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Managerial overconfidence, internal financing and investment

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Abstract

Corporate investment decisions are determined by a variety of factors, including various managerial measures, including overconfidence of managers, which are important determinants of corporate investment decisions. Most corporate executives prefer internal financing, but if internal resources are not sufficient to meet this need, they use external resources with the least degree of information asymmetry. The purpose of this study was to investigate the effect of managerial overconfidence on investment and the moderating effect of the internal financing method is on their relationship. The study consisted of listed companies in Tehran Stock Exchange during the period 2011 to 2016 and using a systematic elimination sampling method, 97 companies were selected. To investigate the research hypotheses, EVIEWS software and panel data regression method was used. The results of the research showed that managers' overconfidence has a positive and significant effect on investment as well as underinvestment, but internal financing does not have a significant effect on the relationship between the overconfidence of managers and investment as well over-investment. But the effect of internal financing on the relationship between managers' overconfidence and underinvestment was a significant positive. Finally, it became clear that internal financing had a significant negative impact on investment and over-investment.

Keywords: Investment, Internal financing, Overconfidence managers, Over-investment, Underinvestment.

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Introduction

Undoubtedly, investing is one of the most important tasks for company managers. If managers are able to correctly identify valuable investment opportunities (positive net present value plans) in the market and invest appropriately in each of them, this will ultimately lead to company growth. As a result, shareholder wealth will increase (Arabsalehi et al, 2014). Companies need financial resources to invest, and decisions about the corporate financial resources are of the most important financial management decisions to the extent that they are part of the corporate strategic decisions because of their effects on the company financial structure and investor resources (Ghadrdan et al, 2018). Corporate investment decisions are determined by many factors, including economic factors, macroeconomic policies, capital markets, company operations, and so on (Richardson, 2006). Management factors, such as the irrationality of managers, especially in inefficient financial markets and in poorly managed companies, are important factors that determine the investment decisions of companies. (Malmendier et al, 2011). Roll (1986) emphasizes that overconfidence is a kind of irrational behavior that company managers tend to exhibit when making decisions about their business (Heaton, 2002). Overconfidence is a personality trait that can be defined as behavioral bias and having unrealistic (positive) beliefs about any aspect of an event under uncertainty conditions (Skala, 2008). Most overconfident managers are very optimistic about their decisions and their results, especially in terms of investment decisions (Cooper et al, 1988).

They believe that the market values their company less than truly valued, making external financing costly. For this reason, if the company has internal resources, overconfident managers may be more willing to overinvest, but if project financing requires external resources, they may underinvest (Malmendier et al, 2005). According to hierarchical theory (Myers, 1984), companies prioritize their resources for financing by considering the cost of capital, they mainly prefer to use internal financing first and then the next stage, They use debt to finance and ultimately choose to raise new capital. Managers with overconfidence believe that if they use external financing, the value of their company's stock will decrease and they do not consider this desirable (He et al., 2019). As a result, by emphasizing hierarchical theory, they first prefer internal financing, and later prefer debt to equity (Malmandir et al., 2011). From a behavioral finance perspective, corporate executives are more inclined to external financing because they will be able to control the domestic budget more with internal financing; therefore, managers with

overconfidence tend to influence the efficiency of investment projects with internal financing (He et al, 2019). Based on the above, the present study seeks to examine the effect of managers' overconfidence on investment (over-investment and under-investment) and the moderating effect of internal financing methods on their relationship.

Literature Review

Investing in different things by companies has always been considered as one of the most important ways of developing companies and preventing stagnation and backwardness (Farid et al, 2018). Investment decisions are influenced by various factors including behavioral factors. So far, various behavioral factors have been raised in financial decision-making. One of the most important behavioral disorders is overconfident decision-making. Overconfidence is one of the most important findings of psychology in the field of judgment and decision-making. Psychologists define a person with overconfident behavioral characteristics as someone who believes that their information and knowledge are highly accurate (more than what it truly is). According to Hyde, psychology texts have provided two definitions for overconfident people. First, they overestimate their abilities. Second, they perceive an event more definite than it really is (Chavoshi et al, 2015). CEO overconfidence is defined as the possibility of the CEO to anticipate highly positive results, with the overestimation of the probability of results occurring (Malmendier et al, 2008). An overconfident manager will systematically overestimate the future returns from investment projects, or one might say that they overestimate the probability and effect of favorable events and underestimate the probability and effect of adverse events on the corporate cash flows (Heaton, 2002). Therefore, overconfident managers are expected to have higher capital expenditures and overinvest in investment projects (Malmendier et al, 2005).

One of the most important decisions facing business managers is financing decisions. Financing and investing are two sides of the same coin. Funds from financial resources are spent on investments. There are various theories regarding financing, one of the most important of which is the pecking order theory. The pecking order theory is one of the theories related to the choice between debt and equity in the capital structure and states that companies adhere to a hierarchy of financing sources. Hierarchy formation is the result or consequence of information asymmetry. According to this theory, in cases where there is information asymmetry between managers and external investors, managers prefer internal financing to external financing, that is, they

firstly finance from accumulated profits and savings. Then, if internal sources were not adequate, they use external resources by first releasing the least risky securities, i.e. issuing bonds (debt); and if the debt was not enough either, they eventually issue shares (Farid et al, 2018).

