162)		(-3.070)
<i>NWC</i>		0.001		0.000
		(1.451)		(0.982)
<i>Investment</i>		0.005		0.008
		(0.720)		(1.067)
<i>Dividend</i>		0.02		0.024*
		(1.334)		(1.851)
<i>R&amp;D</i>		0.001		0.001
		(0.428)		(0.557)
<i>Board Size</i>		-0.006		-0.007
		(-0.238)		(-0.286)
<i>SEO</i>		0.000		0.002
		(0.076)		(1.003)
Adjusted R-squared	0.000	0.001	0.007	0.008
Observations	4849	4849	4849	4849
Year Fixed Effects	No	No	Yes	Yes
Industry Fixed Effects	No	No	Yes	Yes

halved and their significance also disappears. These results are consistent with chaebols' increased reliance on credit ratings and the attenuation of internal capital markets among them after the 1997 Asian financial crisis.

#### 4.3. Credit rating sensitivities and market evaluation

We now discuss an additional implication of our results. By extending the finding that chaebol firms increase their cash holdings in response to credit rating sensitivities, we would expect chaebol firms to be more sensitive to credit ratings when market participants pay more attention to them. Table 5 presents our findings on this issue.

Specifically, Table 5 shows that the effects of credit rating sensitivities on cash holdings are more prominent when a firm is investment-grade (i.e., BBB- and higher) rather than speculative-grade (i.e., BB+ and lower). Although the coefficients for  $CR^{POM}$  of Regressions (3) and (4) (i.e., speculative-grade firms) are not statistically significant, those of Regressions (1) and (2) (i.e.,

<sup>12</sup> Like Kisgen (2006), we also examine the asymmetric effects between notch ratings: upgrades and downgrades. For example, if a firm is downgraded from AA to AA- its incentives to hold cash might be different from a firm upgraded from AA to AA+. However, we find that there are not statistically significant differences between them.

<sup>13</sup> Analyzing Chinese firms, Liu et al. (2015) provide similar results that family firms hold more cash than non-family firms.

**Table 4**  
Effects of Credit Ratings on Cash Holdings: Chaebols vs. Non-Chaebols.

This table shows the effects of credit ratings on corporate cash holdings among chaebol firms and non-chaebol firms. All variables are defined in Table 3, although the sample is divided between firms that are in chaebols (i.e., Regressions (1) and (2)) and all other firms (i.e., Regressions (3) and (4)). Intercepts are not reported. The standard errors are adjusted for clustering at the firm-level. The numbers in parenthesis represent t-statistics. The symbols \*\*\*, \*\*, and \* denote significance of the parameter estimates at the 1%, 5%, and 10% levels, respectively.

	$\Delta Cash$			
	Chaebols		Non-Chaebols	
	(1)	(2)	(3)	(4)
$CR^{POM}$	0.008**	0.009***	0.002	0.003
	(2.416)	(2.839)	(0.616)	(0.822)
<i>Leverage</i>		0.002		0.011**
		(0.319)		(2.002)
<i>Profit</i>		0.003		0.008
		(0.162)		(0.430)
<i>Size</i>		-0.002***		-0.002*
		(-3.057)		(-1.654)
<i>M/B</i>		-0.001		0.001
		(-0.684)		(0.972)
<i>NWC</i>		0.009		0.011
		(1.224)		(1.108)
<i>Investment</i>		0.01		0.031*
		(0.404)		(1.842)
<i>Dividend</i>		0.003		0.001
		(1.146)		(0.265)
<i>R&amp;D</i>		-0.007		-0.008
		(-0.498)		(-0.245)
<i>Board Size</i>		0.003		0.002
		(1.528)		(0.623)
<i>SEO</i>		-0.007*		0.004
		(-1.840)		(1.143)
Adjusted R-squared	0.006	0.009	0.007	0.009
Observations	1253	1253	3596	3596
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes

investment-grade firms) are significantly positive at the 5% level. Specifically, an investment-grade chaebol firm that has just had its credit rating changed so that it is close to being upgraded or downgraded, is associated with an approximately 0.8% increase in cash holdings.

