


“Why do firms hold cash? Evidence from Korean stock listings”

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Why do firms hold cash? Evidence from Korean stock listings

Abstract

Corporate governance and the availability of external financing can be important determinants of corporate cash holdings. In this research, in line with Opler et al. (1999), the authors find that Korean firms' cash holdings are affected by firm-level characteristics including firm size, leverage, market to book, cash flow ratio, net working capital, and cash flow volatility in addition to corporate governance. Rather than agency-prone, the authors can ascribe the increase in cash holdings to the precautionary corporate demand for cash (Campbell et al., 2001). The authors also report that operating risks stemming from cash flow volatility, unavailability of external finance, credit rating downgrades, etc., may be associated with precautionary corporate demand for cash. Lastly, it is documented that corporate governance proxied for by block and/or insider ownership stakes is inversely associated with corporate cash holdings.

Keywords: demand for money, corporate governance, corporate cash holding.

JEL Classification: G39, E41, G34.

Introduction

This research is motivated by the recent literature (Bates et al., 2009; Dittmar et al., 2003; Hartford et al., 2008) that discusses the determinant of corporate demand for cash. Because the managerial decision of internal funds is the central issue of the conflict between shareholders and managers (Jensen, 1986), the increasing trend of firm's cash holdings can be agency-problematic. According to the classic model of Miller and Orr (1966), firms hold a certain amount of cash due to transaction costs associated with converting a noncash financial asset into cash. However, as advances in information and financial technology are deemed to have reduced the corporate needs of cash holdings, it is imperative for financial economists to identify the factors associated with and consequences of firm cash holdings. According to Jensen (1986), agency-ridden firms without promising investment opportunities are led to accumulating cash since the underincentivized managers do not reward their shareholders. Thus, we expect a negative association between corporate governance and firm cash holdings. Also, it would be of academic intrigue if stock returns vary in the cross-section of listed companies' retained cash.

Using a sample of 23,606 observations from firms listed on the Korea Exchange (KRX) and KOSDAQ from 1981 until 2008, the cash holding ratio¹ of Korean listed firms shows a persistent increase over time from 7% to 10% which compares to the U.S.

case (Opler et al., 1999). The net leverage ratio² exhibits a steep concurrent decrease. The increase in cash holdings is closely related with the new listings of firms, in line with the claim of Fama and French (2001, 2004) who ascribe it to disappearing dividends. However, we find no evidence of a statistical association between the cash buildup (cash holding ratio) of newly listed Korean firms and diminishing dividends (propensity to dividends)³.

In line with Opler et al. (1999), we find that Korean firms' cash holdings are also affected by firm-level characteristics including firm size, leverage, market to book, cash flow ratio, net working capital, cash flow volatility, corporate governance, etc. Rather than agency-prone, we can ascribe the increase in cash holdings to the precautionary corporate demand for cash. According to the conventional theory of precautionary demand for cash, one may hold cash as a buffer asset against adverse cash flow shocks, a well-documented idiosyncratic risk (Campbell et al., 2001). We find that operating risks stemming from cash flow volatility, unavailability of external finance, credit rating downgrades, etc. may be associated with corporate demand for cash whose motive is supported by the precautionary demand theory.

We conjecture that firm cash holdings convey a meaningful, agency-problematic signal to investors controlled for a numerous basket of varying firm-level factors. Thus, we further investigate investor reaction to the information resolved in firm cash holdings. More (less) cash holding in a firm with weaker (more stringent) governance implies a higher (lower) motivation of the manager's discretion to deploy internal cash as it will be reflected in a lower (higher) investor appraisal of the

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¹ Defined as cash and marketable securities divided by total assets.

² Defined as leverage minus cash and cash equivalents.

³ This may be due to the sufficient data of Korean listed firms as the sample period of the propensity to dividends was short due to a low data frequency (yearly basis) in addition to the unavailability of dividend payout ratio.

firm value. The level of corporate governance can be proportionately proxied for by block and/or insider ownership stakes. We also find supporting empirical evidence to a such reasoning.

The remainder of this paper is organized as follows. Section 1 discusses the motives of cash holding. Section 2 describes the data, defines the variables, and presents the statistical test and preliminary estimation results. The main results are discussed in section 3. The final section concludes.

1. Cash holding motives

The literature has identified the following reasons of corporate demand for cash: transaction, precautionary, and agency motives.

1.1. Transaction motive. Classic models by Baumol (1952) and Miller and Orr (1966) derive the optimal demand for cash when a firm incurs transaction costs associated with converting noncash financial assets into cash and using cash for payments. Since there are economies of scale with the transaction motive, large firms hold less cash. From this motive, we can expect that the bigger the firm size (measured by natural log of total assets), the smaller cash the firms need.

1.2. Precautionary motive. Firms hold cash to better cope with adverse shocks when access to capital markets is costly⁴. Consistent with this perspective, Opler et al. (1999) find that firms with riskier cash flows and poor access to external capital hold more cash. The precautionary motive also suggests that firms with better investment opportunities hold more cash, because adverse shocks and financial distress are more costly for them. From this precautionary motive, we expect that the larger the volatility of cash flows (measured by standard deviation of cash flow) and/or the larger the cost of external financing (measured by credit ratings), the more cash the firms need.