Since overconfident managers overestimate and are optimistic about the profitability of their business, they feel the capital market has undervalued their securities. Hence, when a business needs financing, they prefer to issue debt than equity and assume that by choosing shorter-term debt, they increase shareholder wealth. In this case, Heaton (2002) argues that overconfident managers may underestimate the market value of securities issued by companies and as a result, would not go for external financing. When companies seek external financing, they may think that the cost of issuing equity securities is higher than the costs of issuing debt securities; therefore, they prefer debt financing because they believe that stock prices are more sensitive than debt securities to market expectations (Hasani Alghar et al, 2018).

Background

Ahmadi and Ghalambar (2019) examined the effect of managerial overconfidence criteria on the risk of future stock price crashes in companies listed on the Tehran Stock Exchange. Their results show that among the selection criteria for managerial overconfidence, overinvestment, debt-to-equity ratio, net cash flow, dividend policy and capital expenditure ratio have a significant positive effect on the risk of future stock prices crash. In addition, their results show that the main criterion of managerial overconfidence has a significant positive effect on the risk of future stock prices crash.

Hasani Alghar and Rahimian (2018) investigated the effect of a psychological factor (managerial overconfidence) on the debt maturity structure. Their results show that managerial overconfidence has a significant positive effect on debt maturity structure, and companies managers with overconfidence adopt a shorter debt maturity structure, by choosing a higher percentage of short-term debt, and provide the liquidity risk related to this policy does not deter them from doing so.

Darabi and Mohsenzadeh Ganji (2017) investigated the effect of CEO overconfidence on financing ways of companies listed on the Tehran Stock Exchange. Their findings showed that the two financing methods of bank loans and increasing capital are significantly and directly affected by CEO

overconfidence and that CEO overconfidence has a significant, albeit reverse, the effect on financing from debt and share issuance.

Ali Nejad Saro Kalai and Sobhi (2016) examined the effect of managers' overconfidence on book value and market value of the capital structure. Their results indicate that the overconfidence of managers has no effect on the book value of the capital structure, while they observed the effect of overconfidence on the market value of the capital structure.

Chavoshi et al (2015) investigated the relationship between managers' overconfidence and the choice of financing policy in companies listed on Tehran Stock Exchange. Their results show a lack of relationship between managers' overconfidence and financial decisions. Also, they showed that the relationship between cash flow investment and growth opportunities, the profitability of company size, and distress were significantly related to financial decisions.

Arabsalehi et al (2014) examined the effect of overconfidence of senior managers on the sensitivity of cash flow investment The results of this study indicate that over the examined time, the overconfidence of senior managers has increased the sensitivity of cash flow investment.

He et al (2019) examined the effect of managers' overconfidence on the performance of investment (investment; overinvestment and underinvestment) and the moderating effect of internal financing on the relationship between them. Their results indicate that internal financing creates business occasions and reduces capital deficits, but may lead to overinvestment in companies with managerial overconfidence. The results also showed that the relationship between managerial overconfidence and overinvestment in public companies is stronger than that of private companies.

Zhang and Yang (2018) examined the relationship between over-confidence in the CEO and investment financing behavior. Their results show that CEO overconfidence increased the level of leverage, increased the number of loans, and especially increased in the number of short-term loans; and as economic growth accelerated, the CEOs of those companies tended more to show overconfident behaviors.

Tekin (2018) examined the effect of managers' overconfidence on financial decisions. Their results show that the studied managers have a high degree of overconfidence and this bias has a significant impact on financial decisions.

Deshmukh and Goel (2013) concluded that as overconfident managers

find external financing for investment in the company costly if they need higher future investment, they will give lower dividends. They also found that this negative relationship is more intense in firms with lower growth and lower cash flows.

Huang et al (2011) examined the effect of managers' overconfidence on the sensitivity of cash flow investment and the impact of agency costs on that relationship. Their results show that on average, managerial overconfidence leads to an increase in the sensitivity of cash flow investment, and this effect is significantly greater in companies with higher agency costs.

Malmendier et al (2008), in a study entitled "Who makes acquisitions? CEO over conifdence and the market's reaction" found that managers' personal characteristics, especially overconfidence, can lead to deviations in corporate investment decisions, and these optimistic managers have significantly higher investment cash flow sensitivity, especially in joint-stock companies. Their results also show that managers with overconfidence prefer debt financing to share financing.

Ben-David et al (2007), in a study entitled "Managerial Overconfidence and Corporate Policies" concluded that companies that have managers with overconfidence have lower discount rates than cash flow values, invest more, use more debt, are less likely to pay dividends, and are more likely to redeem the shares.

Ekholm and Pasternake (2007), in a study entitled "Overconfidence and investor size", examined the relationship between investor behavior and their investment capacity in Finland. Their findings showed that more minor and more confident investors are more harmed by their investment behaviors. In the end, they came to the conclusion that investor behavior changed and affected by the size and volume of investment.

Heaton (2002) attempted to provide a model for examining the decision-making process of overconfident managers, regardless of agency costs and information asymmetry. Their findings show that overconfident managers, increase their investment free cash flow sensitivity, believing that the market underestimates the value of their firm projects and that external financing costs will be too high. Also, optimistic managers often overestimate cash flows, and as a result, the company investment opportunities will be overvalued.

As mentioned earlier, the effect of managerial overconfidence on investment and the effect of internal financing on the relationship between them, as well as the effect of internal financing on investment, has been

examined in this study. The point distinguishing the present study from local studies is examining the effect of internal financing as an important moderating variable on the relationship between managerial overconfidence and investment.

Research Hypotheses

Economists believe that managers usually rational. However, based on psychological research, researchers have found that people are overconfident when evaluating their skills. People would like to overstatement (Alicke, 1985) and think that they are wiser and better than average people. This "better than average" affects economic decision making (Camerer et al, 1999). The leadership role of management also enhances the confidence of managers: They can use their powers to control the company and move on toward their own interests.

