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The Effect of Deviation from Optimal Cash Level on Adverse Selection and Moral Hazard in Firms Listed on Tehran Stock Exchange

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Abstract

This study aims to investigate the impact of deviation from optimal level of cash holdings on adverse selection and moral hazard problems. The data set includes 106 listed firms of Tehran Stock Exchange during the period of 2005-2016 and both panel data and cross-sectional data multivariate regressions were utilized in different stage of analysis to test the hypotheses. According to the optimal level of cash holdings, firms were divided into two groups of firms with or without excess cash holdings. The results of the study revealed that lower optimal level of cash holdings increases adverse selection. In addition, higher optimal level of cash holdings leads to moral hazard. In other words, the findings confirmed both pecking order and free cash flow theories. The findings imply that there is a positive relationship between information asymmetry and marginal value of cash holdings. Such a relationship will gradually decrease when the firms hold higher than optimal level of cash and translate into a negative one.

Keywords

Optimal cash level, Information asymmetry, Adverse selection, Moral hazard, Marginal value of cash holdings.

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Introduction

Cash holdings are one of the vital resources in every profit-making unit and the balance between available cash and cash requirements is considered to be the most important factor for the success of any business unit (Saghafi and Hashemi, 2004). According to Bates, Kahle, and Stulz (2009) the amount of cash held by American firms has been remarkably more than doubled for the period 1980-2006. Considering the cost of holding cash and in conditions under which higher optimal level of excess cash holdings causes a contradiction between directors and shareholders' interests, this question arises that why firms tend to hold more cash. A possible explanation for this issue is that precautionary theories create the motives in directors toward excess cash holdings (Keynes, 1936) such that, firms will secure themselves against unexpected risk of future cash deficit through storage. Pinkowitz, Stulz, and Williamson (2006) believed that when the firms perform in markets with no agency or information asymmetry problems, the cost of external financing is similar to that of internal financing. In such conditions, in case of insufficient internal cash, firms can easily tend to external financing to finance investment projects (Drobetz and Grüninger, 2007). Therefore, as stated by Bates et al. (2009), investment and financing will be independent of each other in a complete market; hence, cash holding has no effect on firm value. However, in reality, and due to agency and information asymmetry problems in imperfect market, higher or lower optimal level of cash holdings causes a cost for the firm at the expense of losing shareholders' interests.

According to information asymmetry theory, companies prefer to hold excess cash (Scott, 2006). However, deviation from optimal level of cash may result in issues such as the costs of adverse selection and moral hazard.

Adverse selection refers to a situation where one party has information advantage over the other party. In case of information asymmetry, firms follow pecking order policy for their financing (Myers and Majluf, 1984). Consequently, since the management prefer internal over external financing, it tends toward cash holdings in order to be able to finance the firm internally. Therefore, according to pecking order theory, there is expected to be a direct relationship

between cash holdings and firm value in case of information asymmetry.

On the other hand, excess cash holdings can have a negative impact on firm performance through agency problems. Jensen (1976) believed that agency cost is driven from the conflict between managers and stockholders and happens when each of them has various long-term interests. In this case, the important issue is moral hazard in managers' behavior such that it is probable managers waste firms' resources and do not allow the real value of the firm to increase. One of such conflicts between the managers and stockholders occurs because of the presence of free cash flow. Owning high levels of free cash flow without optimal investment opportunities causes the managers to invest in non-optimal projects and increases agency costs (Jensen, 1986). Besides, increasing cash holdings can decrease the firm's need to absorb new capitals and thus, reduces the ability of capital market to control the managers' decisions leading to an increase in information asymmetry. Therefore, based on agency costs, there is predicted to be a reverse relationship between cash holdings and firm value under information asymmetry conditions.

Although various studies have been conducted regarding the determinants of cash holdings and also its effect on the firm value, few studies have been carried out about information asymmetry and cash holdings. More interestingly, an investigation of such studies reveals that there exist contradictory results regarding cash holdings and firm value under information asymmetry conditions. For example, unlike Zaheer (2017), Poorzamani and Razmpour (2013), Chung, Kim, Kim and et.al (2012), Ghorbani and Adili (2012), Robertz and leary (2010) and Pinkowitz et al. (2006) who refer to the negative relationship between cash holdings and firm value under information asymmetry conditions, Salehi, Rostami and Hesari (2014), Maabadi, Abdoli, Dehdar, et al (2013) Nourafkan (2012), and Autore and Kovacs (2006) indicate that there is a positive relationship between those variables.

