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Do Real Options of Cash Holdings Matter? Evidence from Tehran Stock Exchange

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Abstract

Subject and purpose: This paper investigates the relationship between the real option component of cash holding and stock excess return on the Tehran Stock Exchange. The real option component of cash holding indicates the amount of retained cash not affected by the market and other variables and optionally managed by the management.

Methodology: Two hypotheses were developed and tested, one at the stock level and another at the portfolio level. A sample of 121 companies on the Tehran Stock Exchange for 10 years from 2012 to 2021 was selected and a multivariate regression model was used to analyze the gathered data.

Findings: Findings showed a positive relationship between the real option component of cash holding and stocks' excess return. however, this relationship is stronger in portfolios with a lower real option component of cash holding.

Conclusion: Managers can gain excess return by holding more cash than their operational and investment needs, but this has a reverse effect as the component reaches higher levels.

Keywords: Stock Return, Excess Return, Cash Holding, Real option component of cash holding, Real Options Model.

1. Introduction

One of the questions which is in the attention of company managers almost every day is the level of cash retention. Cash retention strategies of companies express management concerns and determine the future of companies. In inefficient markets, companies tend to hold cash for future transactions and avoid risk. Maintaining large amounts of cash, on the one hand, increases opportunity costs and leads to a decrease in shareholders' wealth due to the rejection of projects with positive net present value, and on the other hand, keeping less than the optimal amount may also cause disruption in the operating cycle and business of the company. The optimal level of cash holding indicates a balance between the costs and benefits of holding cash. Firms determine the optimum level of cash holding to achieve many benefits that are positively reflected in the reputation and financial position of enterprise, which may gain the confidence of shareholders, investors, and other stakeholders, and thus be reflected in shareholders' share value and wealth (Ye, 2018). The investigations show that cash held in the world's prominent stock exchanges after the recent financial crisis. (Chen, Jia, and Sun, 2016) Companies maintain cash for two purposes: firstly, they hold cash for their daily operations with different motives of transactional, precautionary, tax, and agency. (Bates, Kahle, and Stulz, 2009) They also hold cash to invest in projects with positive net present value. Companies often invest their cash in various projects to obtain higher returns. Hence, cash holdings are like real options for enterprises to remain in the market or expand when profitable projects emerge. Therefore, the real option component of corporate cash holdings provides the enterprises with the flexibility to avoid operational distress or to expand operations when appropriate. Kisser (2013) presents an explicit valuation framework of cash holdings and show cash has a real option value. The real option component of cash holding is the amount of cash holding that is not affected by the market and other operational variables and is hold selectively and voluntarily by the management. Hence, it can represent the management's attitude towards the future economic situation. (Chen et al, 2016)

Real options are not directly observable and previous studies have provided several real option proxies. Chen et al (2016) Bates et al (2009) and Zhang (2005) argue that book to market ratio significantly explain cash holdings. Cao, Simin, and Zhao (2008) showed a relationship between corporate growth options and idiosyncratic volatility. In this study to extract the real option component of corporate cash holdings, we used the method developed by Da, Guo, and Jagannathan (2012). Specifically, we regressed each enterprises cash holdings on three proxies of book to market ratio, idiosyncratic volatility, and return on assets without the intercept to extract the real option component of cash holdings.

Previous studies have shown noticeable increase in the level of cash holding in many countries. Cash holding in stock market listed companies in 45 countries has risen approximately from 9% in 1995 to more than 37% in 2017 (Rashed and Ghoniem, 2022). Meanwhile, the average cash holdings among Iranian listed companies is in a lower levels compared to other countries. Companies listed in the Tehran Stock Exchange maintain on average about 6.7% of their assets in form of cash and equivalents such as short-term investments. While this figure is equal to 8.1% of total assets in American companies and 9.9% of total assets in British companies. (Agayi et al, 2009)

Therefore, our research question is first of all to measure the real option component of cash holdings in Tehran Stock Exchange, and second, to test the Tehran Stock Exchange listed companies' managers' perceptions about the future economic situation and whether they can achieve the additional returns by holding extra cash. In order to increase the power of the test, we also investigated the research question by developing homogeneous portfolios in terms of cash holdings.

Our study is different in investigating the relationship between cash holdings and stock returns from previous studies carried out on the Tehran Stock Exchange listed companies in two ways: first, we

attempt to measure excess cash holdings of companies using a novel method developed by Da et al (2012); second, we attempt to further investigate the relationship by developing portfolios of homogeneous companies.

Literature Review

Three theoretical models have been proposed in literature for corporate cash holding decisions: Trade-off theory, Pecking order theory and Free-cash flow theory. These theories have been described as follow.