Most thinkers in society consider the importance of overconfidence and its effects on the dimensions of business performance to be significant. However, based on hierarchical theory, corporate managers take their costs into account in order to prioritize financing. Graham and Harvey (2001) believe that most managers of different companies believe that they have the ability to control financing decisions and influence the performance of businesses. On the other hand, it is believed that the psychological characteristics of managers are usually closely related to changes in stock prices and the value of companies. Besides, managers are overconfident about their technological capabilities and the power of their judgment and decision-making. They believe that their companies have high practical potential and that foreign investors are unable to estimate their company's real value and underestimate it. Also, due to the issue of information asymmetry and high costs, managers are interested in providing internal financing and maintaining cash in their company. Previous studies have shown that managers with too much confidence are reluctant to share the profits earned by the company (Deshmuk et al., 2013). Similarly, Ben David et al. (2007) found that managers with overconfidence were less likely to share dividends and more likely to be interested in domestic financing.

For a long time, the issue of improving the efficiency of investment in industry and academia has been considered. Since Schumpeter (1942) stated that companies would be able to maintain a monopoly by investing more in innovative activities, the issue of domestic financing and the need for companies to invest in innovative activities became more important, and studies Extensive funding decisions were made and developed (Howard, 1998).

The pecking order theory proposed by Myers (1984) shows that companies can minimize information asymmetry and the risk of undesirable selection by conducting internal financing. By providing internal financing by the company, additional free cash flow is created, so companies can take advantage of this opportunity and invest more in essentials, but because of the ethical risks, the extra free cash flow can lead to over-investment. In this way, the managers of a company may expand their investment to achieve personal interests. They can also seek to increase their power and position with extra cash. Reducing domestic financing reduces additional cash and makes it impossible to meet the company's investment needs. Under these circumstances, even if it is possible to invest in projects with a net present positive value, companies do not have sufficient cash available for this purpose. Both over-investment and under-investment are considered as classes of inefficient investment.

Managerial overconfidence affects both the decisions they make in terms of financing and the efficiency of companies' investments (Malmandir et al., 2008). They are positive about the future of the company, so they agree with internal financing to improve the company's performance and increase personal interests, so they may make mistakes when deciding on the current value of various projects. In addition, it is possible, young managers are looking to increase their credibility and reputation, and therefore to make any kind of investment Inefficient investments to improve short-term performance (Baker and Wergler, 200) Overconfident managers believe that their companies' stock in the market is less valued than the real value, and therefore tend to use The extra cash flow they have is investing too much. In short, internal financing plays a moderating role between managers' overconfidence and investment effectiveness. In view of the above, the following hypotheses are suggested:

1. Managerial overconfidence has a significant impact on investment.
2. Internal financing has a significant impact on the relationship between managerial overconfidence and investment.
3. Internal financing has a significant impact on investment.
4. Managerial overconfidence has a significant impact on overinvestment.
5. Internal financing has a significant impact on the relationship between managerial overconfidence and overinvestment.
6. Internal financing has a significant negative impact on overinvestment.
7. Managerial overconfidence has a significant positive impact on underinvestment.
8. Internal financing has a positive impact on the relationship between managerial overconfidence and underinvestment.
9. Internal financing has a significant impact on underinvestment.

Methodology

This is an applied study based on the analysis of information collected from the Tehran Stock Exchange. This is a post-event study in nature (based on historical information). Using a systematic elimination sampling method, a statistical sample size of 97 companies for the period of 2012-2017 was selected. The companies studied in this study include all companies that have the following conditions:

1- In terms of increasing comparability, the financial period of companies should end on March 20, and the company should not be one of the financial intermediation companies, insurance companies and investment companies.

2- During the years under review, has not changed their activity or change of fiscal year and their transactions have not been stopped for a long time (3 months).

3- The data desired by the companies should be available during the period under review.

Due to the nature of the research, the library methods and corporate documents and financial statements were used to collect data and information. Research hypotheses were examined using EViews software and panel data regression tests.

1.Variables used in Research

Table 1. Research variables and how they are measured

Variable type	Variable	Symbol	Measurement
Dependent	Investment	INV	The ratio of company investment to total assets
	Overinvestment	overINV	Positive residuals of the Richardson model (2006) except for the first quartile
	Underinvestment	underINV	The absolute magnitude of the negative residuals of the Richardson model (2006) except for the first quartile
Independent	Managerial overconfidence	OC	See the description below in the Table
Moderator	Internal financing	INTERN	Retained earnings to total assets ratio
Control variables	Size of the company	SIZ	Natural logarithm of company assets
	Investment opportunity	TOBIN_Q	The market value of the company plus the sum of liabilities divided by the sum of total assets
	Financial leverage	LEV	The ratio of Debt to assets
	Return on assets	ROA	The ratio of net profit to total assets
	Earnings per share	EPS	The ratio of net profit to total equity
	Cash flow	CF	The ratio of net cash flow to total assets

In this study, according to the study of Ahmed & Duellamanm (2013) and Arabsalehi & Hashemi (2015), the investment surplus criterion was used to measure managerial overconfidence, in which residuals greater than zero indicate overconfidence.

$$ASSET \times GR_{i,t} = \beta_0 + \beta_1 SALE \times GR_{i,t} + \varepsilon_{i,t}$$

ASSET*GR: Corporate asset growth that comes from the difference in asset changes from last year.

