The Impact of Managerial Ability and Overconfidence on Firm Risk-taking: The Moderating Role of Corporate Governance Efficiency

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Abstract:

This study aims to investigate the impact of managerial ability and overconfidence on firm risk-taking in Egypt and to examine the moderate effect of corporate governance efficiency on such relationships. The sample includes 45 non-financial EGX-100 index firms from 2018 to 2022 with 225 balanced observations. Four accounting-based proxies are used to measure firm risk-taking. Managerial ability is estimated based on the DEA-Tobit approach developed by Demerjian et al. (2012). Managerial overconfidence was evaluated using the Schrand & Zechman (2012) indicator. Corporate governance efficiency is calculated using the DEA platform, which uses inputs and outputs of corporate governance. Data were then analyzed using panel regression models with fixed and random effects.

Results showed a positive relationship between managerial ability and corporate risk-taking. Increasing managerial ability increases firm risk-taking, as high-ability managers are more adept at capitalizing on opportunities. Results also indicated that managerial overconfidence negatively influences firm risk-taking indicators. Further, findings showed that corporate governance efficiency moderately influences the impact of managerial ability and overconfidence in firm risk-taking. Moreover, firm size positively affects firm risk-taking proxies, supporting the political costs hypothesis in the positive accounting theory, as big-size firms are more likely to take risks to reduce political costs.

Based on existing literature, limited studies have examined how managerial ability and overconfidence influence firm risk-taking. Further, prior studies have not explored the potential moderating role of corporate governance efficiency on such a relationship, highlighting the study's novelty and significance. The study's findings are expected to significantly impact researchers, investors, policymakers, and corporate directors.

Keywords: Managerial ability, Overconfident managers, Firm risk-taking, Positive accounting theory.

ملخص الدراسة:

تهدف الدراسة الحالية الى اختبار تأثير القدرة الإدارية والثقة المفرطة على تحمل الشركات للمخاطر في مصر واختبار تأثير كفاءة حوكمة الشركات على هذه العلاقة كمتغير مُعدل Moderator variable. وتغطي العينة ٤٥ شركة غير مالية مدرجة في مؤشر EGX-100، خلال الفترة 2022-2018، تتكون من ٢٢٥ مشاهدة متوافقة. استخدمت الدراسة أربعة مقاييس محاسبية لتحمل الشركات للمخاطر. تم تقدير القدرة الإدارية بناءً على منهج DEA-Tobit الذي أنشأه Demerjian et al. (2012). واستخدامت الدراسة مؤشر Schrand & Zechman (2012) لتقييم الثقة الإدارية المفرطة. كما تم حساب مؤشرًا لكفاءة حوكمة الشركات باستخدام منصة DEA، والتي تستخدم مدخلات ومخرجات حوكمة الشركات. وتم تحليل البيانات من خلال الانحدار الخطى متعدد المتغيرات باستخدام نماذج التأثيرات الثابتة والعشوائية.

أظهرت النتائج وجود تاثير ايجابي للقدرة الإدارية على تحمل الشركات للمخاطر، وان زيادة القدرة الإدارية تزيد من تحمل الشركات للمخاطر، حيث أن المديرين ذوي القدرة العالية هم أكثر مهارة في الاستفادة من الفرص. كما أشارت النتائج إلى أن الثقة الإدارية المفرطة تؤثر سلبًا على مؤشرات تحمل الشركات للمخاطر. علاوة على ذلك، أظهرت النتائج أن كفاءة حوكمة الشركات لها دور مُعدل على تأثير القدرة الإدارية والثقة المفرطة في تحمل الشركات للمخاطر. وأظهرت أن حجم الشركة يؤثر بشكل إيجابي على مؤشرات تحمل الشركة للمخاطر، مما يدعم فرضية التكاليف السياسية في نظرية المحاسبة الإيجابية، حيث أن الشركات الأكبر حجمًا أكثر عرضة لتحمل المخاطر لتقلل من التكاليف السياسية.

واستنادًا إلى الأدبيات الموجودة، فقد تناولت دراسات محدودة في كيفية تاثير القدرة الإدارية والثقة المفرطة على تحمل الشركة للمخاطر. وعلاوة على ذلك، لم تتناول الدراسات السابقة الدور المُعدل المحتمل لكفاءة حوكمة الشركات على مثل هذه العلاقة، مما يسلط الضوء على حداثة الدراسة وأهميتها. ومن المتوقع أن تؤثر نتائج الدراسة بشكل كبير على الباحثين والمستثمرين وصناع السياسات ومديري الشركات.

الكلمات المفتاحية: القدرة الإدارية، الثقة الإدارية المفرطة، تحمل الشركة للمخاطر، نظرية المحاسبة الإيجابية.

1. Introduction:

Managers' actions, personalities, and traits affect companies' risk-taking (Salehi et al., 2020). While the upper-echelon theory suggests that CEOs significantly influence firm risk-taking, the influence of managerial attributes on such a risk remains unexplored. Managers' decisions can affect firms' behavior and outcomes, so studying them is crucial. Amernic and Craig (2010) argued that management shapes firms, and firms reflect managers. Leaders' actions determine firm risk. Hambrick and Mason's (1984) upper-echelon theory posits that top management's rationale, values, and personal backgrounds significantly influence their decisions and actions, influencing the firm's outcomes. Managers are firms' top leaders, so they have the most power to make decisions and direct other top management teams, even though theory suggests their characteristics affect firm outcomes. Management values and beliefs affect firm leaders' policies and decisions. Financial literature shows managers' traits are evident in their firm-affecting decisions and strategies. Agency and perspective theories may explain managerial risk (Aroui & Omri, 2008). It's unclear how managerial ability and overconfidence affect risk-taking. Therefore, this study examines the impact of some managerial attributes (managerial ability and overconfidence) on risk-taking in Egyptian firms.

Managerial ability affects firm performance, earnings quality, and working capital (Leverty & Grace, 2012; Demerjian et al., 2013; Ujah et al., 2021). However, there is little research on the association between managerial ability and firm risk-taking, one of the main strategic decisions that affect firm survival, especially in a rapidly changing and competitive business environment. March and Shapira (1987) found that managers believe risk-taking is essential to their job. Yung and Chen (2018) suggested that determinants of managerial ability, personality traits, experience, education, and intelligence are related to risk-taking propensity heterogeneity. The managerial ability affects firm risk-taking indirectly through equity capital cost (Mishra, 2014), financial disclosure (De Franco et al., 2017), credit rating process (Bonsall et al., 2017), and cost stickiness (Li et al., 2020).

