Tax Avoidance, Investment Efficiency The Role of Managerial Ability and CEO Overconfidence: Evidence from Egypt

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Abstract:

This paper attempts to examine the effect of managerial ability (Low managerial- High managerial) and CEO overconfidence (Good CEO - Weak CEO) on the relationship between both tax avoidance and the efficiency of investment. This research tests hypotheses based on a sample of 80 Egyptian firms listed in Stock Exchange covering the years 2018 to 2023.

The study using regression to analyze the impact of managerial ability categorized as (Low- High) on the association between both tax avoidance and the efficiency of investment (positive investment – negative investment). And the impact of CEO over confidence (Good over confidence – Weak CEO over confidence) on the association between both tax avoidance and the efficiency of investment (positive investment – negative investment). The results indicate that firms with high (low) managerial ability show increased (decreased) efficiency in their investments when tax avoidance increases. Additionally, the

results indicate that firms with good (weak) CEO overconfidence show increased (reduced) investment efficiency when tax avoidance increases. This result is consistent with (Lee et al., 2018; Gan, 2019; Ngelo et al., 2020 ; Widuri et al., 2020); Tuljannah and Helmy,2023 ;Dayuningtyas, and Rahmiati,2020). These findings explained that Managers' personality attributes (over confidence - managerial ability) can play an important role in firm policy. It leads managers to use risky financial strategies, such as tax avoidance, to finance their investment projects, which may be reflected in their investment decisions.

Key words: CEO overconfidence - investment efficiency-managerial ability-tax avoidance.

Introduction:

Tax avoidance activities by firms are considered a fundamental problem in many countries, because taxes are the main source of state revenues.

However, firms may view the tax due to the state as a burden or obligation that must be decreased. Since avoiding or reducing this burden may lead to an increase in the firm's profits after tax and an increase in its assets, on the other hand, it may have negative effects on the transparency and the accuracy of financial statements, and thus the possibility of affecting the efficiency of investment (Abdalkrim, 2019;Khurana, et al., 2018; Asiri et al.,2020).

Firms utilize tax avoidance strategies, to increase the profits after tax that are disclosed, by taking advantage of the exemptions of the tax law, which achieves benefits for shareholders and management through increasing distributions, incentives and rewards for management (Lawrence,2024**)**.

Despite the benefits of tax avoidance for management and owners, it affects the transparency and quality of financial reports. It also increases agency problems between management and owners, such as information asymmetry, and affects the internal control structure, in addition to the existence of non-tax costs resulting from tax avoidance such as the impact on the firm's reputation, and the possibility of being exposed to fines as a result of violating the tax law (Khurana, et al., 2018).

Studies have adopted two different points of view in explaining tax avoidance:

The conventional perspective: indicates that tax avoidance reduces the transfer of wealth to the government, allowing firms to preserve more resources and enhance value for shareholders (Ngelo et al. ,2022). Nevertheless, a number of studies-including Khurana et al. (2018); Lawrence (2024**)** indicates that management of firms with higher tax avoidance levels may undertake expensive actions meant to obscure their tax avoidance behavior from law enforcement.

As a result, managers of these firms might provide less transparent financial statements, which could encourage

managers to engage in opportunistic behavior, often known as rent extraction. The use of tax avoidance proceeds by the firm's management to increase investment, reaching beyond optimal levels (Khurana, et al., 2018) and the failure to allocate tax avoidance proceeds to positive net present value (NPV) projects (Benkraiem et al.,2024) are two instances of such managerial opportunistic behavior.

In neoclassical point of view, managers should invest in projects that increase shareholder wealth and produce a positive net present value (NPV) for the firm. Accordingly, a firm's investments and internally generated cash flows must have little to nothing in common. However, investment spending is sensitive to cash flows, particularly the cash flows from tax evasion, in case of agency issues or weak corporate governance structures that restrict the availability of external finance (Bhabra et al., 2018).

Generally, if a firm is able to avoid taxes (tax avoidance), it has cash flows that can be directed to invest in projects with a positive net present value. However, in light of the separation of ownership from management, agency problems appear, and management invests extensively, even in projects with a negative net present value, in order to maximize its personal benefits or enhance its administrative reputation, which results in excessive investment. On the other hand, management may refrain from investing in the previous kind of projects, if they do not achieve

their personal benefits, which results in a decrease in investment, due to the problems of moral hazard and adverse selection, which negatively affects the efficiency of investment decisions.

Prior research has indicated that the ability of management to efficiently transform the firm's input into output - or what is known as managerial ability - is a pivoted determinant of the efficiency of investment decisions. Managers with high managerial capability are able to achieve their goals, due to their ability to identify favorable investment opportunities to support the growth of the firm. Consequently, they are able to direct cash flows available from tax avoidance activities to investment projects that achieve a positive net cash flow and to refrain from those that achieve a negative net cash flow, i.e. achieving efficient investment decisions. On the other hand, managers with low managerial capacity may fail to direct these flows towards projects that achieve investment efficiency, because they do not have the ability to efficiently transform the firm's resources and inputs into outputs (Chen et al., 2021، Gan,2019; Andreou et. al, 2017).

Additionally, to managerial ability, Prior research have shown that there is another determinant of investment efficiency, which is the CEO managerial Over confidence. Personality traits of CEOs may influence investment decisions.

Previous studies have consistently supported a positive association between managers’ overconfidence and exaggerate

investment (Longjie and Anfeng, 2017; Choi et al., 2018; Adel and Al-Karaan ,2019), compared to under confident managers. This occurs because overconfident managers are inclined to overstate the potential returns of investment opportunities while simultaneously downplaying or underestimating the associated risks. Consequently, engaging in tax avoidance activities to provide more cash and financial resources to finance their investment projects (Kubick and Lockhart, 2017; Tuljannah and Helmy, 2023 ،Dayuningtyas, and Rahmiati, 2020 ; Araújo et al., 2020).

Based on the above and in light of the experimental evidence between the variables under study (investment efficiency, tax avoidance, CEO over confidence, managerial ability), and in light of the support and endorsement of many studies and research evidence for the link between tax avoidance and investment efficiency that were conducted in foreign environments. and in light of what the experimental results of many studies conducted in foreign environments indicated about the existence of a relationship between investment efficiency and tax avoidance, which was interpreted from two points of view as indicated by (Asiri et al., 2020; Khurana et al. ,2018; Ngelo et al., 2022). Therefore, in this study, the relationship between both tax avoidance and the efficiency of investment will be re-examined conditionally on the managerial ability and CEO overconfidence.

Research objective

This research tends to examine how managerial ability categorized as (high managerial ability -low managerial ability), as well as CEO's Over confidence (good CEO over confidence-weak CEO over confidence) influence the relation between both corporate tax avoidance and investment efficiency.

Research Contribution

This research contributes to literature in two different ways:

Initially: The expected contribution of the current research is to extend the work of previous studies conducted in foreign environments (Chen et al., 2021; Gan,2019; Andreou et al., 2017). By presenting empirical evidence from the Egyptian business environment about the nature and direction of the association between both tax avoidance and the efficiency of investment, specifically in the context of both high and low managerial ability.

Secondly: This research contributes to the limited literature examining how CEO overconfidence (good CEO overconfidence and weak CEO overconfidence) affects investment efficiency in the Egyptian business environment. By revealing new perspective on how behavioral biases influence investment decision-making within the Egyptian business environment, through application to a sample of firms listed on the Egyptian

Stock Market, which will be presented in the next part of this research.

The rest of this research will be structured as follows. **Section 2,** a literature review will be presented to illustrate how tax avoidance impacts the efficiency of investment conditionally on managerial ability and CEO over confidence and presents the developed hypothesis. Throughout **Section 3 and 4,** the researcher will describe both the sample, variables, research design and the methodology of research. **Section 5,** will present the results of the research. While **Section 6,** will offer the research Conclusion, **finally, Section** 7, will present prospective research direction.

2- *Literature review and Hypothesis Development*

2-1 Managerial Ability, Investment Efficiency and Tax Avoidance.

When talking about Tax Avoidance and the efficiency of investments, it is essential to consider two key perspectives. **First,** as mentioned by (Ngelo et al., 2022), that tax avoidance represents one of the high-risk investment options that management may face. Since cash flows derived from tax avoidance can act as an important source of funding, engaging in this strategy raises the likelihood of a firm retaining more funds for larger investments. Consequently, tax avoidance reduces the amount of money transfers from firms to the government, allowing firms to maintain

more resources and enhance shareholder value (Khurana et al., 2018; Tuljannah and Helmy, 2023).

Second, the separation between ownership and management results in agency problems due to information asymmetry between owner-managers, which encourages managers' decisions to achieve their interests over those of the firm and its shareholders. Tax avoidance may enable managerial opportunism to direct surplus funds and make ineffective investment decisions. It serves the interests of managers at the expense of owners and shareholders (Khurana et al., 2018). Once more, Asiri et al,(2020) conjectured that firms participating in tax avoidance will invest in ineffective or unproductive ways. Their argument was supported by the findings that managerial decisions greatly affect a firm's value and that investment choices are among the most important ones a firm makes with regard to capital expenditure and the firm's ability to achieve its operational and strategic objectives. Consequently, to enhance shareholder welfare and raise the firm's worth, shareholders demand that the firm's management make wise investments.