1- SALE*GR: Corporate sales growth that comes from the difference in sales changes from last year.
2- Managerial overconfidence is a virtual variable that is 1 if the residuals of the above model are greater than zero, otherwise, it is 0.
3- The Richardson model (2006) is used to measure over and under investment:
4- $INV_t = \alpha_0 + \alpha_1 Q_{t-1} + \alpha_2 Cash_{t-1} + \alpha_3 Age_{t-1} + \alpha_4 Size_{t-1} + \alpha_5 Lev_{t-1} + \alpha_6 Return_{t-1} + \alpha_7 INV_{t-1} + \varepsilon$
5- Q: Tobin's Ratio
6- CASH: Cash
7- AGE: Age of company
8- SIZE: Size of the company
10. LEV: Financial leverage
11.RETURN: Stock returns
12. INV: Investment

2. Models

The regression models used in a study by He et al (2019) were employed to investigate the research hypotheses.

$$INV_{it}(overINV/underINV) = \alpha_0 + \alpha_1 OC_{it} + \alpha_2 SIZE_{i,t-1} + \alpha_3 TOBIN\_Q_{i,t-1} + \alpha_4 LEV_{i,t-1} + \alpha_5 ROA_{i,t-1} + \alpha_6 EPS_{i,t-1} + \alpha_7 CF_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

$$INV_{it}\left(\frac{overINV}{underINV}\right) = \alpha_0 + \alpha_1 INTERN_{it} + \alpha_2 SIZE_{i,t-1} + \alpha_3 TOBIN_{Q_{i,t-1}} + \alpha_4 LEV_{i,t-1} + \alpha_5 ROA_{i,t-1} + \alpha_6 EPS_{i,t-1} + \alpha_7 CF_{i,t-1} + \varepsilon_{i,t} \quad (2)$$

$$INV_{it}\left(\frac{overINV}{underINV}\right) = \alpha_0 + \alpha_1 OC_{it} + \alpha_2 INTERN_{it} + \alpha_3 SIZE_{i,t-1} + \alpha_4 TOBIN_{Q_{i,t-1}} + \alpha_5 LEV_{i,t-1} + \alpha_6 ROA_{i,t-1} + \alpha_7 EPS_{i,t-1} + \alpha_8 CF_{i,t-1} + \varepsilon_{i,t} \quad (3)$$

$$INV_{it}(overINV/underINV) = \alpha_0 + \alpha_1 INTERN_{it} + \alpha_2 OC_{it} * INTERN_{it} + \alpha_3 SIZE_{i,t-1} + \alpha_4 TOBIN\_Q_{i,t-1} + \alpha_5 LEV_{i,t-1} + \alpha_6 ROA_{i,t-1} + \alpha_7 EPS_{i,t-1} + \alpha_8 CF_{i,t-1} + \varepsilon_{i,t} \quad (4)$$

Research findings

Descriptive statistics of variables are measured using data from 97 companies listed on the Tehran Stock Exchange from 2012 to 2017[1].

Table 2. Descriptive statistics

Research variables	Mean	Median	Maximum	Minimum	Standard deviation	Skewness	Elongation	Number of observations
Investment	0.330966	0.290030	0.852632	0.031533	0.193274	0.700173	2.602094	582
Managerial overconfidence	0.460481	0.000000	1.000000	0.000000	0.498865	0.158572	1.025145	582
Internal financing	0.114230	0.123208	0.605556	-0.7903	0.189386	-0.7281	5.020715	582
Size of the company	11.93820	11.86083	14.31845	10.54763	0.636632	0.815248	4.176097	582
Investment opportunity	1.604293	1.441584	4.739627	0.672363	0.618885	1.843386	7.371669	582
Financial leverage	0.607197	0.632701	0.939766	0.090164	0.166476	-0.494166	3.045938	582
Return on assets	0.091326	0.078146	0.631343	-0.4039	0.132972	0.436080	5.090240	582
Earnings per share	0.226184	0.209892	0.858323	-0.8883	0.271663	-0.6735	4.565612	582
Cash flow	0.114331	0.102255	0.642432	-0.3870	0.126408	0.537686	5.064299	582

[1] The systematic elimination sampling method was used with limitations such as the companies not being financial intermediary, have not stopped for more than 3 months, and being active from 2012 to 2017.

Table 3. Descriptive statistics - overinvestment

Research variables	Mean	Median	Maximum	Minimum	Standard deviation	Skewness	Elongation	Number of observations
Managerial overconfidence	0.482587	0.000000	1.000000	0.000000	0.500944	0.069694	1.004857	201
Size of the company	11.94530	11.84982	13.96749	10.55717	0.654547	0.642906	3.524632	201
Investment opportunity	1.538085	1.436179	3.595125	0.672363	0.548349	1.561055	5.630324	201
Financial leverage	0.596123	0.616819	0.939369	0.109104	0.170029	-0.48937	2.899242	201
Internal financing	0.094603	0.121936	0.528823	-0.61984	0.200996	-0.80142	4.484250	201
Return on assets	0.078210	0.071297	0.517987	-0.29371	0.127661	0.311075	4.303033	201
Earnings per share	0.172697	0.182870	0.817046	-0.88436	0.296898	-0.49911	3.468259	201
Cash flow	0.123990	0.104922	0.532428	-0.2689	0.127725	0.503965	4.220959	201
Overinvestment	0.054053	0.043112	0.182472	0.013797	0.039515	1.518531	4.894781	201