Therefore, in different levels of excess cash holdings and using the dataset of Tehran Stock Exchange, we try to provide evidence regarding the interrelation between information asymmetry and value of cash holdings and to examine adverse selection and moral hazard

problems, which are two competing theories that arise in relation to information asymmetry. The results of this research can have a new contribution among documented literature and empirical foundations of the field of cash holdings under information asymmetry. In addition, investors and other researchers can apply these findings as well.

Hypothesis development

The main aim of the present study was to investigate the impact of deviation from optimal cash level on adverse selection and moral hazard increase in firms listed in Tehran Stock Exchange. Adverse selection and moral hazard are the two main topics, derived from information asymmetry theory. Adverse selection describes a situation where managers or other insiders have greater information regarding the current conditions and future prospects of the firm as compared to investors. In other words, it refers to a process where only non-favorable results occur and bad products or customers are more likely to be selected. However, moral hazard happens since the ownership of mostly large business units is separated from their management. In fact, it is impossible for the investors and creditors to directly control all top manager's functions and the quality of his work. Therefore, the manager may be tempted to underact and claim that such underacting is due to factors beyond his control. It is obvious that such a situation will bring about unpleasant consequences for the investment and efficient operations of economic system.

There exist different theories and models to justify the factors affecting the cash and the reasons for cash holdings under information asymmetry assumption. According to pecking order theory, internal financing is preferred to external financing. Therefore, directors tend toward cash holdings and thus the cost of adverse selection, which increases with external financing, could be prevented in order to help increase the firm value. Pecking order theory refers to adverse selection. In other words, according to free cash flow theory, although cash is considered a very favorable asset, it is not productive, and excessive holding of it – without any return – in the firm decreases the efficiency that leads to a decrease in the value of the firm.

Myers and Majluf (1984) argue that firms prefer internal financing to external financing which is sensitive to the information. Including time-varying adverse selection costs in the model and in the line with pecking order theory, Autore and Kovacs (2006) provide evidence that when the level of information asymmetry is low, managers prefer to access capital markets to finance via equity. In addition, when information asymmetry is more pronounced, it will be expected that cash should be more important for firms and may have a higher market value. Accordingly, if internal assets are insufficient for investment project financing and under information asymmetry conditions, managers may forgo profitable projects. In such conditions, cash will be very valuable (Drobetz ,Grüninger & Hirschvogl, 2010). Salehi et al (2014) showed that despite the existence of positive relationship between information asymmetry and equity financing, there is no significant relationship between information asymmetry and debt financing. Nguyen (2017) reveals an inverse U-shape relationship between cash holdings and firm value.

All at all, since equity imposes further costs for the firms due to information asymmetry conditions, firms should finance investments first with retained earnings, then with safe debt and risky debt, and finally with equity. The aim of such order is to minimize asymmetric information costs and other financing costs. According to this viewpoint, because of information asymmetry and external financing problems, external financing policies follow a pecking order approach which is based on the preference of internal financing over external one. Therefore, the management tends to cash accumulation and does not refer to external resources. Consequently, adverse selection may occur due to information asymmetry and in case of deviation from optimal level of cash holdings. Therefore, the following hypothesis can be stated:

H1: Lower optimal level of cash holdings increases adverse selection.

In Jensen's viewpoint (1986), higher optimal cash level allows the managers to avoid market control. Free cash flow is, in fact, the excess cash flow of financing of projects that their future cash flows are decreased by the cost rate of related capital and their net present value to be positive. In order to gain discretionary power over the firm

investment decisions, Jensen's free cash flow theory (as cited in Ferreira and Vilela, 2004) recommend that managers have an incentive to build up cash to increase the amount of assets under their control. For this reason, managers prefer to invest and carry out current functions of the firm with available cash without being forced to provide the detailed information of the capital markets. Drobetz et al (2010) argue that the availability of free cash flow in a commercial unit leads to the overinvestment of that unit. Their findings indicate that the value of corporate cash holdings is less in periods with a higher degree of information asymmetry, which can be justified by the free cash flow theory. According to them, in firms with high free cash flow, because of agency problem, it is probable that the managers misuse funds for value-destroying projects. In such firms, internal funds are used for investment and the likelihood of using external funds is less. In this case, managers are allowed to escape from controlling of the capital market; they do not need shareholders' approval and decide on investments according to their own discretion. In this condition, although there are no profitable investments available, managers are unwilling to pay out funds such as cash dividend. Faulkender and Wang (2006) found that the marginal cash holdings would value less in high level of cash holdings. In another attempt, Ghorbani and Adili (2011) investigated the relationship between cash holdings and firm value under information asymmetry assumption. The findings indicated that there exists a significantly reverse relationship between cash holdings and firm value under information asymmetry assumption and this confirms the free cash flow theory. Chung et al (2012) found that the existence of higher information asymmetry situations would cause companies to have smaller cash holdings. Poorzamani and Razmpour (2013) examined Quality Grade of Information Asymmetry and Firm's Cash Flow Values. The results suggest that information asymmetry is inversely related to firms' cash flow value. Also, higher quality information asymmetry is inversely related to firms' cash flow value. Huang, Ma and Lan (2014) find that the value of cash holdings drops increasingly with the increase in information asymmetry level. Taking the sample set from manufacturing companies listed on the Karachi Stock Exchange, Zaheer (2017) indicated that there was a significant and

