Searching for an Optimal Level of Cash Holdings for Korean Chaebols

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국내 재벌 계열사들의 최적 현금유동성 수준에 대한 실증적 분석

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Abstract This study examined one of the concerned or even imperative issues in the field of contemporary finance related to approaching an optimal level of cash holdings for the firms belonging to the chaebols in the Korean domestic capital markets. However, the subject may not have been drawn much attention so far, even if there are still ongoing and active debates among the interest parties at the macro- or micro-level. Two primary hypotheses were postulated to be empirically tested. On the results of the first hypothesis test for the existence of an optimal cash reserves for the sample firms, two estimation techniques were performed in terms of a quadratic regression equation and a relationship between a firm's value and the residuals derived from the static panel date model. As a primary financial implication of the study which may contribute to the practitioners and the academics in finance, the optimal level of cash holdings can be estimated by controlling for the a priori significant components for the sample firms towards maximizing firm value.

요 약 본 논문에서는 현재 국내외적으로 재무분야에서 중요 이슈가 되고 있는 주제들 중, 대기업의 현금유동성 적정수준에 대한 존재 여부와 이와 관련한 상대적으로 과도한 현금유보 기업들의 재무적 특성들을 실증적인 방법을 통하여 검정, 분석 하였다. 2가지의 관련 가설들이 설정되었으며, 전자는 다항함수모형과 잔차변수모형을 이용한 현금유동성의 존재 여부를 추정하는 것이고, 후자의 검정에서는 로짓회귀모형을 활용한, 현금유보비율 기준 상대적으로 높은 기업과 낮은 기업들 간의 통계적 유의성이 있는 차별적 재무변수들을 분석하였다. 표본기업들로서는 국내 재벌 계열사들이며, 표본기간은 2009년부 터 2013년 (5년간)으로 설정되었다. 학문적 그리고 실무적인 측면에서 본 연구가 기여할 수 있다고 판단되는 시사점으로는 기존의 현금유동성 관련 선행연구들에서 판명된 재무적 유의변수를 사용하여, 상충이론에 의거한 국내 재벌기업들의 최적 의 현금유동성 수준의 존재를 검정하였다는 점이며, 이를 통하여 주주들의 목표인 기업가치의 극대화에 최종적으로 기여할 수 있다는 점이라 판단된다.

Keywords : Excessive Cash Reserves, Korean Chaebols, Logistic Regression Analysis, Optimal Level of Cash Holdings, Residual Analysis

1. Introduction

This study addresses one of the imperative issues which most firms inclusive those belonging to the business conglomerates (the chaebol firms) may contemporarily face with ongoing debates among the interest parties such as government, corporations, and investors in the Korean domestic capital markets. The study looked into any optimal level (or point) of cash holdings for a firm whose primary objective is to

maximize its value *per se*. By approaching to search for the optimal level, shareholders' wealth of the firm may be attained towards maximization. It has been reported that the amount of total cash reserves hoarded by the largest 500 domestic firms including the chaebol firms, unprecedentedly increased up to the level of about 158 trillion KRW as of the 3rd quarter of 2014, in comparison to the amount of 94.5 trillion KRW as the end of the year, 2007.[1]

The major motivation to perform the present study may be epitomized as follows: First, there seems to be relatively voluminous researches performed to date on the financial determinants of a corporate cash holdings in theory and empirical evidence. To exemplify, Al-Najjar[2] empirically tested five primary financial components (that is, leverage, dividend payout ratio, profitability, liquidity, and size) which may affect the level of corporate cash savings for the sample firms such as Brazil, Russia, India, and China. They found that all of the aforementioned explanatory variables were, on average, significant factors on the level of cash holdings during the investigated years from 2002 to 2008. As an empirical test to test for the financial determinants of cash savings for the firms domiciled in Canada as an advanced capital markets, Gill and Shah [3] employed relatively comprehensive exogenous variables to account for the level of cash holdings during the era of the post-global financial crisis from 2008 to 2012. Total sample of 166 domestic firms listed on the Toronto Stock Exchange were analyzed to detect the following statistically significant variables on corporate cash reserves in each industrial sector. That is, for the manufacturing industries, market- to book-value ratio, net working capital showed their statistical importance, while market- to book-value ratio, net working capital, and firm size were found to be significant in the service industries. They also described that the Canadian sample firms may overall maintain optimal size of board of directors, which theoretically related with agency costs in contemporary finance. Horioka and Terada-Hagiwara [4] also