Previous studies have differed between these two viewpoints. Weiskirchner-Merten (2023) showed that corporate managers might choose to allocate excess free cash flows in unprofitable projects instead of returning them to shareholders, for personal reasons, including building an empire, maintaining managerial

power and prestige, in addition to increasing the size of the firm. Abdalkrim (2019) finds a substantial positive association between the size of the firm and executives' compensation, indicating that managers primarily profit from acquisitions to increase their gains.

In the same context, the study of Widuri et al. (2020) revealed that tax avoidance is positively correlated with the efficiency of investment mediated by product market competition in Indonesian public listed firms from 2014 to 2018.

The results of Ngelo et al. (2022) further indicated that avoidance of taxes represented by the current effective tax rate (CETR) has a positive impact with investment efficiency. The study was carried out by applying a sample of non-financial firms in Indonesia from 2010 to 2019 for 2064 firm-year observations.

This has been confirmed by Lawrence (2024) study. The findings indicated that both investment efficiency and tax avoidance were positively association in 75 Nigerian firms over the period from 2007 to 2022.

On the other hand, a study by Ding (2019) indicated that tax avoidance measurements- book-tax difference (BTD) had a positively significant relationship with non-efficiency

investment. This study was conducted in China between 2019 and 2016.

This was agreed upon by Forughi (2020) study. The results showed an inverse association between both avoidance of taxes and efficiency of investment, which means that increased tax avoidance leads to reduce the efficiency of firm's investment. The study examined 152 firms that were listed between 2009 to 2014 on the Tehran Stock Exchange. These results are aligned with the study conducted by Ibrahim et al, (2024) which indicated a negative impact on investment efficiency in the Egyptian stock market. Specifically, their study found in the presence of cash holdings a mediating variable had a positive impact on overinvestment and a negative impact on underinvestment.

In the same context, Alsmady (2022) examined the relation between both investment opportunities and tax avoidance in six Arabian Gulf Cooperation Council (GCC) countries. Using a sample consisting of 191 firms with 1337 firm-year observations from 2011 to 2017. The findings showed that tax had a substantial adverse impact on investment opportunities.

Similarly, Bashirimanesh and Arefmanesh (2023) found that tax avoidance adversely affected investment efficiency. The study analyzed data from 128 firms registered on the Tehran Stock Exchange over the period from 2014 to 2021.

The findings of Benkraiem et al. (2024) also indicate that tax avoidance is positively linked to ineffective investments. This study was conducted on a sample of 38 countries with 82,487 firm-year observations.

According to Desai and Dharmapala (2006, 2008, 2009) and Desai et al. (2007) framework, which suggests that the surplus free cash flow brought up by increased avoidance of taxes only benefits firms with strong corporate governance or superior managerial skills. In these situations, managers of these firms may utilize the extra cash flow derived from increased tax avoidance to fund initiatives that don't always generate value for shareholders. One example of this type of action is using the excess free cash flow from tax avoidance activities to fund business acquisitions or capital expenditures that might not be in the best interests of shareholders. However, even when given lucrative prospects, firms with less capable managers may decide not to pursue further investments using the money obtained via tax avoidance operations. Instead, they may choose the ‘quiet life.’ (Bertrand and Mullainathan, 2003).

Similarly, Khurana et al. (2018) study discussed how managerial competence influences the relationship between both investment efficiency and tax avoidance, applied to a sample of American companies from 1996 to 2015 with a total of 14,462 observations. Managerial ability was measured using the Demerjian et al. (2012) model, and investment efficiency was

measured by identifying (over- under) investment based on the difference between actual investment and expected investment. The study concludes that firms with high (low) managerial competence demonstrate a reduction (increase) in deviation from the anticipated level of investment and thus, an increase (decrease) in investment efficiency.

This finding was confirmed by the results of Hsieh and Huang (2019) study, which indicated that highly skilled managers are more (less) likely to (over- under) invest when the industry becomes more competitive. Similarly, the findings of Lee et al. (2018); Gan (2019); Andreou et al. (2017); said et al.(2024) revealed that managerial ability and investment efficiency are positively related with each other.

In a related investigation Khodamipour et al.(2020) examined how managerial competence affected the relation between both tax avoidance and efficiency of investment. The study's concluded that, when tax avoidance rises, firms with high managerial competence enjoy higher effectiveness of investments when tax avoidance increases. The study was carried out on a sample of 152 firms listed on the Tehran Stock Exchange during the period from 2009-2018.

From the previously mentioned, we deduced there is a discrepancy between the results and research evidence provided

by previous studies that were treated in advanced foreign environments with respect to the Egyptian business environment, especially, regarding the association between both tax avoidance and the efficiency of investment, and the impact of managerial ability on this relationship. Therefore, it is clear that there is a research gap. The researcher believes that it is important to study and test this relationship in the Egyptian environment to determine and explain its nature and direction, which represents one of the goals of the current research.

From the above, the first main hypothesis of the study can be formulated as follows:

H1: There is a relation between tax avoidance, managerial ability and investment efficiency.

The following Sub- hypotheses are developed from this main hypothesis:

H1/1: when tax avoidance rises, firms with lower managerial ability have in return lower levels of investment efficiency.

H1/2: when tax avoidance increases, firms with higher managerial ability have accordingly, higher levels of investment efficiency

2-2 CEO over confidence, Tax Avoidance, and Investment Efficiency

Additionally, to managerial ability, other personal characteristics possessed by executive managers within the firm may also play an important role in strategic decisions and firm tax policy, including tax avoidance activities. One characteristic that executive managers may promote is managerial overconfidence. This overconfidence not only influences decision-making in general but also leads managers to engage in risky financial strategies, including tax avoidance, in an attempt to finance their investment projects (Sugiono and Anggraeny, 2022، Hsieh et al., 2018 ، Harymawan et al., 2019).

According to the Upper Echelons theory Hiebl (2014), executive managers often see firms' situations from their perspective, considering investment opportunities, associated risks, and potential threats. These Executive managers play an important role in allocating resources and making strategic decisions, which reflects the organization behavior. The theory also takes into account that a CEO is an organization's strategic decision-maker since managers are accountable for the firm as a whole, thus, any decisions made will be influenced by the manager's action

An outline of how an overconfident CEO calculates future return on investment is provided by Upper Echelons theory. According to the theory, an overconfident manager's actions

reflect how the organization reacts to them. Overconfident managers frequently apply their viewpoints to the circumstances of the company when assessing return on investment (Hiebl ,2014). Furthermore, the theory indicates that overconfident managers may exaggerate the expected return on investment in order to make the investment appear profitable to investors (Hiebl, 2014، Adel and Alkaraan,2019).

Overconfident managers have an attitude that tends to exaggerate their abilities and the possibility that their performance will be better and more useful. They are investing excessively because they feel that they have better knowledge and experience than others, so, the CEO can control all the risks of the investments and aims to achieve higher levels of revenue to meet their revenue expectations. Engaging in tax avoidance activities can help overconfident managers provide more cash and financial resources to finance their investment projects by reducing the tax burden of the firm (Hsieh et al., 2018). Overconfident managers' behavior encourages tax avoidance activities to reduce the tax burden and cash flow to pay taxes, allowing firms to divert their funds for other profitable projects, finance their investments, and expand their businesses (Sugiono and Anggraeny, 2022; Dayuningtyas, and Rahmiati , 2020 ;Araújo et al., 2020).

A CEO's overconfidence often makes inflated estimates of the return on future investments. The connection between the firm and the investor will suffer from overinvestment since the firm will be seen as being unable to foresee investment returns with any degree of accuracy. This inability could lead to a conflict of interest between shareholders and managers resulting in agency costs. Additionally, the firm won't be able to live up to investor expectations, and the investor rate of return will drop. Knowing this, a manager will be more inclined to engage in tax avoidance to satisfy investors' initial expectations and boost the firm's performance going forward, all the while continuing the reckless behavior (Dayuningtyas, and Rahmiati , 2020).

Overconfident managers have the power to determine the firm's tax policies. An overconfident CEO's "tone at the top" can have an impact on the tax aspects of the firms. Overconfident CEOs will stop at nothing to lower the tax burden and supply funds for investment activities using opportunistic strategies that the firm frequently employs, such as earnings management techniques. One way to employ earnings management practices is to put a tax planning strategy into action. states that tax planning is the first stage of tax management and that it minimizes tax (Dayuningtyas, and Rahmiati, 2020؛ Kubick and Lockhart, 2017).

According to the agency theory, tax avoidance activities may result in a conflict of interest between the management and

the firm owner. For the management, tax avoidance activities can be used to achieve personal interests, including achieving expected income and building personal glory for managers, providing cash flow to finance investment projects. As for the firm owner, tax avoidance activities may affect the deferred tax obligations that the firm pays in the future, which may affect the value of the firm in the future. In addition, agency fees cause the firm's profits to be reduced, which may influence the firm's investing activities. To reduce this, a manager who exudes confidence would take advantage of opportunities to lower expenses by engaging in tax avoidance.

