

The effect of managers' overconfidence on cash holdings in companies listed on the Baghdad stock exchange: Mathematical analysis

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ABSTRACT

One of company managers' most important financial decisions is to choose an optimal level of cash holdings so that cash deficit costs are reduced, and profit resources are directed in line with the company's profitability goals. Managers' overconfidence is one of the most critical factors affecting the company's cash Holdings. The raison d'être of overconfidence is the peace that people get from it. In this regard, the current research aims to mathematically investigate the effect of managers' overconfidence on cash Holdings in companies listed on the Baghdad Stock Exchange in the ten years between 2012 and 2022. The statistical population of this research was the companies admitted to the Baghdad Stock Exchange, and 50 companies were selected using the systematic elimination method. A multivariate regression method and combined data were used to test the hypotheses. The research findings based on mathematical analysis showed that managers' overconfidence does not affect companies' cash Holdings on the Baghdad Stock Exchange.

Keywords: Mathematical analysis, Overconfidence, cash holdings, financial decision-making, Baghdad Stock Exchange, multivariate regression.

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1. Introduction

The term liquid assets describe cash and assets that can easily be converted into cash. If capital market imperfections increase the borrowing rate relative to the lending rate, maintaining liquidity will have a cost. There should be a balance between profits from liquidity and maintenance costs. It works. Cash is the most liquid asset; other assets have different amounts of liquidity, which depends on their ease of liquidation. Apart from cash, other assets have two dimensions: (1) the time required to convert assets into cash and (2) the degree of certainty regarding the liquidation of assets. Liquidity management involves identifying these two types of assets that the company will hold. Against the benefits of having cash, there are costs. At this time, the desired and optimal amount of liquidity will be determined by the final analysis of the yield obtained from maintaining liquidity.

Many theories have been proposed about the level of cash retention. Still, in most of these theories, factors such as investment opportunities, financial leverage, cash flows, and the size and liquidity of assets are shared in determining cash retention. Based on the balance theory, companies determine the optimal amount of their cash by balancing the benefits and costs of holding cash. Companies adjust their optimal level of cash by assessing the importance of the final expenses and the final benefits resulting from carrying cash. The critical point of this theory is that there is an optimal level of cash for companies in which the management takes a proactive approach based on cost-benefit analysis to maintain cash [1].

One of the reasons cash managers hold cash is that they are risk averse. Opportunistic managers try to keep more cash at the expense of shareholders. Since saving excess cash allows managers to take arbitrary actions to avoid capital market principles, investing in cash can have detrimental effects on firm value. With this interpretation, the assumption of agency costs in managerial theories means that management can keep cash at the expense of shareholders but for its benefit [2]. and it depends on the specific characteristics of the managers of each company, such as the behavioral and personality characteristics of the managers. One of the most critical behavioral characteristics of managers is overconfidence.

Overconfidence causes people to overestimate their knowledge and skills, underestimate their risks, and feel they have control over issues and events when this may not happen. Based on the principles of overconfidence, people who are more inclined towards their work in doing more complex tasks are more attracted to risky opportunities. Therefore, managers carry out complex investment opportunities; They keep cash. Since determining the optimal level of liquidity is very important in the capital market of Baghdad, it is essential to examine the effect of managers' overconfidence on the level of cash retention. Therefore, the results of this research contribute to the richness of the existing literature in this field.

2. Literature Review and research background

Usually, a significant part of the company's assets is kept in the form of cash or tradable securities, and this ratio varies between 8 and 22% in most cases [3]. Cash reserves held by companies have increased significantly over the past decades. Some companies keep excess cash compared to their needs for reasons such as information asymmetry or using it for future investment opportunities.

Keynes has identified three motivations for holding cash: trading motivation, foresight motivation, and speculative motivation (speculation). The reason for giving and receiving is the need for cash that exists for business payments. Foresight motivation to keep cash should be done by keeping a fund (cash) or savings to face possible unexpected events. A speculative basis depends on holding cash to take advantage of anticipated changes in stock prices.