In Table 6, we repeat the prior regression analyses (1) and (2) of Table 4 by dividing our chaebol samples into two subsamples according to whether or not they are leading firms in their chaebol groups. The coefficients for  $CR^{POM}$  of Regressions (1) and (2) (i.e., leading firms) are 0.025 and 0.027, respectively, and are statistically significant at the 5% level. Further, the magnitudes of the coefficients are nearly three times as large as those of Regressions (1) and (2) in Table 4. This suggests that among chaebol firms, the leading firms are especially responsive to credit ratings. Based on Regression (2), leading firms that are more likely to be upgraded or downgraded, on average increase their cash holdings by 2.7% relative to those that are not. However, the coefficients for  $CR^{POM}$  of Regressions (3) and (4) (i.e., non-leading firms) are 0.004 and 0.006, respectively, and their significances have become weak. These results are consistent with our prior findings because they show that credit ratings are more likely to drive firms' decisions when such firms are prominent players in the market.

#### 4.4. Robustness checks

In this section, we describe various robustness checks on our main results. Our findings in this paper show a strong positive relation between credit rating sensitivities and corporate cash

**Table 5**  
Effects of Credit Ratings on Cash Holdings: Investment Grades vs. Speculative Grades.

This table shows that the effects of credit ratings on corporate cash holdings are more dominant when a firm is investment-grade (i.e., BBB- and higher) rather than speculative-grade (i.e., BB+ and lower). All regressions in this table are repeated by dividing our chaebol samples into two subsamples based on whether firms are investment-grade firms or speculative-grade firms. Intercepts are not reported. The standard errors are adjusted for clustering at the firm-level. The numbers in parenthesis represent t-statistics. The symbols \*\*\*, \*\*, and \* denote significance of the parameter estimates at the 1%, 5%, and 10% levels, respectively.

	$\Delta$ Cash			
	Investment Grades		Speculative Grades	
	(1)	(2)	(3)	(4)
$CR^{POM}$	0.007** (1.967)	0.008** (2.395)	0.021 (1.433)	0.026 (1.484)
Leverage		0.004 (0.467)		0.032 (1.074)
Profit		-0.003 (-0.138)		0.010 (0.251)
Size		-0.002*** (-2.689)		-0.01 (-1.673)
M/B		0.000 (-0.131)		-0.009* (-1.772)
NWC		0.015* (1.828)		-0.013 (-0.472)
Investment		0.002 (0.160)		0.056 (1.161)
Dividend		0.003 (1.040)		0.006 (0.387)
R&D		-0.007 (-0.484)		-0.351 (-1.603)
Board Size		0.003 (1.385)		0.025 (1.093)
SEO		-0.010*** (-2.792)		0.014 (0.955)
Adjusted R-squared	0.005	0.010	0.269	0.247
Observations	1168	1168	85	85
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes

holdings. However, our results are subject to two types of endogeneity concerns: omitted variable bias and reverse causality. Even though we control for the typical variables used in the corporate cash literature, the possibility of omitted variables that affect both cash holdings and credit ratings may make our observed relationship spurious. To mitigate this omitted variable concern, we run the regressions with firm fixed effects rather than industry fixed effects, which enable us to address the issues related to time-invariant omitted firm characteristics. We report the regression results in Table 7. The coefficients for  $CR^{POM}$  of Regressions (1) and (2) are consistently positive and significant, confirming the positive relation between credit rating sensitivities and corporate cash holdings after controlling other firm-specific characteristics.<sup>14</sup>

We also use a two-stage least-squares (i.e., 2SLS) approach with an instrument variable (i.e., IV) to address the reverse causality concern. The IV aims to capture variations in credit rating sensitivities that are exogenous to the change of corporate cash holdings. We use the analyst coverage (i.e., *Analyst Coverage*) as the instrument variable, which is calculated by the logarithm of the average number of analysts who observe a particular company in a given year. Analysts indeed pay more attention to the firms that are more likely to be upgraded or downgraded relative to those that are not. Meanwhile, the number of analysts tracking on a firm is

<sup>14</sup> We also repeat our analyses by applying the industry-year (i.e., interaction) fixed effects to control for time-varying shocks at the industry level. Our main findings remain intact.