It is clear from the above that there is a positive relationship between tax avoidance and the overconfidence of executive managers. This suggests that overconfident managers may be able to lower actual tax rates and take risks through tax avoidance actions, which could impact on the firm's future investment (Dayuningtyas, and Rahmiati, 2020 ;Araújo et al., 2020).

The results from the study conducted by He and Hu (2019) are consistent with this. Their study indicates a positive association between managerial overconfidence, corporate internal financing, and investment in Chinese firms.

Building on the results of He and Hu (2019), the study by NGUYEN et al. (2020) demonstrated that Overconfidence of managers has a positive effect on investment. At the same time,

their results also indicated that firms with overconfident CEOs and large cash flow tend to invest less than firms with low cash flow. The study was carried out on a sample comprising 480 firms listed on the Vietnam Stock Exchange from 2014 to 2018.

Expanding on the implications of managerial overconfidence on investment decisions identified by NGUYEN et al. (2020); He and Hu (2019) study by ZALUDIN et al.(2021) delves into the nuanced impact of internal financing and corporate governance on investment efficiency. A sample of 44 industrial firms in Indonesia participated in this study between 2014 and 2019. The results indicated a substantial association between managerial overconfidence and investment efficiency. In the same line, a study by EL-Ansary and Ahmed (2023) found that firms run by overconfident managers may lead to overinvestment even if internal financing is available.

On the other hand, the study by Hassas Yeganeh and Hasani (2019) also aims to test the effect of financial reporting quality on the relationship between both managerial overconfidence and investment efficiency in firms registered on the Tehran Stock Exchange. A sample of 112 firms between 2007 and 2015 was employed for this analysis. The results find that a decline in investment efficiency is accompanied by high levels of managerial over confidence. Additionally, the quality of financial reporting plays a moderating role in the relationship

between managerial overconfidence and efficiency of investment.

From the above, it is clear, there is a discrepancy between the results and research evidence provided by previous studies that were treated in advanced foreign environments, there is no previous study, especially in the Egyptian business environment, to the knowledge of the researcher who was interested in testing how CEO over confidence impact the relationship between both tax avoidance and efficiency of investment, which represents another research gap. The researcher believes that in order to find an explanation for the nature of the relationship between tax avoidance and investment efficiency, it is important to study and test the impact of CEO over confidence on this relationship in the Egyptian environment, which represents the main objective of the current research.

From the above, the second hypothesis of the study can be formulated as follows:

H2: There is a relation between tax avoidance, CEO over confidence and investment efficiency

The following Sub- hypotheses are deduced from this main hypothesis:

H2/1: when tax avoidance increases, firms with lower CEO over confidence have lower level of investment efficiency.

H2/2: when tax avoidance increases, firms with higher CEO over confidence have higher levels of investment efficiency.

3- Research Design

3-1 Sample and research period

The research community involves joint-stock firms registered on the Egyptian Stock Exchange and includes a sample of firms during the period (2019-2023). The study relies on a judgmental sample of registered firms to achieve homogeneity among the sample firms, considering that the sample has sufficient data on the study variables and that the firm's financial reports are regularly available. The banking and financial services sectors were excluded due to the financial nature of the banking and financial services sectors, which differ from their counterparts in non-financial firms. For analysis purposes, the study relies on financial data from the financial reports of Egyptian joint-stock firms**.**

After conducting a survey of published information to calculate the study variables for a sample of 124 Egyptian joint-stock firms, by applying these criteria, a sample of 80 firms from

the period (2018-2023) was chosen with a total number of observations of 480 observations distributed over 9 sectors.

The following table (1) shows the study sample classified on a sectoral basis as follows:

Table 1

serial	Industrial sector	Average companies in the sector during the research period	The sample
1	Basic Resources	22	15
2	Food & Beverage	20	15
3	Health care and medicine	15	12
4	real estate	14	6
5	Tourism and entertainment	8	5
6	Services, Products and Cars	9	4
7	Household Products	12	9
8	Construction and building	18	11
9	Trade and distributors	6	3
	Total	124	80

3-2 Data collection sources

- Egyptian Stock Exchange website **http://www.egx.com.eg.**
- Egypt for Information Dissemination EGID **egidegypt.com.**

3-3 Research models and definition of procedural variables

Research models

to assess the impact of both CEO over confidence, managerial ability, tax avoidance, and Investment efficiency. The researcher uses two models of multiple regression to test the hypothesis of the research.

H 1: Model (1): Testing the effect of tax avoidance and managerial ability on investment efficiency.

First, the researcher using ordinary least squares (OLS) estimation to investigate the impact of tax avoidance and **managerial ability** on investment efficiency (over investing – under investing).

$$Y_{im} = B_0 + \beta_1 TaxAV_{it} + \beta_2 MA_{it} + \beta_3 TaxAV_{it} * MA_{it} + \Sigma\beta j +_1 C_{it} + Year + Industry + \varepsilon_{it} \quad (1)$$

Second, the researcher estimates two OLS models that follow:

To demonstrate the test of H1/1 and H1/2, the first model utilizes Residual InvestPositive as a dependent variable, and the second model uses Residual InvestNegative.

$$Y_{it} = B_0 + \beta_1 TaxAV_{it} + \beta_2 LowMA_{it} + \beta 3 TaxAV_{it} * Low\ MA_{it} + C_{it} + Year + Industry + \varepsilon_{it} \quad (1/1)$$

$$Y_{it} = B_0 + \beta_1 TaxAV_{it} + \beta_2 HigMA_{i\,t} + \beta 3 TaxAV_{it} * HigMA_{i\,t} + C_{it} + Year + Industry + \varepsilon_{it}$$

(1/2)

Whereas:

Y_{it}	Residual Invest Positive or Residual Invest Negative
$TaxAV_{it}$	Tax avoidance
$MA_{i\,t}$	Managerial ability
C_{it}	**control variable** free cash flow (FCF), Leverage (DLTT)debt-to-assets ratio, firm size (LnAsset), and return on asset (ROA).
$TaxAV_{it}$*Low MA_{it}	The interactive effect of tax avoidance variable and low managerial ability.
$TaxAV_{it}$*$HigMA_{it}$	The interactive effect of tax avoidance variable and High managerial ability.

H2: Model (2): Testing the effect of tax avoidance and CEO Over confidence on investment efficiency.

First, the researcher used ordinary least squares (OLS) estimation to investigate the impact of tax avoidance and **CEO Over confidence** on investment efficiency (over investing – under investing).

$$Y_{it} = B_0 + \beta_1 TaxAV_{it} + \beta_2 CEO\ ove_{it} + \beta_3 TaxAV_{it}{}^{*}CEO\ over_{it} + {}_1C_{it} + Year + Industry + \varepsilon_{i,t} \quad (2)$$

Second: the researcher estimates the two OLS models that follow:

To demonstrate the test of H2/1 and H2/2, the first model utilizes Residual InvestPositive as a dependent variable, and the second model uses Residual InvestNegative.

$$Y_{it} = B_0 + \beta_1 TaxAV_{it} + \beta_2 WeakCEO\ over_{it} + \beta_3 TaxAV_{it}{*}WeakCEO\ over_{it} + C_{it} + Year + Industry + \varepsilon_{it} \quad (2/1)$$

$$Y_{it} = B_0 + \beta_1 TaxAV_{it} + \beta_2\ GoodCEO\ over_{it} + \beta_3 TaxAV_{it}{*}GoodCEO\ over_{it} + C_{it} + Year + Industry + \varepsilon_{it} \quad (2/2)$$

Whereas:

Y_{it}	Residual Invest_Positive or Residual Invest_Negative
$TaxAV_{it}$	Tax avoidance
$CEO\ ove_{it}$	Managerial ability
C_{it}	**control variable** free cash flow (FCF), Leverage (DLTT) debt-to-assets ratio, firm size (LnAsset), and return on asset (ROA).
$TaxAV_{it}{*}WeakCEO\ over_{it}$	The interactive effect of tax avoidance variable and weak CEO over confidence
$TaxAV_{it}{*}GoodCEO\ over_{it}$	The interactive effect of tax avoidance variable and Good CEO over confidence

4- Variable description

4-1 Measurement of Dependent Variables

The researcher depends on Richardson's (2006) and Blaylock's (2016) approaches to identify both (over - under) investments. By comparing the actual and anticipated level of investment expenditure for a firm. To evaluate hypotheses.

Firstly, we estimate the OLS regression model, which follows:

$$\mathbf{Investment_{it} = \alpha + \beta_1 MBRatio_{it-1} + \beta_2 ROA_{it-1} + \beta_3 Cash_{it-1} + \beta_4 Age_{i\,t-1} + \beta_5 Lev_{i,t-1} + \beta_6 LnAsset_{it-1} + \beta_7 Investment_{it-1} + \text{Year fixed effect} + \text{Industry (2 digit SIC) fixed effects} + \varepsilon_{i,t} \quad (1)}$$

Then we utilize the residual from the previous model to measure the level of over- and under-investment. For the test of H:1,we define Residual Invest Positive (Residual Invest Negative) as the value of the model (1) residuals with positive (negative) values.