Moreover, Yung and Chen (2018), Ahmed et al. (2022), and Cheng and Zhang (2022) all found a positive relationship between risk-taking and managerial ability. They discovered that managers with higher risk-taking abilities are more competent at capitalizing on opportunities while minimizing firms' risks, resulting in increased firm success. Leng and Pan (2023) showed that high-ability managers increase firm risk, but this decreases with tenure and disappears for CEOs who work for the same firm for five years or more. Qian et al. (2023) found significant evidence suggesting managerial risk-taking improves corporate innovation performance, relying on managerial ability. However, Salehi et al. (2020) demonstrated that product market competition prevents managers from risky investments, but managerial ability does not affect this relationship. Simamora et al. (2024) found that competent managers are more likely to manipulate earnings using their risk-taking behavior. The literature shows no consensus on how managerial ability affects firm risk-taking. Thus, the study extends the literature by examining the impact of managerial ability on firm risk-taking in Egyptian firms.

Overconfident managers are risk-taking and enjoy challenges (Ho et al., 2016; Kim et al., 2016), as overconfident managers can handle risky investments and increase behavioral finance overinvestment, leading to increased R&D and innovation (Koo & Yang, 2018). Narcissism, a common trait among CEOs, can also contribute to overconfidence, leading to risky decisions and hurting investors and a firm value (Ham et al., 2018; Salehi, 2020). Narcissistic CEOs often describe their firms as entrepreneurial and seek strategic opportunities with higher innovation and risk-taking (Wales et al., 2013). Kim et al. (2016) argued that overconfident managers accept projects with a negative NPV because they believe they can turn negative situations around. Memon and Tauni (2021) showed that overconfident Chinese managers increase corporate risk over time. However, Han et al. (2015) found that managerial overconfidence enhances firm performance. They found that overconfident managers help firms manage risks and perform better. Managerial overconfidence contributes to firm performance by increasing market value and reputation (Hirshleifer et al., 2012). Cho et al. (2021) demonstrate that overconfident managers' investments increase firm value in competitive industries. Overconfident managers make

conservative and profitable family firms. (Chang and Lin, 2022). Mundi and Kaur (2019) discovered that overconfident managers make optimal investments and believe in their abilities, and overconfident managers' innovation and exploration drive firms' growth. Burkhard et al. (2023) also discovered that overconfident managers' investment strategies are riskier, which improves financial performance. Using a sample of Tehran-based businesses, Salehi et al. (2022) showed that managerial overconfidence lowers firm risk over the year. Sumunar and Djakman (2020) found no connection between managerial overconfidence and firm risk using a sample of manufacturing companies in Southeast Asia. The association between managerial overconfidence and firm risk can be influenced by other factors, which explains why previous research has produced inconsistent results.

Corporate governance and firm risk-taking have been studied with mixed results. Muhammad et al. (2023) found a significant association between governance mechanisms and firm risk-taking using agency and resource dependence theories. They found that board gender diversity increases systematic risk caused by board size, independent directors, CEO gender, and duality while reducing CEO duality's positive effect on firm unsystematic risk. Caprio et al. (2007) emphasized that managers can manipulate valuations and earnings due to a lack of transparency in bank corporate governance systems. Adams et al. (2005) argued that influential CEOs implement policies that elevate risk. Sayari and Marcum (2018) suggested that CEO dual responsibilities hinder sound investment decisions, leading firms to increase risk-taking. When the CEO does not hold a dual role, they can make more effective decisions and allocate resources with less risk. Coles et al. (2008) and Al-Smadi (2019) found that firm risk level negatively correlates with the number of independent directors. Block owners effectively manage firms.

The empirical evidence for the impact of managerial ability and overconfidence on firm risk-taking is insufficient. This study aims to expand the scope of the relevant literature. Accordingly, this study pursues to examine how managerial ability and overconfidence influence firm risk-taking in the Egyptian context; it also explores the moderating role of corporate governance efficiency in such relationships through the following sub-questions:

- To what extent does managerial ability influence risk-taking in Egyptian firms؟
- To what extent does managerial overconfidence influence risk-taking in Egyptian firms؟
- To what extent does corporate governance efficiency influence the association between managerial ability and risk-taking in Egyptian firms?
- To what extent does corporate governance efficiency influence the relationship between managerial overconfidence and risk-taking in Egyptian firms?

Objectives of the Study: This study aims to examine how managers' personality traits affect firm risk-taking as it explores the impact of managerial ability and overconfidence on risk-taking in Egypt, focusing on the moderating role of corporate governance efficiency through the following sub-objectives:

- Examine how managerial ability influences risk-taking in Egyptian firms.
- Examine how overconfident managers influence risk-taking in Egyptian firms.
- Examine how corporate governance efficiency influences the association between managerial ability and risk-taking in Egyptian firms.
- Examine how corporate governance efficiency influences the relationship between managerial overconfidence and risk-taking in Egyptian firms.

Significance of the Study: This study contributes to the literature in several ways. First, it investigates the influence of managerial ability on firm risk-taking in Egypt, as there is no consensus in the literature on how managerial ability influences firm risk-taking, which has yet to be studied in Egypt. Second, this study investigates the impact of overconfident managers on firm risk-taking, as no studies have been conducted to explore such a relationship in the Middle East, especially in Egypt. Thus, this study provides a fundamental understanding of firm risk-taking determinants to

assist stakeholders in making investment decisions in Egypt. Likewise, this study examines the potential moderating influence of corporate governance efficiency on the association between managerial ability, overconfidence, and firm risk-taking, which has not been explored in prior studies. The study's findings are expected to significantly impact researchers, investors, policymakers, and corporate directors.

Scope of the Study: This study employed data from non-financial companies in the EGX100 index. Only firms with complete data for all variables analyzed in the study are included. The data spans from 2018 to 2022, providing the latest information available for the study period. The analysis omits financial enterprises because their fundamental differences from non-financial firms could lead to incomparable characteristics.