performed a regional based research which was focused on the Asian emerging capital markets with 11 nations across the era of the pre- and post-global financial turmoil (2002 - 2011). In the empirical findings, firms belonging to the emerging markets may, on average, retain cash liquidity on a more conservative basis than those in the developed capital ones before the period of the financial crisis. Moreover, they presented that income effect may be more pronounced than the substitution effect, which may result from a high productivity shock and cash flow sensitivity of cash was positive and more pervasive to the small size and more financially constrained firms across developed and developing nations. Another researches on the financial determinants of corporate cash holdings in the Korean domestic markets may be referred to from the recent studies by Kim [5] and Kim [6]. The former study tested on the subject to identify significant financial characteristics on the cash savings of the Korean cheabol firms. Cash flow, a firm's market-to book-value ratio, reinvestment, and agency costs showed their significant effects on the cash reserves in the statistical context. Moreover, the study by Kim [6] examined proposed financial elements which had been found to be statistically significant in the former study for robustness and consistency. The results provided evidence that the independent variables such as cash flow, market- to book -value of total assets, capital expenditure, and agency cost with cash conversion cycle were statistically important factors to affect the level of corporate liquidity.

Consequently, based on the financially significant characteristics obtained and verified by the results of the previous literature in the international and domestic context as a first stage, the present study may well investigate an existence of any optimal points of cash holdings for the firms by utilizing the financial characteristics, as a second stage. This should, in turn, increase or maximize their value as an objective of a corporation. The second motivation to implement the study may be, to large extent, attributable to the

fact very little attention has been paid to the subject of this paper in previous literature, especially for the firms belonging to the chaebols in the domestic capital markets. Therefore, the outcome derived from the study may contribute to increasing wealth or profit at the macro- and micro-economic levels when considering to rearrange a government or corporate strategy as a 'virtuous' cycle.

2. Data and Hypotheses Postulation

2.1 Data Collection and Employed Variable

The following criteria in Table 1 described a primary data collection procedure for the sample firms belonging to the chaebols, whose criteria had also been utilized in [5] and [6] as a first stage before proceeding the present study, as mentioned above.

Table 1. Data Collection Criteria for the Chaebol firms during the Investigated Period

1. All the data for the variables employed in each corresponding model were available for at least five years from 2009 to 2013, which was covering the post-era of the global financial turmoil.
2. The sample firms were listed on either the KOSPI or the KOSDAQ bourses during the studied period.
3. They were also included in the population of the database of New KisValue sourced by the NICE.
4. The criteria to classify a firm into being the chaebol one during the studied period, were set in accordance with the guidelines by the Fair Trade Commission (FTC) in the Republic of Korea, such that it was the one classified into a 'Large Business Group', subject to the ceiling limits on cross-shareholding mechanism.
5. Financial and regulated industries were not included in the final sample.

The dependent variable (DV) as a proxy for the level of cash holdings used in the static panel data model of the study was defined as [cash + cash equivalents + marketable securities] scaled by total assets] as frequently employed in the previous literature inclusive of [2], [7], and [8]. Regarding the exogenous variables in the model, most variables were chosen on the basis of their commonalities and relative

importance in the rationale of modern finance in the previous literature of concern, which had also been adopted in [8] as the first stage.

Table 2. Definitions of the Independent Variables Employed in the Models

Definition of IDV	Symbol	Measurement of Proxy
Liquidity	LIQUID	[(Cash & equivalents + marketable securities - inventory) / Current liabilities]
Cash Flow	CASHFLOW	(Net income + depreciation + amortization) / Total assets]
Agency	AGENCY	((Research & development expenses + Advertizing expenses + Total assets) / Sales]
Leverage	LEVERAGE	[Book value of liabilities / (Market value of equity + Book value of preferred stock)]
Size	SIZE	Natural logarithm transformation of total sales at the fiscal year-end
Growth	GROWTH	[Intangible assets / Total assets]
Market- to Book-value of Total Assets	MVBV	((Market value of common equity + Book value of preferred stock + Book value of liabilities) / Total assets]
Market- to Book-value of Equity	MVBV1	((Market value of common equity + Book value of preferred stock / Book value of Equity]
Investments	NETINVEST	((Tangible Assets $_t$ - tangible Assetst $_{t-1}$) / Total assetst]
Dividend Yield	DYIELD	[Dvidend per share / Common stock price at the fiscal year-end]
Cash Conversion Cycle	CCC	[(inventory + Accounts Receivable - Accounts payable) / Sales]
Financial Risk	FRISK	Z-score = 3.3 x (Earnings before interest & taxes / Total assets) + 1.0 x (Sales / Total assets) + 1.4 x (Retained earnings / Total assets) + 0.6 x (Market value of equity / Book value of equity), as in [9].