negative relationship between excess cash and the value of firms, which can be justified by Jensen's free cash flow and agency cost theories.

Accordingly, it can be concluded that free cash flow refers to moral hazard and therefore the following hypotheses might be proposed:

H2: Higher optimal level of cash holdings increases moral hazard.

Method

Firms listed in Tehran Stock Exchange were regarded as the statistical population of the study. For the final sample, firms were selected under the following conditions: the firms' fiscal year terminates on 29th of Esfand (March 19th). They must be manufacturing companies and not those financial companies including banks, insurance, or investment companies; in addition, they should not exit the list of Tehran Stock Exchange companies up to 2016 and should have ongoing performance. Besides, for the sake of having many zeros in firms' monthly return only active firms were included in the sample, as they should not have more than 6-month transaction stops.

Considering the aforementioned criteria, 106 firms were selected during the period of 2005-2016 and were classified in to two groups based on the optimal cash holdings criteria; firms with holding higher than optimal cash and lower than optimal cash. Using Stata and Eviews softwares, both panel-data and cross sectional-data regressions methods were utilized to estimate models 8 and 9 respectively to come up with hypothesis testing.

Measures of Information asymmetry

In the current study, three different criteria were used to measure information asymmetry, the first of which is price synchronicity model (Shekari and Jamshidinavid 2017; Liu 2016; Pan and Zhu 2015). Higher synchronicity of stock return and market return is an indicator that reflects the existence of a higher level of information in the market through which investors would be able to discover the initial value of any security by way of order flow of other securities in the market. This will reduce the risk of adverse selection and information asymmetry. Stock price synchronicity is the correlation of stock return with market return that shows to what extent changes in

stock return can be explained through changes in market return. As stated by Chan, Hameed and Kang (2013), stock price synchronicity is a measure which is calculated by R-squared measure (R^2), and is obtained by market model regression such as CAPM. However, the superiority of Fama-French model compared to the CAPM has been emphasized in many studies in Iran as well as other markets (Guant, 2004; Rahmani, 2006; Simpson and Ramchander, 2008; Izadinia, Ibrahimi and Hajiannejad, 2015). Following Baruch, Karolyi and Lemmon (2007), it is expected that stock price synchronicity has a reverse relationship with information asymmetry. In other words, the higher the stock price synchronicity is, the less the information asymmetry will be. Then, a reduction in information asymmetry would cause the liquidity to increase.

In this study, Fama and French three-factor model which is provided below, was used to obtain R^2.

$$R_I - R_f = \alpha_i + b_i\left(R_M - R_f\right) + s_i SMB + h_i HML + \varepsilon_i \quad (1)$$

Here r is the portfolio's expected rate of return, R_f is the risk-free rate for which the return of Islamic bonds issued by government for the periods of 2006-2015 was used and R_m is the return of the market portfolio. *SMB* stands for "**S**mall [market capitalization] **M**inus **B**ig" and *HML* for "**H**igh [book-to-market ratio] **M**inus **L**ow"; they measure the historic excess returns of small caps over big caps and of value stocks over growth stocks. $\left(R_M - R_f\right)$ is defined as excess return of market portfolio to the risk-free rate of return. To calculate SMB, for each year of the period under study and based on the market size, firms are divided into two portfolios of small (S) and big (B) companies, each including half of the sample firms. Then, the samples are divided into three sub-portfolios based on book-to-market ration including 30% High (H), 40% Medium (M), and 30% Low (L) firms through which six portfolios (SH, SM, SL, BH, BM, BL) were obtained. Therefore, portfolio return of size is calculated in the following way:

$$r_{SMB} = \frac{\left(r_{SH} + r_{SM} + r_{SL}\right)}{3} - \frac{\left(r_{BH} + r_{BM} + r_{BL}\right)}{3} \quad (2)$$

