

An Analysis of Cash Holdings of ICT firms

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Abstract

Objectives: The purpose of this paper is to investigate whether the levels of cash holdings and cash reserves of ICT firms are different from those of non-ICT firms.

Methods/Analysis: This study in this paper uses regression analysis to examine the association between ICT industry and level of cash holding and cash reserve ratio. Our final sample contains 1,299 Korean listed firms from 2011 to 2013. The key classification is the distinction between ICT and non-ICT firms. The former are firms in the information and communications technology industry, and the latter are in traditional manufacturing industries.

Findings: The results of this study indicate that cash holdings and cash reserves ratio are positively associated with ICT firms. ICT firms and non-ICT firms take different approaches to spending and holding their cash. Firms with high sales volatility and capital expenditures including ICT firms hold more cash, and firms with higher leverage and sales revenue hold less cash. While the cash reserve ratio is unrelated to sales volatility, and firms with a high cash reserve ratio are more likely to have higher sales revenue.

Conclusion/Application: This is one of few empirical studies that examine the relationship between cash holding and characteristics of ICT firm. This study simply that the level of cash holdings of a firm is affected by not only its capital structure but also industry characteristics. By examining this relationship, the study offers another consideration of the ongoing debate in Korean market about high cash holdings and conglomerate.

Keywords: Agency Theory, Cash Holding, Cash Reserve Ratio, ICT Industry, Trade Off Theory

1. Introduction

The Korean listed companies have been increased cash holdings even though they had poor performance recently. They have been criticized for decreasing investment over high cash holdings and cash reserve ratio. Can a company have too much of cash? Cash offers companies more options for future growth, and it also gives protection against crisis. However, a large amount of cash holdings can signal good and bad for information users. How they take cash holdings depends on how the cash get there, the kinds of business the company is and what managers plan to do with the cash. Each firm has its own proper cash level, and companies should keep enough cash to cover their expenses, interest, capital expenditures, and some for emergencies.

Figure 1 shows the cash holdings of Korean listed firm for a last decade. Close look at the statement of financial

position of these firms show that their cash holdings have largely increased since 2008 after the financial crisis.

One lesson that Korean companies learned from the 1998 financial crisis is that they need money set aside to survive a credit crunch. Consequently, many companies increased their cash holdings to build a buffer against an unexpected financial crisis. When the global economy was thrown into turmoil in 2008 because of the U.S. sub prime mortgage crisis, many Korean companies were not affected because they had already accumulated enough retained earnings to avoid any negative impact. Last year, the reserve ratio of Korea's 10 largest conglomerates' listed units reached a new record, exceeding 1,500 percent, as companies stepped up their drive to accumulate cash¹. Their cash holdings have become so substantial that the Korean government was considering levying taxes on them as a means of impelling firms to increase spending. The government believed that companies were

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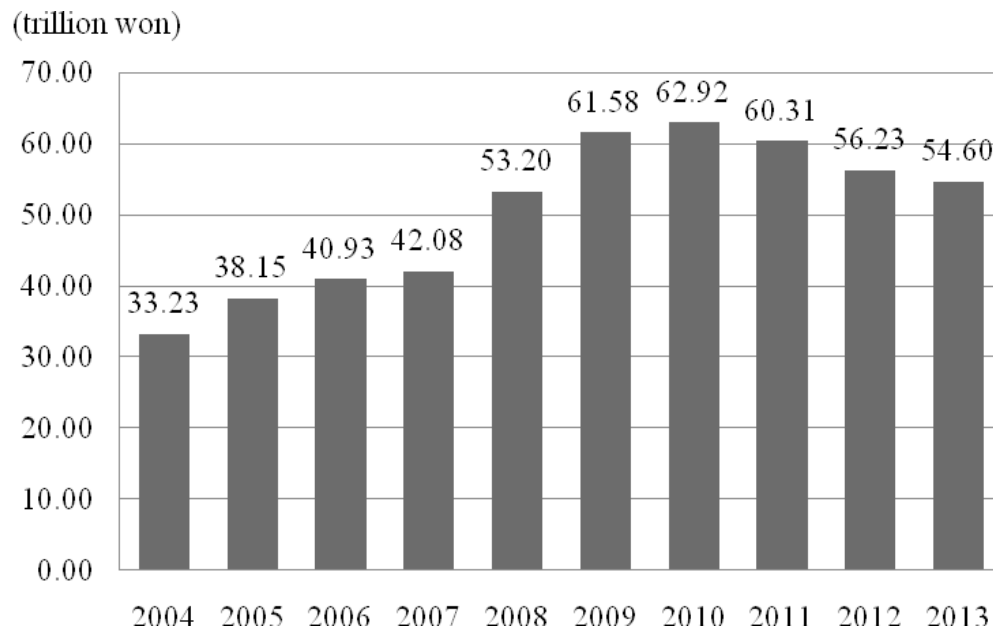