4-2 Independent Variable:

4-2-1 Tax Avoidance

This research uses the main measure for tax avoidance: (**Asiri *et al*., 2020)**

Actual tax rate = Income tax paid in cash / Income before tax
A lower rate means a higher level of taxation.

4-2-2 Managerial Ability

This research relies on Demerjian et al. (2012) to measure managerial ability (MA). This measure is applied in two stages:

The first: is calculating the firm's overall efficiency.
The firm's financial efficiency is estimated at the level of each industry using the Data Envelopment Analysis method through the following equation:

$$\textbf{Max } \theta = \frac{\textbf{Sales}}{\textbf{PPE+SGA+COGS}}$$

The firm's overall efficiency is measured by the ratio of output, represented by revenues to input, which includes the cost of sales, selling and administrative expenses, net assets, and property and equipment.

The value of performing the Data Envelopment Analysis method ranges between 0 and 1. Firms that take the value (1) are the most efficient firms, as they make the most of the resources available to them compared to their counterpart firms operating in the same industry, while firms that are less than the correct one are inefficient firms.

The second: is adjusting the firm's overall efficiency score.

It is modified by excluding the effect of some firm characteristics that affect it, such as firm size, firm market share, positive free cash flow, and firm age. Factors that hinder administrative effort, such as the firm's multiple sectors and international business operations, are also excluded. This is done through a Tobit regression model.

$$\textbf{Firm Efficiency}_{i,t=}\beta_0 + \beta_1 \textbf{ Log Total Assets}_{it} + \beta_2 \textbf{ Market Share}_{it} + \beta_3 \textbf{ Positive Free Cash Flow}_{it} + \beta_4 \textbf{ Log FirmAge}_{it} + \beta_5 \textbf{ Foreign Currency Indicator}_{it} + \beta_6 \textbf{ Year Indicator}_{it} + \varepsilon_{it}$$

The residuals (the unexplained proportion of the model) are also attributed to the regression to management. Thus, the residuals from the Tobit equation are the degree of managerial ability of managers.

The ratios are classified based on the average of the degree of managerial ability of managers.

Low managerial ability (LowMA): the firm takes a value equivalent to (1) if the firm's managerial ability (MA) score is below the average measured as determined by (Demerjian et .al,2012)

High managerial ability (HighMA): the firm takes a value equivalent to (2) if the firm's managerial ability (MA) score is higher than the average as determined by (Demerjian et .al,2012; saied et al., 2024).

4-2-5 CEO over confidence

This research relies on an aggregated index consisting of five components to measure CEO over confidence using dummy variables. coded 1 if the sum of the following five dummy variables is equal to or greater than 3 and zero otherwise (Ji and Lee, 2015 ; El-Ansary and Ahmed, 2023).

1- **Excess Investment** = dummy variable takes the value (1or 0). defined as the residual from a regression of total asset growth on sales growth. equals 1 if excess investment is in the top quartile of firms within the industry for the year and 0 otherwise.

$$\Delta A_{it} / A_{it-1} = \square_1 + \square_2 \Delta S_{it} / S_{it-1} + \varepsilon_{i,t}$$

2- **Net Acquisition** = dummy variable equal to 1 if net cash acquisitions rank in the industry's upper quartile for the year, otherwise 0

3- **Debt-to-Equity ratio** = dummy variable measured by dividing total debt by total market value (the market value of equity + the book values of /long-term debt + preferred stock), the variable takes the value equal to 1 if the debt-to-equity ratio is in the top quartile of firms within the industry for the year and 0 otherwise.

4- **Risky Debt** = dummy variable takes the value (1or 0), equal to 1 if either convertible debt or preferred stock is greater than zero and 0 otherwise.
5- **Dividend Yield** = dummy variable equal to 1 if dividend yield is zero and 0 otherwise.

4-2-6 Control variables:

Variable name	A privation	Measure
Size:	**LnAsset**	The natural log of the total assets' book value of the firm.
Return on asset:	**ROA**	net income for the current year (IB) divided by the end of previous year book value of assets.
Leverage	**(DLTT)**	Ratio of total assets (DLTT) to long -term liabilities
Free Cash Flow:	**FCF**	calculated as operation cash flow (OCF) plus R&D expenses (RDX), minus depreciation (DP), and scaled by assets at the end of previous year minus anticipated investment. (Khurana, et al., 2018; Lawrence,2024 ;Benkraiem, etal.,2024).

5- Statistical results for testing the study hypotheses

5-1 Descriptive Statistics

Table 2 : Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Independent variable						
MAit	480	1	1	2	1.50	.501
TaxAVit	480	2.60	.10	2.70	.4880	.38517
TaxAVitMAit	480	32.90	.10	33.00	.6336	1.58673
CEOoveit	480	3.00	1.00	4.00	2.4354	.97569
TaxAVitCEOoveit	480	3.80	.10	3.90	.6421	.57080
Dependent variables						
InvestEfficit	480	16.00	-4.40	11.60	.9792	3.69837
Control variables						
Size	480	3.31	7.14	10.46	8.4580	.52606
DLTT	480	1.37	.13	1.50	.5219	.22031
ROA	480	1.70	.10	1.80	.3900	.28317
FCF	480	.81	.10	.91	.3322	.20655
Valid N (listwise)	480					

Descriptive statistics show the following:

- There is low dispersion between the average of the research sample as indicated by the low values of the standard error for all research variables, which means the accuracy of estimating the arithmetic mean of the sample in addition to the high values of the range for the research variables, which enhance the accuracy of the estimates for the regression model coefficients and the significance of its variables.
- The average value for the tax avoidance variable (TaxAVit) reached (0.4880)with a standard deviation of(0.38517).

which is an indicator of low tax avoidance among the sample firms in the Egyptian environment.

- The average value for investment efficiency variable (InvestEfficit) reached (0. 9792)with a standard deviation of(3.69837) . which is an indicator of high investment efficiency among the sample firms in the Egyptian environment.
- The average value for the managerial ability variable (MAit) reached (1.50) with a standard deviation of (0.501). This is an indicator of the high level of managerial ability among the sample firms in the Egyptian environment.
- The average value for the CEOoverconfidence variable (CEOoveit) reached (2.4354) with a standard deviation of 0.97569. This is an indicator of the high level of managerial overconfidence among the sample companies in the Egyptian environment.
- Regarding the control variables, the mean firm size (Size) is measured by the natural logarithm of total assets (8.4580) with a standard deviation of (0.52606). The maximum value obtained for the average return on assets rate (ROA) was (1.80), which indicates a high average financial performance among the sample firms. The results also indicate a significant disparity in the debt ratio (DLTT) among the sample firms. The debt level ranged from (1.50), which represents the highest level of debt among the sample firms, to (0.13) which represents the

lowest level of debt with an average of (0.5219). Which is an indicator of the high level of debt among the sample firms, as approximately (0.52) of the sample firms were financed through borrowing. Furthermore, the results also showed the average value of the free cash flow variable (FCFit) reached (0.81)with a standard deviation of(.206) . which is an indicator of high free cash flow among the sample firms in the Egyptian environment.

- As for the interactive effect of the variable tax avoidance with both the variable managerial ability (TaxAVit*MAit) and CEO overconfidence (TaxAVit*CEOoveit). According to the results, the average value of the two interactive variables among the sample firms increased (0. 6336 — 0.6421) respectively. Which may be an indicator of high tax avoidance, managerial ability, and CEO over confidence among the sample firms, the significance of which will be confirmed later.

5-1 Data validity test

5-2-1 Multicollinearity

This problem arises when there is a correlation between the independent variables, which results in the instability of the regression model coefficients and consequently, the invalidity of the linear model for application. To confirm that the problem of multicollinearity is not present, the variance inflation factor (VIF) was used as shown in the table (3) -(4). The results

indicate that variables do not suffer from the problem of multicollinearity. The value of the permissible variance (tolerance), as shown in the tables, is less than one for all model variables, as it ranged between (0 .214 - 0.969), additionally, the value of the variance inflation factor (VIF) for all model variables is less than 10, ranging between (1.003- 4.679), which means that there is no problem of multicollinearity in these models (O'brien,2007).