1.3. Agency motive. The agency motive of corporate demand for cash is argued by Jensen (1986) which says that entrenched managers would rather retain cash than increase payouts to shareholders when the firms have poor investment opportunities. This was shown a numerous times in the such as by Dittmar et al. (2003), Pinkowitz et al. (2006), Hartford et al. (2008). Therefore, it can be tested with the variables related with agency cost such as insider holding ratio, block holding ratio, corporate governance indices, e.g., G index (Gompers et al., 2003), etc.

2. Data

2.1. Databases and variables. Our sample firms consists of KRX and KOSDAQ listed stocks

sourced from DataGuide from 1981 until 2008. Financial firms are excluded since they tend to carry cash to meet capital requirements rather than on economic motives, and utility listings for their cash holdings subject to regulatory supervision. We can control for firm-specific characteristics that may affect the conditions of firm cash holdings following Opler et al. (1999). These variables include firm size, leverage, market to book, cash flow to total assets, standard deviation of cash flows, net working capital to total assets, research and development (R&D) to sales, propensity to dividend. Our bond dumour takes a value of one for an investment grade or zero otherwise⁵. For the governance measure, we use the insiders' percentage ownership (*InsiderHoldings*) defined as the proportion of block holders with stakes exceeding 10%. *Assets* are defined as the total assets net of cash and cash equivalents. *Size* is measured as the natural log of assets. *Leverage* is measured as the ratio of total debt to asset. Another leverage measure is *NetLeverage* which is the ratio of net leverage (leverage minus cash and cash equivalents) to net assets (assets minus cash and cash equivalent). *MarketBook* is the market to book ratio which proxies for growth opportunities, and is defined as the book value of assets minus book value of equity plus the market value of equity and divided by the book value of assets. *CashFlow* is the cash flow ratio measured as the earnings after interest, dividend, and taxes, but before depreciation, divided by assets. *CashFlowVol* is the standard deviation of the firm's cash flows, a proxy for business conditions, is computed using the firm's standard deviation of the cash flow ratio for the past 5 years. *NetWorkCapital* proxies for liquidity and is defined as the ratio of current assets net of cash minus current liabilities divided by assets. *R&D* is the ratio of R&D to sales which proxies for the financial distress costs. Each sample firm's stock return (*StockReturn*) is to used to investigate investor appraisal of corporate cash holdings controlled for *RoA* (*Return on Assets*).

2.2. Estimation and preliminary results. Table 1 provides average cash holding ratios and net leverage ratios of all KRX and KOSDAQ-listed firms including newly floated companies. In Table 1 and Figures 1 and 2, the cash holding ratio of an average newly listed firms appears significantly higher than that of an average existing companies, and the leverage ratios lower. This may be related with the disappearing dividends phenomenon of newly listed firms (Fama and French, 2001, 2004). However, the propensity to dividends does not seem to significantly explain the increasing cash holding ratio.

⁴ Per precautionary motive, holding cash is like "longing options" on hedging purposes. In this case, the value of cash holdings can be estimated by the real options approach.

⁵ The bond dumours are A, including A-, A, A+, AA(-, +), AAA(-, +); B, including B(-, +), BB(-, +), BBB(-, +); C, including C(-, +), CC(-, +), CCC(-, +); D, including D group ratings and NA for unidentified ratings. These credit ratings are the most conservative ones among 3 major credit rating agencies in Korea: KBP, NICE, and KIS.

Table 1. Cash holding and net leverage ratios

The cash holding ratio is defined as cash and marketable securities divided by total assets. The net leverage ratio is defined as the leverage net of cash and cash equivalent divided by net assets.

Year	All firms			Excluding firms listed since 1999			Excluding firms listed since 1989		
	Cash holding ratio	Net leverage ratio	No. of obs.	Cash holding ratio	Net leverage ratio	No. of obs.	Cash holding ratio	Net leverage ratio	No. of obs.
1981	0.070	0.742	183	0.070	0.742	183	0.070	0.742	183
1982	0.069	0.731	184	0.069	0.731	184	0.069	0.731	184
1983	0.072	0.720	185	0.072	0.720	185	0.072	0.720	185
1984	0.083	0.705	193	0.083	0.705	193	0.083	0.705	193
1985	0.074	0.709	201	0.074	0.709	201	0.074	0.709	201
1986	0.069	0.705	207	0.069	0.705	207	0.069	0.705	207
1987	0.068	0.695	228	0.068	0.695	228	0.068	0.695	228
1988	0.074	0.676	283	0.074	0.676	283	0.074	0.676	283
1989	0.083	0.671	343	0.083	0.671	343	0.083	0.671	343
1990	0.086	0.671	366	0.086	0.671	366	0.086	0.671	366
1991	0.091	0.661	380	0.091	0.661	380	0.091	0.661	379
1992	0.096	0.626	382	0.096	0.626	382	0.096	0.625	381
1993	0.091	0.644	388	0.091	0.644	388	0.091	0.644	387
1994	0.094	0.652	408	0.094	0.652	408	0.094	0.652	407
1995	0.092	0.654	436	0.092	0.654	436	0.091	0.654	430
1996	0.100	0.660	608	0.100	0.660	608	0.093	0.661	461
1997	0.115	0.655	685	0.115	0.655	685	0.094	0.667	478
1998	0.139	0.619	708	0.139	0.619	708	0.097	0.642	487
1999	0.133	0.588	802	0.133	0.588	802	0.076	0.628	498
2000	0.099	0.578	962	0.099	0.579	955	0.071	0.614	519
2001	0.105	0.515	1 142	0.098	0.538	1 022	0.073	0.604	535
2002	0.110	0.475	1 373	0.104	0.505	1 169	0.065	0.596	569
2003	0.092	0.470	1 502	0.084	0.497	1 256	0.067	0.580	579
2004	0.095	0.419	1 672	0.084	0.441	1 355	0.064	0.483	590
2005	0.100	0.403	1 939	0.084	0.425	1 501	0.069	0.469	634
2006	0.104	0.374	2 284	0.083	0.408	1 662	0.066	0.447	694
2007	0.114	0.357	2 593	0.080	0.400	1 832	0.064	0.442	736
2008	0.097	0.378	3 126	0.077	0.414	2 058	0.065	0.447	768
Average	0.093	0.598		0.089	0.607		0.078	0.626	
Minimum	0.068	0.357		0.068	0.400		0.064	0.442	
Maximum	0.139	0.742		0.139	0.742		0.097	0.742	