Figure 1. Cash holdings of Korean listed firms.

being excessively conservative by holding such large cash reserves. The purpose of these taxes is to urge firms to increase their spending in order to boost the economy.

A company's cash holding policy is a matter of managerial discretion. When companies hold excess cash, managers are able to pursue their own interests by making unnecessary expenditures and unprofitable investments, without market discipline². The Information and Communications Technology (ICT) industry is growing rapidly. ICT firms, such as telecommunications services and software companies, do not require the same level of spending that traditional firms do. The ICT sector is very innovative, and its technology is evolving rapidly. If companies have high business risk, they have increased difficulty obtaining external financing and their managers have a strong incentive to retain a significant amount of cash.

Prior research has studied the major determinants of cash holdings, such as firm size, leverage, capital expenditure, and sales growth. Like capital structure decisions, industry characteristics tend to affect the cash holdings of a company. This study investigates one of the fastest-growing industries in our economy, the ICT industry. We analyze the effect of an industry dummy variable on cash holdings and cash reserve ratios. The ICT industry is then compared with the non-ICT industry in order to investigate the presence of heterogeneity among firms.

The remainder of this paper is organized as follows: Chapter 2 provides a literature review and develops a hypothesis. Chapter 3 discusses the sample and variables. Chapter 4 offers an analysis of the results. The final chapter presents the conclusions.

2. Theoretical Background and Hypothesis

2.1 Cash Holdings and Related Theories

The cash holdings policies of companies can be explained via economic and behavioral theories. The former includes trade-off theory and pecking theory, and the latter agency theory. According to trade-off theory, firms have two purposes for holding cash: a precautionary motive and a transaction cost motive. The main benefits associated with cash holdings include reducing the likelihood of financial distress, pursuing the optimal investment policy even when financial constraints are met, and minimizing the costs associated with raising external funds or liquidating existing assets³. The precautionary motive suggests that firms may reduce their investments when they face cash shortages⁴. The amount of the cash shortage is proportional to cost because firms must either cut investment or raise additional funds. The transaction cost motive suggests that firms hold cash because raising funds

in capital markets is more costly than retaining existing cash. Therefore, the optimal level of cash holdings is reached when the marginal cost of cash shortage equals the marginal cost of cash holdings⁵. The marginal cost of holding cash is correlated with the opportunity cost of the capital due to the low return on liquid assets.

The pecking order theory developed by reference⁶ is an alternative capital structure theory. According to the pecking order theory, a firm's capital structure is driven by its preference to finance with internally generated funds instead of with external financing. Financing comes first from retained earnings, then from safe debt, risky debt, and finally from equity. When operational cash flows are sufficient enough to finance new investments, firms repay debt and then accumulate cash. When retained earnings are not high enough to finance current investments, firms use the accumulated cash holdings and, if needed, issue debt. This theory can be explained through the notion of asymmetric information and the existence of transaction costs.

Agency theory deals with the relationships between managers, who delegate authority, and agents, who must perform the delegated duties⁷. According to the literature on agency theory, maintaining a high level of cash holdings provides managers with greater discretion. Reference⁸ suggests that managers try to retain more cash as a privilege and⁵ also argues that managers prefer the control that comes with holding cash over paying dividends to stockholders.