One of the reasons managers hold cash is that they are risk averse. Opportunistic managers try to keep more cash at the expense of shareholders. Since saving excess cash allows managers to take arbitrary actions to avoid capital market principles, investing in cash can harm the company's value. With this interpretation, the assumption of agency costs in managerial theories means that management can keep cash at the expense of shareholders but for its benefit [4]. When the company's liquidity is low, the company will turn to external financing to pay short-term debts. But this action will have its costs. Therefore, in keeping extra cash in the company, investors value more for each rial of extra cash. But suppose the company's liquidity level is stable at debt maturity. In that case, the situation will be different because additional cash will no longer create more value for the company, and investors, knowing this, will value each rial of extra cashless [5].

Companies that keep a limited amount of their assets in cash and quasi-cash. Also, many companies increase the level of their cash assets. Ferreira and Villa [6], by researching the ratio of money to assets of European Monetary Union companies, concluded that these companies account for 15% of all. They keep their purchases in cash or quasi-cash. Bates et al. [7] also reported that US industrial companies' average cash to assets ratio increased by 129% from 1980 to 2004. According to what has been said and also many other issues, it is possible to understand the result of the increasing importance of cash and its effect on companies, so such a reason is logical to be a motivating factor for the company and its shareholders to take measures to avoid taxes to achieve their primary goal, which is to increase the percentage of shareholders' interests.

Deciding to determine companies' cash reserves is considered one of the issues worthy of attention in the financing literature. The main advantage of keeping cash in inefficient capital markets is increasing the company's ability to use valuable investment opportunities and avoiding the high costs of financing outside the company; on the other hand, keeping elevated levels of cash for the company has an opportunity cost [8]. Managers should determine the best financing sources to maximize shareholders' wealth and increase the company's value [9]. Risks and adverse events are defined. In the financial and accounting literature, strong evidence has been presented regarding the effect of managers' overconfidence on investments, profit sharing, internal controls, conservatism, etc [10]. Providing such evidence regarding the outcome of managers'

overconfidence in various company policies shows the impact of this feature on cash held. Overconfidence happens frequently in everyday life, and as a result, its traces can be seen in investment decisions. It is possible. People are more confident about the correctness of their judgments and can hardly consider the possibility of mistakes in their choices. For this reason, financial analysts barely return to their original opinion after presenting their report, even when they have obtained more information, and the new information overshadows their previous judgment.

The conducted studies show contradictory findings regarding the effect of managers' overconfidence on cash held. For example, the research results of Aktas et al. [11] and Winifred et al. [12] show the positive effect of managers' overconfidence on cash held and cash flow sensitivity. They argue that overconfident managers may have more money to finance future investment opportunities to avoid future financing outside the company, which, in their view, is unnecessarily costly. On the other hand, the research results of Deshmukh et al. [13] prove the opposite of this issue. In this regard, their argument is based on the fact that overconfident managers may consider the current costs of financing outside the company unnecessarily expensive and, therefore, capital To finance current investments through internal sources, which reduces the cash held.

The organization's managers, as its vital decision-makers, are exposed to cognitive distortions and irrational behaviors. This issue causes managers' performance and, consequently, the performance of organizations to decrease. Recognizing irrational behaviors and psychological distortions and their effects on the performance of managers and organizations is one of the study topics that has been of great interest to researchers in recent years. Irrational behavior in behavioral finance literature is not the opposite of rationality in classical finance. Still, irrational behavior means behavior that does not fully comply with the defined rational characteristics of classical finance or deviates from it [14]. The main issue of behavioral finance is that people have cognitive distortions when making decisions and cannot make completely sound decisions. One of the essential cognitive distortions is overconfidence. Various studies have shown that professional people and jobs that need to make decisions are more exposed to this strain than others; the senior management of for-profit organizations can be considered one of these jobs. It is assumed that managers make their decisions rationally and seek to create more value for their shareholders, but this is not always the case. They make a lot of effort to implement them so that they ignore the market's valuation and suspect that foreign financing is expensive. As a result, they invest all the cash obtained from the company's activities in projects that they think are profitable. The consequence of this action is a reduction in the company's value and the loss of shareholders. Overconfidence or overconfidence in the general statement can be summed up in an unfounded confidence in one's cognitive abilities, judgments, and intuitive reasoning. Overconfident managers impose many costs on shareholders by not investing correctly, using excessive company cash, and not distributing it [15].