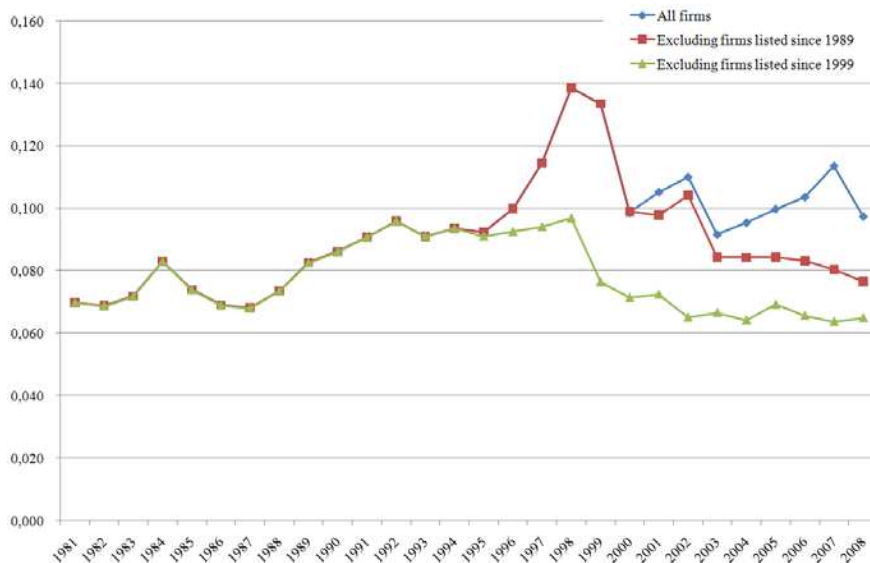


Fig. 1. Cash holding ratio

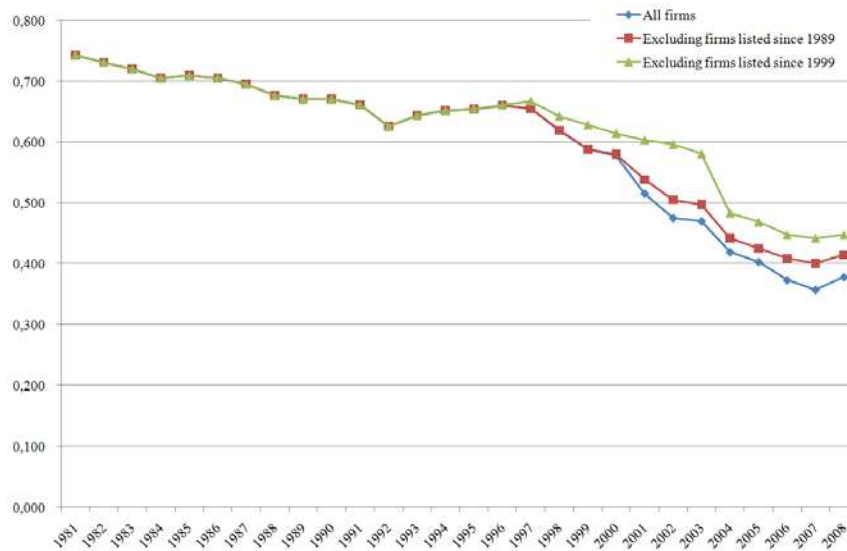


Fig. 2. Net leverage ratio

We suspect that the corporate cash holding ratio might be related with the firm’s governance and the extent of external financing availability. Table 2 and

Figures 3 and 4 show the time trends of cash holding ratio and (net) leverage ratio of each sub-insider holding groups.

Table 2. Cash holding and net leverage ratios by insider ownership

The cash holding ratio is defined as cash and marketable securities divided by total assets. The net leverage ratio is defined as the leverage net of cash and cash equivalent divided by net assets. Insider ownership is defined as the proportion of block holder ownership.