2.2 Hypotheses Formalized and Econometric Estimation

As previously described, the primary objective of performing the present study was to search for the existence of an optimal level of cash holdings as a second stage. The primary financial rationale to retain cash holdings from a corporate perspective may be formalized in line with conventional finance theory, as presented in Al-Najjar [2]: trade-off theory, Myers' hierarchical theory on corporate financing, and agency costs theory. The trade-off theory between marginal costs and marginal benefits of cash holdings may indicate an existence of an optimal cash holdings to maximize a firm's value, while the latter two rationale may suggest non-existence of an optimal point or level of cash savings, due to a possible information asymmetry and/or costs incurred by a corporate manage who may not be in the best interest of his/her shareholders in economic aspects, as also described in [5]. Therefore, it was of interest to corroborate the issue on the existence of an optimal financial point by employing relevant empirical procedures, since the theories on the corporate cash holdings seemed to imply their perverse or contradictory positions to be verified. All the relevant hypotheses were postulated as follows, based upon the results obtained from the previous literature such as [5], [6], and [8] as a first or *a priori* procedure.

<The first hypothesis>

H_0: *The chaebol firms in the domestic capital market may not maintain their optimal levels of cash holdings affecting the firms' value during the investigated period, based on the conventional theories of corporate cash savings.*

Concerning the specific methodologies applied to test for the hypothesis, this study followed the overall procedures which had been utilized in Martines-Sola et al. [10]. In other words, the value of a firm was represented by the proxy of the ratio of the market- to book- value of total assets (MVBV). Moreover, to find any optimal level of corporate cash holdings, two estimation techniques were performed as follows: First, it was to identify any quadratic relationship between a firm's cash holdings and its value. Second, it was to examine a negative relationship between a firm's value and the residuals derived from the aforementioned static panel date model employing the statistically important explanatory variables which had been found in Kim's study [8]. For the former estimation, three financial antecedents to affect a firm's value such as intangible assets (GROWTH), a firm's size (SIZE), and leverage (LEVERAGE) were adopted in the model as in [10], with the IDVs of cash holdings and its square. It was postulated that the signs of cash holdings and its square may show a positive and a negative relationship with the dependent variable of MVBV, respectively, if there exists an optimal level of cash holdings for the sample firms. Regarding the latter estimation, the residuals in absolute term (RR) derived from the static panel data model along with the significant IDVs in the previous research of [8], was entered as an explanatory variable with the aforementioned IDVs such as GROWTH, SIZE, LEVERAGE in the corresponding model. It was expected to find a 'negative' association between the residuals (RR) and the value of the firms (MVBV), if there is an optimal level of cash holdings for a chaebol firm.. The study further investigated whether or nor, there were any significant financial attributes which discriminated between the chaebol firms a positive residual and a negative one during the investigated time reference. To proceed this estimation, the sample firms were further divided into two sub-samples in accordance with their signs of RR and then the logistic regression procedure was applied to detect any discriminating financial factors related to the residuals. Proposed financial components entering into the logistic model, were chosen on the basis of the relatively robust and consistent results obtained from the previous researches of [5] and [6], which included a list of CASHFLOW, MVBV1, NETINVEST,

AGENCY, and CCC, as illustrated in the next section. As for a fundamental motivation to formulate the 2nd hypothesis, it was to investigate unique and robust financial components between the two comparison groups on a relative basis, whose results were also anticipated to be referred to as an effective tool, when considering more relevant variables to attain the optimal level of cash retention among various financial indices from the perspectives of academics and/or practitioners.

<The second hypothesis>

H0:The chaebol firms hoarding relatively excessive cash reserves estimated by positive residuals, may not possess any disparities in comparison with their counterparts with negative residuals, in terms of major financial components.