An important difference between the trade-off and pecking order theories lies in the relationship between investment and cash holdings⁹. Similarly, how agency theory relates to these two economic theories depends on the extent of investment opportunities. When firms have limited opportunities for investment, retaining a high level of cash increases the likelihood of asset expropriation by managers, as excess cash may effectively tempt managers to over invest and thus damage the interests of shareholders⁹⁻¹¹. Paying dividends decreases cash holdings and the agency cost of overinvestment¹².

2.2 Characteristics of ICT Industry and Hypothesis

The ICT industry is one of the fastest-growing industries in our world today. Although it is subject to the same market forces as every other industry, economic theory suggests there are three forces that may be particularly

important in determining the capital structure in the ICT sector¹³. First, network effects (i.e., economies of scale) characterize some ICT products and services. If there are unexpected positive feedback effects on a network's goods or services, the under-investment costs of debt are increased and the benefits of debt in limiting the scope for over-investment are reduced. However, if the adoption of the network's goods or services is significantly limited, they have no value and the risk of failure is high. The expected cash flows of an investment in a network good or service can also be very volatile, as it is difficult to predict the success of a telecommunication service in the presence of strong network effects¹⁴. Accordingly, it is difficult to predict the success of an ICT firm in the presence of strong network effects, which usually increase the level of volatility of the firm's future cash flow. Cash flow volatility increases the cost of external funds and thus can be a strong motive for managers to hold cash.

Second, in the intermediate ICT goods industries (e.g., software and ICT equipment), where the predominant form of innovation is in developing better quality products for related industries, the appropriability of innovations can be high^{15,16}. This high appropriability opens up new investment opportunities and thus increases the under-investment costs of debt.

Third, in some ICT industries, the costs of entry are fixed, and the marginal and 'transportation' costs (i.e., degree of product differentiation) are low because of the nature of the products (e.g., 'information goods' and chips)¹⁷. There is a high risk that the fixed, possibly R&D-related, entry investment cannot be recovered if ICT incumbents adopt aggressive entry deterrence strategies¹⁸. This risk implies that the use of debt to finance the investment may be infeasible in the first place and, furthermore, that there is little benefit in utilizing debt to limit the scope for over-investment.

Lastly, ICT products, by their nature, exhibit fixed entry costs and low marginal costs¹⁷. This, combined with ICT incumbents' aggressive strategy of erecting entry barriers, can make recovering those fixed entry costs very difficult¹⁸. In such a case, investors may be reluctant to invest in high-cost projects, leading to an increase in the cost of external financing. Depending on the level of risk (i.e., uncertainty), external funds may be too expensive or even unavailable, and the firm's level of cash holdings may be affected by industry characteristics.

In this paper, we examine whether the levels of cash holdings and cash reserves of ICT firms are different from

those of non-ICT firms. The ICT industry is growing steadily, and the related technology is growing even faster. Therefore, decision makers in this sector have to regularly spend funds on R&D despite that success is unpredictable. In addition, some ICT firms participate in regulated industries such as telecommunications. Consequently, regulation and policy changes can be barriers for these companies. The Korea Communications Commission (KCC) imposed a combined fine of 106.4 billion won on Korea's top three mobile carriers. The regulator also imposed a business suspension on them this year as a result of high competition. Such events may elicit a strong precautionary motive in managers of ICT firms.

Based on these financial characteristics of ICT firms, we hypothesize that ICT firms are more likely to hold cash than are non-ICT firms. In the subsequent empirical analysis, we provide evidence for this inference by investigating whether the amounts of cash holdings and cash reserves are larger for ICT firms than for other firms.