Year	Cash holding ratio			Net leverage ratio		
	< 5%	5%-25%	> 25%	< 5%	5%-25%	> 25%
1981	0.054	0.068	0.073	0.837	0.746	0.731
1982	0.046	0.073	0.068	0.801	0.735	0.726
1983	0.058	0.083	0.068	0.765	0.729	0.717
1984	0.041	0.086	0.083	0.750	0.737	0.698
1985	0.065	0.060	0.076	0.706	0.774	0.700
1986	0.035	0.054	0.071	0.790	0.774	0.695
1987	0.049	0.092	0.065	0.799	0.686	0.696
1988	0.141	0.069	0.073	0.699	0.690	0.673
1989	0.253	0.086	0.080	0.647	0.692	0.665
1990	0.168	0.085	0.085	0.613	0.675	0.670
1991	0.108	0.121	0.085	0.803	0.623	0.668
1992	0.099	0.110	0.094	0.783	0.597	0.629
1993	0.153	0.087	0.091	0.787	0.623	0.646
1994	0.122	0.087	0.094	0.825	0.658	0.650
1995	0.109	0.081	0.094	0.707	0.691	0.648
1996	0.080	0.095	0.101	0.668	0.663	0.659
1997	0.037	0.134	0.111	0.871	0.678	0.650
1998	0.070	0.120	0.143	0.942	0.672	0.605
1999	0.119	0.286	0.105	0.741	0.476	0.605
2000	0.067	0.128	0.093	0.651	0.574	0.577
2001	0.126	0.118	0.102	0.573	0.507	0.515
2002	0.108	0.106	0.111	0.635	0.482	0.469
2003	0.099	0.103	0.089	0.657	0.463	0.466
2004	0.126	0.103	0.093	0.469	0.434	0.415
2005	0.218	0.103	0.095	0.364	0.454	0.395
2006	0.194	0.107	0.099	0.382	0.381	0.372
2007	0.169	0.100	0.115	0.374	0.408	0.346
2008	0.148	0.091	0.096	0.364	0.444	0.364
Average	0.109	0.101	0.091	0.679	0.610	0.595
Minimum	0.035	0.054	0.065	0.364	0.381	0.346
Maximum	0.253	0.286	0.143	0.942	0.774	0.731

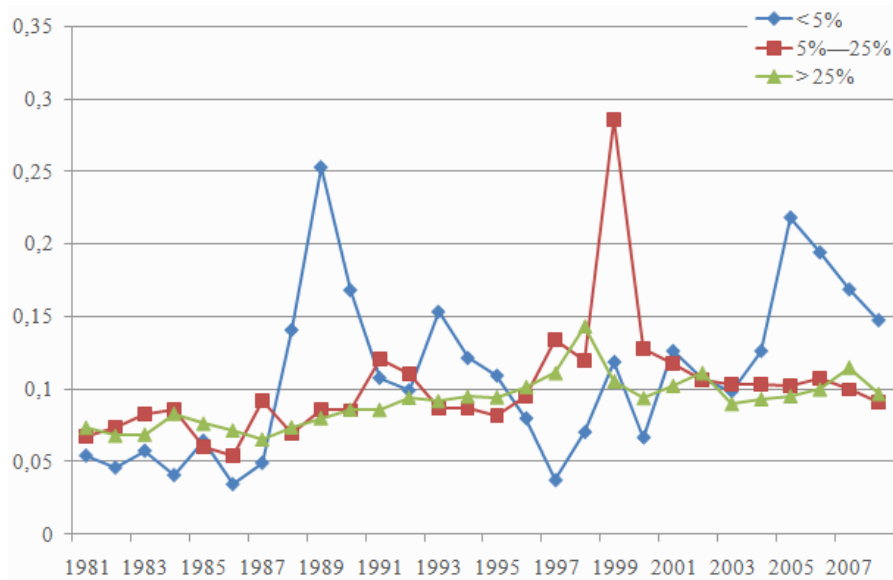


Fig. 3. Cash holding ratio by inside-holding group

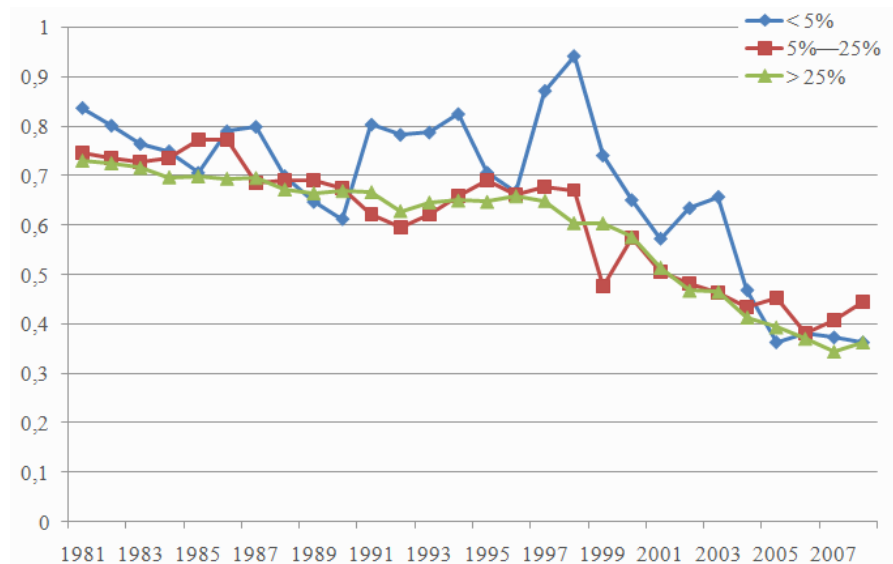


Fig. 4. Net leverage ratio by inside-holding group

From Table 2 and Figures 3 and 4, we observe evidence that the volatility of cash holding ratio is inversely associated with the extent of corporate governance, in terms of insider ownership, albeit the difference in mean statistically weak. The inverse relation seemingly holds true for the net leverage ratio as well, and the stability of decreasing pattern in net leverage ratio is more conspicuous with a better governed firm.