3. Analysis and Discussion

3.1 Analysis of Results

With respect to the analyses of the first hypothesis, quadratic relationship with a firm's value in polynomial regression, MVBV, was investigated for the estimated coefficients of $(DV)^2$ with a negative sign and DV with a positive one to have a point of inflection as tested in [10].

Table 3. Results of Testing for Any Quadratic Relationship Between the DV and a firm's value (MVBV)

IDV	The Estimated Coefficient from the Static Panel Data Model (Fixed Effects Model)	p-value
Constant	3.35	< 0.0001
SIZE	-0.04	0.12
GROWTH	-1.73	<0.0001
LEVERAGE	-0.004	0.28
DV	0.28	0.65
$(DV)^2$	-0.04	0.98

The results of the quadratic association between a firm's value, MVBV and the level of cash holdings for

the chaebol firm, provided the expected signs of their estimated coefficients with a negative sign for $(DV)^2$ as -0.04 and a positive sign for DV (0.28), respectively, as in Table 3. However, there were weak associations between them (i.e., DV^2 and DV, and MVBV, respectively) in the statistical context. Therefpre. an alternative procedure was applied to further examine an existence of a optimal level of cash holdings. That is, the residuals were employed in the corresponding model in their absolute value, which were derived from another model utilizing the significant financial determinants such as LIQUID, MVBV1, DYIELD, FRISK which had been found in the previous literature of [8], as described.

Table 4. Results of Testing for Statistically Significant Factors Affecting the DV to Derive Residuals Utilized in [Table 5]

IDV	The Estimated Coefficient from the Static Panel Data Model (Fixed Effects Model)	p-value
Constant	0.18	< 0.0001
LIQUID	0.14	< 0.0001
MVBV1	-0.02	<0.0001
DYIELD	0.0008	0.07
FRISK	0.0.02	<0.0001

Table 5. Results of Testing for Any Statistical Relationship Between a Firm's Value (MVBV) and the Residuals (in Absolute Term) found in [Table 4]

IDV	The Estimated Coefficient from the Static Panel Data Model (Fixed Effects Model)	p-value
Constant	3.56	< 0.0001
Residuals	-2.04	0.005
SIZE1	-0.05	0.08
GROWTH1	-1.71	<0.0001
LEVERAGE1	-0.004	0.26

With respect to the analysis of the results obtained for the second hypothesis to possibly discriminate any pronounced factors between the robust and consistent financial determinants, the results from a logistic regression model were reported in Table 6.

Table 6. Results on the Logistic Model to Examine Any Discriminating Aspects for the Chaebol firms Estimated with Residuals (RR) Between Positive and Negative Value during the sample period

IDV	Coefficient	Chi-square
Intercept	-0.4496	4.2477 *
CASHFLOW	-1.4700	3.0803 **
MVBV	0.1359	1.0100
NETINVEST	0.4915	5.4970 *
AGENCY	0.1791	4.6949 *
CCC	0.4499	0.3663
Goodness of Fit		10.5787 **

<Note 1> * and ** denotes the statistical significance in the Chi-square test at the 5% and 10% levels, respectively. Each coefficient was estimated by the method of maximum likelihood (ML) and the overall goodness of fit was estimated by the likelihood ratio (LR) test, while the significance of each individual coefficient was tested by the Wald specification test.

On the analysis of the logistic regression model estimated by utilizing SAS (9.4 version) package, only three financial determinants (CASHFLOW, NETINVET, and AGENCY) provided their statistical evidence to discriminate between the two counterparts (i.e., a firm with a positive residual vs. negative one), as reported in Table 6. Given the probability modeled was set to be for a firm with a positive residual (i.e., residual > 0) in software programming, the probability to be classified into a firm with a positive value of residual analogous to a possibility of holding excessive cash reserves will be higher, if NETINVEST and AGENCY increase, while the probability to be classified into a firm with a negative value of residual may increase, if CASHFLOW becomes larger.