Table 3: Collinearity Statistics

Independent variables	Dependent variables InvestEfficit				Dependent variables Investnegative LOWER MANAGERIAL		Dependent variables Investnegative LOWER CEO		Dependent variables Investpositive LOWER MAMAGERIAL		Dependent variables Investpositive LOWER CEO	
	VIF	Tolerance	VIF	Tolerance	VIF	Tolerance	VIF	Tolerance	VIF	Tolerance	VIF	Tolerance
MAit	1.822	.549			1.189	.841			1.403	.713		
TaxAVit	1.255	.797	2.245	.445	1.822	.549	1.702	.587	2.548	.392	1.745	.573
TaxAVit*MAit	1.783	.561			1.340	.746			1.416	.706		
CEOoveit			2.021	.495			1.177	.849			1.261	.793
TaxAVit*CEOoveit			2.746	.364			2.628	.381			2.394	.418
Control variables												
Size	1.068	.936	1.775	.563	1.206	.829	1.189	.841	1.248	.801	1.197	.835
DLTT	1.898	.527	1.626	.615	3.235	.309	1.627	.614	2.389	.419	1.475	.678
ROA	1.457	.686	1.297	.771	4.011	.249	1.842	.543	4.679	.214	1.816	.551
FCF	1.003	.997	1.210	.827	1.073	.932	1.059	.944	1.084	.922	1.033	.968

Table 4: Collinearity Statistics

Independent variables	Dependent variables InvestEfficit				Dependent variables Investnegative HIGHER MANAGERIAL		Dependent variables Investnegative HIGHER CEO		Dependent variables Investpositive HIGHER MAMAGERIAL		Dependent variables Investpositive HIGHER CEO	
	VIF	Tolerance	VIF	Tolerance	VIF	Tolerance	VIF	Tolerance	VIF	Tolerance	VIF	Tolerance
MAit	1.822	.549			1.174	.852			1.032	.969		
TaxAVit	1.255	.797	2.245	.445	1.575	.635	1.875	.533	2.027	.493	1.104	.906
TaxAVit*MAit	1.783	.561			2.792	.358			3.852	.260		
CEOoveit			2.021	.495			1.666	.600			1.211	.826
TaxAVit*CEOoveit			2.746	.364			1.137	.879			1.302	.768
Control variables												
Size	1.068	.936	1.775	.563	1.030	.971	1.547	.646	1.037	.964	1.395	.717
DLTT	1.898	.527	1.626	.615	2.043	.489	1.401	.714	2.860	.350	1.728	.579
ROA	1.457	.686	1.297	.771	1.072	.933	1.450	.690	1.042	.960	1.433	.698
FCF	1.003	.997	1.210	.827	1.118	.894	1.727	.579	1.071	.934	1.682	.595

5-2-3 Normal distribution test

To verify that the data follows a normal distribution, the (Kolmogrov-Smirnov)-(Shapiro-Wilk)-skewness-kurtosis test was used. The findings indicated that the data did not follow a normal distribution because the significance level for each variable (0.000) was less than 0.05. Furthermore, the kurtosis falls between (-3 and 3), and the skewness coefficients get closer to zero. The validity of the study models will not be impacted by the problem of the data that does not follow the normal distribution because the sample size is (480) observations is larger than 50 observations (Verbeek, 2017; Wooldridge, 2015).

Table 5 : Test of Normality

Tests of Normality								
	Kolmogorov-Smirnov[a]			Shapiro-Wilk				
	Statistic	df	Sig.	Statistic	df	Sig.	skewness	kurtosis
MAit	.469	480	.000	.537	480	.000	1.171	-.631
TaxAVit	.261	480	.000	.779	480	.000	1.332	.581
TaxAVit*MAit	.251	480	.000	.702	480	.000	1.778	2.309
CEOoveit	.219	480	.000	.876	480	.000	-.028	-1.012
TaxAVit*CEOoveit	.237	480	.000	.759	480	.000	1.989	3.788
InvestEfficit	.262	480	.000	.817	480	.000	.336	2.614
Size	.258	480	.000	.766	480	.000	1.200	4.041
DLTT	.092	480	.000	.948	480	.000	-.098	-1.220
ROA	.146	480	.000	.864	480	.000	1.486	3.551
FCF	.147	480	.000	.852	480	.000	1.366	1.329
a. Lilliefors Significance Correction								

5-2-4 Autocorrelation

To check for autocorrelation problem among the study variables, the Durbin-Watson test was used.

Table 6: Autocorrelation

nvestEfficit		nvestnegative				nvestpositive			
		Low	Weak	High	Good	ow	Weak	igh	Good
I :1	I:2	I:1/1	I:2/1	I:1/2	I:2/2	I"1/1	I;2/1	I:1/2	I;2/2
MATit	CEOovit	MATit	CEOovit	MATit	CEOovit	MATit	CEOovit	MATit	CEOovit
.920	.213	.281	.706	.883	.671	.322	.373	.396	.140

As shown in Table (6):

- The findings indicated that the Durbin-Watson value for each of the H:1 model to measure the effect of managerial ability

on investment efficiency and H2/1 model (Weak CEOit For Investnegative), and HighMATit- Good CEOovit) for Investnegative H:1/2, H:2/2 respectively are (1.706-1.883-1.671) which is greater than 1.5 which means that these models do not suffer from autocorrelation problem in the residuals (Millo,2017).

- the Durbin-Watson value for the H:1/1 – H: 1/2 models (Lower managerial – Higher managerial for each of Investnegative – Investpositive respectively (1.281- 1.322-1.396) are all less than 1.5, which means that these models suffer from the problem of autocorrelation between the residuals.
- The results also show that H2 for (InvestEfficit) and H2/1-H:2/2 models (Weak CEO - Good CEO) for Investpositive are (1.213- 1.373- 1.140) respectively. Further confirming the presence of autocorrelation.
- To address this problem, the study used (Robust Standard Error). using the SPSS application to estimate the parameters in light of the autocorrelation problem.

5-2-5 Heteroskedasticity

The study relied on the Breusch-Pagan test to verify the problem of the difference in the variance of random error. If the significance of the test is less than (0.05), this means that the

model has a problem with the difference in the variance of random error (Verbeek, 2017; Wooldridge, 2015).

Table 7: Heteroskedasticity

	InvestEfficit " Dependent "		**Investnegative** "Dependent				**Investpositive** Dependent			
			Low	**Weak**	**High**	**Good**	**low**	**Weak**	**high**	**Good**
Model	**H :1**	**H:2**	**H:1/1**	**H:2/1**	**H:1/2**	**H:2/2**	**H"1/1**	**H;2/1**	**H:1/2**	**H;2/2**
Independent	**MATit**	**CEOovit**	**MATit**	**CEOovit**	**MATit**	**CEOovit**	**MATit**	**CEOovit**	**MATit**	**CEOovit**
Chi-Square	2.192	3.154	3.703	2.402	2.715	3.463	2.508	1.721	2.596	1.966
Prob	.139	0.076	0.054	0.121	0.99	.063	0.113	0.190	0.107	.161

It is clear from the test results, as shown in table (7), that the probability value for all models was greater than (0.05), which means that this model does not fall into this problem**.**

5-2-6 Descriptive statistics

Table 8: Descriptive statistics

Descriptive Statistics					
	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
MAit	480	1	2	1.50	.501
TaxAVit	480	.10	2.70	.4880	.38517
TaxAVit*MAit	480	.10	33.00	.6336	1.58673
CEOoveit	480	1.00	4.00	2.4354	.97569
TaxAVit*CEOoveit	480	.10	3.90	.6421	.57080
InvestEfficit	480	-4.40	11.60	.9792	3.69837
Size	480	7.14	10.46	8.4580	.52606
DLTT	480	.13	1.50	.5219	.22031
ROA	480	.10	1.80	.3900	.28317
FCF	480	.10	.91	.3322	.20655
Valid N (listwise)	480				

The results of the descriptive statistics showed the following:

- Low dispersion between the average of the research sample, as is clear from the low values of the standard error of the average of all research variables, which means the accuracy of estimating the arithmetic mean of the sample.
- The results also showed a wide range between the investment efficiency variable, as the lowest value reached (- 4.40 ،11.60), which means that there is a disparity between the sample companies in terms of the level of investment efficiency. The results also showed that average of the investment efficiency variable reached (0.9792) between the sample firms with a standard deviation of (3.69837), which means high investment efficiency between the sample firms, which may affect the level of tax avoidance.
- The average of tax avoidance variable reached (0.4880) between the sample companies, which means high tax avoidance between the sample firms. The results also showed a wide range among the sample firms for the tax avoidance variable, as the value of the variables ranged between (0.10 - 2.7), which means that there is a large disparity between the levels of tax avoidance among the sample companies, which may affect the level of investment efficiency.
- The average of CEO overconfidence reached (2.4354), which means high excessive administrative confidence between the sample firms.

- As for the control variables, the mean firm size is measured by the natural logarithm of total assets (8.4580)with a standard deviation of (0.52606) and the maximum value obtained for the average return on assets (0.3900) reached, which is an indicator of the low average financial performance among the sample firms. The findings also reveal a large disparity in the debt ratio among the sample companies (0.13), which represents the lowest level of debt with an average of (0.5219), which is an indicator of the high level of debt among the sample firms, as the equivalent of (0.5219)of the sample firms, were financed through borrowing. The results also indicated a wide range among the sample firms for the free cash flow variable, as the lowest value reached (0.10) with a standard deviation of (0.20655)
- The analysis of interactive variables between managerial ability and tax avoidance(TaxAVit*MAit) and between CEO over confidence and tax avoidance(TaxAVit*CEOoveit), indicated an increase in the average value of these interactive variables among the sample firms , respectively (0.6336-0.6421). Which may be an indicator of the increase in managerial ability and CEO over confidence among the sample firms and tax avoidance, which may be confirmed later.