In Table 1 and Figure 1, it is intriguing to note that the cash holding ratio of newly listed firms has increased significantly during the Asian economic crisis period in late 1990's. This can be seen as such that the older firms which committed to dividend payments cannot flexibly build up cash even in the anticipation of operating risk. This financial inflexibility may affect stock returns in the period of business crisis. In Table 2 and Figure 3, we see that only the firms with from 5 to 25% insider ownership

show the increase in the cash holding ratio during the crisis period. Even though the firms with very weak governance show very volatile cash holdings, they did not increase cash holdings during the crisis. The companies with strongest governance still show very stable cash holding trend. The firms with middle governance group might be able to react with more flexibility to the crisis, and the firms with weakest governance might have less ability to manage the crisis periods.

Table 3 and Figures 5 and 6 show the average cash holding ratio and net leverage ratio by credit rate groups. It appears that the firms with lower credit ratings show higher cash holdings, which is consistent with the expectation that firms with higher costs of external financing tend to hold more cash. From Figure 5, we see that the firms with higher credit ratings can willingly finance from external sources in the crisis.

Table 3. Cash holding and net leverage ratios by credit rating

The cash holding ratio is defined as cash and marketable securities divided by total assets. The net leverage ratio is defined as the leverage net of cash and cash equivalent divided by net assets. The bond dumours are A, including A-, A, A+, AA(-, +), AAA(-, +); B, including B(-, +), BB(-, +), BBB(-, +); C, including C(-, +), CC(-, +), CCC(-, +); D, including D group ratings; and NA for unidentified ratings. These credit ratings are the most conservative ones among 3 major credit rating agencies in Korea: KBP, NICE, and KIS.

Year	Cash holding ratio				Net leverage ratio			
	A	B	C	D	A	B	C	D
1981	0.066	0.070	0.068	0.071	0.769	0.792	0.858	0.718
1982	0.075	0.069	0.040	0.068	0.750	0.778	0.820	0.710
1983	0.077	0.059	0.058	0.074	0.734	0.777	0.823	0.697
1984	0.082	0.084	0.064	0.084	0.738	0.756	0.812	0.678
1985	0.068	0.067	0.054	0.078	0.744	0.768	0.820	0.680
1986	0.060	0.057	0.061	0.075	0.765	0.771	0.827	0.666
1987	0.048	0.062	0.087	0.075	0.760	0.756	0.792	0.659
1988	0.050	0.071	0.071	0.080	0.732	0.739	0.759	0.646
1989	0.052	0.072	0.090	0.091	0.720	0.730	0.749	0.646
1990	0.064	0.068	0.099	0.094	0.717	0.738	0.707	0.647
1991	0.060	0.095	0.095	0.097	0.721	0.710	0.700	0.638
1992	0.057	0.110	0.120	0.101	0.719	0.698	0.678	0.591
1993	0.060	0.081	0.075	0.100	0.686	0.851	0.950	0.587
1994	0.054	0.075	0.097	0.106	0.718	0.804	0.943	0.601
1995	0.052	0.072	0.153	0.103	0.689	0.809	1.046	0.611
1996	0.053	0.076	0.080	0.111	0.711	0.776	0.856	0.631
1997	0.054	0.093	0.189	0.124	0.726	0.746	0.702	0.632
1998	0.225	0.087	0.171	0.131	0.519	0.706	0.677	0.623
1999	0.306	0.080	0.176	0.112	0.366	0.757	0.657	0.600
2000	0.050	0.097	0.074	0.106	0.617	0.655	0.626	0.563
2001	0.046	0.075	0.138	0.115	0.618	0.633	0.620	0.486
2002	0.055	0.076	0.098	0.121	0.597	0.562	0.564	0.449
2003	0.048	0.062	0.082	0.100	0.569	0.539	0.479	0.452
2004	0.076	0.084	0.093	0.099	0.508	0.531	0.442	0.398
2005	0.084	0.083	0.091	0.103	0.484	0.505	0.439	0.384
2006	0.086	0.085	0.117	0.107	0.450	0.481	0.356	0.356
2007	0.085	0.077	0.109	0.120	0.431	0.485	0.347	0.339
2008	0.086	0.071	0.068	0.101	0.436	0.489	0.480	0.362
Average	0.078	0.077	0.097	0.098	0.643	0.691	0.698	0.573
Minimum	0.046	0.057	0.040	0.068	0.366	0.481	0.347	0.339
Maximum	0.306	0.110	0.189	0.131	0.769	0.851	1.046	0.718