3. Method

3.1 Data and Sampling

Consistent with previous empirical studies, we excluded financial firms. Financial firms are constrained by regulations to maintain specific cash reserves at all times. The final sample met the data requirement of at least three years of financial data of 1,299 firms from 2011 to 2013. Data on sample firms were extracted from the Korean Information Service Value (KIS-Value) database. We argue that liquidity concerns and optimal cash holdings decisions affect firms' solvency and thus influence firms' capital structure choices; therefore, all financial firms were excluded. The key classification is the distinction between ICT and non-ICT firms, which are industrial classifications. The former are firms in the information and communications technology industry, and the latter are in traditional manufacturing industries. An ICT dummy variable is included in the model specification to account for industry heterogeneity.

3.2 Measurement

The dependent variables are cash holdings (cash) and cash reserve ratio (CRR). For our analysis, we view cash as a liquid investment necessary to support the working capital needs of the firm, which is closely related to its size.

Therefore, the cash holding that we examine in our study is the cash-to-assets ratio, which is a commonly accepted measure of cash holdings. It is computed as cash and cash equivalents divided by total assets. Though not tabulated, cash reserve ratio is also considered as a measure of cash holdings. The CRR is calculated by dividing a company's surplus by its paid-in capital. The key independent variable is an ICT industry dummy. ICT firms are assigned the value of 1, and all others are assigned the value of 0. To test our hypothesis on the relationship between cash holdings and the ICT industry, we estimated the following model. The subscripts *i* and *t* represent firm and time, respectively.

$$\text{Cash}_{it} (\text{CRR}) = \beta_0 + \beta_1 \text{ICT}_{it} + \beta_2 \text{CF}_{it} + \beta_3 \text{Lev}_{it} + \beta_4 \text{Sales}_{it} + \beta_5 \text{Svola}_{it} + \beta_6 \text{Capex}_{it} + \beta_7 \text{ROI}_{it} + e_{it} \quad (1)$$

$$\text{Cash} = \frac{\text{cash and cash equivalents}}{\text{total assets}}$$

$$\text{CRR} = \frac{(\text{capital surplus} + \text{retained earnings})}{\text{Capital}}$$

$$\text{ICT} = \begin{cases} 1 & \text{If a firm is ICT firm} \\ 0 & \text{otherwise} \end{cases}$$

$$\text{CF} = \frac{\text{operating cash flow}}{\text{Sales}}$$

$$\text{Lev} = \frac{\text{interest-bearing liabilities}}{\text{total assets}}$$

$$\text{Sales} = \text{a natural log of sales}$$

$$\text{Svola} = \text{volatility of recent 3 years of sales revenue}$$

$$\text{Capex} = \text{a natural log of capital expenditure}$$

$$\text{ROI} = \text{return on investment}$$

The cash holdings has identified a set of key variables that help explain firm's cash holding or cash reserve behavior. So, we also included control variables used in previous researches of cash holdings such as operating cash flow (CF), leverage (Lev), sales, sales volatility (Svola), capital expenditure (Capex), and profitability (ROI): Cash flow (CF) since firms with higher cash flows are likely to require lower precautionary cash holdings; Leverage (Lev), because firms may use cash to reduce leverage; Sales (Sales) is a proxy of size because there are economies of scales to holding cash; Sales volatility (Svola), which may increase the precautionary savings; capital expenditure (Capex), because the investment create assets that can be used as collateral; and ROI to control for future investment opportunities.

4. Empirical Results

Table 1 shows descriptive statistics for the variables used in this study. It reports means, medians, standard deviations, and minimum and maximum values. The mean and median of cash ratio over the sample are 5.8% and 3.4% respectively.

Cash is the ratio of cash and equivalents to total assets. The CRR is cash reserve ratio. New dummy equals 1 if a company is a new economy firm, otherwise 0. CF is cash flow. Lev is debt ratio. Sales is sales revenue. Svola is volatility of sales. Capex is capital expenditure. ROI is Return On Investment.

The mean of CRR (Cash Reserve Ratio) is 1,599.7% which is considerably very high. The distribution of CRR is highly right-skewed and its standard deviation is 36.225 which is very large compare to other variables. Mean value of ICT dummy is 0.055. It means 5.5% of sample firms are in ICT industry. The average firm in the sample has CF (operating cash flow to total assets) is 10.5%, leverage ratio of 23.3%, sales of about 26.555, sales volatility of 0.142, capital expenditure to assets of about 4.7%, and ROI of about 3.045.