5-2-7 Correlation Analysis

Table (9): Correlations

		InvestEfficit	MAit	TaxAVit	TaxAVit*MAit	CEOoveit	TaxAVit*CEOoveit	Size	DLTT	ROA	FCF
InvestEfficit	Pearson Correlation	1									
	Sig. (2-tailed)										
	N	480									
MAit	Pearson Correlation	.353**	1								
	Sig. (2-tailed)	.000									
	N	480	480								
TaxAVit	Pearson Correlation	-.024	-.035	1							
	Sig. (2-tailed)	.602	.439								
	N	480	480	480							
TaxAVit*MAit	Pearson Correlation	.426**	.422**	.419**	1						
	Sig. (2-tailed)	.000	.000	.000							
	N	480	480	480	480						
CEOoveit	Pearson Correlation	.557**	.501**	-.035	.601**	1					
	Sig. (2-tailed)	.000	.000	.445	.000						
	N	480	480	480	480	480					
TaxAVit*CEOoveit	Pearson Correlation	.298**	.109*	.654**	.608**	.350**	1				
	Sig. (2-tailed)	.000	.016	.000	.000	.000					
	N	480	480	480	480	480	480				
Size	Pearson Correlation	.141**	-.044	.084	.180**	.080	.156**	1			
	Sig. (2-tailed)	.002	.331	.065	.000	.082	.001				
	N	480	480	480	480	480	480	480			
DLTT	Pearson Correlation	.475**	.481**	-.004	.576**	.656**	.221**	.230**	1		
	Sig. (2-tailed)	.000	.000	.935	.000	.000	.000	.000			
	N	480	480	480	480	480	480	480	480		
ROA	Pearson Correlation	.345**	.297**	-.023	.361**	.430**	.206**	.123**	.454**	1	
	Sig. (2-tailed)	.000	.000	.619	.000	.000	.000	.007	.000		
	N	480	480	480	480	480	480	480	480	480	
FCF	Pearson Correlation	.072	.214**	-.015	-.058	-.063	-.037	.038	-.012	.010	1
	Sig. (2-tailed)	.114	.000	.748	.207	.170	.414	.402	.786	.827	
	N	480	480	480	480	480	480	480	480	480	480

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

The previous correlation matrix shows the following:

- There is a positive correlation coefficient with a value of (0.353) and statistically significant at a significant level of (1%) between the variable of investment efficiency (InvestEfficit) and managerial ability (MAit) among the sample firms. This is an initial indicator of the existence of a positive moral impact of managerial ability on the efficiency of investment, which suggests that higher managerial ability is correlated with improved investment efficiency.
- In contrast, the analysis indicates a negative correlation coefficient of (-0.024)between investment efficiency (InvestEfficit) and tax avoidance (TaxAVit) among the sample companies. This correlation is statistically non-significant, suggesting that there is no meaningful relationship between investment efficiency and tax avoidance. This finding implies that the two variables do not exhibit a discernible correlation, indicating that tax avoidance does not have a direct impact on investment efficiency in the context of the sample studied. Further investigation may be necessary to verify this conclusion and explore potential reasons for this lack of correlation.
- Additionally, there is a positive correlation coefficient of (0.426) significant at the ($p < 0.001$) level between both the efficiency of investment and the interactive variable combining managerial ability and tax avoidance (TaxAVit*MAit) among the sample companies. This is a preliminary indicator of a positive and strong

influence of managerial ability and tax avoidance on investment efficiency, which may be an indicator of a high level of investment efficiency.

-Moreover, it is also noted that there is a positive correlation coefficient with a value ranging from 0.557 to 0.297, and statistically significant at 1% significance level for both CEO over confidence (CEOoveit) and the interactive variable combining CEO over confidence and tax avoidance (TaxAVit*CEOoveit) , respectively, in relation to investment efficiency(InvestEfficit) among the sample companies. This is a preliminary indicator of the existence of a positive moral effect of CEO over confidence and tax avoidance on investment efficiency, which may be an indicator of high investment efficiency.

- Regarding the control variables, the results illustrated a significant and positive relationship at a significant level of (1%) for each of the variables: financial leverage - return on assets, and company size. While the results showed an insignificant relationship with the variable of free cash flow, which may suggest that this variable does not have a significant effect.

5-2-8 Hypothesis test results

Model (1): Testing the effect of tax avoidance and managerial ability on investment efficiency.

$$Y_{im} = B_0 + \beta_1 TaxAV_{it} + \beta_2 MA_{it} + \beta_3 TaxAV_{it} * MA_{it} + C_{it} + Year + Industry + \varepsilon_{it} \quad (1)$$

Table 10: investment efficiency

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.195	.149		-1.305	.193		
	MAit	.127	.016	.361	7.988	.000	.549	1.822
	TaxAVit	-.187	.042	-.169	-4.497	.000	.797	1.255
	TaxAVit* MAit	.389	.043	.409	9.134	.000	.561	1.783
	Size	.012	.018	.023	.674	.501	.936	1.068
	DLTT	-.111	.053	-.097	-2.102	.036	.527	1.898
	ROA	.140	.040	.140	3.471	.001	.686	1.457
	FCF	.170	.041	.138	4.119	.000	.997	1.003
a. **Dependent Variable**: InvestEfficit								
Adjuster R^2 : 0.46.2			R^2 :68.5		F: 59.761		Sig: 0.001	

The findings presented in the previous table show the regression model's significance at a 1% significance level, The value and significance of the model reached (F-Value= 59.761; P-Value = 0.001 < α = 0.01), as did the explanatory power indicated by the coefficient of determination (R^2) is 46.2%, which means that the independent variables (managerial ability - tax avoidance) explain (46.2%) of the variance in investment efficiency, (53.8%) of the variance for the same variable to

random error or to variables that were not included in the model variables.

Furthermore, the results indicate a positive and statistically significant relationship at the (0.000) level between each of the variables managerial ability (MAit), the interactive variable combining managerial ability and tax avoidance (TaxAVit*MAit), and investment efficiency (InvestEfficit). This finding indicates that higher managerial ability is associated with increased investment efficiency. consistent with studies performed by (Lee et al., 2018; Gan, 2019; Andreou et al., 2017; said et al., 2024). Additionally, the results reveal a statistically significant negative relation at the (0.000) level between the tax avoidance variable and the investment efficiency, suggesting that the lower level of tax avoidance is associated with higher investment efficiency among the sample firms. This result is consistent with studies by (Alsmady,2022; Bashirimanesh and Arefmanesh,2023). Suggesting that firms evade taxes less often tend to make more efficient investment decisions.

Regarding the control variables, the findings reveal a strong positive and statistically substantial association at specified level of (0.0036-0.001-0.000) respectively, for (debt ratio - Return on asset - free cash flow) in relation to investment efficiency, while the results show that firm size does not have a significant effect on investment efficiency.

Model (1/1): Testing the effect of tax avoidance and low managerial ability on Invest Positive and then Invest Negative.

$$Y_{it} = B_0 + \beta_1 TaxAV_{it} + \beta_2 LowMA_{i\,t} + \beta 3 TaxAV_{it} * Low\ MA_{i\,t} + C_{it} + Year + Industry + \varepsilon_{it} \quad (1/1)$$

Table 11: Positive Investment

Coefficients[a]								
		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	2.587	.800		3.232	.001		
	Low MAit	.051	.017	.169	3.024	.003	.713	1.403
	TaxAVit	.286	.098	.221	2.930	.004	.392	2.548
	TaxAVitlow MAit	.098	.036	.152	2.702	.007	.706	1.416
	Size	-.291	.095	-.162	-3.069	.002	.801	1.248
	DLTT	.268	.121	.162	2.210	.028	.419	2.389
	ROA	.173	.124	.143	1.402	.162	.214	4.679
	FCF	-.266	.116	-.113	-2.302	.022	.922	1.084
a. Dependent Variable: Investpositive								
Adjuster R^2 : 0.46.6		**R^2** :48.1		**F**: 30.749		**Sig**: 0.001		

The results listed in the previous table show the significance of the regression model at a significance level of 1%. The value and significance of the model reached (F-Value= 30.749 ; P-Value = 0.001 < α = 0.01), as did the explanatory power of the model indicated by the coefficient of determination(R^2) is (%46.6), this means that the independent variables (managerial ability ,tax avoidance and the interactive variable of managerial ability and tax avoidance) explain (46.6%) of the variance in positive investment;

however, (53.4%) of the variance for the same variable is attributed to random error or to variables that were not included in the model variables.

Additionally, the results illustrated a strong positive relationship at the level of (0.003-0.004) respectively, between the variables of low managerial ability (lowMAit), tax avoidance (TaxAVit) as independent variables and positive investment (Invest positive) as a dependent variable. The results also indicated a significant positive relationship at the level of (0.007) between the interactive variable of low managerial ability and tax avoidance (TaxAVit*lowMAit) and positive investment (Invest positive), suggesting that firms with low managerial ability are associated positively with positive investment when tax avoidance is increased. These results align with the results of previous studies by (Lawrence, 2024; Ngelo et al.,2020; Widuri et al., 2020; Bertrand and Mullainathan, 2003). As for the control variables, the results revealed that variables of (firm size - debt ratio - free cash flow) had a significant positive relationship at p-values of (0.002-0.028-0.022) respectively with the positive investment variable; in contrast, the results showed the insignificance relationship to the variable for return on assets rate.