The remainder of the study is organized as follows: The subsequent section examines the relevant literature for formulating the study hypotheses. Section three defines the research methodology, clarifies the measurement of variables, describes the study models, and identifies the statistical analysis tools used. Section four presents the empirical study and testing of hypotheses, including the statistical analysis results and their interpretation. The final section presents the summary and conclusions.

2. Literature Review and Hypotheses Development

2.1. Managerial Ability and Firm Risk-Taking

The relationship between managerial ability and corporate risk-taking, a critical strategic decision affecting firm survival, is poorly researched, especially given the intense competition in the business environment. March and Shapira (1987) argued that managers believe risk-taking is essential to their job. Yung and Chen (2018) proposed that factors influencing managerial ability are associated with variations in risk-taking propensity. Mishra (2014), De Franco et al. (2017), Bonsall et al. (2017), and Li et al. (2020) have examined how managerial ability indirectly affects firm risk-taking through equity capital cost, financial disclosure, the credit rating process, and cost stickiness. Koijen (2014) and Alzugaiby (2022) argued that skilled managers are less likely to take risks in business decisions. However, Andreou et al. (2016) and Yung and Chen (2018) have examined

how managerial ability affects firm risk-taking in US firms. They found that managerial ability positively influences risk-taking behavior, suggesting that highly able managers have higher risk-taking.

Yung and Chen (2018) examined how managerial ability affects firm risk-taking. They sampled all Compustat non-financial firms from 1980 to 2014. They found that managers with high and low abilities affect risk-taking and firm value differently. Managers with high abilities take risks, while those with low abilities avoid them. Managers with high abilities cut capital expenditures and increase R&D spending, while those with low abilities cut both. Highly skilled managers focus more on a company than less skilled ones. Managerial ability inversely affects firm leverage. Findings also show that managers with high abilities increase firm value, while those with low abilities decrease it.

Salehi et al. (2020) examined how managerial ability influences product market competition and corporate investment choices, focusing on risk-taking and investment efficiency. Regression analysis explored the relationship between firm risk-taking, the over-investment of free cash flow, product market competition, and managerial ability. Using data from firms listed on the Tehran exchange from 2011 to 2015, findings indicated that competition prevents managers from pursuing risky investments. The research additionally showed that managerial ability does not influence the relationship between product market competition and risk-taking.

Cheng and Zhang (2021) examined how managerial ability affects risk-taking in innovative Chinese firms in 2009-2019. Based on fixed effects models, they found a positive relationship between managerial ability and risk-taking. Subsample analyses showed that managers and idiosyncratic risk are more positively correlated when there is more significant earnings pressure or information gaps but less so at higher innovation levels due to less short-term earning pressure and a greater focus on long-term growth through technological innovation. They also found that managerial ability increases firm value, but idiosyncratic fluctuation reduces this effect. The study suggests managerial ability with agency problems or constraints of risk-taking motivations can lower firm value if risk-taking motivations and behaviors are not monitored or constrained.

Yari and Baghomi (2021) examined how managerial ability influences firm risk-taking behavior. Data from 165 firms listed on the TSE from 2008 to 2017 was sampled. Managerial ability was measured using the Model established by Demerging et al. (2012). Additionally, they evaluated the risk-taking behavior of firms by employing two variables: the StdDev of Return on Assets (ROA), the ratio of capital expenditures to total assets, and the firm's financial leverage. Hypothesis testing is performed utilizing a multiple regression model with panel data. The findings indicated that managerial ability has a positive and significant relationship with ROA and the ratio of capital expenditures to total assets.

Ahmed et al. (2022) investigated the moderating influence of managerial ability on the relationship between firm risk-taking and financial success. They utilized a sample of 100 firms listed on the KSE 100 Index in Pakistan from 2014 to 2020. The data were analyzed using random effects panel regression to estimate a firm's efficiency. The findings demonstrate a positive association between managers' risk-taking abilities and their firms' success, as those with higher abilities are more competent at capitalizing on opportunities while minimizing firms' risks.

Alzugaiby (2022) explored the impact of managerial ability on the risk-taking behavior of firms in Saudi Arabia. A fixed-effects model with firm-year and firm-industry specifications was employed to analyze Saudi non-financial firms from 2008 to 2018. The association between managerial ability and firm risk-taking proxies was negative and statistically significant with ROA and leverage standard deviations. At the same time, it was positive and statistically significant with Z-scores. The results indicated that executives with high abilities tend to lead firms that are cautious in their approach to risk. The primary findings remain strong even when subjected to further sensitivity analyses, which encompass a different measure of managerial ability, a logistic regression proxy for risk-taking, the inclusion of financial crises as dummy variables, and a cross-lagged panel model that incorporates fixed effects to address endogeneity issues.

Leng and Pan (2023) examined the association between a CEO's general managerial skills and a firm's risk-taking behavior. It was discovered that CEOs are associated with particularly increased firm risk. Their findings indicated that this association diminishes with the length of CEO

tenure and ultimately disappears for CEOs who remain with the same company for five years or longer. Such findings cannot be accounted for by the outsider CEO's inclination towards risk-taking or the non-random allocation of CEOs to firms. They explain the transformation of managerial skills: as a CEO remains with the same company, skills and knowledge evolve from general to more specific to the firm. Consequently, the impact of general managerial skills is primarily obvious during the initial years of CEO tenure.

Qian et al. (2023) investigated the mediation role of managerial ability in the association between firm risk-taking and innovation performance among Chinese A-share listed firms between 2015 and 2020. They found significant evidence suggesting managerial risk-taking improves corporate innovation performance, relying on managerial ability. Moreover, findings indicated that risk-taking by management enhances their ability, and firm risk-taking enhances innovation performance only when combined with high managerial ability. They presented new evidence suggesting that excessive managerial risk-taking may impair managerial ability. Moreover, the findings showed that managerial ability and firm risk tolerance may collaboratively enhance corporate innovation performance.

Simamora et al. (2024) investigated how risk-taking behavior affects managerial ability and earnings management. The sample includes 846 manufacturing firms listed on the Indonesian Stock Exchange between 2008 and 2018. The fixed-effects regression model is used for data analysis. Findings showed that risk-taking behavior weakens the impact of managerial ability on earnings management. The results also revealed that competent managers are more likely to use their risk-taking proclivity to manipulate earnings. Competent managers implement earnings management strategies to address earnings volatility caused by risk-taking.