Table 2 reports the results of correlation analysis. The Pearson correlation matrix reveals no multi collinearity problems between the variables. Most of the variables are

Table 1. Descriptive Statistics

	N	Mean	Median	Std.D	Min	Max
Cash	1,299	0.058	0.034	0.103	0.000	2.949
CRR	1,299	15.997	7.214	36.225	-8.128	400.134
ICT	1,299	0.055	0.000	0.229	0.000	1.000
CF	1,299	0.105	0.050	1.899	-1.631	68.058
Lev	1,299	0.233	0.215	0.174	0.000	0.779
Sales	1,299	26.555	26.343	1.532	20.415	32.696
Svola	1,299	0.142	0.103	0.141	0.001	1.709
Capex	1,299	0.047	0.030	0.055	0.000	0.871
ROI	1,299	3.045	3.550	9.129	-68.230	37.740

Table 2. Correlations

	Cash	ICT	CF	Lev	Sales	Svola	Capex	ROI
Cash	1	.018**	.076***	.010**	-.213***	-.122***	.173***	.018***
ICT		1	.141***	.011**	-.212***	.260***	-.041***	.177***
CF			1	-.006**	-.062***	-.020***	.057***	-.039***
Lev				1	-.019***	-.106***	.164***	.014***
Sales					1	.065***	.002***	-.410***
Svola						1	-.158***	.255***
Capex							1	-.147***
ROI								1

*, **, *** are statistically significant at the 10%, 5% and 1% levels.

significant at the level of 1% or 5%. The two main dependent variables (cash holdings and cash reserve ratio) were also found to be significantly correlated with the rest of variables. For example, cash holdings was found to be positively correlated with ICT dummy, sales volatility and ROI, yet negatively correlated with leverage and sales.

Table 3 provides a brief description of the main variables used in this paper. By comparing and contrasting ICT firms with non-ICT firms, it becomes apparent that ICTs have a higher cash holding (Cash) relative to non-ICTs with a mean value of 0.090 in contrast to 0.056. ICT firms also have a higher Cash Reserve Ratio (CRR) relative to non-ICTs. The difference of both of them was found to be significant at the 1% level. ICT firms are lower leverage, with a mean value of 0.188 relative to 0.235 for non-ICT firms. It results consist with prior research. The difference is significant at the 5% level with a t-value of -2.268. Moreover, ICT firms have higher sales volatility (0.175) with a difference significant at the 1% level.

We examine the relation between ICT industry and cash holdings and various controls for firm specific variables in a multivariate setting using cross sectional models. The dependent variables are cash holdings and

cash reserve ratio. The independent variables are ICT dummy and firm specific factors affecting cash holdings and reserve. The coefficients on the ICT variables directly address the predictions of our hypothesis relating industry to cash holdings.

Model 1 of Table 4 reports the analysis of the relationship between ICT and cash holdings variable. There is a positive relation between ICT variables and cash holdings, which is statistically significant. The results also suggest that cash holdings is positively related to sales volatility and capital expenditure, all significant at 1% significant level. We find that cash holdings is negatively related to leverage ratio and sales revenue. Firms with high cash holdings tend to have lower leverage and sales revenue. However, higher cash holding firms are characterized by higher sale volatility, capital expenditure and ICT firms. The coefficients on control variables are generally consistent with past studies.