Table 12: Negative Investment

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-1.135	.619		-1.834	.068		
	lowMAit	.042	.015	.112	2.707	.007	.841	1.189
	TaxAVit	.308	.070	.227	4.422	.000	.549	1.822
	TaxAVit*lowMAit	-.339	.018	-.813	-18.440	.000	.746	1.340
	Size	.141	.073	.081	1.928	.055	.829	1.206
	DLTT	-.433	.108	-.274	-3.996	.000	.309	3.235
	ROA	.179	.091	.150	1.963	.051	.249	4.011
	FCF	-.239	.096	-.098	-2.483	.014	.932	1.073
a. **Dependent Variable**: Investnegative								
Adjuster R ^{2} : 0.65.3		**R**^{2} :81.5		**F**: 65.364		**Sig**: 0.001		

The previous table (12) shows a positive and significant relationship at p- values of 0.007 and 0.000 respectively, between the variables of low managerial ability (lowMAit), tax avoidance (TaxAVit) as independent variables and negative investment (Invest negative) as a dependent variable. Additionally, the results indicated that there was a statistically significant negative relationship at the level of p- value (0.000) between the interactive variable of low managerial ability and tax avoidance (TaxAVit*lowMAit) and negative investment (Invest negative), indicating that firms with low managerial ability are associated negatively with negative investment as tax avoidance increases. This result is consistent with the study

conducted by Bertrand and Mullainathan (2003), which indicated that firms with less capable managers may decide not to pursue further investments with the money obtained via tax avoidance operations. Instead, they may choose the 'quiet life'. As for the control variables, the results revealed that there was a positive relationship with significance levels (0.000 -0.014) respectively, between the variables of (debt ratio - free cash flow) and the negative investment variable, while the results showed the insignificance of the variables return on assets rate and firm size.

Furthermore, the results showed the explanatory power of the model at (65.5 %), as the coefficient of determination (R^2)presented, which means that the independent variables (managerial ability, tax avoidance, and the interactive variable of low managerial ability and tax avoidance) explain (65.5%) of the variance in negative investment, while (34.5%) of the variance for the same variable is attributed to random error or to variables that were not included in the model variables.

Model (1/2): Testing the effect of tax avoidance and High managerial ability on Invest Positive and then Invest Negative.

$$Y_{it} = B_0 + \beta_1 TaxAV_{it} + \beta_2 HigMA_{i\,t} + \beta 3 TaxAV_{it} * HigMA_{i\,t} + C_{it} + Year + Industry + \varepsilon_{it} \quad (1/2)$$

Table 13: Positive investment

Coefficients[a]								
		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	19.968	1.372		14.559	.000		
	HigMAit	-20.463	1.281	-.635	-15.972	.000	.969	1.032
	TaxAVit	-.649	.204	-.177	-3.174	.002	.493	2.027
	TaxAVit*HigMAit	-.405	.175	-.178	-2.316	.021	.260	3.852
	Size	-.014	.056	-.010	-.240	.811	.964	1.037
	DLTT	.736	.239	.204	3.076	.002	.350	2.860
	ROA	.297	.129	.092	2.306	.022	.960	1.042
	FCF	.635	.167	.154	3.802	.000	.934	1.071
a. **Dependent Variable**: Investpositive								
Adjuster R ^{2} :63.4		**R^2** :64.5		**F**: 60.090		**Sig**: 0.001		

The findings listed in table (13) illustrate the significance of the regression model at a significance level of 1%. The value and significance of the model reached(F-Value = 60.090 ; P-Value = 0.001 < α = 0.01), as did the explanatory power of the model indicated by the coefficient of determination (R^2) is (63.4), which means that the independent variables (high managerial ability , tax avoidance, and the interactive variable of high managerial ability and tax avoidance) explain (63.4%) of the variance in positive investment, while (36.6%) of the variance for the same variable is attributed to random error or to variables that were not included in the model variables.

Additionally, the results presented that there was a negative and statistically significant association at the level of P- value (0.000-0.002) respectively, between the variables of high managerial ability (HigMAit), tax avoidance (TaxAVit) as independent variables and positive investment (Invest positive) as a dependent variable. The results also revealed that the interactive variable of high managerial ability and tax avoidance (TaxAVit*HigMAit) had a statistically significant negative relationship (P – Value = 0.021) with positive investment (Invest positive). This suggests that firms with highly managerial ability are negatively associated with positive investment as their level of tax avoidance rises.

These results are aligned with those of previous studies by Khurana et al.(2018);Hsieh and Huang (2019) which indicate that firms with high (HigMAit), low (lowMAit) managerial ability exhibit a decrease (increase) in deviation from the expected level of investment and thus lead to an increase (decrease) in investment efficiency.

As for the control variables, the findings showed that there was a positive and statistically significant relationship at the level of (0.002-0.022-0.000) respectively between the variables of (debt ratio - Return on asset - free cash flow) and positive investment variable, while the results showed insignificance relationship of the variable firm size.

Table 14: negative investment

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-2.216	.619		-3.579	.000		
	HigMAit	1.954	.595	.204	3.283	.001	.852	1.174
	TaxAVit	.155	.063	.177	2.458	.015	.635	1.575
	TaxAVit*HigMAit	.221	.047	.451	4.713	.000	.358	2.792
	Size	.027	.020	.077	1.333	.184	.971	1.030
	DLTT	.118	.057	.168	2.052	.041	.489	2.043
	ROA	-.101	.046	-.129	-2.182	.030	.933	1.072
	FCF	-.261	.058	-.272	-4.498	.000	.894	1.118

a. **Dependent Variable**: Investnegative

Adjuster R ^{2} : 29.5 **R**^{2} :31.8 **F**: 13.845 **Sig**: 0.001

The results also showed a positive association at the level of significance (0.001-0.015) respectively between each of the variables of high managerial ability (HigMAit), tax avoidance (TaxAVit) as independent variables and positive investment (Invest negative) as a dependent variable. The findings also showed a statistically significant positive relationship at the level of (0.000) between the interactive variable of high managerial ability and tax avoidance (TaxAVit*HigMAit) and negative investment (Invest negative), indicating that firms with high managerial ability are associated positively with negative investment as tax avoidance increases.

These results align with the results of previous studies by Khurana et al. (2018); Hsieh and Huang (2019) which indicated that firms with high (low) managerial ability exhibit a decrease (increase) in deviation from the anticipated level of investment and thus an increase (decrease) in investment efficiency.

Model (2): Testing the effect of tax avoidance and CEO over confidence on investment efficiency.

$$Y_{it} = B_0 + \beta_1 TaxAV_{it} + \beta_2 CEO\ ove_{it} + \beta_3 TaxAV_{it}^{*} CEO\ over_{it} + C_{it} + Year + Industry + \varepsilon_{i,t} \quad (2)$$

Table: 15 investment efficiency

Coefficients[a]								
		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	-1.159	.110		-10.554	.000		
	CEOoveit	.057	.007	.328	8.676	.000	.495	2.021
	TaxAVit	-.381	.076	-.200	-5.021	.000	.445	2.245
	TaxAVit* CEOoveit	.182	.032	.252	5.731	.000	.364	2.746
	Size	.088	.015	.215	6.091	.000	.563	1.775
	DLTT	.156	.053	.100	2.951	.003	.615	1.626
	ROA	.227	.048	.145	4.780	.000	.771	1.297
	FCF	.455	.047	.285	9.754	.000	.827	1.210
a. **Dependent Variable**: InvestEfficit								
R^2 66.7		**Adjusted R^2 66.2**			**F : 135.172**		**Sig : .001**	

In the previous table (15), the results showed the regression model's significance at 1%. The value and significance of the

model reached (F-Value= 135.172 ; P-Value = 0.001 < α = 0.00), as did the explanatory power of the model indicated by the coefficient of determination (R2) is (66.2), which means that the independent variables CEO over confidence , tax avoidance explain (66.2%) of the variance in investment efficiency, and (33.8%) of the variance can be attributed to random errors or to variables not included in the model variables.

The results also show a positive and statistically significant relationship at the (0.000) level between each of the variables, CEO Over confidence (CEOoveit), the interactive variable of CEO Over confidence and tax avoidance (TaxAVit* CEOoveit), and investment efficiency (InvestEfficit). This indicates that higher CEO overconfidence and tax avoidance is associated with increased investment efficiency. This finding aligns with studies conducted by (Kubick and Lockhart, 2017; Tuljannah and Helmy, 2023 ;Dayuningtyas, and Rahmiati, 2020 ; Araújo et al., 2020). This suggests that overconfident managers may be able to lower actual tax rates and take on risks through tax avoidance actions, which could impact the firm's future investment positively. Additionally, the findings revealed a negative and significant relationship at the (0.000) level between both tax avoidance and the efficiency of investment, suggesting that the lower levels of tax avoidance are associated with higher investment efficiency among the sample firms. This result is consistent with studies by (Alsmady, 2022; Bashirimanesh and Arefmanesh, 2023). This finding suggests that

firms that avoid taxes more often tend to make more efficient investment decisions.