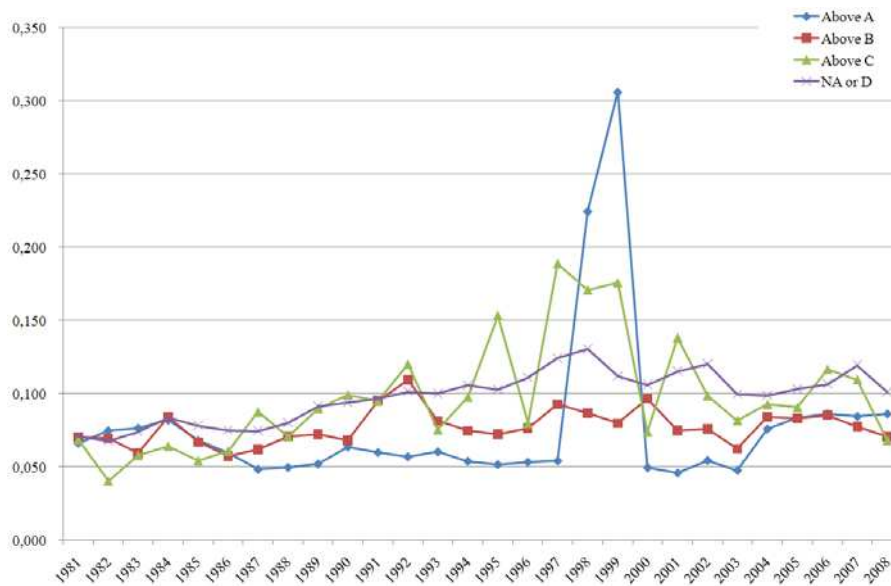


Fig. 5. Cash holding ratio by credit rating

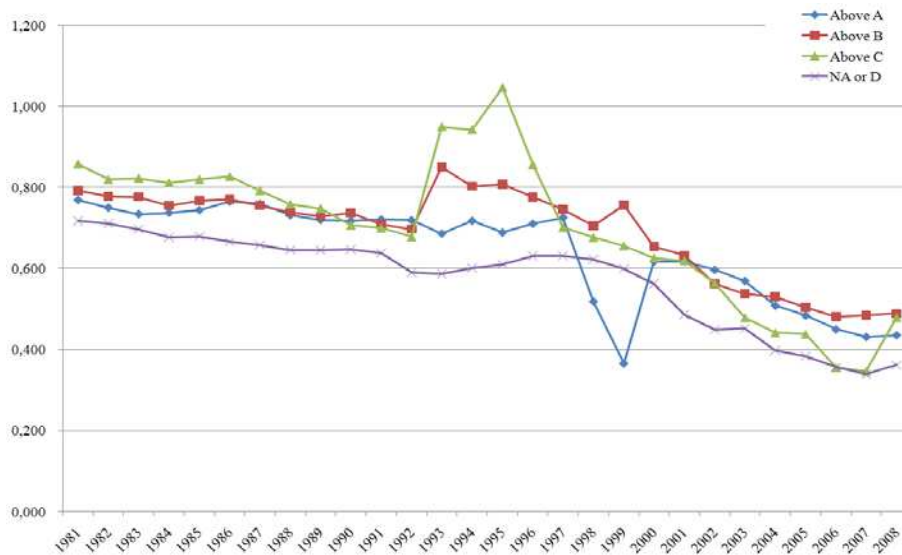


Fig. 6. Net leverage ratio by credit rating

Table 4 shows a cross-country comparison in cash holdings. The firms with more intangible assets rather than tangible assets appear to have higher cash holding ratios: they may tend to hold more cash for the precautionary reason for their relative shortage in physical collateral in the event of a business downturn.

Table 4. Cash holding ratio by industry

The cash holding ratio is defined as cash and marketable securities divided by total assets.	
Industry	Cash holding ratio
Information technology	0.108
Communications	0.104
Entertainment	0.103
Services	0.102
Electrics and electronics	0.095
Machinery	0.090
Food and beverage	0.086

Construction	0.082
Distribution	0.080
Others	0.079
Manufacturing	0.078
Transportation and related machinery	0.078
Medical precision and pharmaceuticals	0.076
Chemistry	0.071
Textiles and apparels	0.070
Paper and forestry	0.070
Non-metal minerals	0.044

3. Main results

We, first, examine the relation between cash holdings and firm characteristics after controlling for industry effect. After controlling firm characteristic variables, we further investigate for the governance and credit rating roles in cash holdings by regression analyses.

Table 5. Multivariate analysis of cash holdings and corporate governance

The dependent variable is <i>CashHoldings</i> which is the firms' cash holding rate defined as cash and marketable securities divided by total assets. <i>Assets</i> are defined as the total assets net of cash and cash equivalents. <i>Size</i> is measured as the natural log of assets. <i>Leverage</i> is measured as the ratio of total debt to asset. <i>NetLeverage</i> which is the ratio of net leverage (leverage minus cash and cash equivalents) to net assets (assets minus cash and cash equivalent. <i>MarketBook</i> is the market to book ratio which proxies for growth opportunities, and is defined as the book value of assets minus book value of equity plus the market value of equity and divided by the book value of assets. <i>CashFlow</i> is the he cash flow ratio measured as the earnings after interest, dividend, and taxes, but before depreciation, divided by assets. <i>CashFlowVol</i> is the standard deviation of the firm's cash flows, a proxy for business conditions, is computed using the firm's standard deviation of the cash flow ratio for the past 5 years. <i>NetWorkCapital</i> proxies for liquidity and is defined as the ratio of current assets net of cash minus current liabilities divided by assets. <i>InsiderHoldings</i> , as a proxy for corporate governance, is defined as the proportion of block holders with stakes exceeding 10%. <i>InsiderLow</i> (dummy variable) is the ownership stake of insiders less than 5%. <i>InsiderMid</i> (dummy variable) is the ownership stake of insiders more than 5% and up to 25%. <i>InsiderHigh</i> (dummy variable) is the ownership stake of insiders more than 25%. The parenthesized numerical values below coefficient estimates are the t-statistics. ***, **, and * stand for statistical significance based on two-sided tests at the 1%, 5%, and 10% level, respectively. The observations are in firm-years.					
	Model 1	Model 2	Model 2	Model 4	Model 5
<i>Intercept</i>	0.284 (1.300)	0.331*** (8.700)	0.368*** (20.500)	0.351*** (21.700)	
<i>Size</i>	-0.014 (-1.200)	-0.009*** (-5.500)	-0.010*** (-13.000)	-0.010*** (-14.100)	-0.010*** (-14.200)
<i>NetLeverage</i>	0.029 (1.500)	-0.098*** (-17.100)	-0.089*** (-39.000)	-0.088*** (-41.900)	-0.087*** (-41.800)
<i>MarketBook</i>	-0.020 (-0.300)	-0.027*** (-4.100)	-0.069*** (-14.100)	-0.053*** (-13.700)	-0.055*** (-14.100)
<i>CashFlow</i>	0.204	0.079***	0.089***	0.095***	0.092***