Table 4. Descriptive statistics - underinvestment

Research variables	Mean	Median	Maximum	Minimum	Standard deviation	Skewness	Elongation	Number of observations
Underinvestment	0.054554	0.040798	0.196062	0.012330	0.040970	1.429627	4.720364	233
Managerial overconfidence	0.437768	0.000000	1.000000	0.000000	0.497180	0.250878	1.062940	233
Size of the company	11.95049	11.86303	14.22362	10.55240	0.665176	0.917233	4.055810	233
Investment opportunity	1.601974	1.470884	3.869757	0.725678	0.542760	1.351276	4.821288	233

Financial leverage	0.622064	0.654612	0.939766	0.090164	0.175518	-0.605306	3.134414	233
Return on assets	0.095315	0.079933	0.545730	-0.26867	0.134395	0.707675	4.862160	233
Earnings per share	0.246117	0.234071	0.858323	-0.88826	0.282471	-0.7789	5.097943	233
Cash flow	0.103466	0.095502	0.642432	-0.38701	0.133229	0.593720	5.617221	233
Internal financing	0.126350	0.121201	0.770691	-0.3894	0.192560	0.215671	3.828915	233

To prevent false regression results, the reliability of the variables was evaluated by the Dickey-Fuller, Lin, Levine and Chu reliability tests. The results of the above tests are presented in the following table.

Table 5. Variables reliability test - investment

Variables	Statistic	Significance level	Result
Investment	-104.656	0.0000	Reliable
Managerial overconfidence	-28.5151	0.0000	Reliable
Internal financing	-11.3969	0.0000	Reliable
Size of the company	-22.6485	0.0000	Reliable
Investment opportunity	-96.1193	0.0000	Reliable
Financial leverage	-25.2898	0.0000	Reliable
Return on assets	-71.0494	0.0000	Reliable
Earnings per share	-41.8235	0.0000	Reliable
Cash flow	-26.7866	0.0000	Reliable

Table 6. Variables reliability test - overinvestment

Variables	Statistic	Significance level	Result
Overinvestment	-15.27050	0.0000	Reliable
Managerial overconfidence	-15.26321	0.0000	Reliable
Internal financing	-9.748928	0.0000	Reliable
Size of the company	-7.185165	0.0000	Reliable
Investment opportunity	-11.67062	0.0000	Reliable
Financial leverage	-8.742319	0.0000	Reliable
Return on assets	-9.012975	0.0000	Reliable
Earnings per share	-9.663649	0.0000	Reliable
Cash flow	-10.64275	0.0000	Reliable

Table 7. Variables reliability test - underinvestment

Variables	Statistic	Significance level	Result
Underinvestment	-12.02785	0.0000	Reliable
Managerial overconfidence	-15.68920	0.0000	Reliable
Internal financing	-9.260731	0.0000	Reliable
Size of the company	-7.452790	0.0000	Reliable
Investment opportunity	-11.76938	0.0000	Reliable
Financial leverage	-8.903116	0.0000	Reliable
Return on assets	-8.863879	0.0000	Reliable
Earnings per share	-12.50548	0.0000	Reliable
Cash flow	-12.20990	0.0000	Reliable

Using the F-Limer test, it was examined whether panel data regression could be used, also, the type of effects between sections was investigated using the Hausman test. Also, the panel data regression test was used to test the research hypothesis. The results of the above tests are presented in the following table.

Table 8. Panel data regression test results - investment dependent variables

Variables	Abbreviations for variables	Model 1	Model 2	Model 3	Model 4
Managerial overconfidence	OC	0.021217*** (2.951771)	-	0.019642** (2.249345)	-
Managers' overconfidence * internal financing	OC*INTERN	-	-	-	0.010774 (0.401802)
Internal financing	INTERN	-	-0.178969*** (-3.19709)	-0.171613*** (-3.076718)	-0.183587*** (-5.623785)
Size of the company	SIZE	0.137721** (1.985553)	0.111606*** (3.200535)	0.127826*** (3.608073)	0.113096* (1.635513)
Investment opportunity	TOBINQ	-0.038997*** (-5.964493)	-0.038596*** (-3.77086)	-0.038863*** (-3.816915)	-0.038733*** (-6.567029)
Financial leverage	LEV	-0.283816*** (-4.038631)	-0.297335*** (-5.70676)	-0.305920*** (-5.886860)	-0.296239*** (-4.198325)
Return on assets	ROA	-0.151469*** (-4.946149)	-0.012509 (-0.17349)	-0.033364 (-0.461375)	-0.013102 (-0.274406)
Earnings per share	EPS	-0.008022 (-0.268342)	-0.005367 (-0.19521)	-0.011779 (-0.428377)	-0.005730 (-0.181817)
Cash flow	CF	-0.041036 (-0.765082)	-0.030218 (-0.67924)	-0.040264 (-0.905264)	-0.031951 (-0.638562)
The adjusted coefficient of determination	Adj. Rsq	0.805723	0.807927	0.809957	0.807459
Durbin-Watson statistic	Durbin-Watson stat	2.109075	2.027370	2.089712	2.030756
Total model statistic	F-	20.30088***	20.57574	20.64568	20.33100***

	statistic		***	***	
F-Limer test	Fixed Effects Tests	16.650033***	16.680475***	17.079340***	16.657502***
Hausman test	Hausman Test	35.725249***	32.438793***	35.300784***	33.091402***
INV: The ratio of company investment to total assets; OC: Using investment surplus criterion to measure managerial overconfidence; INTERN: Retained earnings to total assets ratio; SIZ: Natural logarithm of company assets; TOBIN_Q: Company market value plus total debt divided by total assets; LEV: Debt to asset ratio; ROA: Ratio of net profit to total assets; EPS: Ratio of net profit to total equity; and CF: Net cash flow to total assets ratio					

Dependent variable: Investment. * At 90% confidence level. ** At 95% confidence level. *** At 99% confidence level.