The trade-off theory identifies two costs of holding cash. Assuming management maximizes shareholder value, the main cost that holding cash bears is the opportunity cost (Ferreira & Vilela, 2004). This cost is the difference between the return on cash and the interest that would have to be paid to finance an additional dollar of cash (Dittmar, Mahrt-Smith, and Servaes, 2003). The second cost, is agency cost of holding cash. Assuming managers don't maximize shareholders' value, they increase their cash holdings in order to be able to increase their discretion. In this way, cash is worth less when agency problems between insiders and outside shareholders are greater. Therefore, companies that do not protect the rights of shareholders well, maintain more (Dittmar and Mahrt-Smith, 2007; Pinkowitz, Stulz, and Williamson, 2006).

The holding cash has benefits due to two motives of transaction and precautionary. The main advantage of holding cash is that when payments due, the firm does not have to liquidate assets. Therefore, firms will increase cash holdings when liquidating assets will bear more costs and will tend to maintain lower amount of cash when its opportunity costs are high (Bates et al., 2009, Dittmar et al., 2003, Baumol, 1952, Miller and Orr, 1966).

According to the pecking order theory (Myers, 1984, Myers and Majluf, 1984) firms in order to minimize financing costs, should finance investments in the following order: first with retained earnings, second with safe debt, third with risky debt, and finally with equity. So, based on this theory, there is no optimal amount of cash for firms, and just investment needs alongside with retained earnings would determine suitable cash level.

Free-cash flow theory (Jensen, 1986) states when investment opportunities are few, managers would maintain cash instead of paying it out to shareholders. By retaining free cash flow, managers reduce their need to the capital markets and would be free of capital markets monitoring and restrictions.

Cash Holding Determinants

Meanwhile many studies have investigated the relationships that several characteristics of corporations have with cash holdings such as sales growth, firm size, financial leverage, and etc.

Firm size: Some argue that there is a negative relationship between firm size and cash holding, since some enterprises especially small ones are more exposed to irregular risks and borrowing restrictions, and therefore managers tend to maintain a higher level of cash (Maheshwari and Rao, 2018). On the other hand, some argue that firm size has a positive relationship with the level of cash holding due to agency problems, since it would increase the management discretion (Opler, Pinkowitz, Stulz, and Williamson, 1999).

Dividend Payments: the relationship between dividend payments and cash should be negative, since firms that currently pay dividends can raise funds at low cost by reducing their dividend payments (Al-Najjar & Belghitar, 2011, Opler et al., 1999), Drobetz and Grüninger, 2007).

Cash flow volatility: based on previous empirical research, there is a positive relationship between cash holdings and cash flow uncertainty (Bates et al., 2009; Saddour, 2006; Ferreira and Vilela, 2004; Opler et al., 1999).

Net working capital: net working capital mainly consists of liquid asset that substitute for cash. The more these liquid assets, the less need of firms to rely on capital markets to finance funds (Al-Najjar, 2013, Bates et al., 2009, Ferreira and Vilela, 2004).

Capital expenditures: according to *Bates et al.(2009):* "*if capital expenditures create assets that*

can be used as collateral, capital expenditures could increase debt capacity and reduce the demand for cash".

Financial leverage: empirical evidence on the relationship between cash holdings and financial leverage is mixed. Some evidence show that they have negative relationships (Ozkan & Ozkan, 2004, Al-Najjar and Belghitar, 2011, Opler et al., 1999), and some show a positive relationship between them (Bates et al., 2009). In line with the transaction cost theory, highly levered firms have high cost of money and therefore hold less cash (Ferreira and Vilela, 2004, Kim, Mauer, & Sherman, 1998).

Growth opportunities: according to the trade-off theory, the relationship between cash holding and growth opportunities is positive. Since firms with high investment opportunities have a more uncertainty about future cash flows , they maintain more cash to make sure that the enterprise will be able to finance its investment needs when the internal retained cash is at low levels (Kim, 2015; Chung, Kim, Kim, & Zhang, 2015; Chen et al., 2018).

Profitability: empirical research findings show an association between firm profitability and cash holding. In line with pecking order theory, firms with higher financial results retain higher levels of liquidity to internally finance their future needs (Opler et al., 1999, Ferreira and Vilela, 2004, Al-Najjar and Clark, 2017).

Overall, while literature shows an association between cash holding with some of its determinants, there is a mixed evidence on another part of determinants of cash holdings. No doubt that for-profit enterprises seek profitable investment opportunities in order to maximize their shareholder value and cash is an essential factor for their success in taking the opportunities. Hence, many studies have been done to investigate whether companies with cash holdings have been successful in fulfilling their mission of value creation or there is no difference between them and those companies that have not reserved cash. Some of them and their findings are as follow.