The above discussion shows no consensus on how managerial ability affects firm risk-taking. This study extends the literature by examining the effect of managerial ability on risk-taking in Egyptian non-financial listed firms. Based on the discussion above, the following hypothesis is formed:

H1: Managerial ability statistically impacts firm risk-taking.

2.2. Managerial Overconfidence and Firm Risk-Taking

Overconfidence is a crucial financial behavior concept in business and psychological theories, influencing managers' decisions and causing overestimation of success and risk. CEOs often exhibit overconfidence, leading to an inflated sense of their abilities and their firms' prospects. Firms with overconfident managers require higher investment capital and may ignore investing in financial resources. Despite having sufficient financial slacks, these firms are more likely to make excessive investments (Malmendier and Tate, 2005; Ben-David et al., 2013). Zhang et al. (2019) associate overconfidence with return on investment, as firms prefer excessive investment (Pikulina et al., 2017). Overconfidence prevents CEOs from learning from their faults (Chen et al., 2015) and heightens litigation risk (Banerjee et al., 2018). They take more risks (Hirshleifer et al., 2012), and overconfident CEOs are more likely to leave (Choi et al., 2013). Ben Salah and Boujelbène (2018) found that overconfident managers may underestimate future risks, leading to increased company risk due to high returns. More confident managers are more willing to take risks (Ham et al., 2017). Salehi et al. (2020) found that manager overconfidence significantly increases company risk-taking. Yang and Kim (2020) discovered that overconfident managers are risk-averse and cautious.

The upper echelon theory by Hambrick and Mason (1984) states that top managers' traits influence firm performance. Overconfident managers take more risks (Ho et al., 2016; Kim et al., 2016), believe they can perform better (Heaton, 2002), and value their investment return-generating skills (Malmendier and Tate, 2005 & 2008). They are arrogant and believe in turning losses into profits and are more likely to take projects with a negative NPV, overinvest, underestimate risks, and ignore feedback (Kim et al., 2016), which can lead to project failure and lower future profitability.

Overconfident managers also innovate in high-tech projects (Li and Tang, 2010), invest in R&D (Hirshleifer et al., 2012), merge or acquire (Ferris et al., 2013), and use debt financing (Malmendier et al., 2011), which increases cash flow uncertainty. Overconfident managers lead to financial misreporting (Schrand & Zechman, 2012), improve financial restatements (Presley and Abbott, 2013), and release less conservative financial statements (Ahmed and Duellman, 2013). Managerial overconfidence can

increase firm risk through several actions and behaviors. Memon and Tauni (2021) showed that overconfident managers increase firm-specific risks over time. Managerial overconfidence is expected to increase firm risk through stock volatility as investor confidence declines or the probability of loss grows. Overconfident managers' carelessness in decision-making and willingness to engage in high-risk activities can send negative signals to investors.

However, other studies have shown that managerial overconfidence improves firm outcomes. Galasso and Simcoe (2011) argued that overconfident managers increase patents and R&D productivity. Managers who exhibit overconfidence in their decision-making regarding high-risk projects may address the issue of underinvestment (Cho et al., 2021). Innovation helps businesses survive and thrive in competition. Managerial overconfidence is predicted to improve firms' market value and reputation (Hirshleifer et al., 2012). Gao et al. (2021) showed that overconfident managers enhance Korean non-financial firms' values. Sumunar and Djakman (2020) demonstrated that investors' irrationality prevents managerial overconfidence from affecting firm risk in Southeast Asian manufacturing firms.

In contrast, Salehi et al. (2022) examined the association between managerial overconfidence and firm risk-taking by analyzing 150 firms listed on the TSE during 2011-2017. Their findings showed that managerial overconfidence significantly negatively impacts risk-taking behavior. Overconfidence, a characteristic of narcissism, often leads corporate managers to be prompted and admired. That suggests they will make efficient, low-risk investments, ultimately mitigating the firm's risk-taking.

Sutrisno et al. (2023) examined the impact of managerial overconfidence on firm risk and discussed how the founder CEO affects such a relationship. The study analyzed a composite score index to assess managerial overconfidence in Indonesia Stock Exchange-listed non-financial firms covering 2012–2019. The research hypothesis is tested with multiple linear regression. The findings showed that managerial overconfidence lowers firm risk. Founder CEOs do not affect managerial overconfidence or firm risk. The study supports upper echelon theory by showing that top management influences firm outcomes and behavior. Top

management influences firm outcomes and behavior in a two-tier governance system. Overconfident managers who can diversify firm risks will be better chosen.

Wagdi and Aly (2024) examined how managerial overconfidence affects corporation risks in emerging markets like Brazil, Egypt, India, Russia, Saudi Arabia, South Africa, and Turkey. They used board governance as a moderator variable in such a relationship. The study included 70 non-financial firms covering 2013-2022. Due to overinvestment in the company's assets, managerial overconfidence was the construct variable. The study found that board governance moderates managerial overconfidence in emerging markets, explaining the corporation's risks.

Purba et al. (2024) examined how CEO and Board narcissism and managerial overconfidence affect corporate risk-taking. This study used data from 22 Indonesia Stock Exchange-listed manufacturing firms during 2014–2020. The study used E-Views 12 to test data using regression data panels. The results showed that Board Narcissism and Management Overconfidence negatively affect Corporate Risk Taking. Corporate risk-taking is positively correlated with leverage. Research helps investors and the industry understand how CEOs, boards, and management's narcissism and overconfidence affect rational risk-taking decisions.

Tang and Chang (2024) examined whether managerial overconfidence increases risk-taking and firm value, whether high incentive compensation does, and whether financial constraints reduce their value. They used data from New York, Nasdaq, and American stock exchange firms. They found significant differences in variable data between firms with overconfident managers and those without. Overconfident managers increase risk, firm value, and financial constraints. Managerial overconfidence increases risk-taking and firm value, promoting overinvestment. Overconfidence can distort investment decisions and lead to risky but profitable investments. Firms with non-overconfident managers and higher financial constraints took less risk but lost more value.

