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Corporate Cash Holdings and the Effect of Chaebol Affiliated on the Implied Cost of Equity Capital: Evidence from Korea

기업의 현금보유수준, 재벌여부가 내재 자기자본비용에 미치는 영향: 한국기업을 중심으로

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This paper examines firms' cash holdings and their effect on equity capital cost, distinguishing firms that belong to chaebol and non-chaebol groups. A chaebol is a South Korean form of business conglomerate. Chaebols are typically global multinationals owning numerous international enterprises, controlled by controlling shareholders with power over all operations. So this paper needs to examine whether firms' cash holdings and their effect on the implied cost of equity capital, distinguishing firms that belong to chaebol or not.

Empirical results suggest that higher cash holdings increase risk, which holds for chaebol group of firms. Thus, a poor corporate governance system for a chaebol-affiliated firm with high cash holdings could be a possible factor contributing to the risk premium. Finally, we conduct a 2SLS regression, and our empirical results are consistent for both the full and the chaebol samples, suggesting that our ordinary least squares results are valid. So in Korea, higher cash holdings represent risk premium closely related to overinvestment and agency problems between managers and shareholders.

Key Words: Cash holdings, Implied cost of equity capital, Chaebol, Agency problem.

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I. Introduction

There is some debate as to whether excess cash holding by chaebol firms is beneficial or not in Korea. After the 2008 global financial crisis,[1] the top 10 Korean chaebol firms' cash reserves quadrupled compared to their pre-crisis levels. In 2006, these cash holdings totaled 250 billion dollars; however, by 2012, this had increased to 1.1 trillion dollars because of economic uncertainty. However cash holdings themselves have numerous costs and benefits for the firm. Cash balances represent benefits such as precautionary motives(Martinez-Sola, Garcia-Teruel, & Martinez-Solano, 2013), transactional motives(Keynes, 1936), and preventing under-investment costs. Meanwhile, cash balances represent opportunity costs and create agency problems between managers and shareholders using free cash flows for their own private benefit(Jensen, 1986; Dittmar & Marth-Smith, 2007).

Therefore, from the firm's perspective, successful liquidity management may be a key issue for current policies. Prior literature has recommended using trade-off theory, pecking order theory, and agency theory to explain that firms reserve cash for various reasons. Further research has investigated the factors that cause firms to hold cash reserves. Among these researchers, Opler, Pinkowitz, Stulz, and Williamson(1999) suggest that strong growth opportunities, higher business risk, and smaller firm size cause firms to hold more cash than other firms. Pinkowitz, Stulz, and Williamson(2006), Pinkowitz and Williamson(2007), and Drobetz, Grüninger, and Hirschvogl(2010) also suggest that excess cash holdings could decrease firm value. However, limited studies have been conducted on the direct empirical association between cash holdings and the implied cost of equity capital.

1) After the 2008 global financial crisis, firms increased cash and cash-equivalent holdings for precautionary motives. Korean chaebol firms increased their cash holdings fourfold; this excess cash holding might bring another issue in terms of whether such excess leads to high investment.

Prior cash holdings-related studies investigate its association with firm value(Pinkowitz et al., 2006; Martinez-Sola et al., 2013) but do not directly investigate the implied cost of equity capital(Hereafter, ICOE). Implied cost of equity capital models could offer useful insights because they make an explicit attempt to separate the effect of ICOE from firm valuations and control for cash flow or growth effects(Chen, Chen, & Wei, 2011). This paper addresses this gap in the literature by directly investigating cash holdings and its effect on ICOE. Cash balances are easily accessible by managers with little scrutiny, and much of their use is discretionary. We posit that large cash reserves bring about increasing agency conflicts between managers and shareholders and that managers are more likely to use their money for inefficient investments for their own sake, which might destroy shareholder value(Jensen & Meckling, 1976). In addition, Jensen(1986) shows that overinvestment costs exist in large free cash flow situations in which cash facilitates investments in seemingly negative net present value(NPV) projects.[2] Therefore, investors perceive large cash reserves as a risk premium factor given that such reserves could lead to inefficient investments and investment costs. However, given precautionary measures and transactional advantages, risk-reducing factors may exist. Thus, cash holdings vis-à-vis risk perspective could represent an open empirical line of inquiry. We posit that excess cash holdings in Korean firms result in inefficient investments and an overinvestment problem and that a positive association may exist between cash holdings and ICOE.

Further, we divide our sample into two groups: chaebol and non-chaebol firms. Korea's chaebol firms, a unique feature of corporate governance, have pyramidal ownership and cross-holdings within business groups. For instance, chaebol firms have pyramidal ownership structures, and owner-managers of chaebol-affiliated

2) Increasing cash dividends or stock repurchases might be efficient tools to enhance firm stock price using firm excess cash.

groups hold the ultimate power in their firms through minimal cash flow rights(Bae, Kang, & Kim, 2002; Joh, 2003). Weak shareholder protection in Korea makes shareholders amenable to control in order for firms, particularly chaebol firms, to expropriate minority shareholders. Further, chaebol owner-managers are more likely to engage in more inefficient investments than are non-chaebol firms(independent firms) through their ultimate power when they hold excess cash. Therefore, we posit that this positive association between cash holdings and ICOE is more pronounced in chaebol firms due to agency problems between controlling shareholders of the chaebol firm and minority shareholders.