To determine the effect of the independent variable on the dependent variable, it is judged based on the significance level and t- statistic. The independent variable will have a significant effect on the dependent variable if the significance level is less than 0.05 and the absolute value of t-statistic is greater than 1.96. Based on the table above, the results of the research hypotheses examination show that managerial overconfidence has a positive and significant impact on investment at 95% confidence level; so, the first research hypothesis will be accepted, i.e., increasing (decreasing) managerial overconfidence will increase (decrease) investment, too. The results also show that at 95% confidence level, internal financing has no significant impact on the relationship between managerial overconfidence and investment; so, the second hypothesis will not be accepted, i.e., increasing (decreasing) internal financing has no significant impact on the relationship between managerial overconfidence and investment. Finally, it turned out that at 99% confidence level, internal financing has a significant negative impact on investment; so, the third hypothesis is accepted, i.e., increasing (decreasing) internal financing will decrease (increase) investment.

Coefficients of determination (R) indicate that, for all models, approximately 80-81% of the dependent variable variations are explained by the independent variables considered in this model and the remainder are explained by other variables not considered here. According to the above table, the Durbin-Watson statistic value showed no self-correlation problem. Also based on the probability of F statistic ($F<0.05$) the regression equation is significant overall.

The typical regression test was used to test the research hypotheses, the results of which are presented in the following table.

Table 9. Results of typical regression test - Dependent variable of overinvestment

Variables	Abbreviations for variables	Model 1	Model 2	Model 3	Model 4
Managerial overconfidence	OC	0.002062 (0.351819)	-	0.003243 (0.706277)	-
Managers' overconfidence * internal financing	OC*INTERN	-	-	-	0.024405 (1.162219)
Internal financing	INTERN	-	-0.051462*** (-2.575722)	-0.052681*** (-2.626942)	-0.0610*** (2.8215)
Size of the company	SIZE	0.001648 (0.30514)	0.001197 (0.225072)	0.001098 (0.205910)	0.000337 (0.062863)
Investment opportunity	TOBINQ	0.008381* (1.72400	0.006821 (1.415236)	0.006962 (1.445486)	0.007086 (1.476906)
Financial leverage	LEV	-0.024248 (-1.22399)	-0.030388 (-1.549560)	-0.031640 (-1.604940)	-0.027223 (-1.382631)
Return on assets	ROA	-0.005271 (-0.14342)	0.057688 (1.337307)	0.056147 (1.302913)	0.052926 (1.231483)
Earnings per share	EPS	-0.030971** (-2.24662)	-0.031713** (-2.331836)	-0.032169** (-2.364914)	-0.030790** (-2.279111)
Cash flow	CF	-0.053888** (-2.34058)	-0.050291** (-2.222480)	-0.051632** (-2.270341)	-0.051933** (-2.297059)
The adjusted coefficient of determination	Adj. Rsq	0.201500	0.227908	0.225802	0.229225
Durbin-Watson statistic	Durbin-Watson stat	1.539251	1.574980	1.562852	1.559926
Total model statistic	F-statistic	5.99648***	6.844625***	6.249877***	6.353108***
OC: Using investment surplus criterion to measure managerial overconfidence; INTERN: Retained earnings to total assets ratio; SIZ: Natural logarithm of company assets; TOBIN_Q: Company market value plus total debt divided by total assets; LEV: Debt to asset ratio; ROA: Ratio of net profit to total assets; EPS: Ratio of net profit to total equity; and CF: Net cash flow to total assets ratio					

* Dependent variable: Overinvestment. * At 90% confidence level. ** At 95% confidence level. *** At 99% confidence level.

The results of the research hypotheses examination show that managerial overconfidence has no significant impact on overinvestment; so, the fourth hypothesis will not be accepted. Also, internal financing has no significant impact on the relationship between managerial overconfidence and overinvestment; so, the fifth hypothesis will not be accepted; but internal financing has a significant negative impact on overinvestment, which shows that the sixth hypothesis will be accepted.

Coefficients of determination (R) indicate that for all models approximately 19-23% of the dependent variable variations are explained by the independent variables considered in this model and the remainder are explained by other variables not considered here. According to the above table, the Durbin-Watson statistic value showed no self-correlation problem. Also based on the probability of F statistic (F<0.05) the regression equation is significant overall.

The typical regression test was used to test the research hypotheses, the results of which are presented in the following table.

Table 10. Results of typical regression test - Dependent variable of underinvestment

Variables	Abbreviations for variables	Model 1	Model 2	Model 3	Model 4
Managerial overconfidence	OC	0.010990** (2.057162)	-	0.010625* (1.971679)	-
Managers' overconfidence * internal financing	OC*INTERN	-	-	-	0.074472*** (3.14714)
Internal financing	INTERN	-	-0.021503 (-0.813947)	-0.015598 (-0.589901)	-0.045801* (-1.69282)
Size of the company	SIZE	-0.008643* (-1.810003)	-0.008923* (-1.818318)	-0.008164* (-1.683993)	-0.009013* (-1.8635)
Investment opportunity	TOBINQ	0.005344 (0.917695)	0.005452 (0.929047)	0.005240 (0.898274)	0.002167 (0.371130)
Financial leverage	LEV	0.049852** (2.467242)	0.047717** (2.060595)	0.043301* (1.877249)	0.04158* (1.823586)
Return on assets	ROA	0.007755 (0.222707)	0.035270 (0.878471)	0.019939 (0.491715)	0.001999 (0.04897)