The relation between ICT industry and cash reserve is expected to be more positive for firms facing relatively high external financing and business risk like sales volatility than for traditional industry firms facing relatively low financial constraints. In model 2, consistent with the

Table 3. T-test results

	Variables	N	Mean	t-value	Mean Diff.
Cash	ICT	72	0.090	3.388***	0.034
	Non-ICT	1,227	0.056		
CRR	ICT	72	37.091	5.133***	22.332
	Non-ICT	1,227	14.759		
CF	ICT	72	0.059	-0.790***	-0.049
	Non-ICT	1,227	0.108		
Lev	ICT	72	0.188	-2.268***	-0.047
	Non-ICT	1,227	0.235		
Sales	ICT	72	26.431	-0.711***	-0.132
	Non-ICT	1,227	26.563		
Svola	ICT	72	0.175	2.043***	0.035
	Non-ICT	1,227	0.141		
Capex	ICT	72	0.054	1.104***	0.007
	Non-ICT	1,227	0.046		
ROI	ICT	72	1.576	-1.406***	-1.555
	Non-ICT	1,227	3.131		

*, **, *** are statistically significant at the 10%, 5% and 1% levels.

Table 4. Regression results

Variables	Model 1 (Cash)	Model 2 (CRR)
Intercept	0.293 ^{*****}	-145.374 ^{*****}
ICT	0.021 ^{*****}	21.299 ^{*****}
CF	-0.293 ^{*****}	0.727 ^{*****}
Lev	-0.120 ^{*****}	-44.011 ^{*****}
Sales	-0.009 ^{*****}	6.403 ^{*****}
Svola	0.066 ^{*****}	-3.262 ^{*****}
Capex	0.523 ^{*****}	10.670 ^{*****}
ROI	-6.177 ^{*****}	0.090 ^{*****}
N	1,299	1,299
R ²	0.158	0.140
Adjusted R ²	0.153	0.136
F-value	34.550 ^{***}	30.097 ^{***}

*, **, *** are statistically significant at the 10%, 5% and 1% levels.

model's prediction, the relation between ICT dummy and cash reserve ratio is positively and significantly related.

On the other hand, the results show that sales volatility and capital expenditure have no significant impact on cash reserve are not significantly related to the cash reserve ratio. The finding of a negative relationship between cash holding and leverage is in accordance with agency theory and trade-off theory that highly leveraged firms find it difficult and expensive to raise additional funds do payout existing debts first hence, hold smaller cash and induce negative relationship. This is consistent with the findings of reference³ that cash and leverage are negatively related.

5. Discussion

Cash holdings have been the subject of contentious debate among business leaders. Cash is the most liquid and least productive asset of a firm. If cash remains idle, it earns nothing and accrues costs via the interest payable to finance it. Although cash is the least productive currency asset, firms should hold a certain amount of cash for marketable securities. In this paper, we examine whether the levels of cash holdings and cash reserves of ICT firms are different from those of non-ICT firms.

Our results suggest that cash holdings and cash reserves are positively correlated with ICT firms. We start

by distinguishing ICT firms and non-ICT firms. These firms take different approaches to spending and holding their cash. Firms with high sales volatility and capital expenditures including ICT firms hold more cash, and firms with higher leverage and sales revenue hold less cash. However, our findings related to cash holdings varied from those related to cash reserves. We have found that the cash reserve ratio is unrelated to sales volatility, and we have determined that firms with a high cash reserve ratio are more likely to have higher sales revenue. The firm-level data and the analysis of the prior literature presented suggest that firms hold large amounts of cash or maintain high cash reserves for several reasons. This trend, which started in the early 2000s, is largely attributed to structural factors and is likely to be independent of the financial crisis. In ICT industry, especially, increasing competition seems to have contributed to the rise in cash holdings of Korean firms.

Our findings lead to two important empirical implications. First, a firm's cash holdings and cash reserves are expected to depend on industry characteristics. The amount of cash holdings as well as the cash reserve ratio are higher for ICT firms than for non-ICT firms because of the precautionary motive. Second, the cash holding behavior of firms is very different from their cash reserve behavior. We have found that sales volatility is positively related to cash holdings, but only for this model.

Furthermore, sales revenue is significant in both models, but the signs are opposite. These results for Korean firms do not fall short of being generalizable to other firms. We have contributed compelling information to the literature by analyzing the cash holding and cash reserve behavior of ICT firms and non-ICT firms.

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