In this study, current market value is used as a criterion for calculating the size of a firm that is calculated as:

$$\text{Current market value} = \text{the number of shares issued} \text{share price} \quad (3)$$

HML represents a value factor which is obtained from the difference between the average return of stock portfolio of the firms with high book-to-market value and stock portfolio of the firms with low book-to-market value. Return of this portfolio is calculated by the following model:

$$r_{\text{HML}} = \frac{\left(\text{r}_{\text{SH}} + \text{r}_{\text{BH}}\right)}{2} - \frac{\left(\text{r}_{\text{SL}} + \text{r}_{\text{BL}}\right)}{2} \quad (4)$$

Following the calculation of variables related to Fama-French three-factor model, 106 separate annual regressions were estimated for 106 firms and 106 separate (R^2) were obtained. However, since (R^2) is between 0 and 1 interval, following Johnston (2009) and Piotroski and Roulstone (2004), natural logarithm is used to define price synchronicity (SYNCH):

$$SYNCH_{i.t} = Log\left(\frac{R_{i.t}^2}{1-R_{i.t}^2}\right) \quad (5)$$

The second criteria for measuring information asymmetry is percentage change in the number of institutional investors (Cormier, Sylvain & Marie 2013; Liu (2016); Aghaei, Ahmadian & Sefidgaran 2018). Institutional shareholders can make congruence among various types of market tools and forces acting to decrease the divergence between managers and owners' interests. According to clause 27, Article 1 of Securities Market Act of the Islamic Republic of Iran, an institutional investor includes any investors that obtain more than 5 percent of nominal value of the issued securities of a firm. The percentage change in the number of institutional investors is calculated as:

$$\text{PCNII}_{\text{i.t}} = \frac{\text{Num.of inst.holding}_{\text{i.t}} - \text{Num.of inst.holding}_{\text{i.t-1}}}{\text{Num.of inst.holding}_{\text{i.t-1}}} \quad (6)$$

where $\text{Num.of inst.holding}_{i.t}$ and $\text{Num.of inst.holding}_{i.t-1}$ show the number of institutional investors in the current and previous years, respectively.

The third proxy for information asymmetry is the range of bid and ask spread which was developed by Venkatesh and Chiang (1986):

$$\text{SPREAD}_{i.t} = \frac{(\text{AP} - \text{BP}) \times 100}{(\text{AP} + \text{BP}) \div 2} \tag{7}$$

where SPREAD is the range of bid and ask spread, AP is the ask price average of the firm *i* in *t* interval and BP is the bid price average of firm *i* in *t* interval. The higher the bid and ask spread, the more the information asymmetry exists. Gregoriou, Ioannidis, and Skerratt (2005) believed that bid and ask spread is the main source of revenue (compensation) for market makers in order to compensate for the liquidity proposed by them. More specifically, some dealers in the market have information advantages as compared to market makers. Therefore, due to the knowledge of such specific information, these informed traders purchase only when the bid price is very low; they also sell their stocks when the ask price is very high.

Research model

To explore the hypotheses, first, the Bates et al. (2009) model estimated using panel-data regression method. Then, based on the residuals (deviation from optimal cash level) of the model, in each year, firms were split into two groups of with or without excess cash:

$$\begin{aligned}\frac{C_{i.t}}{TA_{i.t}} = {} & \beta_0 + \beta_1 \frac{MV_{i.t}}{TA_{i.t}} + \beta_2 \text{Ln}(TA_{i.t}) + \beta_3 \frac{CF_{i.t}}{TA_{i.t}} + \beta_4 \frac{NWC_{i.t}}{TA_{i.t}} \\ & + \beta_5 \frac{CAPEX_{i.t}}{TA_{i.t}} + \beta_6 \text{Leverage}_{i.t} + \beta_7 \text{dividend-dummy}_{i.t} + \varepsilon_{i.t}\end{aligned} \tag{8}$$

where, MV represents firm's market value, CF shows earning after interest dividends and taxes but before depreciation, NWC is an indicator of the net working capital, and CAPEX, leverage, dividend dummy represent capital expenditure, financial leverage, and dummy variable, respectively. In addition, in the year which the firm pays the

dividend, the values of dividend dummy equals 1. Otherwise, it is zero.