This paper offers several advantages over the voluminous studies on cash holding in the U.S. Korea has the unique chaebol business group feature; thus, cash holdings and their differential effects on chaebol and non-chaebol groups can only be examined in Korea. In addition, most cash holding-related studies are Western-oriented, in particular U.S.-based(Opler et al., 1999; Pinkowitz et al., 2006; Dittmar & Marth-Smith, 2007; Martinez-Sola et al., 2013). Note that Dittmar, Marth-Smith, & Servaes(2003) conduct a cross-country study and show that investor protection level and corporate governance structure have direct effects on firm liquidity management. Therefore, the empirical results of Ditmar et al.(2003) suggest that there might be a differential effect regarding cash holdings and their economic consequences between the U.S. and Korea because agency costs, which include internal and external monitoring systems, might differ. Particularly, the cash holdings of a country with high agency costs might be 25% higher than that of a country with low agency costs. Ergo, Korea tends to exhibit substantial agency problems vis-à-vis shareholders when compared with the U.S.; hence, it is reasonable to expect different empirical results between these two countries regarding cash holding and its economic consequences.

This study uses 3,146 firm-year observations for firms listed on the KOSPI/KOSDAQ for the period 2002–2015. The empirical results suggest that cash holdings are

positively associated with ICOE. Thus, therefore, in Korea, given its poor corporate governance system, higher cash holdings are regarded as a risk-increasing factor. In addition, we divided our sample into chaebol and non-chaebol groups, and our empirical results are consistent for the chaebol group. Thus, a poor corporate governance system for a chaebol-affiliated firm with high cash holdings could be a possible factor contributing to the risk premium. Finally, we conduct a 2SLS regression, and our empirical results are consistent for both the full and the chaebol samples, suggesting that our ordinary least squares results are valid.

This paper offers several contributions to the finance literature. First, to the best of our knowledge, this study is the first to empirically show a direct relationship between cash holdings and ICOE. Prior research suggests a relationship between cash holdings and firm value (Pinkowitz et al., 2006; Pinkowitz & Williamson, 2007; Martinez-Sola et al., 2013). However, limited studies exist on cash holdings and ICOE. Therefore, this paper's results extend the prior literature by using ICOE, which represents an investor's risk perspective. Second, this paper suggests that cash holdings and ICOE differ for chaebol and non-chaebol firms. In Korea, a chaebol is a unique characteristic of the business environment that allows the controlling shareholders to use his or her ultimate power to expropriate minority shareholders. Thus, an investor experiences a higher risk premium regarding the cash holdings of a chaebol's controlling shareholders. Third, numerous finance-related papers attempt to reveal the determinants of the cost of equity capital, particularly earnings attributes(Francis, Lafond, Olsson, & Schipper, 2004), institutions and securities regulations(Hail & Leuz, 2006), shareholder rights(Chen et al., 2011), and real asset illiquidity(Ortiz-Molina & Phillips, 2014). Thus, this paper adds to the extant literature the notion that cash holdings could be a factor that determines the cost of equity capital.

The remainder of this paper proceeds as follows. Section 2 summarizes prior research and develops hypotheses. Section 3 describes the data utilized to construct

our sample and presents the research design. Section 4 reports results of the main analysis and robustness tests. Finally, Section 5 concludes.

II. Literature Review and Hypotheses Development

Three theoretical models primarily explain the characteristics that influence a firm's cash holding decisions. First, the trade-off model stipulates that firms identify their optimal level of cash holdings by weighing the marginal costs and marginal benefits of holding cash. The greatest benefit related to cash holdings is the reduction in the likelihood of financial distress, which allows investment when financial constraints are met. The cost of raising external funds or liquidating existing assets is minimized as well. Second, the pecking order theory attributed to Myers(1977), and supported by the theoretical foundation of Myers and Majluf(1984), suggests that to minimize asymmetric information costs and other financing costs, firms should finance investments first with retained earnings, then with safe debt and risky debt, and finally with equity. This theory emphasizes that firms do not have target cash levels. Finally, free cash flow theory propounded by Jensen(1986) is the most widely used. Jensen(1986) suggests that managers have the incentive to build up cash to increase the amount of assets under their control and to gain discretionary power over the firm's investment decisions. Therefore, cash reduces the pressure to perform well and allows managers to invest in projects that best suit their own interests but may not be in shareholders' best interests. The following empirical research has attempted to elucidate the factors that explain the significant amounts of cash and cash equivalents held by firms.

Opler et al.(1999) suggest the determinants and implications of cash holdings using a sample of U.S. firms over 1971-1994. They find that firms with strong growth

opportunities, higher business risk, and smaller size hold more cash than do other firms. With respect to agency theory, Opler et al.(1999) find that the managerial entrenchment hypothesis explains the level of cash holdings. Mikkelson and Partch(2003) show that the operating performance of U.S. firms with high cash levels is comparable with or even greater than that of other U.S. firms. Dittmar et al.(2003) suggest that the agency costs of managerial discretion play an important role in explaining cash holdings. Using a sample of more than 11,000 firms across 45 countries, they find that corporations in countries in which shareholders rights are not protected well hold up to twice as much cash as corporations in countries with good shareholder protection. Ferreira and Vilela(2004) use EU country data to show that cash holdings are negatively affected by asset liquidity, leverage, and firm size. Pinkowitz et al.(2006) show that the marginal value of cash and the firm value are much weaker in countries with poor investor protection than they are in other countries. Dittmar and Marth-Smith(2007) show that corporate governance has a substantial impact on value through its impact on cash: $1.00 in cash in a poorly governed firm is valued at only $0.42 to $0.88. Consequently, good corporate governance approximately doubles this value. Drobetz et al.(2010) investigate the marginal value of cash in connection with firm-specific information asymmetries, showing that such asymmetries decrease the marginal value of cash.