3.2 Discussion

As for the first hypothesis test, an optimal level or point of corporate cash holdings was examined, assuming the trade-off theory. A quadratic relationship of corporate cash hoardings on a firm's value was found in terms of the signs of the explanatory variables (i.e., DV and DV^2) with (+) and (-), respectively, even if they may be weakly significant in the context of statistical context, as reported in Table 3. Alternatively, residuals (RR) were entered in the corresponding model towards validity of existence of the optimal point of cash savings for the chaebol firms, as performed in [10]. It was confirmed that the optimal point or level may exist by finding a negatively significant estimated coefficient with the value of -2.04 (*p-value* =0.005), as shown in Table 5. This phenomenon may empirically suggest that the value of Korean chaebol firms during the studied years (the years, 2009 - 2013), may, on average, have been maximized by attaining their optimal points of cash holdings, as deviations from the mean in the model, may progressively decrease in absolute term. In terms of the theoretical rationale to retain corporate cash reserves, the results of the present study provided evidence which may be imperative to the academic purpose. In other words, among the conventional theories on the cash savings, the theory of trade-off is expected to be academically extended to future research such as comprehending industry and/or country classifications. To exemplify, one of the seminal subjects conducted in modern finance was to examine the existence of a firm's optimal capital structure. Since the presence of the optimal point had been theorized, subsequent researches were academically extended to find an optimal level of capital structure on the basis of each industry and/or country. Therefore, it may be worth extending the scope of the current study in various financial aspects to search for an optimal level of corporate cash holdings inclusive of the chaebol firms. On the financial implication based on the analysis of the results as reported in Table 6, the study also found that the chaebol firms estimated to hold excessive cash reserves, (i.e., the value of the residuals derived from the corresponding model > 0), on average, revealed their financial characteristics possessing higher NETINVEST and AGENCY, and lower CASHFLOW

than those of their counterparts during the investigated period, as reported in Table 6. The followings imply major financial interpretations: First, the estimated coefficient of NETINVEST (i.e., change in capital expenditure) with a statistical significance and a positive sign can suggest an evidence that the chaebol firms with excessive cash savings, may suffer from relatively inefficient liquidity management practices, In other words, the firms anticipating overall higher net investments may maximize the firms' value if they may shrink the current cash holdings down to the optimal level equating to the residuals with '0'. However, one of the most plausible reasons accounting for excessive cash savings (i.e., residual > 0) can suggest that most chaebol firms with higher REINVESTMENT, may still face with financial constraints in external financing, even if they seemed to retain relatively better credit-ratings than the other counterparts in small or medium size in the domestic capital markets, as in [5]. Second, the results form the present analysis, Table 6, showed that the sample firms estimated with excessive cash savings, on average, suffered from larger agency costs than their counterparts with less cash reserves deviated from the mean of cash holdings in the corresponding model. [11] presented that there was an inverse relationship between the proxy representing agency costs and the level of cash holdings for the U.S. sample firms and this phenomenon may be corroborated with the free cash flow theory by [12]. In line with the results of the previous literature, the chaebol firms with excessive liquidity may well be concerned about or ponder to resolve the costs by lessening the level of the cash holdings. Finally, the negatively significant coefficient (-1.4700) of CASHFLOW in the logistic model, indicated that the chaebol firms with higher CASHFLOW, on average, retained lower cash reserves. Therefore, it was suggested that the sample firms anticipating of relatively abundant cash flow, may need to accumulate their cash reserves up to the optimal point, in accordance with the precautionary and transactional motives, thus maximizing firms' value.

4. Concluding Remarks

The study was primarily concerned with looking into the existence of an optimal level of cash holdings for the Korean chaebol firms during the period from 2009 to 2013. As for the results of the first hypothesis test, it seemed that there was an existence of an optimal level of cash holdings applied to the Korean chaebol firms. Subsequently, the study examined to find statistically significant financial determinants discriminating the sample firms between having a positive and a negative residual which were estimated from the corresponding model. The former sample group with excessive cash savings seemed to possess the financial attributes such as higher NETINVET and AGENCY. As one of the financial applications of the present study to contribute to the practitioners in the field of finance, an optimal level or range of cash holdings for the sample firms may be derived from the econometric model employing the significant explanatory variables as described earlier, given the corroboration of the existence of an optimal point supported by the trade-off theory. That is, the optimal level of cash holdings may be estimated by controlling the financially significant factors for the Korean chaebol firms to achieve the maximization of firm value. In spite of the weaknesses of the study suffering from the legitimate empirical limitations of data collection and estimation techniques, the results of the study may contribute to future research, in that it found an existence of optimal cash holdings as well as discriminating financial factors between the Korean chaebol firms with excessive cash reserves and their counterparts.

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