Chen et al (2016) examined the relationship between the amount of cash held and stock returns in companies listed on the American Stock Exchange. Based on three empirical indicators (the ratio of book value to the market value of equity, specific volatility of stock returns, and return on assets), they extracted the part of real option component of cash holding. The results of their research indicate that this part of cash decreases with the increase of GDP and decreases with its increase. Also, companies with real option component of cash holding will earn more returns in the future. This result shows that generally, investors in unfavorable economic conditions prefer companies that keep more cash.

Rashid (2016) examined the relationship between cash holding and stock returns at the level of small and large companies and finally came to the conclusion that small companies hold more cash due to their weak credit status and lack of ease of access to capital markets, and this has a positive effect on their stock returns. In the case of large companies, this negative relationship was observed but it was insignificant.

Chuan et al. (2019) examined the relationship between cash holdings and average stock returns in NYSE. They empirically verified that the relationship was positive and robust to the adjustment of risk, the construction of cash holdings portfolios, and the weighting scheme of portfolio returns. Overall, their results indicated that the cash holding effect did not present a new asset-pricing regularity, but that it was a manifestation of existing anomalies closely related to mispricing.

Garavito and Chion (2021) examined the relationship between cash holdings and expected equity returns in Pacific alliance countries and found that there was a positive relationship between them. Their findings suggested that corporate liquidity contains underlying information that contributes to explain the expected equity return, which, if ignored, can produce quite misleading results.

Rashed and Ghoniem (2022) explored the impact of cash holdings on stock returns in small and medium enterprises on Egyptian Stock Exchange and showed a

statistically significant and negative effect of cash holding on stock returns in small and medium enterprises on the Egyptian Nile Exchange. Further, the evidence shows that firms with higher levels of cash holding have higher investment alternatives and then lower stock returns.

According to above mentioned literature, we developed two hypotheses to test the relationship between real option component of cash holding by companies and their stocks' excess returns as follow:

H1: The real option component of cash holding has a significant positive relationship with excess stock return.

H2: Real option component of cash holding have a significant positive relationship with excess stock returns in portfolios with different sizes in terms of real option component of cash holding.

Methodology

The sample consists of 121 listed companies on the Tehran Stock Exchange for a period of 10 years from 2012 to 2021, with a total number of 1210 observations. From the original data, some companies were excluded because their activity are in the service sector, and some of them has a fiscal year other than the end of Esfand (Final month based on Iranian calendar).

The required data was collected from the Tehran Stock Exchange official sites including TSETMC.com and Codal.ir. Panel data analysis via OLS and GMM was used to analyze data.

In order to test the second hypothesis, first, the sample companies were divided into 5 portfolios (portfolio number 1 with the lowest amount and portfolio number 5 with the highest amount) based on the ratio of the real option component of cash holding to their assets and then the relationship between this variable and the additional returns of stocks was investigated by comparing the first and fifth baskets.

The model used to test the first hypothesis is as follows: (Chen et al, 2016)

$$R_{it} - R_{ft} = \alpha_{it} + \beta_{i,t}\, ROCH_{i,t} + \varepsilon_{i,t} \quad (1)$$

in which:

R_{it}: Stock rate of return, and is calculated by the following formula:

$$R_{it} = \frac{(1+\alpha_{it})\times P_{it} - P_{i\,(t-1)} + D_{it} - M}{P_{i\,(t-1)}} \quad (2)$$

P_{it}: Stock price

D_{it}: Dividend

M: Cash contribution of stockholders

$\propto_{it}$: Capital increase ratio

R_{ft}: The risk-free rate of return, which is considered as equivalent to the interest rate of the central bank's bonds.

$\boldsymbol{ROCH_{i,t}}$: Real option component of cash holding, which is calculated by using three empirical indicators (the ratio of book value to the market value of equity, special volatility of stock returns and return on assets). In order to measure this variable, regression model (3) was first estimated. (Da et al, 2012)

$$\mathrm{CH_{i,t}} = \beta_1 \mathrm{BM_{i-M,it}} + \beta_2 \mathrm{IVOL_{i-M,it}} + \beta_3 \mathrm{ROA_{i-M,it}} + \varepsilon_i \quad (3)$$

$\mathrm{CH_{i,t}}$: Cash holding; which is the ratio of cash and short-term investments to total assets.

$\mathrm{BM_{i-M,it}}$: The difference between the ratio of the book value to the market value of the company's equity and the market.