Martinez-Sola et al.(2013) suggest that excess cash holdings decrease firm value. They suggest that large cash reserves can increase agency conflicts between managers and shareholders because managers can waste funds on inefficient investments that offer benefits but also destroy shareholder value. Thus, by using this money for their own projects, managers could destroy shareholder value, following Jensen and Meckling(1976). Therefore, following free cash flow theory(Jensen 1986), an overinvestment cost exists in situations in which cash facilitates investment in negative (−) NPV projects. In addition, the existence of large free cash flows allures managers to

engage in discretional activities that might be harmful to shareholder interest. Empirical evidence suggests that increases in managerial discretion could lead managers to overuse corporate liquidity resources.

This study shows how and to what extent corporate cash holdings affect the implied cost of equity capital. From prior studies, it has been gleaned that firms hold cash for precautionary purposes or use it for daily transactions. In addition, holding cash is beneficial to the firm to reduce the likelihood of financial distress. Meanwhile, higher cash holdings are associated with higher propensities of managers to use cash for their own private benefit, which results in inefficient investments and severe agency problems. In Korea, if managers use their cash for their own private benefit, then we posit that higher cash holdings might be positively associated with ICOE, following the free cash flow theory of Jensen(1986). Our first hypothesis is as follows.

H1) Cash holdings are positively associated with the implied cost of equity capital.

Much of the extant literature provides empirical evidence consistent with the tunneling view(Bae et al., 2002; Baek, Kang, & Lee, 2006; Jiang, Lee, & Yue, 2010). The tunneling view represents that controlling shareholders expropriate minority shareholders' wealth by minimal cash flow rights. Agency problems in Korea are uniquely manifested through the controlling effect of managers of chaebol firms. Prior literature related to Korean chaebol suggests that the widespread use of pyramid ownership and cross-holdings among firms that belong to a business group allows controlling shareholders to exercise full control and unchecked or ultimate power over a firm(Claessens, Djankov, & Lang, 2000; Kim & Lee, 2003; Baek et al., 2006; Hwang, Kim, Park, & Park, 2013). Therefore, a chaebol firm's controlling shareholders is more likely to use cash for their own pet projects, thus leading to seriously inefficient investment. Kang and Chang(2014) report that chaebol firms' cash reserves do not

induce firms' investments and that excess cash holdings reduce firms' investment efficiency. Hence, they suggest that chaebol firms' excess cash might induce owner-managers' overinvestment for their own private benefit.

Regarding agency problem, as we see in many news, controlling shareholders of chaebol make their own slush fund through cash reserve and use it for their own purpose. More specifically, such as SK, CJ, Hyundai Mortors' controlling shareholders make their own slush fund and use it as their lobbying activity to government or paying their own donation tax. Therefore, we posit that the agency problem between controlling shareholders and minority shareholders or overinvestment problem arising from excess cash is more pronounced in chaebol-affiliated firms than it is in non-chaebol firms(independent firms). Of course, chaebol-affiliated firms have a coinsurance system that is advantageous for cash management—if one firm faces financial difficulty, then it can be subsidized by other, group-affiliated firms(Byun, Choi, Hwang, & Kim, 2013). However this coinsurance system of chaebol firms might lead to overinvestment problems and inefficient corporate diversification problems within the same business group. Meanwhile, we raise the issue of agency between minority shareholders and controlling shareholders or inefficient investment problems arising from excess cash in chaebol firms would result in a more direct effect between cash holdings and ICOE in Korea. Therefore, excess cash is more likely to influence the agency problem of chaebol controlling shareholders or inefficient over investments, which increases the risk premium—possibly an open empirical question. So if chaebol managers use their cash holdings for their own sake, then our first hypothesis is more pertinent in chaebol firms for the foregoing reason. Thus, our second hypothesis is as follows:

H2) Cash holdings are positively associated with the implied cost of equity capital, particularly for chaebol firms.

III. Research Methodology

1. Regression Models

To test our hypotheses, we regress the arithmetic mean of the ex-ante ICOE from the RIVC, RIVI, OJ, and PEG models on cash holdings. A detailed explanation regarding ex-ante ICOE is provided in the 〈Appendix〉. Thus, we have Eq. 1 as follows:

$$ICOE_{i,t} = \beta_0 + \beta_1 CASH1_{i,t} + \beta_2 LNSIZE_{i,t} + \beta_3 BM_{i,t} + \beta_4 LNDM_{i,t} + \beta_5 BETA_{i,t} + \beta_6 OIVOL_{i,t} + \beta_7 EDISP_{i,t} + \beta_8 NUMEST_{i,t} + Firm\ \&\ Year\ Dummy + \varepsilon_{i,t} \quad (1)$$

where

ICOE = Arithmetic mean of the ICOE from the RIVC, RIVI, OJ, and PEG models;

CASH1 = (Cash+ Cash Equivalents) divided by total assets

LNSIZE = Logarithmic value of total assets;

BM = Book-to-market ratio, the ratio of the book value of equity to the market value of equity;

LNDM = Logarithmic value of the debt-to-market ratio, a ratio of the book value of total debt to the market value of equity;

BETA = Systematic risk estimated by regressing 30-60 prior months' monthly stock returns against each corresponding market index (KOSPI and KOSDAQ);

OIVOL = Standard deviation of operating income scaled by average total assets from the past 2-5 years;

EDISP = Dispersion of analysts' earnings forecasts, which is the standard deviation of one-year-ahead analysts' forecasts scaled by the absolute mean of those forecasts; and

NUMEST = Firms' analyst coverage.