The inconsistent results of previous studies prompt this study to examine managerial overconfidence and firm risk in Egyptian listed public

firms. Thus, the varying perspectives regarding managerial overconfidence in the outcomes of firms lead to the following hypothesis:

H2: Overconfident managers statistically impact firm risk-taking.

2.3. Corporate governance and risk-taking

Corporate governance and firm risk-taking have been frequently examined in analyses with mixed results. Muhammad et al. (2023) demonstrated a significant association between corporate governance mechanisms and corporate risk-taking using agency and resource dependence theories. They showed that board gender diversity increases the systematic risk that the board size, independent directors, CEO gender, and duality cause. It reduces CEO duality's positive effect on firm unsystematic risk. Their results support board gender diversity's risk-reduction effect and are robust to alternative firm risk-taking measures. Caprio et al. (2007) emphasize that managers can manipulate valuations and earnings due to a lack of transparency in bank corporate governance systems. Adams et al. (2005) contended that influential CEOs implement policies that elevate risk. According to Sayari and Marcum (2018), the CEO's dual responsibilities as board chairman disregard the board's capacity and role to oversee and regulate the management, impeding the CEO's capacity to make sound investment decisions. Therefore, firms are compelled to increase their risk-taking. When the CEO does not hold a dual role, he can make more effective decisions by performing his duties with greater responsibility. Further, the CEO can effectively allocate resources with the least risk by refraining from taking on a dual role. Directors can recognize and resolve conflicts of interest between shareholders and managers (Boubaker and Nguyen, 2012; Jensen and Meckling, 2019). Coles et al. (2008) and Al-Smadi (2019) found that the firm's risk level negatively correlates with the number of independent directors. Block owners effectively manage firms.

Agency issues between owners and managers may be resolved by controlling owners. Consequently, blockholders reduce the inefficiency and agency costs. Jumreornvong et al. (2020) found that more concentrated ownership reduces firm risk. Further, Ahmad and Azhari (2020) examined the impact of institutional ownership on firm risk-taking. They analyzed 522 Malaysian non-financial firms from 2000 to 2014, using fixed panel

regression and GMM to solve endogeneity problems. The results showed that institutional ownership was negatively associated with firm risk-taking, while growth opportunity had a causal relationship with risk-taking. The study highlights the importance of balancing institutional ownership and growth opportunities in reducing firm risk-taking.

Al-Smadi (2019) examined the impact of corporate governance compliance on firm risk-taking, using data from Amman Stock Exchange-listed firms from 2013 to 2017. The study found that transparency and disclosure rules were the most critical factors in corporate governance compliance, with general meeting assembly rules being the fourth. However, the study also found that board size, independence, and committees negatively affected corporate risk-taking. Similarly, Zhang and Lu (2024) found that non-executive directors can increase firm risk-taking by reducing agency costs and financing constraints. However, state-owned companies, high executive incentives, superior external supervision, high ownership concentration, older management, and external uncertainty reduce the positive influence of non-executive directors on firm risk-taking.

Fariska and Khaerunisa (2024) studied the impact of macroprudential policies and board effectiveness on bank risk-taking in 43 Indonesian Stock Exchange-listed banks. They found that board effectiveness and company size partially impact bank risk-taking behavior, while macroprudential policies and inflation did not. Factors contributing to this include corporate governance effectiveness, policy easing and tightening, and macroprudential and monetary policy interactions. Likewise, Jha et al. (2024) found that solid corporate governance enhances firm performance; however, results indicated that robust corporate governance is associated with a decline in firm risk-taking. Similarly, Srairi (2024) examined the influence of corporate governance variables on risk-taking in 31 Islamic banks operating in six Gulf countries. Results showed that cross-membership, accounting, and finance expertise are characteristics of Sharjah supervisory boards that negatively affect bank risk.

2.3.1. Corporate governance, management ability, and risk-taking

Research on the relationship between management ability and firm risk-taking is limited, with some studies suggesting a correlation and others

implying that managers must take risks. High-ability managers are more inclined to take risks, while low-ability managers tend to avoid them. Effective managers prioritize the company to mitigate leverage and reduce capital spending. Baghdadi et al. (2023) found a positive association between board gender diversity and managerial ability in US firms from 2001 to 2016. They found that female board directors enhance managerial ability, particularly in monitoring roles. The effect is stronger when using tenure-weighted measures and more pronounced for firms with three or more women on the board. Firms with more gender-diverse boards tend to promote managers with more generalist managerial skills. Likewise, Safiullah et al. (2022) studied the impact of Shariah supervisory board (SSB) governance on Islamic banks' liquidity creation. They found that better SSB governance increased on-balance-sheet liquidity creation but decreased off-balance-sheet liquidity creation. SSBs and regular boards of directors enhanced managerial ability, indicating that these governance mechanisms influence liquidity creation in Islamic banks. Similarly, Da Silva (2023) examined the impact of effective corporate governance practices on the managerial skills of B3 firms. Findings showed that firms with poor corporate governance practices had more skilled managers to compensate for their organizational deficiencies. Firms with better governance practices had managers who did not necessarily possess superior managerial skills. The study suggests that good corporate governance practices can establish high organizational culture standards, reducing the dependence of managers' skills on the organization's results.

Salehi et al. (2020) found that managers avoid risky investments due to competition. Cheng and Zhang (2021) found a positive correlation between risk-taking and management ability in innovative Chinese firms, with a stronger link between managers and idiosyncratic risk when there is a lot of information or earnings pressure. However, this link weakens when there is more innovation, as there is less short-term earning pressure and more focus on long-term growth through technological innovation. Management skills also impact a firm's risk-taking behavior. Leng and Pan (2023) showed that high-risk managers enhance organizational success by optimizing opportunities and mitigating risks. Qian et al. (2023) found that skilled managers stimulate corporate innovation and that earnings management and

managerial ability are influenced by risk-taking. Based on the above discussion, it is argued that corporate governance efficiency can moderate the influence of managerial ability on firm risk-taking. Thus, the third hypothesis is formed as follows:

H3: Corporate governance efficiency impacts the association between managerial ability and firm risk-taking.