Earnings per share	EPS	-0.000811 (-0.066959)	0.003881 (0.313141)	0.000753 (0.060575)	0.004294 (0.35363)
Cash flow	CF	0.032276 (1.446897)	0.031385 (1.397144)	0.031465 (1.405323)	0.030586 (1.390781)
The adjusted coefficient of determination	Adj. Rsq	0.090738	0.076564	0.088083	0.111797
Durbin-Watson statistic	Durbin-Watson stat	1.979098	1.980850	1.980262	1.972403
Total model statistic	F-statistic	3.893988** *	3.404464** *	3.489917***	4.244632***
OC: Using investment surplus criterion to measure managerial overconfidence; INTERN: Retained earnings to total assets ratio; SIZ: Natural logarithm of company assets; TOBIN_Q: Company market value plus total debt divided by total assets; LEV: Debt to asset ratio; ROA: Ratio of net profit to total assets; EPS: Ratio of net profit to total equity; and CF: Net cash flow to total assets ratio					

* Dependent variable: Underinvestment * At 90% confidence level. ** At 95% confidence level. *** At 99% confidence level.

Based on the table above, the results of the research hypotheses examination show that managerial overconfidence has a positive significant impact on underinvestment; so, the seventh hypothesis will be accepted. Also, internal financing has a positive effect on the relationship between managerial overconfidence and underinvestment; so, the eighth hypothesis will be accepted; but internal financing has no significant impact on underinvestment, which shows that the ninth hypothesis will not be accepted.

Coefficients of determination (R) indicate that for all models approximately 7-10% of the dependent variable variations are explained by the independent variables considered in this model and the remainder are explained by other variables not considered here. According to the above table, the Durbin-Watson statistic value showed no self-correlation problem. Also based on the probability of F statistic (F<0.05) the regression equation is significant overall. The adjusted determination coefficient of the model indicates that its size-dependent variable changes can be attributed to changes in independent and control variables, and the rest of dependent variable changes are due to changes in other factors that have been taken for granted here.

Table 11. Summary of hypotheses results

Row	Hypotheses	Impact	Result
1	Managerial overconfidence has a significant impact on investment.	Positive and significant	Accepted
2	Internal financing has a significant impact on the relationship between managerial overconfidence and investment.	Positive and non-significant	Rejected
3	Internal financing has a significant impact on investment	Negative and significant	Accepted
4	Managerial overconfidence has a significant impact on overinvestment.	Positive and non-significant	Rejected
5	Internal financing has a significant impact on the relationship between managerial overconfidence and overinvestment.	Positive and non-significant	Rejected
6	Internal financing has a significant negative impact on overinvestment.	Negative and significant	Accepted
7	Managerial overconfidence has a significant positive impact on underinvestment.	Positive and significant	Accepted
8	Internal financing has a positive impact on the relationship between managerial overconfidence and underinvestment.	Positive and significant	Accepted
9	Internal financing has a significant impact on underinvestment.	Negative and non-significant	Rejected

Conclusion

The present study investigates the effect of managerial overconfidence on investment (over and under investment) and the effect of internal financing on the relationship between them in companies listed on the Tehran Stock Exchange. Of the most important decisions facing managers are financing and investing decisions. Hence, it is important to examine the behavioral biases affecting such managers' decisions. According to the results of this study, managerial overconfidence has a positive and significant effect on investment and underinvestment decisions, i.e., increasing (decreasing) managerial overconfidence increases (decreases) company investment. The above result shows that when managers are overconfident, they maintain optimistic attitudes about the company and consider investment increase as good news. Another research result showed internal financing had no significant effect on the relationship between managerial overconfidence and investment and overinvestment. The above result shows that the internal financing method has not affected the biased tendencies of the managers that may change the level of investment, and that the managers use other methods of financing to improve

their company performance and to gain their personal benefits. It was also found that internal financing has a negative impact on investment and overinvestment decisions, i.e., increasing (decreasing) using internal financing method decreases (increases) investment level. The above results show that internal financing methods are costly and have reduced investment. Finally, the results of the study showed that internal financing has a positive impact on the relationship between managerial overconfidence and underinvestment. The result shows that overconfident managers have a lower tendency to dividend payout and underinvestment increases because of the increased cash flow, so overconfident managers prefer internal financing. The results of the present study are consistent with Darabi et al (2017), Arabsalehi et al (2014) and Huang et al (2011) and inconsistent with He et al. (2019). Based on the above results, it is recommended that shareholders and managers of companies pay attention to behavioral factors such as overconfidence and investment projects evaluation in selecting company managers, especially CEOs, board members, and executives because this supervision will reduce the likelihood of errors in investments and increase administrative and financial health and information transparency. It is also recommended that other external financing methods be used to increase investment power. For future research, it is suggested to examine the impact of managerial overconfidence on investment (over and under investment) by industry or life cycle. It is also suggested that the impact of external financing methods on the relationship between managerial overconfidence and investment (over and under investment) are examined and the results are compared with this study.

The difference in results between the present study and the study by He et al (2019) can be due to the use of different measurement indices of variables, different times and locations of the research and finally the difference between the markets studied, which are considered as research limitations.

References

Ahmadi, M .& Ghalambar, M. & Dourse, S. (2019). Investigating the Impact of Overconfidence of Senior Managers Criteria on the Risk of Stock Prices Crash in Companies Listed on Tehran Stock Exchange. *Financial Accounting and Auditing Research*, Vol 11, No 41, PP 93–124. (In Persian)

Ahmed, A. S. & Duellamanm S. (2013). Managerial overconfidence and accounting conservatism. *Journal of Accounting Research*, Vol 51, No 1, PP 1-30.