Following the existing literature, we employ widely known risk proxies to control for the effect of these risk proxies on the cost of equity capital as follows. Prior studies suggest that large firms have better liquidity than do small firms. Therefore, larger firms have a greater advantage of a lower cost of equity capital (Gebhardt et al., 2001; Gode & Mohanram, 2003). Therefore, we use the logarithmic value of total assets as a proxy for firm size. Fama and French (1992) suggest that the book-to-market ratio is a suitable risk proxy for a firm's distress risk. Following Gode and Mohanram (2003), we use book-to-market ratio (*BM*) as a proxy for firm distress risk. Modigliani and Miller (1958) predict that the cost of equity capital is an increasing function of financial leverage. Prior literature identifies a positive relationship between a firm's financial leverage and the cost of equity capital (Fama & French, 1992; Gebhardt et al., 2001; Gode & Mohanram, 2003; Botosan & Plumlee, 2005). Thus, we include the logarithmic value of the debt-to-market ratio to measure firm financial leverage. *BETA* is the proxy for systematic risk as predicted by the Capital Asset Pricing Model (CAPM). Prior studies show that this factor has a positive correlation with the cost of equity capital (Fama & French, 1992; Gordon & Gordon, 1997). Beta is calculated by regressing the monthly stock returns of each company for the past 60 months (at least 30 months) to the market returns. Previous studies indicate that the volatility of reported operating profits is a source of risk, which means that unstable operations of the firm entail high risk premiums(Madden, 1998; Gode & Mohanram, 2003). We calculate the standard deviation of operating income over the past five years divided by the average assets for companies with at least two years of financial data(*OIVOL*) as a proxy for firm risk. The dispersion of individual analysts' earnings forecasts (*EDISP*) reflects information risks (Botosan & Plumlee, 2005) or earnings variability (Gebhardt et al., 2001). *EDISP* is the standard deviation of one-year-ahead analysts' earnings forecasts that are scaled by the absolute mean of those forecasts. The greater the number of analysts analyzing a firm, the lower the risk of information asymmetry. Therefore, the number of analysts

has a significant correlation with the cost of equity(Botosan, 1997). *NUMEST* is estimated as the number of analysts following the firm.

2. Sample

This study uses unbalanced panel data on Korean firms from 2002 to 2015. We extract accounting and stock return data from the Korea Information Services Value (hereafter Kis-Value)[3] database and analysts' earnings forecasts data from the Fn-guide database. In April of each year, we select firms that meet the following criteria: (1) financial statement data usuable from Kis-Value that are required to compute the main variables, stock return data, and industry identification codes; (2) the availability of all of the risk proxies and cash holdings; (4) non-financial company; (5) fiscal year is December.

This process yields a final sample of 3,146 annual firm-year observations from KOSPI/KOSDAQ-listed companies between 2002 and 2015.[4] All variables are winsorized at the 1% and 99% levels. With due regard to the panel structure of our dataset, we employ year- and firm-fixed effects in almost all regressions with robust standard errors clustered at the firm level.

3) In addition, we use the 3-year government bond rate that is a proxy for the risk-free rate, and the core inflation rate has been obtained from the Economic Statistics System of the Bank of Korea. The ex ante estimation of the cost of equity capital involves simplifying premises (forecasts horizon), and hence, measurement error perhaps stems from the assumptions for implementing the equity valuation model.

4) We need analyst forecasting data to calculate the implicit cost of equity capital. So sample is only applied to one and two year analysts' earnings forecasts are positive. So our final sample is 3,146 firm-year observations due to analyst earnings forecast data.

IV. Empirical Results

1. Descriptive Statistics

Table 1 provides descriptive statistics on cash holdings, chaebols, and the implied cost of equity capital, and risk proxies. The mean (median) of the arithmetic mean of four ex-ante costs of equity capital (ICOE) is 13.9% (13.1%). CASH1's means (medians) are 0.065 (0.045). In our sample, 39.4% of firms are chaebol-affiliated. The mean (median) and distribution of risk proxies (*LNSIZE, BM, LNDM, BETA, OIVOL, EDISP*, and *NUMEST*) are generally consistent with prior Korean evidence (Ahn, Cha, Ko, & Yoo, 2008).

〈Table 1〉 Descriptive Statistics

This table presents the distributions of our full sample of 3,146 firm-year observations over the period 2002–2015. This paper use unbalanced panel data. ICOE is the average of four implied cost of equity capitals (COE_{RIVC},COE_{RIVI},COE_{OJ} and COE_{PEG}). COE_{RIVC}, COE_{RIVI}, COE_{OJ}, and *COEPEG* are the implied cost of equity capital from the RIVC, RIVI, OJ, and PEG models, respectively. See the 〈Appendix〉 for details of the implementation of each valuation model. *CASH1* is (Cash + Cash Equivalents) divided by total assets. *CHAEBOL* is a dummy variable that equals 1 if the firm is a member of the top-30 business groups identified annually by the Korea Fair Trade Commission, and 0 otherwise. *LNSIZE* is the natural log of total assets. *BM* is the book value of equity divided by the market value of equity. *LNDM* is the natural log of book value of debt divided by market value of equity. *BETA* is the systematic risk estimated by regressing 30–60 monthly stock returns against the corresponding market index. *OIVOL* is the standard deviation of operating income during the past 2–5 years, which is scaled by average total assets. *EDISP* is the dispersion of analysts' earnings forecasts, which is measured as the standard deviation of the 1-year-ahead analysts' earnings forecasts, which in turn is scaled by the absolute mean of these forecasts. *NUMEST* is the number of following analysts.