According to the equilibrium theory, large companies with bank credit can borrow at a better rate and obtain funds more quickly if necessary [16]. In addition, large companies can always sell part of their unnecessary assets to receive funds. Also, size negatively indicates information asymmetry between the company's internal and external employees. Mirz and Majlov [17] showed that companies use debt financing when information asymmetry is insignificant. According to the free cash flow theory, managers usually tend to grow the company beyond its optimal size because its growth increases the management's power by increasing the resources under its control [2]. Also, larger companies tend to have more shareholder ownership dispersion, which gives management more authority. In addition, large companies are less likely to be exposed to unwanted acquisitions due to the financial resources needed to purchase them. Therefore, it is expected that managers of large companies have more discretionary power regarding investment and economic policies, which leads to a more significant amount of cash balance [6].

Suleiman [18] has conducted research entitled "Financial Constraints about excess cash and company performance." For this purpose, information on 56 companies in Pakistan was collected in 10 years between 2009 and 2018. The results showed that financial constraints significantly affect excess cash and company performance. However, financial restriction has no significant effect on financial leverage, return on capital, and return on assets. Aktas et al. [19], in research entitled Overconfidence of the CEO and the Value Relationship of the Level of Cash Retention, examined the relationship between the overconfidence of the CEO and the value relationship of the level of cash retention. The results and findings of the research showed a positive relationship between the CEO's overconfidence and the value relationship of cash holding level. Kay et al. [20], in a study titled "Do internal controls governing financial reporting reduce agency costs?" They have

investigated the effect of the weakness of internal controls on the value relationship between the level of cash holding and capital expenditure. The results and findings of this research show that the existence of internal controls on financial reporting reduces agency problems. Shiu and Lee [21] have conducted research titled "Excess Cash and Investment: The Moderating Role of Financial Constraints and Management Consolidation." They selected a sample based on Taiwanese firms as an emerging market between 2000 and 2006. Excess cash significantly correlates with capital expenditures, especially for financially constrained firms with solid managerial leverage. Karimi Taleghani and Watanparast [22] have investigated "the effect of financial helplessness on the speed of adjustment of cash holding with an emphasis on the growth opportunity and financial limitation" in research. The statistical sample of the study includes 118 companies in the period from 1392 to 1398. The results show that the speed of adjustment of cash holding in financially distressed companies is higher than in non-financially distressed companies. Also, the effect of financial helplessness on the rate of adjustment of cash holding is more significant in companies with high growth opportunities and financial constraints than in other companies. Fakhari, Irani, and Babajani [23] have also conducted research entitled "Excess cash, continuity of transactions and value of companies admitted to the Tehran Stock Exchange." In this research, the information of 155 companies in the Tehran Stock Exchange from 1388 to 1398 has been tested and analyzed using the combined data analysis method. The results show a positive and significant relationship between the continuity of transactions and the value of the company, and the presence of the adjusting variable of continuity of transactions makes the relationship between surplus cash and the value of the company positive and significant. [24] conducted research entitled "The impact of growth opportunities, financial constraints and financial helplessness on the speed of adjustment of cash holding in small and medium-sized companies." Several 75 small and medium-sized companies admitted to the Tehran Stock Exchange from 2011 to 2016 were selected as a sample and tested using multiple regression equations based on combined data. This research showed that the speed of small and medium companies adjusting the amount of cash held to reach their target level is affected by growth opportunities, financial limitations, and financial helplessness. The research results show that small and medium-sized companies adjust their cash quickly due to concerns about losing growth opportunities, financial constraints, and costs related to economic helplessness. In research, Jafari and Jafari [25] investigated "the moderating role of institutional shareholders and financing restrictions on the relationship between excess cash holdings and changes in company value." The results of the research show that excess cash reserves have a positive effect on the value of the company. Also, financial limitation significantly affects the relationship between excess cash retention and company value. In addition, the relationship between excess cash retention and company value is involved in the presence of institutional shareholders and financial limitations. Badavarhanhandi and Derkhor [26] have conducted research titled "Investigating the Relationship between Financial Constraints, Cash Value, and Net Investment." In this research, the financial information of 86 companies during the period of 2016 to 2018 has been examined. The analysis found that cash increases the company's value more in companies with financial constraints than in companies that do not. Also, money has a direct relationship with the amount of investment, and changes in cash in companies with financial constraints are more likely to cause excess returns than in companies without financial restrictions.