2.3.2. Corporate governance, overconfidence, and risk-taking

Gervais et al. (2005) suggested that risk-averse managers occasionally abandon risky investment plans that have the potential to enhance the value of their firm. In contrast, overconfident managers may overestimate their capacity to mitigate risks. As a result, they may approve such risky plans, which would increase the firm's value and reduce the necessity for stock option compensation. Consequently, board members must consider the CEO's confidence level when developing a CEO compensation structure. Sudarsanam and Huang (2007) found that corporate governance and overconfidence significantly impact post-acquisition firm performance and risk selection in acquiring firms. Thus, corporate governance efficiency and overconfidence can influence risk-taking behavior. The positive influence of board independence on the reduction of bias resulting from the CEO's administrative optimism was identified by Baccar et al. (2013).

Shahid and Shahid (2020) examined CEO overconfidence, corporate investment, firm performance, and corporate governance's moderating effect using Pakistani-listed firms From 2010 to 2018. Results show that CEO overconfidence affects corporate investment and performance, and corporate governance moderates this relationship. In addition, Tobin's Q and ROA are significantly correlated with CEO overconfidence. The moderator effect also affects CEO overconfidence, Tobin's Q, ROA, and CEO overconfidence. Further, Bouzouitina et al. (2021) examined how CEO narcissism and overconfidence affect CSR and how corporate governance mechanisms moderate it in the UK. Using the FGLS method, they tested hypotheses on a sample of 2,360 FTSE 400 UK firms from 2010 to 2017. According to the study, CEO narcissism and overconfidence increase CSR. They also found that corporate governance effectiveness moderates CEO overconfidence behavior. Based on the above discussion, it is argued that corporate

governance efficiency can moderate the association between overconfident CEOs and firm risk-taking. Thus, the fourth hypothesis is formed as follows:

H4: Corporate governance efficiency impacts the association between CEO overconfidence and firm risk-taking.

3. Research Methodology

3.1. Sample and Data Sources

EGX-100 firms from 2018 to 2022 served as a proxy to represent the Egyptian context. The EGX-100 index includes Egypt's 100 most active firms and the EGX30 and EGX70 index firms. Thus, EGX-100 index firms must show effective governance and reporting. The study sample was selected from EGX-100 index firms using specific criteria. Such criteria include excluding finance sectors, as they are highly specialized and accounting-oriented, with unique regulations. Their listing on the Egyptian Stock Exchange remained uninterrupted from 2018 to 2022, and data availability is required to measure variables. Financial reports are issued in Egyptian pounds, and the industry should have at least three firms.

Table (1): Sample and Composition

Sector	*Observations*	*% Observations*
Real estates	50	22
Health care and medicine	35	16
Building Materials	25	11
Food, drinks, and tobacco	30	13
Communications, media, and IT	15	7
Tourism and Leisure	20	9
Automotive and industrial products	15	7
Basic resources	35	16
Total	***225***	***100***

The research sample comprises 45 firms from 8 industries from 2018 to 2022, with 225 balanced observations. Financial reports are available on the Mubasher Info Egypt website. Shareholder general assembly meetings and board reports are available on the Egyptian Stock Exchange site and the firm's website. Table (1) shows the research sample distribution across different sectors, indicating the number of observations in each industry.

3.2. Variables Measurement

3.2.1. Dependent variable: firm risk-taking

This study uses four literature-based proxies to measure firm risk-taking. First, (σEPS) is the StdDev of a firm's earnings per share. Second (σROA) measures the StdDev of a firm's return on assets variability. It is a standard risk measure in financial economics; this proxy reflects investment decision riskiness (Faccio et al., 2016). The StdDev of (σEPS) and σ(ROA) is calculated using 3-year overlapping windows (2016-2018, 2017-2019, 2018-2020, 2019-2021, and 2020-2022). Third is leverage (LEV), which measures loan default risk (Kim et al., 2017). Leverage (LEV) is calculated as the total financial debt to total asset book value. Higher ratios increase the likelihood of defaulting on debt (Faccio et al., 2016). Fourth, Altman's (1968) Z-score is a popular distress prediction model. Non-financial firms' liquidity, leverage, growth, and profitability are associated with financial distress (Gao et al., 2021). Although many distress prediction models exist, the original Z-score still performs well internationally (Altman et al., 2017). It is a binary variable: one for distressed firms with Z-scores less than 1.89 and zero otherwise. Calculated as follows:

$$Z - score = 1.2WC + 1.4RE + 3.3EBIT + 0.6MVE + 0.999S \quad (1)$$

Where:

WC : working capital / total assets
RE : retained earnings / total assets
$EBIT$: earnings before interests and taxes / total assets
MVE : market value of equity / total liabilities
S : sales / total asset

3.2.2. Independent variable:

3.2.2.1. Managerial Ability (ManAbility)

The DEA-Tobit procedure, developed by Demerjian et al. (2012), measures managerial ability. They presented a two-step approach as follows:

Step one: The DEA platform evaluates the values of total efficiency θ between 0 and 1 based on the input and output variables. Total efficiency (θ)

is driven by specific characteristics of the firm and its managers from Equation (2):

$$\text{Max}\theta = \text{Sales} / (v1\text{COGS}+v2\text{SG\&A}+v3\text{R\&D}+v4\text{PPE}+v5\text{GW}+v6\text{Intan}) \quad (2)$$

Where:

Output	*Sales*	Total sales over the year t
Inputs	*COGS*	Cost of goods sold over year t
	SG&A	SG&A expenses over year t
	R&D	R&D cost over year t
	PPE	Plant and equipment at the beginning of the year t
	GW	Goodwill at the beginning of the year t
	Intan	Other intangibles at the beginning of the year t

Step two: Some firm characteristics and business operations that impact a firm's overall efficiency have been excluded. The Tobit Regression model assesses managerial ability based on the Model's residuals, which is achieved through the following Equation:

$$Firm\ efficiency_i = \alpha + \beta_1\ Ln(Total\ Assets)_i + \beta_2\ Market\ Share_i + \beta_3\ Free\ Cash\ Flow\ Indicator_i + \beta_4\ Ln(Age)_i + \beta_5\ Business\ Segment\ Concentration_i + \beta_6\ Foreign\ Currency\ Indicator_i + Year_i + \varepsilon_i \quad (3)$$

Where:

Firm efficiency: refers to total efficiency estimated using the DEA, the output of the platform's Equation (1), which ranges from 0 to 1.

Ln(Total Assets): refers to total assets' natural logarithm.