$\mathrm{ROA_{i-M,it}}$: The difference between the rate of return on company assets (the ratio of net profit to total assets at the beginning of the period) and the rate of return on market assets

$\mathrm{IVOL_{i-M,it}}$: The difference between the specific fluctuations of the company's stock return and the specific fluctuations of the market return, which was measured using the three-factor model of Fama and French (1993) as described in relation (4):

$r_{i,t} - r_{m,t} = \alpha_{i,t} + \beta_{MRKTit}MRKT_t + \beta_{SMB,it}SMB_{i,t} + \beta_{HML,it}HML_{i,t}$

(4)

in which:

$r_{i,t}$: Monthly stock returns of company i

$r_{m,t}$: Monthly stock return of market

$MRKT_t$: Capital market risk premium, which is the difference between the market return and the risk-free return (rate of return on the central bank's bonds considered as the risk-free rate of return).

$SMB_{p,t}$: Size factor which is the difference between the return of portfolio consisting of stocks of large companies and portfolio consisting of stocks of small companies and was measured using the following relationship:

$$SMB = \frac{(S/L + S/M + S/H)}{3} - \frac{(B/L + B/M + B/H)}{3}$$

(5)

$HML_{i,t}$: Value factor, which is the difference between the return of the portfolio consisting of shares of highly capitalized (book value to market value ratio) and portfolio of shares of low capitalized companies and was calculated using the following relationship:

$$HML = \frac{(S/H + B/H)}{2} - \frac{(S/L + B/L)}{2}$$

(6)

The variance of the remaining values of model (4) ($Var\varepsilon_{i,t}$) represents the risk of specific fluctuations in the company's stock returns ($IVOL_{i-M,it}$).

It should be noted that the variables related to the market were calculated based on the weighted average according to the value of the companies. After determining the coefficients and estimating the model (3), the value of the real option component of cash holding (ROCH) was obtained through the following relation:

$$ROCH_{i,t} = \overline{\beta_1}BM_{i-M,it} + \overline{\beta_2}IVOL_{i-M,it} + \overline{\beta_3}ROA_{i-M,it}$$

(7)

And the model used to test the second hypothesis of the research, was the three-factor model of Fama and French (1993), along with the effects related to the real option component of cash holding, as follows:

$$R_{p,t} - R_{ft} = \alpha_{p,t} + \beta_{1,pt}MRKT_t + \beta_{2,pt}SMB_t + \beta_{3,pt}HML_t + \beta_{4,pt}\,ROCH_t + \varepsilon_{p,t}$$

(8)

in which:

$R_{p,t}$: Portfolio return in the period t, (sample was divided into 5 portfolios according to their real option component of cash holdings level).

Findings

The summary of descriptive statistics of research variables is as follows.

As can be seen in the table above, the average abnormal stock return is equal to 0.284 and it indicates an annual return of 28% in excess of the risk-free annual return. The values of skewness coefficient (1.606) and kurtosis coefficient (1.415) of this variable indicate the normality of the distribution of this variable. The obtained results show that the average real option component of cash holding is equal to approximately 3% of the total assets of the sample companies.

Table (2) shows the results of diagnostic test to select appropriate regression model. Panel data, and fixed effects model are the most appropriate.

Table (3) represents the regression model analysis for the first hypothesis.

It is noted that the coefficient related to the variable of real option component of cash holding is equal to 5.359 and it is statistically significant (t=3.519), which means a positive relationship between this variable and the dependent variable of excess stock returns. Therefore, the first hypothesis of the research is not rejected.

According to the value of t-statistics of different portfolios and the level of significance obtained, it can be seen that there is a positive and significant

relationship between the real option component of cash holding and the additional return of stocks in different portfolios.

However, the comparison of the relationship between real option component of cash holding and the abnormal stock return in the portfolios with the lowest and highest cash holding is considerable. The value of the t-test is 2.415 and the significance level obtained is less than 5%, shows that the difference of relationships between these portfolios are meaningful. In other words, the relationship between research variables in the first basket is more than the fifth basket. Therefore, the second research hypothesis is rejected at the 95% confidence level.