Three different criteria were used to split the firms. Based on the first criterion, positive and negative residual values are used to identify firms with or without excess cash, respectively. Using this criterion, it was revealed that 550 year-company out of 954 observations may have excess cash. To further investigate and more precisely compare the results, the analysis retested by other methods. According to the second criterion, firms were categorized by the median of the residual of model 8. In this step, both groups of firms equally contained 477 year-company observations. In addition, samples were divided into four parts of 25%, 50%, 75%, and 100% of all sample based on the residuals of model 8, and the top and bottom quartile observations were considered as firms with and without excess cash holdings respectively.

Information asymmetry was entered into the Pinkowitz et al. model (2006) in order to explore the effect of deviation from the optimal cash level on the increasing of adverse selection and moral hazard problems. As a result, the final model applied to test the research hypothesis was provided as:

$$\frac{V_{i.t}}{TA_{i.t}}=\beta_0+\beta_1\frac{C_{i.t}}{TA_{i.t}}+\beta_2\frac{C_{i.t}}{TA_{i.t}}*\text{Info-Asyn}_{i.t}+\beta_3\text{Info-Asyn}_{i.t}+\beta_4\frac{E_{i.t}}{TA_{i.t}}+\beta_5\frac{I_{i.t}}{TA_{i.t}}+$$
$$\beta_6\frac{D_{i.t}}{TA_{i.t}}+\beta_7\frac{dNA_{i.t}}{TA_{i.t}}+\beta_8\frac{dE_{i.t}}{TA_{i.t}}+\beta_9\frac{dI_{i.t}}{TA_{i.t}}+\beta_{10}\frac{dD_{i.t}}{TA_{i.t}}+\beta_{11}\frac{dE_{i.t+1}}{TA_{i.t+1}} \quad (9)$$
$$\beta_{12}\frac{dI_{i.t+1}}{TA_{i.t+1}}+\beta_{13}\frac{dNA_{i.t+1}}{TA_{i.t+1}}+\beta_{14}\frac{dD_{i.t+1}}{TA_{i.t+1}}+\beta_{15}\frac{dv_{i.t+1}}{TA_{i.t}}+\varepsilon_{i.t}$$

In this model, V and C are indicators of firm's size, which was calculated via market value of company and cash, respectively. In addition, $\frac{C}{TA}*Info-Asyn$ as well as $Info-Asyn$ represent the relationship between information asymmetry and cash holdings, and information asymmetry, respectively. Besides, E, I, D show earnings before extraordinary, interest expenses, and common dividend paid. Furthermore, NA and TA indicate net assets and total assets. Variables shown by *d* symbol reflected previous to current year's changes as well. It was expected that the control variables entered into the model to control the effect of the variables affect firm value. Model 9 is

estimated for firms with and without deviation from optimal cash holdings level and results are compared in the next section.

Data analysis and hypothesis testing

Jark-Bra test was used to examine the normality of the variables. Since the *p*-value of the test for all variables at 95% level of confidence was less than 5 percent ($p \leq .05$), it can be stated that none of the variables were normal. Accordingly, to explore the correlation between the variables, Spearman method was applied. The highest correlation coefficient among independent variables belonged to variables of MV and CF with a correlation coefficient of 0.44 at a *p*-value of 0.001 and the lowest correlation belonged to MV and Leverage with a correlation coefficient of 0.45 at a *p*-value of 0.0001. Generally, the results of the correlation test among the variables indicated that there was no high correlation among independent variables and hence, no co-linearity was supposed to happen among independent variables.

The results obtained from both tests of Levin, Lin, and Chu and Phillips-Perron revealed that all variables were stationary at 95% level of confidence. In addition, according to the results of F-Limer and also Hausman tests, fixed-effect-based panel data model was recognized as the most appropriate model to estimate regression model 8. Investigating the results of Breusch-Pagan and Wooldridge tests also showed that there was no autocorrelation. However, there existed heterogeneity of residuals. In order to deal with heteroscedasticity, Generalized Least Squares method (EGLS) was used.

Finally, to test the research hypotheses, 24 separate cross sectional regressions were estimated using Pinkowitz et al. (2006) model. Classical assumptions for above regression was also explored and possible problems were removed.

Results

Tables 1, 2 and 3 propose the hypothesis testing results based on each of three sample splitting methods.