According to the proposed theoretical foundations, the research hypothesis was developed as follows:
 Research hypothesis: Overconfidence of managers has a positive effect on cash retention.

3. Method

The current research is applied based on the results because different people can use its effects. Based on the method, it is a descriptive-correlation type. From the nature of the data, the type of research is quantitative. In addition, in terms of the kind of reasoning, it is considered inductive-deductive. It is archival regarding the post-event time dimension and information collection methods and techniques. In terms of its nature, it is original (first-hand) research. Paying attention to the fact that in authentic research, the availability of information is of particular importance, and according to the criteria set by the stock exchange organization, the information related to the companies admitted to the stock exchange is more coherent, homogeneous, and of high quality. It is higher than other companies. In addition, information about companies admitted to the stock exchange is available in Baghdad. Therefore, in this research, the statistical population is the companies admitted to the Baghdad Stock Exchange from 2012 to 2022. For sampling, using the systematic elimination method, all the companies in the statistical population with the following conditions were selected as samples, and the rest were excluded: 1- The end of the companies' financial year is December 31 to make the information comparable. 3- They should not be part of financial intermediaries, investment, or leasing companies. 4- The information related

to the variables selected in this research should be available. According to the above conditions and restrictions, 50 companies have been selected from the companies listed on the Baghdad Stock Exchange.

4. Empirical models

We have used the following multiple regression models to test the research hypotheses for panel data consisting of 550 observations, according to Chen et al. (2020). The model is presented as follows:

$$\text{cash}_{i,t} = \alpha_0 + b_1 \text{OVC}_{i,t} + b_2 \text{div}_{i,t} + b_3 \text{size}_{i,t} + b_4 \text{lev}_{i,t} + b_5 \text{CAPEX}_{i,t} + b_6 \text{MB}_{i,t} + b_7 \Delta \text{NWC}_{i,t} + b_8 \Delta \text{shortdebt}_{i,t} + \varepsilon_{i,t}$$

Table 1. Variable measurement and definitions

Variable	Symbol	Variable measurement and definitions
Cash holdings	cash	The ratio of cash plus short-term investments to the book value of assets
overconfidence	OVC	dummy variable: if the profit forecasted by the management is more than the actual value, it takes one and zero; otherwise
Dividend Policy	DIV	dummy variable: if the Firm Pay Dividends, it takes one and zero otherwise
Firm size	Size	Natural logarithm of the book value of total assets
Leverage	LEV	Book value of total debts divided by total assets
Capital Expenditure	CAPEX	The ratio of Change in Fixed Assets to the Fixed Assets in the previous year
Market to book	MB	The ratio of the Market Value of Equity to the book value of equity
Net working capital	NWC	the difference between current non-cash assets and current liabilities, scaled by total assets
Change in shot debts	Δ shortdebt	the difference between existing debts and the previous year's debts, scaled by total assets

5. Results and discussion

The research findings are presented in two parts: descriptive statistics and inferential statistics.

5-1- descriptive statistics

Table 2 shows descriptive statistics related to research variables, including central and dispersion indicators.

Table 2. Descriptive Statistics

variable	Kurt	Skew	Max	Min	STD	Mean
Cash holdings	290/42	630/5	219/1	0004/0	120/0	0618/0
Size	795/1	332/0	233/28	245/19	385/2	748/23
LEV	262/2	336/0	953/0	011/0	218/0	362/0
Capex	916/174	781/10	599/7	001/0	419/0	292/0
MTB	482/485	225/21-	516/153	987/862-	159/38	451/3
NWC	367/7	394/1	275/1	686/0-	242/0	085/0
Δ shortdebt	479/56	095/4-	212/2	546/3-	316/0	0086/0

As shown in Table 2, the average variable of "cash holding level" in Baghdad capital market companies is equal to 0.061, which shows that the average cash assets to the total assets of companies in the capital market of Baghdad were equal to 6.1%. On the other hand, the intermediate variable of "financial leverage" is equal to 0.362, which shows that companies' debts were 36.2% of their assets on average.