Variable	No. of Obs	Mean	Std.	Min	25%	Median	75%	Max
ICOE	3,146	0.139	0.052	0.051	0.101	0.131	0.167	0.309
CASH1	3,146	0.065	0.066	0.000	0.017	0.045	0.092	0.315
CHAEBOL	3,146	0.394	0.489	0.000	0.000	0.000	1.000	1.000

LNSIZE	3,146	26.852	1.650	23.789	25.621	26.619	28.028	30.935
BM	3,146	1.011	0.925	0.013	0.471	0.781	1.263	15.399
LNDM	3,146	-0.605	1.210	-3.695	-1.438	-0.563	0.281	2.131
BETA	3,146	1.014	0.445	0.003	0.703	0.996	1.300	2.232
OIVOL	3,146	0.035	0.029	0.003	0.015	0.026	0.046	0.156
EDISP	3,146	0.136	0.180	0.000	0.025	0.091	0.172	1.175
NUMEST	3,146	6.223	6.737	1.000	1.000	3.000	10.000	26.000

Table 2 provides a bivariate Pearson correlation matrix covering the cost of equity capital, cash holding, chaebols, risk proxies, and the number of following analysts. In table 2, the cost of equity capital (ICOE) is significantly negatively association with business. with business group (*CHAEBOL*), natural log of firm size (*LNSIZE*), and number of following analysts (*NUMSET*). The cost of equity capital (*ICOE*) is positively associated with book-to-market (BM), the natural log of debt to market (*LNDM*), BETA (*BETA*), the volatility of firm operating income (*OIVOL*), and dispersion of analyst's earnings forecasts (*EDISP*). Correlation analysis does not capture the real effect of the association between cash holdings and the cost of equity capital. In the next section, we perform multivariate regression analyses to examine the ceteris paribus association between cash holdings and the cost of equity capital with various risk proxies.

〈Table 2〉 Bivariate Pearson Correlation Matrix

This table presents the Bivariate Pearson Correlation analysis. See the note accompanying Table 1 for definitions of variables. Bold numbers indicate statistical significance at the 5% level or better (two-tailed).

	ICOE	*CASH1*	*CHAEBOL*	*LNSIZE*	*BM*	*LNDM*	*BETA*	*OIVOL*	*EDISP*
CASH1	-0.066								
CHAEBOL	-0.124	-0.197							
LNSIZE	-0.481	-0.103	0.569						
BM	0.429	-0.191	0.07	-0.273					
LNDM	0.422	-0.307	0.297	-0.053	0.538				
BETA	0.105	0.034	0.035	-0.059	-0.088	0.081			
OIVOL	0.056	-0.213	-0.213	-0.126	-0.208	-0.337	0.171		
EDISP	0.053	0.142	0.142	0.118	0.055	0.170	0.155	0.018	
NUMEST	-0.282	0.392	0.392	0.716	-0.214	-0.044	0.019	-0.008	0.158

2. Multivariate Analysis

Table 3 presents regression results vis-à-vis ICOE on the level of cash holdings and various risk proxies. Column 1 shows fixed effect analysis and CASH1 is 0.034 and that it is statistically significant at the 5% level. Column 2 shows random effect analysis and CASH1 is 0.024 and that it is statistically significant at the 5% level. Also we conduct Hausman Test to show which model (Fixed or Random) is more suitable in our analysis. Hausman Test shows that Fixed Effect Model is more suitable in our model. Therefore, the overall results indicate that high cash holdings have a significantly higher implied cost of equity capital. These results suggest that firms with more cash holdings are more likely to have a higher risk premium because investors perceive high cash holdings as the risk premium.

〈Table 3〉 Cash Holdings and Implied Cost of Equity Capital

Table 3 presents regression results ICOE on the level of cash holdings and various risk proxies. Also we conduct Hausman Test to show which model (Fixed or Random) is more suitable in our analysis. See the notes accompanying Tables 1 and 2 for definitions of variables. ***, **, and * denote, respectively, statistical significance at the 1%, 5%, and 10% levels.

VARIABLES	(1) *ICOE*	(2) *ICOE*
	Fixed Effect	Random Effect
CASH1	0.034** [2.284]	0.024* [1.936]
LNSIZE	-0.012*** [-6.134]	-0.015*** [-17.024]
BM	0.010*** [6.706]	0.005*** [4.711]
LNDM	0.013*** [8.205]	0.014*** [15.253]
BETA	-0.005** [-2.217]	-0.002 [-1.088]
OIVOL	0.136*** [3.898]	0.175*** [6.096]

EDISP	0.018***	0.014***
	[4.453]	[3.600]
NUMEST	0.001***	0.001***
	[3.723]	[4.626]
Constant	0.477***	0.563***
	[9.184]	[23.628]
Year Dummy	Yes	Yes
Hausman Test	chi2=68.79, Prob〉chi2=0.0000	
Observations	3,146	3,146
R-squared	0.420	0.415
Number of Stock	722	722

In table 4, we decide to use fixed effect model and also we use firm level clustering analysis at the same time with fixed effect model. So column 1 shows that CASH1 is 0.034 and that it is statistically significant at the 5% level. We then divide our sample into chaebol and non-chaebol groups.[5] Table 4 shows that higher cash holdings are positively associated with ICOE in only the chaebol firms. We interpret this as suggesting that chaebol firms are more likely to use this cash for purposes of their prerogative, investors perceive this behavior as being a risk premium factor. The CASH1 coefficient in the chaebol sample (0.44) is approximately 30% larger than that in the full sample (0.33).