Table 1. Split of Samples According to Residuals of Model (8)

Variable	Whit SYNCH (FF3)		With PCNII		With Spread	
	Residual		Residual		Residual	
	<0	>0	<0	>0	<0	>0
C/TA_t	-0.89	8.53	-2.60	-3/85	-10.95	3.42
	[0.83]	[0.01]	[0.33]	[0.28]	[0.05]	[0.01]
C/TA_t*SYNCH(FF3)	8.35	4.76				
	[0.00]	[0.01]				
SYNCH(FF3)	-0.12	0.10				
	[0.35]	[0.34]				
C/TA_t*TPCNII			27.5	20.1		
			[0.00]	[0.02]		
TPCNII			-0.40	-0.01		
			[0.00]	[0.99]		
C/TA_t*Spread					0.53	0.13
					[0.02]	[0.01]
Spread					-0.01	-0.01
					[0.01]	[0.00]
E/TA_t	0.03	-2.44	-0.17	-0.53	0.06	-0.11
	[0.01]	[0.01]	[0.78]	[0.01]	[0.00]	[0.62]
dE/TA_t	-0.03	1.50	7.94	1.38	-0.08	-0.10
	[0.06]	[0.47]	[0.00]	[0.00]	[0.00]	[0.77]
dE/TA_{i+1}	-0.18	-0.97	-4.41	0.94	-0.05	-0.29
	[0.24]	[0.70]	[0.13]	[0.00]	[0.00]	[0.03]
I/TA_t	-2.76	-5.40	0.54	-8.10	-0.57	-0.85
	[0.51]	[0.00]	[0.41]	[0.03]	[0.91]	[0.75]
dI/TA_t	-7.22	0.04	0.56	-4.07	-7.51	3.82
	[0.35]	[0.98]	[0.71]	[0.79]	[0.21]	[0.28]
dI/TA_{t+1}	1.36	-11.1	-4.42	48.5	5.98	2.76
	[0.90]	[0.00]	[0.12]	[0.01]	[0.28]	[0.40]
D/TA_t	1.05	4.66	6.64	7.54	0.84	6.27
	[0.16]	[0.00]	[0.00]	[0.01]	[0.13]	[0.00]
dD/TA_t	1.22	0.46	-5.03	-3.08	2.03	2.67
	[0.01]	[0.68]	[0.00]	[0.00]	[0.00]	[0.16]
dD/TA_{i+1}	2.86	4.42	1.25	-0.03	0.33	3.70
	[0.01]	[0.07]	[0.36]	[0.97]	[0.69]	[0.09]
dNA/TA_t	-0.15	1.12	-0.52	1.75	0.26	-0.54
	[0.89]	[0.10]	[0.09]	[0.01]	[0.74]	[0.12]
dNA/TA_{i+1}	-2.11	1.40	-2.69	0.99	-1.02	-0.05
	[0.01]	[0.02]	[0.00]	[0.09]	[0.05]	[0.95]
dv/TA_{i+1}	-0.53	-0.19	-0.61	-0.36	-0.53	-0.19
	[0.04]	[0.38]	[0.03]	[0.00]	[0.06]	[0.1]

Table 2. Split of Samples According to the Residuals Median of Model (8)

Variable	Whit SYNCH (FF3)		With PCNII		With Spread	
	Excess cash		Excess cash		Excess cash	
	Median<	Median>	Median<	Median>	Median<	Median>
C/TA_t	2.01	6.90	-0.60	6.10	-.12.4	4.19
	[0.63]	[0.00]	[0.85]	[0.00]	[0.06]	[0.00]
C/TA_t*SYNCH(FF3)	8.90	7.18				
	[0.00	[0.01]				
SYNCH(FF3)	-0.10	-0.24				
	[0.49]	[0.11]				
C/TA_t*TPCNII			14.9	0.61		
			[0.03]	[0.03]		
TPCNII			-0.28	0.64		
			[0.36]	[0.24]		
C/TA_t*Spread					0.62	0.10
					[0.04]	[0.02]
Spread					-0.01	-0.07
					[0.02]	[0.01]
E/TA_t	0.03	-3.30	-0.03	-0.05	0.02	0.20
	[0.00]	[0.07]	[0.31]	[0.87]	[0.06]	[0.25]
dE/TA_t	-0.03	14.5	0.03	-0.24	-0.04	-0.01
	[0.12]	[0.00]	[0.56]	[0.59]	[0.14]	[0.96]
dE/TA_{i+1}	-0.01	-1.27	0.05	-1.62	-0.04	-0.34
	[0.39]	[0.21]	[0.20]	[0.12]	[0.23]	[0.01]
I/TA_t	-1.43	-6.05	-2.80	-3.09	-3.87	-0.97
	[0.76]	[0.04]	[0.36]	[0.18]	[0.43]	[0.65]
dI/TA_t	-9.31	-1.07	2.77	1.02	-3.60	2.99
	[0.30]	[0.78]	[0.65]	[0.68]	[0.58]	[0.34]
dI/TA_{t+1}	2.83	-4.33	-2.14	-6.10	-4.35	2.19
	[0.81]	[0.17]	[0.55]	[0.01]	[0.71]	[0.44]
D/TA_t	0.71	6.23	2.43	5.43	1.19	5.64
	[0.42]	[0.00]	[0.00]	[0.00]	[0.18]	[0.00]
dD/TA_t	1.30	-2.15	-1.58	0.51	1.21	2.53
	[0.01]	[0.30]	[0.18]	[0.74]	[0.05]	[0.15]
dD/TA_{i+1}	3.04	1.67	0.61	3.98	0.70	3.06
	[0.01]	[0.76]	[0.39]	[0.01]	[0.46]	[0.15]
dNA/TA_t	-0.07	0.62	-1.11	-0.01	-0.47	-0.41
	[0.95]	[0.31]	[0.14]	[0.91]	[0.60]	[0.06]
dNA/TA_{i+1}	-2.07	0.91	-0.81	1.26	-1.66	-0.21
	[0.00]	[0.40]	[0.18]	[0.12]	[0.00]	[0.77]
dv/TA_{i+1}	-0.54	0.02	-0.75	-0.04	-0.47	-0.20
	[0.00]	[0.93]	[0.00]	[0.70]	[0.60]	[0.18]