Table 5 (cont.). Multivariate analysis of cash holdings and corporate governance

	Model 1	Model 2	Model 2	Model 4	Model 5
	(0.900)	(6.600)	(10.600)	(14.200)	(13.600)
<i>NetWorkCapital</i>	0.027	-0.105***	-0.130***	-0.128***	-0.127***
	(0.500)	(-9.900)	(-26.000)	(-28.300)	(-28.100)
<i>CashFlowVol</i>	0.468	0.144***	0.142***	0.144***	0.148***
	(0.800)	(6.900)	(11.800)	(13.900)	(14.200)
<i>InsiderLow</i>					0.344***
					(14.800)
<i>InsiderMid</i>					0.344***
					(21.200)
<i>InsiderHigh</i>					0.354***
					(21.900)
Inside ownership	< 5%	5%—25%	> 25%	All	All
Adjusted R ²	0.409	0.156	0.151	0.147	0.406

Table 5 shows that cash holding ratio is negatively associated with firm size (economies of scale) and net leverage ratio (firms with excess cash flow would use the cash to repay the leverage), respectively. The sign of the coefficient estimate of market to book (*MarketBook*) is not intuitive for the firms with more growth opportunities are expected to hold more cash to prevent themselves from underinvestment problems. Since net working capital (*NetWorkCapital*) is considered a cash substitute, the negative sign makes sense. The firms tend to hold more cash the higher the cash flow ratio and/or the more volatile the cash flow. Among the firm characteristics variables which are classically used in cash holding analysis, propensity to

dividend is not significant. Tables 5 and 6 identify the risk factors of corporate propensity to hold cash by insider stakes (corporate governance) and credit ratings (costs of external financing), respectively, controlled for a basket of firm characteristics. The coefficients of the firms in the weakest governance group are not statistically significant. We focus on the cash flow ratio (\equiv EBIT/net assets). The firms with stronger governance hold more cash when they have higher cash flow. Corporate governance does not appear to affect the corporate cash holding ratio as discussed before among the descriptive statistics. The volatility of cash holdings seems economically meaningful unlike before, as shown in Figure 3.

Table 6. Multivariate analysis of cash holdings and credit rating

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<i>Intercept</i>	0.376***	0.179***	0.006	0.404***	0.351***	
	(12.400)	(5.200)	(0.000)	(16.000)	(21.700)	
<i>Size</i>	-0.011***	-0.005***	0.007	-0.012***	-0.010***	-0.011***
	(-8.300)	(-2.700)	(1.200)	(-11.000)	(-14.100)	(-12.500)
<i>NetLeverage</i>	-0.061***	-0.032***	-0.045***	-0.099***	-0.088***	-0.087***
	(-8.500)	(-6.000)	(-2.900)	(-40.900)	(-41.900)	(-41.600)
<i>MarketBook</i>	-0.098***	-0.044***	-0.073***	-0.052***	-0.053***	-0.052***
	(-5.000)	(-6.000)	(-3.600)	(-11.200)	(-13.700)	(-13.500)
<i>CashFlow</i>	0.106***	0.060***	0.204***	0.089***	0.095***	0.095***
	(4.100)	(3.500)	(4.900)	(11.600)	(14.200)	(14.100)
<i>NetWorkCapital</i>	-0.031***	0.018*	-0.099***	-0.155***	-0.128***	-0.127***
	(-2.700)	(1.600)	(-3.000)	(-29.300)	(-28.300)	(-28.100)
<i>CashFlowVol</i>	0.060***	0.162***	0.059	0.159***	0.144***	0.143***
	(3.200)	(5.300)	(0.700)	(13.000)	(13.900)	(13.800)
A						0.366

Table 6 (cont.). Multivariate analysis of cash holdings and credit rating

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
						(18.700)
B						0.361
						(19.600)
C						0.350
						(18.600)
D						0.361
						(20.400)
Credit ratings	A	B	C	D	All	All
Adjusted R ²	0.202	0.107	0.119	0.157	0.147	0.406

In Table 6, we see no evidence that each firm's characteristics affect its cash holdings according to its credit rating changes. Credit ratings themselves does not statistically affect on the cash holding ratio after controlling for firm characteristics variables,

even though a positive association was expected. In Tables 7 and 8, we investigate how market reacts differently on the firm cash holdings interacted with the events of corporate governance or credit rating issues, respectively.