As for the control variables, the results revealed a positive relationship with significance level (0.000- 0.003-0.000-0.000) respectively, between the variables of (firm Size - debt ratio - Return on asset - free cash flow) and investment efficiency.

Model (2/1): Testing the effect of tax avoidance and weak CEO over confidence on Invest Positive and then Invest Negative

$$Y_{it} = B_0 + \beta_1 TaxAV_{it} + \beta_2 WeakCEO\ over_{it} + \beta_3 TaxAV_{it} * WeakCEO\ over_{it} + C_{it} + Year + Industry + \varepsilon_{it} \quad (2/1)$$

Table 16: Positive Investment

Coefficients[a]								
		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	3.449	.754		4.574	.000		
	TaxAVit	-.434	.146	-.176	-2.980	.003	.573	1.745
	TaxAVit* weakCEOoveit	.383	.066	.399	5.763	.000	.418	2.394
	CEOoveit	-.165	.055	-.152	-3.025	.003	.793	1.261
	Size	-.342	.086	-.194	-3.965	.000	.835	1.197
	DLTT	-.173	.132	-.071	-1.312	.191	.678	1.475
	ROA	.495	.080	.375	6.223	.000	.551	1.816
	FCF	-.450	.124	-.165	-3.634	.000	.968	1.033
a. Dependent Variable: Investpositive								
Adjuster R^2 : 52.1				**R :53.5**				**F :38.124**
sig:0.001								

Table 17: Negative Investment

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			**Tolerance**	VIF
1	(Constant)	.128	.405		.316	.752		
	TaxAVit	.193	.079	.163	2.455	.015	.587	1.702
	TaxAVit * weakCEOoveit	-.147	.035	-.352	-4.259	.000	.381	2.628
	CEOoveit	-.118	.026	-.248	-4.479	.000	.849	1.177
	Size	.018	.047	.021	.380	.704	.841	1.189
	DLTT	-.355	.063	-.363	-5.588	.000	.614	1.627
	ROA	.070	.042	.115	1.669	.096	.543	1.842
	FCF	-.143	.062	-.121	-2.305	.022	.944	1.059
a. Dependent Variable: Investnegative								
Adjuster R^2 : 39.7			**R :37.9**		**F :21.845**		**sig:0.001**	

The results listed in the previous tables (16-17) show the significance of both regression models at a significance level of 1%. The value and significance of the models reached, respectively, (F-Value= 38.124; F= 21.845; P-Value = 0.001 < α = 0.00), as did the explanatory power of the models indicated by the coefficient of determination (R^2) are (52.1– 39.7) respectively, which means that the independent variables (CEO overconfidence - tax avoidance - the interactive variable of Weak CEO over confidence and tax avoidance) explain (52.1- 39.7%) of the variance in positive- negative investment respectively.

The findings indicate that the interacting variable of weak CEO overconfidence and tax avoidance (TaxAVit* weakCEOoveit) and positive investment (Invest positive) have a

positive and significant association at the level of (0.000). indicating that firms with weak CEO over confidence are associated positively with positive investment as tax avoidance increases. Conversely, the results also show a significant and negative relationship at the level of (0.000) between the interactive variable of weak CEO over confidence and tax avoidance (TaxAVit*weakCEOoveit) and negative investment (Invest negative), this indicates that firms with weak CEO over confidence are associated negatively with negative investment when tax avoidance decreases. These results are consistent with the studies conducted by (Lawrence, 2024; Ngelo et al.,2020; Widuri et al., 2020; Bertrand and Mullainathan, 2003).

Model (2/2): Testing the effect of tax avoidance and good CEO over confidence on Invest Positive and then Invest Negative

$$Y_{it} = B_0 + \beta_1 TaxAV_{it} + \beta_2\ GoodCEO\ overit + \beta_3 TaxAV_{it} * GoodCEO\ overit + C_{it} + Year + Industry + \varepsilon_{it} \quad (2/2)$$

Table 18: Positive Investment

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-3.758	.402		-9.350	.000		
	TaxAVit	-.583	.272	-.096	-2.139	.033	.906	1.104
	CEOoveit	.473	.081	.273	5.818	.000	.826	1.211
	TaxAVitC* GoodEOoveit	-.323	.148	-.106	-2.181	.030	.768	1.302
	Size	.079	.048	.082	1.622	.106	.717	1.395
	DLTT	1.756	.278	.353	6.313	.000	.579	1.728
	ROA	.837	.205	.208	4.082	.000	.698	1.433
	FCF	.232	.104	.123	2.233	.026	.595	1.682
a. Dependent Variable: Investpositive								
Adjuster R^2 : 56.7		**R^2 :58.0**			**F :45.694**			**sig:0.001**

Table 19: Negative Investment

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.411	.388		1.060	.291		
	CEOoveit	.127	.057	.173	2.236	.026	.416	2.406
	TaxAVitC*GoodE Ooveit	.454	.104	.228	4.354	.000	.901	1.110
	Size	.093	.051	.114	1.809	.072	.622	1.609
	DLTT	-1.264	.190	-.391	-6.640	.000	.713	1.403
	ROA	-.842	.161	-.319	-5.239	.000	.669	1.495
	FCF	-.634	.222	-.193	-2.853	.005	.539	1.854
a. Dependent Variable: Investnegative								
Adjuster R^2 : 46.8		**R^2 :48.3**			**F :32.511**			**sig:0.001**

The results listed in the previous tables (18-19) show the significance of both regression models at a significant level of 1%. The value and significance of the models reached,

respectively, (F-Value= 45.694; F= 32.511; P-Value = 0.001 < α = 0.00), as did the explanatory power of the two models, as indicated by coefficients of determination (R^2) are (56.7– 46.8) respectively, which means that the independent variables (CEO overconfidence - tax avoidance - the interactive variable of Good CEO over confidence and tax avoidance) explain (56.7% - 46.8%) of the variance in positive and negative investment respectively.

The results indicate a negative relationship that is significant at the level of (0.030) between the interactive variable of Good CEO over confidence and tax avoidance (TaxAVit* GoodCEOoveit) and positive investment (Invest positive), indicating that firms with Good CEO over confidence are associated negatively with positive investment when tax avoidance increases. The results also show a significant positive relationship with statistical significance at the (0.000) level , between the interactive variable of Good CEO over confidence and tax avoidance (TaxAVit*GoodCEOoveit) and negative investment (Invest negative), indicating that firms with good CEO over confidence are associated negatively with negative investment when tax avoidance increases. These results are consistent with studies conducted by (Lawrence, 2024; Ngelo et al.,2020; Widuri et al., 2020; Bertrand and Mullainathan, 2003; He and Hu, 2019).

6- CONCLUSION

This paper is the first to investigate the effect of managerial ability (low managerial- High managerial) and CEO over confidence(Good CEO- Weak CEO) on the relation between tax avoidance and the efficiency of investment in the Egyptian environment.

In particular, we look at how the relationship between both tax avoidance and the efficiency of investment is conditioned by managerial skill and CEO confidence. We show that firms with (low- high) managerial skills show (higher -lower) deviations from anticipated levels of investment when tax avoidance rises. Put differently, we demonstrate that whereas poor managerial ability exacerbates investment inefficiency, strong managerial ability fosters investment efficiency as tax avoidance rises. Similarly, we demonstrate that CEO overconfidence is linked to investment efficiency as tax avoidance rises; that is, good (weak) CEO overconfidence rises (decreases) the efficiency of investment.

However, we recognize that the statistical correlations we report rely on our capacity to quantify the concepts of managerial skill, tax evasion, and investment efficiency.

Altogether, our results support the idea put forth by Desai et al. (2007) and Desai and Dharmapala (2006, 2008, 2009) that tax avoidance is more than just a straightforward transfer of funds to

shareholders. Instead, we demonstrate that only where there is a high level of managerial skill and/or CEO confidence can tax avoidance be anticipated to increase shareholder value. On the other hand, managers are more prone to utilizing tax avoidance, which is generally referred to as managerial opportunism, which includes building an empire to enable rent extraction rather than boost shareholder value when there is a lack of managerial skill and/or CEO confidence.

Overall, our research adds to the continuing discussion regarding the effects of tax evasion on shareholders as well as the expanding body of research on the function of managerial skills and CEO overconfidence in the relationship between tax avoidance, manager opportunism and investment.

7- Future Research:

1- The effect of managerial capability and corporate governance on the relationship between tax evasion practices and firm performance.
2- Using the conditional mediation model to explain the different effects of tax avoidance practices on (stock price collapse risks - financial analysts' behavior).
3- Analysis of tax avoidance practices in the Egyptian environment during periods of internal shocks - such as financial crises - and external shocks such as political crises and epidemics.

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