Table 3. Split of Samples According to the Top and Bottom Quartiles of Residuals Median of Model (8)

Excess cash	<25%	25%-50%	50%-75%	>75%
C/TA_t	11.8	-6.61	-4.91	8.23
	[0.19]	[0.06]	[0.11]	[0.02]
C/TA_t*SYNCH(FF3)	29.9	15.6	13.2	8.81
	[0.02]	[0.03]	[0.00]	[0.00]
C/TA_t	-8.75	0.75	3.06	5.51
	[0.16]	[0.61]	[0.00]	[0.00]
C/TA_t*TPCNII	19.1	27.8	9.56	9.26
	[0.02]	[0.00]	[0.01]	[0.03]
C/TA_t	-24.2	5.31	-5.33	3.40
	[0.00]	[0.25]	[0.01]	[0.01]
C/TA_t*Spread	0.67	0.33	0.18	0.12
	[0.03]	[0.03]	[0.04]	[0.00]

Using three proxies of information asymmetry, results of cash evaluation for two groups of firms with lower and higher optimal level of cash holdings are provided in Table 1. In this table, the coefficient and the sign of variable C/TA*SYNCH is positive at the confidence level of 95% for both groups. The above-mentioned value of the coefficient for firms with lower (higher) optimal level of cash holdings is 8.35 (4.76). Therefore, it can be inferred that when firms hold lower cash than optimal level, pecking order theory is preferred to free cash flow theory. In other words, although there exists a significantly positive association between information asymmetry and marginal value of cash holdings, such a positive relationship is gradually decreased when the firms hold higher cash than optimal level or it may even be changed into a negative relationship.

In Table 1, the coefficients of variables C/TA*Spread and C/TA*TPCNII – where information asymmetry was measured by bid-ask spread and percentage change in the number of institutional investors, respectively – were the same as those of variable C/TA*SYNCH where information asymmetry had been calculated using stock price synchronicity technique and Fama and French' three-factor model in such a way that the coefficient of interactional effect of information asymmetry and marginal value of cash holdings were higher for firms having lower cash than optimal level as compared to firms having higher amount of cash than optimal level. Therefore, pecking order theory has

priority over free cash flow. Consequently, it can be concluded that in the time of information asymmetry, if companies do not have deviations from the desired level of cash, the benefits of holding cash will prevail over its disadvantages. This is because in this condition, the lower and higher optimal levels of cash holdings lead to adverse selection and moral hazard problems, respectively.

For further investigation, two other methods of firm division were used in addition to the first method of firm separation into two groups of firms with lower and higher optimal cash level, the results of which are provided in Tables 2 and 3.

In Table 2, the median of residuals of model (8) were used to divide the firms. The results show that at any circumstance, pecking order theory dominates free cash flow theory. The coefficient of interactional effect of information asymmetry and marginal value of cash holdings is significantly positive. In addition, the numerical value is higher for firms with no excess cash holdings compared to firms with excess cash holdings. The findings indicate that in case of information asymmetry, optimal level of cash holdings increases firm's value. However, holding cash higher than optimal level increases the managers' misuse due to agency problems, which stems from the contradiction between management and ownership and allows the managers to lose the excess cash in their favor and at the cost of shareholders.