Market Share: is the firm's sales ratio to the entire industry sales in the given year.

Free Cash Flow Indicator: is a dummy indicator that is one if a firm has a positive Free Cash Flow in year t and zero otherwise.

Ln (Age): is a firm age's natural logarithm.

Business segment concentration: is the ratio of a firm's segment revenues to the total revenue of all business segments in year t.

Foreign Currency Indicator: a dummy indicator is one if a firm has a positive value for foreign exchange adjustment in a year t and zero otherwise.

ε_i*:* is the residual value, which measures business management ability.

The measure of managerial ability being discussed is considered more objective and accurate than other measures. That is because it has fewer errors, as it directly assesses the managerial ability score instead of relying on a proxy. The accuracy of this measure is contingent upon the availability of freely accessible data, as it depends on information extracted from corporate financial statements. The evaluation assesses the managerial ability of the entire team rather than solely focusing on the CEO. Abernathy et al. (2018) suggested that several factors were also examined to determine the validity of this measure, ultimately demonstrating its reliability as an indicator of management ability.

3.2.2.2. Managerial Overconfidence (OCM)

The overconfidence index was measured using the following equation:

$$SG_{it} = \beta_0 + \beta_1 * AG_{it} + \varepsilon_{it} \qquad (4)$$

Managerial overconfidence is measured by the residuals (εit) from asset growth regression on sales growth. A positive value indicates overinvestment (managerial overconfidence = 1), while a negative value indicates underinvestment (managerial overconfidence = 0). This scale has been used by several studies (Kermani et al., 2014; Duellman et al., 2015; Mitra et al., 2019; Carvalho et al., 2024).

3.2.3. Moderator variable: (CGE)

Corporate Governance Efficiency (*CGE*) between 0 and 1 is measured using the DEA platform. The inputs of DEA include corporate governance mechanisms such as the board of directors, audit committee, and ownership structure. These mechanisms have an impact on the success of a firm. The outputs include various financial indicators that can be influenced by corporate governance. These indicators include return on sales, earnings per share, and corporate value (Yang et al., 2020; Shahwan & Habib, 2020; Elhabashy et al., 2023).

$$CGE = \frac{ESP + ROE + ROS}{BD.duality + BD.size + Conown + Aud.Size + Aud.Ind} \quad (5)$$

Where:

Outputs	*ESP*	Earnings per share.
	ROE	Return on equity.
	ROS	Return on sales.
Inputs	*BD.duality*	A dummy variable equals zero if the CEO is the board chairman and one otherwise.
	BD.size	The number of board directors.
	Conown	The percentage owners share is 5% or more.
	Aud.Size	Number of audit committee members.
	Aud.Ind	Number of independent auditors in the audit committee.

3.2.4. Control variables

Various firm-level control variables were utilized to avoid bias in the omitted variables, as the literature indicates several variables that could affect firm risk-taking (Andreou et al., 2016; Yung and Chen, 2018; Alzugaiby, 2022; Leng and Pan (2023); Salehi et al., 2022; Sutrisno, 2023; Wagdi and Aly, 2024; Purba et al., 2024), and they are defined as governing variables as follows:

SIZE: The natural log of total assets measures firm size-related profitability differences, such as economies of scale.

Age: the natural logarithm of firm age identifies differences in a firm's life cycle stage.

MTB: the firm's market-to-book ratio is calculated as market value divided by equity book value.

ROE: the return on equity equals (net income / total equity). It measures performance and improves internal financing, allowing for more investments.

SGR: the sales growth is calculated by dividing annual sales changes by the previous year's sales ($Sales_t$ - $Sales_{t-1}$ / $Sales_{t-1}$).

Table (2) defines the model symbols and associated measures.

Table (2): Variable Definitions and Measurement

Code	Description	Measurements	
Dependent Variables (Risk-taking)			
Σeps	StdDev of earning on share	StdDev of EPS (net income/number of outstanding shares) over 3-year overlapping windows (2016-2018, 2017-2019, 2018-2020, 2019-2021, and 2020-2022).	Andreou et al. (2016); Alzugaiby (2022)
Σroa	StdDev of returns on assets	StdDev of ROA (net income/total assets) over 3-year overlapping windows (2016-2018, 2017-2019, 2018-2020, 2019-2021, and 2020-2022).	
LEV	Financial leverage	Total Liabilities / Total Assets	
Z-Score	Corporate financial distress	Based on Altman's (1968) Model, as shown in Equation (1).	
Independent Variables			
Man Ability	Managerial ability	The DEA-Tobit approach of Demerjian et al. (2012), as indicated in equations (2) and (3).	
OCM	Managerial Overconfidence	The residuals (ε_{it}) from asset growth regression on sales growth serve as a measure $SG_{it} = \beta_0 + \beta_1 * AG_{it} + \varepsilon_{it}$. Positive values indicate overinvestment (OCM = 1), while negative values indicate underinvestment (OCM = 0) (Kermani et al., 2014; Mitra et al., 2018; Carvalho, 2024).	
Moderate Variable			
CGE	Corporate governance efficiency	The DEA platform determines corporate governance efficiency θ between 0 and 1 using Equation (5) (Shahwan & Habib, 2020; Elhabashy et al., 2023).	
Control Variables			
SIZE	Firm size	Total assets' natural logarithm	Salehi et al., 2022
Age	Firm age	Firm age natural logarithm	
SGR	Sales growth	(Sales $_t$ – Sales $_{t-1}$ / Sales $_{t-1}$)	
MTB	market-to-book equity	Equity market value / Equity book value	
ROE	Return on equity	Net income /Total equity	

3.3. Models Specification

Two models are developed to test the hypotheses. Model (1) is informed for testing H1 and H2, while Model (2) is informed for testing H3 and H4.

Equation (6) is used to form Model (1) as follows:

$$Risk_{it} = \beta_0 + \beta_1 ManAbility_{it} + \beta_2 OCM_{it} + \beta_n \sum CONTROLS_{it} + \varepsilon_{it} \quad (6)$$

Where:

Risk: (alternatives) is a firm risk-taking proxy (*σEPS, σROA, LEV, or Z-Score*).

β_0: the constant of the regression models

β_1: coefficients of the managerial ability for firm i in year t.

β_2: coefficients of the managerial overconfidence for firm i in year t.