〈Table 4〉 Cash Holdings and Implied Cost of Equity Capital
(FULL Vs Chaebol Vs Non-Chaebol)

In table 4, we decide to use fixed effect model and also we use firm level clustering analysis at the same time with fixed effect model. We then divide our sample into chaebol and non-chaebol groups. See the notes accompanying Tables 1 and 2 for definitions of variables. ***,

5) In this study, we use the Korea Fair Trade Commission (KFTC) criteria following 'chaebol' related prior literature. Also we hand-colleting chaebol data because chaebol criteria might be vary by change in total assets. So hand-colleting is needed to capture change in chaebol criteria in our sample. We totally agree that some of "chaebol" appointed by KFTC might be government-owned (Ex: Posco, KT) and do not have controlling shareholders. However government-owned chaebol firm is relatively small (14%) and also we want to follow prior literature for the comparability.

**, and * denote, respectively, statistical significance at the 1%, 5%, and 10% levels.

VARIABLES	(1) *ICOE* FULL	(2) *ICOE* CHAEBOL	(3) *ICOE* NON-CHAEBOL
CASH1	0.034** [1.999]	0.044* [1.722]	0.033 [1.562]
LNSIZE	-0.012*** [-4.657]	-0.006 [-1.618]	-0.016*** [-4.462]
BM	0.010*** [4.049]	0.008*** [2.640]	0.013*** [3.241]
LNDM	0.013*** [6.081]	0.009*** [3.438]	0.012*** [4.552]
BETA	-0.005* [-1.681]	-0.004 [-0.816]	-0.004 [-1.103]
OIVOL	0.136*** [3.507]	0.103 [1.528]	0.145*** [3.169]
EDISP	0.018*** [2.934]	0.041*** [5.373]	-0.003 [-0.392]
NUMEST	0.001*** [3.407]	0.001*** [4.213]	0.001* [1.921]
Constant	0.477*** [6.901]	0.313*** [3.202]	0.560*** [6.105]
Firm Dummy	Yes	Yes	Yes
Year Dummy	Yes	Yes	Yes
Number of Stock	722	175	550
Cluster by Firm	Yes	Yes	Yes
Observations	3,146	1,238	1,908
R-squared	0.42	0.488	0.409

In this part, we inspect whether our results are robust by applying alternative model specifications. The overall results, which are summarized in Tables 5 and 6, reinforce our findings that corporate cash holdings lead to higher costs of equity capital. We also put corporate governance or firm characteristics variables, such as foreign ownership, largest shareholder ownership, idiosyncratic risk and growth. Columns 1 to 2 show that CASH1 is statistically and positively associated with the cost of equity capital in the full sample. [6] Therefore, our robustness test suggests that our empirical

6) *IDRISK* is idiosyncratic risk and is measured as the deviation of the residuals from the

analysis is consistent adding additional corporate governance or firm characteristic' control variables.

〈Table 5〉 Robustness Tests: Control Additional Control Variables

In Table 5, we put corporate governance or firm characteristics variables, such as foreign ownership, largest shareholder ownership, idiosyncratic risk and growth. See the notes accompanying Tables 1 and 2 for definitions of variables. FOR is Foreign ownership. OWNER is majority shareholder ownership. IDRISK is idiosyncratic risk and is measured as the variance of the residual from the regression of beta estimates. GROWTH is 3-year-ahead analysts' earnings forecasts minus 2-year-ahead analysts' earnings forecasts scaled by 2-year-ahead analysts' earnings forecasts. T-statistics in brackets, are adjusted for firm-level clustering to modify a serial of correlation within a cluster (firm). ***, **, and * denote, respectively, statistical significance at the 1%, 5%, and 10% levels.

VARIABLES	(1) *ICOE*	(2) *ICOE*
CASH1	0.039** [2.382]	0.030** [2.272]
LNSIZE	-0.011*** [-4.235]	-0.010*** [-4.563]
BM	0.010*** [4.102]	0.010*** [4.726]
LNDM	0.013*** [6.241]	0.012*** [6.486]
BETA	-0.004 [-1.518]	-0.004* [-1.708]
OIVOL	0.131*** [3.347]	0.077** [2.088]
EDISP	0.018*** [2.841]	-0.038*** [-5.246]
NUMEST	0.001*** [3.510]	0.001*** [4.747]
FOR	-0.010 [-0.972]	-0.011 [-1.182]
OWNER	0.017 [1.227]	0.006 [0.464]

regression analysis of BETA estimation. *GROWTH* is 3-year-ahead analysts' earnings forecasts minus 2-year-ahead analysts' earnings forecasts scaled by 2-year-ahead analysts' earnings forecasts.