In Table 3, similarly, the results of both groups of firms confirmed pecking order theory. In other words, it can be stated that there is a positive relationship between information asymmetry and marginal value of cash holdings. However, when the companies hold higher than optimal level of cash, the positive relationship between information asymmetry and the final value of cash holdings decreases steadily, and if this situation continues, it will probably also become a negative relationship.

Discussion and Conclusion

This study aimed to find out which of the two contradictory theories of pecking order and free cash flows was preferred to the other under information asymmetry conditions.

The results of the first research hypothesis confirmed pecking order theory and is in line with the findings of Salehi et al. (2014), Maabadi

et al. (2013), Nourafkan (2012), and Autore and Kovacs (2006). The sensitivity toward using accumulated cash increases in information asymmetry conditions through a rise in the difference between internal and external financing costs. Information asymmetry, according to Opler et al. (2009) makes it hard to raise external funds and causes adverse selection costs since outsiders want to make sure that the securities they purchase are not overpriced. In Myers and Majluf' viewpoints (1984), if investors know less about the real value of the firm than insiders, they may underprice the firm's shares. Also, if the firm inevitably issues its shares to raise cash to undertake new projects, then underpricing may be so severe that the new investors obtain a value more than the new present value net. This causes the current investors to lose. In such cases, firms favor internal over external financing. In addition, when encountered with unusual crisis or valuable investment opportunities, firms with lower optimal cash level inevitably refer to fund market to finance investment projects. Due to information asymmetry, the cash provided will cause adverse selection costs for the firm. In this condition, cash holdings impede adverse selection costs increasing by external financing and in this way help increase the value of the firm.

Besides, the results of the second research hypothesis also confirmed free cash flow theory and is in conformity with research findings by Zaheer (2017), Poorzamani and Razmpour (2013), Chung et.al (2012), Ghorbani and Adili (2012), Robertz and leary (2010) and Pinkowitz et al. (2006). In case of information asymmetry and agency problems, firms with excess cash tend toward a quick use of the cash and low-return investments which, in return, leads to an increase in moral hazard among the managers and decreases the value of the firm. These findings reveal the importance of agency issues resulting from free cash flows. In addition, according to Allayanniz and Mozumdar (2004), the more the cash is, the lower the ratio of asset return will be. Meanwhile, under inflationary conditions, the firm will incur a loss because of losing the power of cash bidding and the decrease of its effect.

The findings indicate that in case of information asymmetry, when the amount of cash is lower than optimal level, the adverse selection cost increases. In addition, the significantly positive effect of marginal value of cash on firm value is more. When the amount of cash is more

than optimal level, the reverse condition occurs, and the positive effect of cash holdings on firm value becomes lower. Therefore, managers increase moral costs in order to raise the face value of the firm. One possible justification for this can be that in developing countries like Iran, problems relating to agency costs are more obvious. In other words, the cause of this issue can be investigated in terms of the availability of information asymmetry between the owner and manager of commercial unit. As a result, it is probable that the managers in developing countries perform in line with the shareholder's interests and think of increasing their own interests. Therefore, regarding the findings of the study, it seems that due to high costs of managers' moral hazard in Iran, firm value is less when holding cash is lower than optimal level as compared to the time of holding higher optimal cash level. While confirming both pecking order and free cash flow hypotheses, the results of the present study also corroborates those of Liu (2015).

According to the results of the proposed hypotheses and considering the fact that deviation from the optimal cash level can reduce firm's value, it is recommended that firm managers delineate their optimal cash level through determining the interests and the importance of the marginal costs of cash holdings. Besides, firm's management proceeds to hold the cash according to cost-interest analysis derived from cash holdings in information asymmetry conditions and the effect of such analysis on firm's value. This is an indicator of the significance of trade-off theory in cash holdings. According to this theory, firms must create a balance between the interests and costs of cash holdings through optimal level cash holdings. Finally, based on the obtained results, it is suggested that in information asymmetry, investors and creditors consider the amount of cash holdings as an important factor in decision making, given its effect on firm's market value in order to be able to obtain appropriate decisions.

The study can be retested in selected industries in order to compare the findings since managers in different industries may have various viewpoints regarding cash holdings. Furthermore, the procedure taken by the study to divide the samples according to the quality of corporate governance into two groups of firms with high and low corporate governance can be another avenue for further research.

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