According to the variance inflation factor test results, the degree of collinearity among the explanatory variables is optimal, and the regression results will not have a problem. Also, the significance level of the Chow test statistic in the research model is smaller than the expected error level. The fixed effects model will be used according to the significance level obtained by the Brash-Pagan test. It is necessary to perform the Hausman test to choose between the random and fixed effects models. The significance level obtained for the Hausman test is greater than the expected error level of 0.05; therefore, using the random effects model will be preferable for testing the research hypothesis. Also, the results of the autocorrelation test in the research model show the existence of autocorrelation between the residuals. The modified Wald test was used to perform the heterogeneity of variance test. The results indicate the problem of heterogeneity of variance in the mentioned model. Therefore, to solve the problem of heterogeneity of variance and autocorrelation, the Price-Winston regression model has been used to test the research hypothesis.

Table 3. Research hypotheses

$cash_{i,t} = \alpha_0 + b_1 OVC_{i,t} + b_2 div_{i,t} + b_3 size_{i,t} + b_4 lev_{i,t} + b_5 CAPEX_{i,t} + b_6 MB_{i,t} + b_7 \Delta NWC_{i,t} + b_8 \Delta shortdebt_{i,t} + \epsilon_{i,t}$				
<i>prob</i>	<i>t-stat</i>	<i>std</i>	<i>coefficient</i>	<i>variable</i>
212/0	25/1-	011/0	014/0-	<i>Ovc</i>
003/0	98/2-	0081/0	024/0-	<i>Div</i>
247/0	16/1	0031/0	003/0	<i>Size</i>
000/0	11/5	0271/0	138/0	<i>Lev</i>
151/0	44/1-	0070/0	010/0-	<i>Capex</i>
455/0	75/0	000/0	000/0	<i>Mb</i>
286/0	07/1	183/0	019/0	<i>Nwc</i>
050/0	96/1-	0263/0	051/0-	$\Delta shortdebt_{i,t}$
518/0	65/0-	0704/0	045/0-	α_0
53/40	<i>F-Stats</i>		1321/0	<i>Adjusted-R2</i>
000/0	<i>Prob</i>			

According to the results of Table 3, the significance level obtained for the "overconfidence" variable statistic is equal to 0.212 and is greater than the 5% error level; it indicates that the overconfidence of managers does not significantly affect the level of cash retention. On the other hand, the adjusted coefficient of determination equals 13.21, which indicates that the independent and control variables can explain and predict 13.21% of the changes in the dependent variable. In addition, the significance level of Wald's statistic equals 0.000, which shows that the regression model is fitted correctly.

6. Conclusion

As stated before, this research investigates the effect of managers' overconfidence on cash retention. A hypothesis was proposed to achieve the above goal. The results of the research hypothesis test indicate that managers' overconfidence does not affect the level of cash holdings of companies listed on the Baghdad Stock Exchange. The results and findings of the research confirm that it seems that in the capital market of Baghdad, the appropriate level of companies' cash is the same in companies with overconfident CEOs and other companies, and it is not affected by the behavioral characteristics of managers (overconfident). In other words, managers maintain the level of cash holdings based on other factors, such as the amount of external financing, financial restrictions, and behavioral factors, such as overconfidence, which do not affect their decisions. The results and findings of the research with the findings of Chen et al. (2020), Aktas et al. [11], Winifred et al. [12], and Deshmukh et al. [13] The conducted studies show contradictory findings regarding the effect of managers' overconfidence on cash held. For example, the research results of Aktas et al. [11] and Winifred et al. [12] show

the positive effect of managers' overconfidence on cash held and cash flow sensitivity. They argue that overconfident managers may have more money to finance future investment opportunities to avoid future financing outside the company, which, in their view, is unnecessarily costly.

On the other hand, the research results of Deshmukh et al. [13] prove the opposite of this issue. In this regard, their argument is based on the fact that overconfident managers may consider the current costs of financing outside the company unnecessarily expensive and, therefore, capital To finance current investments through internal sources, which reduces the cash held. Thus, according to the research results and the lack of influence of overconfidence on the level of cash holdings, it is suggested that the users of financial statements include this issue in their analysis when estimating the company's cash holdings level. Also, the financial managers of the company and financial analysts are suggested to pay more attention to other factors affecting the level of cash retention to evaluate the company's liquidity by estimating the level of cash holdings. Also, the suppliers of the company's financial resources when providing financial resources to the company Apart from the behavioral characteristics of managers, pay attention.

Declaration of competing interest

The authors declare that they have no known financial or non-financial competing interests in any material discussed in this paper.

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