Alicke, M.D. (1985). Global self-evaluation as determined by the desirability and controllability of trait adjectives. *Journal of Personality and Social Psychology*, 49(6), PP 1621–1630.

Ali Nejad Saro Kalai, M. & Sobhi, M. (2016). The Impact of Managerial Overconfidence on Capital Structure. *Financial Accounting and Auditing Research*, Vol 8, No 31, PP 93-109. (In Persian)

Arabsalehi, M. &, Amiri, H. &, Kazemi Nouri, S. (۲۰۱۵). The Effect of Overconfidence of Senior Managers on Investment Cash Flow Sensitivity. *Financial Accounting Research*, Vol 6, No 2, PP 115-128. (In Persian)

Ben-David, I. & Graham. J. R. & Harvey, C. R. (2007). Managerial Overconfidence and Corporate Policies, NBER Working Paper, NO.13711. Available at http://www.nber.org/papers/w13711.

Camerer, C. & Dan, L. (1999). Overconfidence and excess entry: an experimental approach. *The American Economic Review*, Vol 89, No 1, PP 306–318.

Chavoshi, K. & Rastegar, M. &, Mirzaei, M. (2015). Investigating the Relationship Between Managerial Overconfidence and the Choice of Financing Policy in Companies Listed on the Tehran Stock Exchange. *Financial Knowledge of Securities Analysis*, Vol 8, No 25, PP 29-41. (In Persian)

Cooper, A.C. & Woo, C., & Dunkelberg, W. (1988). Entrepreneurs perceived chances for success. *Journal of Business Venturing*, Vol 3, PP 97–108.

Darabi, R. & Mohsenzadeh Ganji, A. (2017). The Impact of CEO Overconfidence on the Financing Methods of Companies Listed on the Stock Exchange. *Economics Studies, Financial Management and Accounting*, Vol 3, No 4, PP 27-39. (In Persian)

Deshmukh, S. & Goel, A. (2013). CEO Overconfidence and Dividend Policy. Working paper, DePaul University.

Ekholm, A & Pasternake, D. (2007). Overconfidence and investor Size. *European financial management*, Vol 14, No 1, PP 82–98.

Farid, D. & Ghadak Forushan, M. (2018). Investigating the Impact of Financing Type on Investment Efficiency with Emphasis on Company Value. *Investment Knowledge*, Vol 7, No 28, PP 103-126. (In Persian)

Graham, J.R. & Harvey, C.R. (2001). The theory and practice of corporate finance: evidence from the field. *Journal of Financial Economics*. No 60, PP 187–243.

Ghaddardan, E. & Solgi, S. & Farahani Fard, M. (2018). Investigating the Factors Influencing Managers' Decision Making in Choosing Internal Financing Methods. *Journal of Management and Accounting Studies*, Vol 4, No 2, PP185-195. (In Persian)

Hasani Alghar, M. & Rahimian, N. (2018). The Effect of Managerial Overconfidence on Debt Maturity Structure in Listed Companies in Tehran Stock Exchange. *Asset Management and Financing*, Vol 6, No 1, PP 89-106. (In Persian

He, Y. & Chen, C. & Hu, Y. (2019). Managerial overconfidence, internal financing, and investment efficiency: Evidence from China, *Research in International Business and Finance*, Vol 47(C), PP 501–510.

Heaton, J. (2002). Managerial Optimism and Corporate Finance. *Financial Management*, Vol 31, No 2, PP 33-45.

Huang, W. & Jiang F. & Liu, Z & Zhang, M. (2011). Agency cost, top executives' overconfidence, and investment-cash flow sensitivity- Evidence from listed companies in China. *Pacific-Basin Finance Journal*, Vol 19, No 3, PP 261-277.

Hubbard, R. (1998). Capital-market imperfections and investment. *Journal of Economic Literature*, No 36, Issue 1, PP 193–225.

Malmendier, U. & Tate, G. & Yan, J.O.N. (2011). Overconfidence and Early-Life Experiences: The Effect of Managerial Traits on Corporate Financial Policies. *Journal of Finance*, Vol 66, Issue 5, PP 1687–1733.

Malmendier, U. & Tate, G. (2005). Does Overconfidence Affect Corporate Investment? CEO Overconfidence. *European Financial Management*. Vol 11, No 5, PP 649-659.

Malmendier, U. & Tate, G. (2008). Who makes acquisitions? CEO Overconifdence and the market's reaction. *Journal of Financial Economics*. Vol 89, PP 20-43.

Myers, S.C. (1984).The capital structure puzzle. *Journal of Finance*, Vol 39, No 3, PP 575–592.

Richardson, Scott. (2006). Over-investment of free cash flow. *Review of Accounting Studies*, Vol 11, PP 159–189.

Roll, R. (1986). The hubris hypothesis of corporate takeovers. *Journal of Business*, Vol 10, No 2, PP 197–216.

Schumpeter, J.A. (1942). Cost and demand functions of the individual firm. Econ 101A – Solution to midterm 2 Th 7 November.

Tekin, B. (2018). Overconfidence and Effect on Firm Financial Decisions in the Context of Behavioral Corporate Finance. Elk Asia Pacific, *Journal of Finance and Risk Management*, Vol 9, Issue 4, PP 2349-2325.

Zhang, Y. & Yang, Z. (2018). Research on the Relationship between CEO's Overconfidence and Corporate Investment Financing Behavior, *Journal of Modeling and Optimization*, Vol 10, No 1, PP 8-14.

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