**Table 6**  
Effects of Credit Ratings on Cash Holdings: Leading Firms vs. Non-Leading Firms. This table shows that the effects of credit ratings on corporate cash holdings are more noticeable when firms receive more attention from market participants (i.e., leading firms). All regressions in this table are repeated by dividing our chaebol samples into two subsamples based on whether or not firms are leading firms in their business groups. Intercepts are not reported. The standard errors are adjusted for clustering at the firm-level. The numbers in parenthesis represent t-statistics. The symbols \*\*\*, \*\*, and \* denote significance of the parameter estimates at the 1%, 5%, and 10% levels, respectively.

	$\Delta$ Cash			
	Leading Firms		Non-Leading Firms	
	(1)	(2)	(3)	(4)
$CR^{POM}$	0.025** (2.496)	0.027*** (2.664)	0.004 (1.339)	0.006* (1.738)
Leverage		0.011 (0.554)		0.001 (0.161)
Profit		0.038 (0.905)		0.000 (0.016)
Size		-0.004 (-1.656)		-0.002* (-1.803)
M/B		-0.005 (-1.262)		0.000 (-0.218)
NWC		-0.001 (-0.063)		0.012 (1.238)
Investment		0 (-0.013)		0.004 (0.246)
Dividend		0.002 (0.297)		0.004 (1.286)
R&D		0.086* (1.924)		-0.017 (-1.502)
Board Size		0.009 (0.946)		0.002 (0.859)
SEO		-0.002 (-0.253)		-0.008** (-1.978)
Adjusted R-squared	0.027	0.004	0.002	0.004
Observations	267	267	986	986
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes

unlikely to be related to the change of its cash holdings. Even though the absolute level of a firm's cash holdings is correlated with analyst coverage, the change of the firm's cash holdings (i.e., our dependent variable) is not directly related with the number of analysts tracking on the firm.<sup>15</sup> As a result, the changes in credit rating sensitivities with different credit rating levels driven by the annual changes in analyst coverages are plausibly exogenous variations that can help us establish the directions of causal relations. Regression (3) shows the first-stage regression with  $CR^{POM}$  as the dependent variable. As expected, the *Analyst Coverage* is significantly and positively related to  $CR^{POM}$ . The F-statistic from the relevance test of the instrument is 12.595 and significant at the 1% level. Based on the rule of thumb, we reject the null hypothesis that the instrument is weak. We then report the second-stage results in Regression (4) where we have estimated  $CR^{POM}$  in the first-stage regression. The coefficient for  $CR^{POM}$  is positive and significant, which indicates that the results obtained from the 2SLS estimation are consistent with those of the main OLS regressions.<sup>16</sup>

Finally, in order to mitigate the concern of the sample selection bias, we run a two-stage Heckman model (Heckman, 1979). Using this model, we compute an inverse Mill's ratio to proxy for the likelihood that corporate cash holdings are observed, which is designated as *Heckman's Lambda*. We then repeat our main regressions, including the *Heckman's Lambda*. The results are

<sup>15</sup> Indeed, we find that the correlation between the change of cash holdings and the analyst coverage in our data is 0.007 and not significant with a p-value of 0.624.



**Table 7**

**Robustness Checks.**

This table shows the various robustness checks on our main results. Specifically, in Regressions (1) and (2), we repeat the regressions with firm fixed effects rather than industry fixed effects. In Regressions (3) and (4), we provide the results of two-stage least-squares (i.e., 2SLS) regressions with *Analyst Coverage* as the instrumental variable (i.e., IV). *Analyst Coverage* is the logarithm of the average number of analysts who observe a particular company in a given year. In Regression (5), we run a two-stage Heckman model including an inverse Mill's ratio (i.e., *Heckman's Lambda*) as a control variable. All the other variables are defined in Table 3. Intercepts are not reported. The standard errors are adjusted for clustering at the firm-level. The numbers in parenthesis represent t-statistics. The symbols \*\*\*, \*\*, and \* denote significance of the parameter estimates at the 1%, 5%, and 10% levels, respectively.