Table (1): Descriptive Statistics

Var.	Ave.	Med.	Std.	Skew.	Kurt.	Min.	Max.
Ri_Rf	0.284	0.109	1.324	1.606	1.415	-0.658	5.668
ROCH	0.029	0.024	0.032	0.832	1.173	-0.035	0.127
MRKT	0.114	0.000	0.403	0.456	-0.940	-0.409	0.857
SMB	0.053	0.057	0.298	0.458	0.246	-0.464	0.697
HML	-0.509	-0.353	0.387	-0.993	-0.127	-1.360	-0.081

Table (2): Diagnostic Tests

Test	Value	P-Value	Result
F Limer	***2.282	0.000	Panel Data
Hausman	***13.627	0.004	Fixed Effects Model

Table (3): Regression Model

Variable	Coefficient	t-statistic	P value
C	0.406	5.104	0.000
ROCH	5.359	3.159	0.000
F	*** 4.149	R2	0.530

Table (4): Portfolios Regression Models

Portf.	a	MRKT	SMB	HML	ROCH	R^2
1	0.493 20.147 ***	0.241 6.140 ***	0.009 1.807 ***	-0.050 -1.284	3.543 6.033 ***	0.619
2	0.575 22.276 ***	0.173 4.151 ***	0.032 1.652 *	0.058 1.450	4.271 6.453 ***	0.519
3	0.579 22.320 ***	0.205 4.809 ***	0.082 1.391	0.084 2.124 *	2.810 5.044 ***	0.553
4	0.559 19.549 ***	0.234 5.227 ***	0.098 1.580	0.045 1.038	2.446 3.780 ***	0.448
5	0.514 20.603 ***	0.258 6.392 ***	0.079 1.377	-0.023 -0.600	2.625 5.313 ***	0.598
1-5	0.021 0.606	0.017 0.304	-0.020 0.252	0.027 0.490	-0.918 2.415 ***	

Robustness test

To examine the robustness of the relationship, we used two approaches. First, we used portfolio analysis (Tze Chuan et al, 2019). We examined the relationship by developing homogeneous portfolios based on their real option cash holdings size, as presented through second hypothesis above. Second, we substituted the

robustness of the cash holding effect can be checked by replacing the real option component of cash holdings (ROCH) value with an alternative measure, that is the ratio of the real option component of cash holdings to total assets (ROCHtA) (Thakur & Kannadhasan, 2019; Shehata & Rashed, 2021; Rashed & Ghoniem, 2022). Statistical findings in table (5) restates the relationship between real option component of cash holdings and stocks' excess return.

Table (5): Regression Model -Robustness Check

Variable	Coefficient	t-statistic	P value
C	0.297	3.985	0.005
ROCHtA	3.301	2.044	0.003
F statistic	***3.001	R2	0.421

Conclusion

In this research, an attempt was made to investigate the relationship between the independent variable of the real option component of cash holding and the dependent variable of the additional return on shares of companies listed in Tehran Stock Exchange at two levels of stocks and stock portfolios. Based on the findings, it was observed that there is a relationship between the two mentioned variables at the stock level and with 95% confidence. In other words, at the 95% confidence level, it can be claimed that companies that keep more discretionary cash earn more additional returns. This research finding is consistent with the findings of Chen et al. (2016).

But at the level of the stock portfolio, to some extent other findings were obtained. It was observed that there is a relatively stronger positive relationship between the research variables in the portfolios with less real option component of cash holding. In other words, in companies with a higher real option component of cash holding, there is a weaker relationship between real option component of cash holding and excess return, and it seems that high retention levels have a negative and reducing effect on excess stock return.

The research findings are partially consistent with the findings of Azimi and Sabbagh (2013) that holding excess cash despite the current levels of cash in the company has a negative relationship with the value of the company. This compliance is due to the fact that a downward but not negative relationship was observed between the real option component of cash holdin and additional returns. Also, VakiliFard and SoroushYar (2013) found that keeping surplus funds improves the company's performance, but the market is unable to reflect it, and the findings of the current research are compatible with their findings only in baskets with high real options to keep cash funds. It can be imagined to some extent that they show relatively lower additional efficiency. Therefore, it seems that the findings are converging regarding the real option of cash holding at high levels and its minimal or low relationship with excess stock returns, but divergence is observed regarding the relationship between the two variables at lower levels.

But at the same time, it seems to be consistent with the findings of Rashid (2016). His study led to the conclusion that in small companies due to their weaker credit status, keeping cash has a positive and significant effect on stock returns, but such an effect is not observed in large companies. Although the amount of real options to hold cash is not necessarily the same as that of small companies, we will probably see lower amounts of cash in small companies.

The findings of the research re-emphasize the real options of cash holding in order to use opportunities and deal with crises and increase additional returns for managers, and in addition, it is suggested that they pay attention to the additional returns due to the decreasing effect of the real option component of cash holding.

According to the findings of the research, the real cash holding has a positive relationship with excess stock returns, but this relationship is stronger in lower values than in high values. It seems that there is an optimal point for the amount of cash holding in which the additional efficiency reaches its maximum level, so it is suggested to carry out research to identify the optimum point and the factors affecting it.

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