Table 7. Multivariate analysis of stock returns onto cash holdings and corporate governance

The dependent variable, <i>StockReturn</i> , is the firms' stock return. <i>CashHoldings</i> is the cash holding ratio defined as cash and marketable securities divided by total assets. <i>InsiderHoldings</i> , as a proxy for corporate governance, is defined as the proportion of block holders with stakes exceeding 10%. <i>InsiderLow</i> is the ownership stake of insiders less than 5%. <i>InsiderMid</i> is the ownership stake of insiders more than 5% and up to 25%. <i>InsiderHigh</i> is the ownership stake of insiders more than 25%. <i>Assets</i> are defined as the total assets net of cash and cash equivalents. <i>Size</i> is measured as the natural log of assets. <i>Leverage</i> is measured as the ratio of total debt to asset. <i>RoA</i> is the firm's net profits divided by its total assets. <i>CashFlow</i> is the he cash flow ratio measured as the earnings after interest, dividend, and taxes, but before depreciation, divided by assets. <i>CashFlowVol</i> is the standard deviation of the firm's cash flows, a proxy for business conditions, is computed using the firm's standard deviation of the cash flow ratio for the past 5 years. The parenthesized numerical values below coefficient estimates are the t-statistics. ***, **, and * stand for statistical significance based on two-sided tests at the 1%, 5%, and 10% level, respectively. The observations are in firm-years.			
	Model 1	Model 2	Model 3
<i>Intercept</i>	-0,566*** (-7.900)		
<i>CashHoldings</i>	0,086*** (2,800)	0,079** (2,500)	
<i>InsiderHoldings</i>	0,001*** (5,200)		
<i>InsiderLow</i>		-0,718*** (-7.700)	-0,703*** (-6.000)
<i>InsiderMid</i>		-0,690*** (-12.200)	-0,694*** (-12.200)
<i>InsiderHigh</i>		-0,629*** (-11.100)	-0,629*** (-11.100)
<i>CashHoldings</i> × <i>InsiderLow</i>			-0,165 (-0.100)
<i>CashHoldings</i> × <i>InsiderMid</i>			0,118 (1,500)
<i>CashHoldings</i> × <i>InsiderHigh</i>			0,072** (2,100)
<i>Size</i>	0,025*** (8,300)	0,029*** (9,600)	0,029*** (9,600)
<i>Leverage</i>	0,012 (1,400)	0,018** (2,100)	0,018** (2,100)
<i>RoA</i>	0,001*** (11,800)	0,001*** (11,700)	0,001*** (11,600)
<i>CashFlowVol</i>	-0,095** (-2.100)	-0,145*** (-3.200)	-0,146*** (-3.200)
Adjusted R ²	0,026	0,057	0,060

In Table 7, in general, the market reacts positively to a higher cash holding ratio. The presence of governance is statistically significant, but economically not meaningful. When cash holdings are combined with a

stronger governance, we expected a positive association. Even though the size increases are not linear and partly insignificant, the signs of coefficient values from two strong governance groups are

meaningful and the coefficient is significantly positive in the case of strongest governance group. From this result, we conclude that cash holding do not adversely

affect the stock returns, and when cash holdings are higher with a stronger corporate governance, the market reacts more affirmatively.

Table 8. Multivariate analysis of stock returns onto cash holdings and credit rating

	Model 1	Model 2	Model 3
<i>Intercept</i>	-0.566*** (-7.900)	0.077** (2.500)	
<i>CashHoldings</i>	0.086*** (2.800)		
<i>A</i>		-0.274*** (-3.600)	-0.276*** (-3.500)
<i>B</i>		-0.353*** (-5.000)	-0.367*** (-5.100)
<i>C</i>		-0.487*** (-6.800)	-0.485*** (-6.500)
<i>D</i>		-0.402*** (-6.000)	-0.405*** (-6.000)
<i>CashHoldings × A</i>			0.065 (0.400)
<i>CashHoldings × B</i>			0.258 (1.700)
<i>CashHoldings × C</i>			0.001 (0.000)
<i>CashHoldings × D</i>			0.071** (2.200)
<i>InsiderHoldings</i>	0.001*** (5.200)	0.001*** (6.400)	0.001*** (6.400)
<i>Size</i>	0.025*** (8.300)	0.012*** (3.200)	0.012*** (3.200)
<i>Leverage</i>	0.012 (1.400)	0.014 (1.600)	0.014 (1.600)
<i>RoA</i>	0.001*** (11.800)	0.001*** (12.300)	0.001*** (12.200)
<i>CashFlowVol</i>	-0.095** (-2.100)	-0.162*** (-3.600)	-0.162*** (-3.600)
Adjusted <i>R</i> ²	0.026	0.060	0.060

Table 8 reaffirms that the credit rating effect is statistically significantly positive. However, it is difficult to interpret the negative signs of good credit rate groups. When cash holdings are interacted with differing credit rate groups, all coefficients other than the credit rate group of B rate are not numerically robust. Although we believe the availability of external financing and higher cash holdings are closely related, the economic magnitudes and statistical validity of their combined effects on stock returns is not straightforward. Overall, the control variables in Tables 7 and 8 are significant and meaningful.

Conclusion

Corporate governance and the availability of external financing are expected to wield meaningful economic consequences for corporate cash holdings. In this research, in line with Opler et al. (1999), we found that Korean firms' cash holdings are also affected by firm-level characteristics including firm size, leverage, market to book, cash flow ratio, net working capital, and cash flow volatility in addition to corporate governance. Rather than agency-prone, we can ascribe the increase in cash holdings to the precautionary corporate demand for cash. According to the conventional theory of precautionary demand

for cash, one may hold cash as a buffer asset against adverse cash flow shocks, a well-documented idiosyncratic risk (Campbell et al., 2001). We reported that operating risks stemming from cash flow volatility, unavailability of external finance, credit rating downgrades, etc., may be associated with corporate demand for cash whose motive is supported by the precautionary demand theory. As

we conjectured that firm cash holdings convey a meaningful, agency-problematic signal to investors controlled for a numerous basket of varying firm-level factors, we further investigate investor reaction to the information resolved in firm cash holdings. We finally documented that corporate governance proxied for by block and/or insider ownership stakes is inversely associated with corporate cash holdings.

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