IDRISK		0.027 [0.312]
GROWTH		0.042*** [11.285]
Constant	0.446*** [6.319]	0.427*** [7.145]
Firm Dummy	Yes	Yes
Year Dummy	Yes	YEs
Cluster by Firm	Yes	YEs
Observations	3,126	3,126
R-squared	0.422	0.543
Number of Stock	716	716

As is common in empirical contexts, one important concern herein is the potential endogeneity caused by reverse causality that may affect the interpretation of the causal association between a firm's cash holdings and the cost of equity capital. Even though OLS regression suggests that high cash holdings lead to an increase in the cost of equity capital in the full sample and the chaebol sample, it might be possible that firms with a higher cost of equity capital hold more cash. In Table 6, we approach this issue using two-stage least-squares estimation (2SLS). For the 2SLS regression, we use ROA as an instrumental variable (Dittmar & Marth-Smith, 2007) that can be viewed as an exogenous variable with respect to the contemporaneous cost of equity capital. As Table 6 shows, in the first-stage regression, the ROA variable is statistically significant at the 1% level with CASH1. We then use the fitted value of the first-stage regression, called PREDCASH, as the main variable for the second-stage regression. Column 2 of Table 6 suggests that PREDCASH (the fitted value of cash holdings) is still significantly and positively associated with the cost of equity capital in the full sample in the second-stage regression. In addition, this positive association is more pronounced in the chaebol sample. Therefore, with 2SLS regression using the full sample and the chaebol sample, we conclude that our empirical results are consistent with the foregoing regression results.

〈Table 6〉 Robustness Tests: Endogeneity Testing

In Table 6, we use two-stage least-squares estimation (2SLS). For the 2SLS regression, we use ROA as an instrumental variable (Dittmar & Marth-Smith, 2007) that can be viewed as an exogenous variable with respect to the contemporaneous cost of equity capital. ROA is net income divided by average total assets. PREDCASH is the fitted value of first stage regression. First-stage regression includes industry dummies not reported here. T-statistics in brackets, are adjusted for firm-level clustering to modify a serial of correlation within a cluster (firm) without column 1. This table pertains to 2SLS regression. See the notes accompanying Tables 1 and 2 for definitions of variables. ***, **, and * indicate, respectively, statistical significance at the 1%, 5%, and 10% levels.

VARIABLES	(1) *CASH1*	(2) *ICOE* Full Sample	(3) *ICOE* Chaebol	(4) *ICOE* Non-Chaebol
	First Stage	Second-Stage	Second-Stage	Second-Stage
ROA	0.052*** [2.804]			
PREDCASH		0.135** [2.075]	0.221* [1.900]	0.107 [1.236]
LNSIZE	-0.005*** [-4.776]	-0.013*** [-11.486]	-0.008*** [-4.224]	-0.018*** [-12.230]
BM	-0.003* [-1.859]	0.006*** [2.715]	0.005 [1.607]	0.008*** [3.400]
LNDM	-0.011*** [-8.487]	0.017*** [12.299]	0.016*** [6.877]	0.015*** [9.002]
BETA	-0.002 [-0.633]	0.003 [1.283]	0.006* [1.753]	-0.000 [-0.085]
OIVOL	0.211*** [4.933]	0.208*** [4.854]	0.159** [2.223]	0.214*** [4.375]
EDISP	-0.008 [-1.140]	0.005 [0.825]	0.022** [2.523]	-0.005 [-0.665]
NUMEST	-0.000 [-1.056]	0.001*** [4.478]	0.001*** [3.595]	0.001*** [2.859]
Constant	0.177*** [5.864]	0.497*** [14.701]	0.360*** [6.345]	0.620*** [14.474]
Year Dummy	Yes	Yes	Yes	Yes
Number of Stock	722	722	722	722
Observations	3,146	3,146	1,238	1,908
R-squared	0.182	0.493	0.503	0.521

V. Conclusion

In this paper, we empirically examine investors' response to firm cash holdings. In particular, we examine how a firm's cash holding strategy affects the cost of equity capital using a sample of 3,146 firm-year observations during 2002-2015. There is no empirical evidence regarding cash holdings or an explanation regarding risk. Using a multivariate regression framework that controls for firm-level characteristics and year effects, we find that in Korea, cash holdings remain positively associated with ICOE. This positive association varies between chaebol and non-chaebol firms, with its being more pronounced in the chaebol sample. This paper has several limitations. First, this paper use Korea Fair Trade Commission criteria "chaebol" then this chaebol criteria contains government owned firms which does not usually have controlling shareholders. So it needs to be cautious about interpreting related empirical result. This paper use the level of corporate cash holdings, however if G-index or blockholders' holding data is available, then it needs to use Dittmar and Marth-Smith (2007)' excess cash calculation approach. This paper has practical implication for managers pursuing and operationalizing cash holding strategies. Further, the results herein can assist academics and stock market participants in understanding the capital market effect of cash holdings.

〈Appendix: Estimation of the Implied Cost of Equity Capital〉

We use the ex-ante measure of cost of equity capital in accordance with four different accounting-based approaches developed by Ohlson(1995), Ohlson and Jeuttner-Nauroth(2005), Gebhardt et al.(2001), and Easton(2004). Subsequently, we use the arithmetic average of all four ex ante estimates of the cost of equity capital that is a proxy for firm cost of equity capital to mitigate potential measurement errors.

The RIV model proposed by Ohlson(1995) re-expresses the dividend discount model by using the clean surplus relation5(here in after referred to as CSR). The RIV model is as follows:

$$P_t = bv_t + \sum_{s=1}^{\infty}\left(\frac{E_t(eps_{t+s} - r_t \times bv_{t+s-1})}{(1+r_t)^s}\right) \quad (2)$$

where rt is the cost of equity capital in period t, Pt is the stock price in period t, bvt denotes the book value of equity per share in period t, and epst indicates the earnings per share in period t.