	Firm Fixed Effects		2SLS Regression with IV		2-Stage Heckman
	(1)	(2)	1st Stage $CR^{POM}$	2nd Stage	(5)
$CR^{POM}$	0.007** (1.980)	0.006* (1.730)		0.122** (2.327)	0.006** (1.973)
<i>Analyst Coverage</i>			0.023*** (3.596)		
<i>Leverage</i>	0.027* (1.830)	0.050*** (2.640)	0.050* (1.691)	0.004 (0.637)	0.003 (0.379)
<i>Profit</i>	-0.011 (-0.390)	0.003 (0.090)	0.055 (1.041)	-0.004 (-0.269)	0.002 (0.091)
<i>Size</i>	-0.010*** (-4.980)	-0.015*** (-3.940)	0.018*** (3.744)	-0.005*** (-2.827)	-0.001 (-1.143)
<i>M/B</i>	0 (-0.100)	-0.001 (-0.960)	0.000 (0.397)	0.000 (0.511)	0.001 (1.292)
<i>NWC</i>	0.017 (0.830)	0.022 (1.040)	-0.042 (-1.467)	0.012 (1.386)	0.007 (1.107)
<i>Investment</i>	0.019 (1.450)	0.033** (2.120)	-0.057 (-1.268)	0.030** (2.146)	0.015 (0.946)
<i>Dividend</i>	0.002 (0.630)	0.003 (0.980)	-0.019* (-1.712)	0.003 (1.189)	0.001 (0.301)
<i>R&amp;D</i>	0.018 (0.430)	0.015 (0.390)	-0.006 (-0.052)	-0.010 (-0.392)	-0.006 (-0.287)
<i>Board Size</i>	-0.007* (-1.860)	-0.001 (-0.340)	0.023 (1.515)	-0.001 (-0.210)	0 (-0.034)
<i>SEO</i>	-0.001 (-0.260)	0.000 (-0.090)	0.024* (1.762)	-0.001 (-0.237)	0.001 (0.460)
<i>Heckman's Lambda</i>					-0.001 (90.029)
1st Stage F-statistics			12.595		
Durbin-Wu-Hausman Test				7.142***	
Adjusted R-squared	0.080	0.094	0.047	0.032	0.046
Observations	4849	4849		4849	5359
Year Fixed Effects	No	Yes	Yes	Yes	Yes
Industry Fixed Effects	No	No	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	No	No	No

reported in Regression (5) in Table 7. The coefficient for  $CR^{POM}$  is positively significant, which indicates that our results remain intact even after controlling for the sample selection bias.

<sup>16</sup> In light of the possible simultaneity between credit rating changes and corporate cash holdings, we conduct Granger causality test. The results show that while the statistics obtained from the Wald test reject the null hypothesis that the coefficients of  $CR^{POM}$  are jointly zero, the null hypothesis that the coefficients of  $\Delta Cash$  are jointly zero cannot be rejected with a p-value of 0.337. Overall, these results reinforce our argument that the sensitivity about credit ratings leads firms to increase their cash holdings.

**5. Conclusion**

This paper examines the impact of credit ratings on corporate cash holdings by considering Korean firms following the 1997 Asian financial crisis. We find that credit ratings affect corporate cash management. The results of the regressions present evidence that, when firms become sensitive to rating changes (i.e., firms that experience rating changes to notch credit ratings), they increase their cash holdings. As a percentage of total assets, this increase is approximately 0.6% more than for firms that do not become sensitive (i.e., all other firms). This is consistent with the role of credit ratings as a major consideration in managers' corporate policy decisions because of the costs and benefits driven by different rating levels. Further, we find that the statistically positive association between cash holdings and credit rating sensitivities is concentrated in chaebol firms. In particular, the increase of cash holdings in chaebol firms is approximately 0.9%, a finding that is consistent with the important role of credit ratings for chaebol groups because of the shrinkage of internal capital markets following the 1997 crisis. Lastly, we show that the credit rating effects analyzed in our chaebol samples are more noticeable when firms have more prominent positions in the market. In particular, the increased liquidity of investment-grade chaebol firms is approximately 0.8% and that of leading firms within chaebol groups is approximately 2.7%. These results support the idea that when firms receive more attention from market participants, they are more sensitive to the discrete costs and benefits driven by rating changes.

In sum, credit rating sensitivities affect firms' cash policy decisions. Thus, our empirical findings have important implications for an understanding of corporate cash management in response to managers' concerns about credit ratings.

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