The RIV equation inevitably assumes the assigned terminal value when deriving the ex-ante cost of equity capital. Following the previous literature, we use the RIV model in two different ways on the basis of the underlying assumptions of the forecast horizon and the growth of residual income beyond the horizon.

The first RIV model(hereinafter referred to as the RIVC model) presumes that the residual income remains constant forever over the forecast horizon, year t + 3(Gebhardt et al. 2001). Therefore, the RIVC model is as follows.:

$$P_t = bv_t + \sum_{x=1}^{3}\left(\frac{E_t(eps_{t+x} - r_t \times bv_{t+x-1})}{(1+r_t)^x}\right) + \frac{E_t(eps_{t+3} - r_t \times bv_{t+2})}{r_t \times (1+r_t)^3} \quad (3)$$

The second RIV model(hereinafter referred to as the RIVI model) estimates the future residual profit using analyst 's predicted earnings forecasts from the time of measurement to year 3, and converges enterprise capital return to industry average capital return from 4 to 12. We then assume that the residual profit for the year 12 will persist forever(Lee et al. 1999; Gebhardt et al. 2001). We use the moving average of the industry's ROE over the past five years as a proxy for the industry average ROE. Korean Standard Industrial Classification(KSIC) codes at the two-digit level are used to

classify industry membership. Meanwhile, we consider only firms with positive ROE when computing the industry median ROE(Gode and Mohanram 2003). The RIVI model is as follows:

$$P_t = bv_t + \sum_{x=1}^{3}\left(\frac{E_t(eps_{t+x} - r_t \times bv_{t+x-1})}{(1+r_t)^x}\right) + \sum_{x=4}^{11}\frac{[E_t(ROE_{t+x} - r_t)] \times bv_{t+x-1}}{(1+r_t)^x} + \frac{[E_t(ROE_{t+12} - r_t)] \times bv_{t+11}}{r_t \times (1+r_t)^{11}} \quad (4)$$

where ROE represents the return on equity for the period t.

Unlike the RIV model, OJ model(Ohlson and Juettner-Nauroth 2005) rules out the CSR assumption. Another apparent difference between the OJ model and the two RIV-based models is that the OJ model assumes an earnings growth rate after the 2-year-ahead forecast horizon. Therefore, the OJ model requires a measure of the perpetual growth rate of capitalized abnormal earnings. Assuming that equals the risk-free interest rate minus the long-term inflation rate(Claus and Thomas 2001), we use the previous 10 years' moving average of the annual inflation rate from the forecasting data to estimate the long-term inflation rate. The OJ model yield is as follows:

$$P_t = \frac{eps_{t+1}}{r_t} + \frac{aeg_{t-w}}{r_t(r_t - \gamma + 1)}, \quad (5)$$

This equation can be rearranged in terms of the cost of equity capital as follows:

$$r_t = A + \sqrt{A^2 + \frac{eps_{t+1}}{P_t}\left(\frac{(eps_{t+2} - eps_{t+1})}{eps_{t+1}} - (\gamma - 1)\right)}, \quad (6)$$

where .

$$A \equiv \frac{1}{2}\left(r - 1 + \frac{dps_{t+1}}{P_t}\right)$$

Further, If the value of the square root is negative, the cost of equity is set to A.

The PEG model is suggested by Easton(2004). This valuation model assumes no change in abnormal earnings growth beyond the forecast horizon and dividends are not paid in the OJ model. Therefore, the PEG model is as follows:

$$P_t = \frac{eps_{t+2} - eps_{t+1}}{r_t^2}. \tag{7}$$

After rearranging the model in terms of the cost of equity capital, the equation becomes as follows:

$$r_t = \sqrt{\frac{eps_{t+2} - eps_{t+1}}{P_t}}. \tag{8}$$

In the calculation of the ex-ante cost of equity capital, we assume that analysts' earnings forecasts are proxies for market expected returns for all four models. This paper also makes the following assumptions about the dividend payout ratio for both models. First, this paper estimates the future dividend by adjusting the dividends for the most recent year as revenue generated in the same year. This paper then solves for '*r*' by searching over a range for 0 to 100% for the value of '*r*' that minimizes the differences (or makes the differences as zero) between the stock price and the intrinsic value estimates based on the sell-side analysts' earnings forecasts.

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요 약

본 연구는 한국기업을 대상으로 현금보유수준이 해당 기업의 자기자본비용에 미치는 영향에 대해서 실증분석을 실시하고자 한다. 더불어 해당 분석결과가 재벌기업 포함여부에 따라, 상이한 결과를 야기하는지도 연구하고자 한다. 재벌은 한국의 특수한 형태의 기업집단으로써, 재벌총수가 해당 기업에게 절대적인 권한을 행사하고 있다. 따라서 재벌기업이 초과 현금을 보유하고 있다면, 해당 기업의 대리인 비용이 증가하여 자기자본비용이 증가할 것으로 예측하였다. 본 연구 결과는 다음과 같다. 현금보유수준이 증가할수록 해당 기업의 자기자본비용은 증가하는 것으로 나타났다. 더불어 해당 경향은 재벌기업에서 강하게 나타났다. 이러한 결과는 한국에서의 높은 현금보유수준은 과대투자로 이어질 확률이 높아지고, 해당 기업의 대리인비용을 증가시켜, 결론적으로 해당 기업의 위험은 증가하는 것으로 해석 가능하다.

※ 국문 색인어: 현금보유수준, 내재적 자기자본비용, 재벌여부, 대리인 문제