β_3 - βn: coefficients of control variables for firm i in year t.

ϵ_{it}: the residual value.

Therefore, Model (1) to test the hypotheses (H1 and H2) related to the effect of managerial ability and overconfidence on firm risk-taking is as follows:

Model (1)

$$Risk_{it} = \beta_0 + \beta_1 ManAbility_{it} + \beta_2 OCM_{it} + \beta_3 SIZE_{it} + \beta_4 Age_{it} + \beta_5 SGR_{it} + \beta_6 MTB_{it} + \beta_7 ROE_{it} + \epsilon_{it}$$

Therefore, model (1) is divided into four submodels using the alternative firm risk-taking indicators (*σEPS, σROA, LEV, or Z-Score*) as follows:

(Model 1a)

$$\sigma EPS_{it} = \beta_0 + \beta_1 ManAbility_{it} + \beta_2 OCM_{it} + \beta_3 SIZE_{it} + \beta_4 Age_{it} + \beta_5 SGR_{it} + \beta_6 MTB_{it} + \beta_7 ROE_{it} + \epsilon_{it}$$

(Model 1b)

$$\sigma ROA_{it} = \beta_0 + \beta_1 ManAbility_{it} + \beta_2 OCM_{it} + \beta_3 SIZE_{it} + \beta_4 Age_{it} + \beta_5 SGR_{it} + \beta_6 MTB_{it} + \beta_7 ROE_{it} + \epsilon_{it}$$

(Model 1c)

$$LEV_{it} = \beta_0 + \beta_1 ManAbility_{it} + \beta_2 OCM_{it} + \beta_3 SIZE_{it} + \beta_4 Age_{it} + \beta_5 SGR_{it} + \beta_6 MTB_{it} + \beta_7 ROE_{it} + \epsilon_{it}$$

(Model 1d)

$$Z\text{-}Score_{it} = \beta_0 + \beta_1 ManAbility_{it} + \beta_2 OCM_{it} + \beta_3 SIZE_{it} + \beta_4 Age_{it} + \beta_5 SGR_{it} + \beta_6 MTB_{it} + \beta_7 ROE_{it} + \epsilon_{it}$$

Equation (7) is used to form Model (2) as follows:

$$Risk_{it} = \beta_0 + \beta_1 ManAbility_{it} + \beta_2 OCM_{it} * CGE_{it} + \beta_n \sum CONTROLS_{it} + \varepsilon_{it} \quad (7)$$

Therefore, Model (2) to test the hypotheses (H3 and H4) related to the moderate effect of corporate governance efficiency (*CGE*) on the association between managerial ability, overconfidence, and firm risk-taking is as follows:

Model (2)

$$Risk_{it} = \beta_0 + \beta_1 ManAbility_{it} * CGE_{it} + \beta_2 OCM_{it} * CGE_{it} + \beta_3 SIZE_{it} + \beta_4 Age_{it} + \beta_5 SGR_{it} + \beta_6 MTB_{it} + \beta_7 ROE_{it} + \epsilon_{it}$$

Once again, model (2) is divided into four submodels using the alternative firm risk-taking indicators (*σEPS, σROA, LEV, or Z-Score*) as follows:

(Model 2a)

$$\sigma EPS_{it} = \beta_0 + \beta_1 ManAbility_{it} * CGE_{it} + \beta_2 OCM_{it} * CGE_{it} + \beta_3 SIZE_{it} + \beta_4 Age_{it} + \beta_5 SGR_{it} + \beta_6 MTB_{it} + \beta_7 ROE_{it} + \epsilon_{it}$$

(Model 2b)

$$\sigma ROA_{it} = \beta_0 + \beta_1 ManAbility_{it} * CGE_{it} + \beta_2 OCM_{it} * CGE_{it} + \beta_3 SIZE_{it} + \beta_4 Age_{it} + \beta_5 SGR_{it} + \beta_6 MTB_{it} + \beta_7 ROE_{it} + \epsilon_{it}$$

(Model 2c)

$$LEV_{it} = \beta_0 + \beta_1 ManAbility_{it} * CGE_{it} + \beta_2 OCM_{it} * CGE_{it} + \beta_3 SIZE_{it} + \beta_4 Age_{it} + \beta_5 SGR_{it} + \beta_6 MTB_{it} + \beta_7 ROE_{it} + \epsilon_{it}$$

(Model 2d)

$$Z\text{-}Score_{it} = \beta_0 + \beta_1 ManAbility_{it} * CGE_{it} + \beta_2 OCM_{it} * CGE_{it} + \beta_3 SIZE_{it} + \beta_4 Age_{it} + \beta_5 SGR_{it} + \beta_6 MTB_{it} + \beta_7 ROE_{it} + \epsilon_{it}$$

Table (2) shows the model symbols' definitions and the corresponding measurements.

3.4. Statistical Analysis Tools

The study uses a longitudinal sample of items collected over time. This study uses cross-sectional data from 45 firms and time-series data spanning five years. Panel data is the result of combining the two types. This study used a panel data model rather than time series or cross-sectional models, which both have limitations. Panel methods with random or fixed effects address the issue of multiple correlations among independent variables

(McManus, 2015). Before testing the hypotheses, three tests were carried out to determine the most appropriate statistical analysis tools, which are the Hausman test, the Wooldridge test, and the Breusch-Pagan test, as outlined below:

a) **Hausman test:** The Hausman test distinguishes between fixed and random effects models. If the p-value of the test exceeds the significance level of $\alpha = 0.05$, the random effects model best represents the data. If the p-value is less than 0.05, the fixed effects model best represents the data. Table (3) displays the Hausman test results. The empirical study and hypothesis testing section shows how STATA 17 analyzes data.

Table (3): Results of the Hausman, Wooldridge, and Breusch-Pagan tests

Models	*Hausman test*			*Wooldridge test*			*Breusch-Pagan*		
	chi²	*p-value*	*Result*	*chi²*	*p-value*	*Result*	*chi²*	*p-value*	*Result*
Model (1a)	9.178	0.240	Random	2.119	0.069	Absence of autocorrelation of error terms	7.85	0.079	Homoskedasticity of the variance error term
Model (1b)	1.328	0.908	Random	5.184	0.078		4.14	0.056	
Model (1c)	62.517	0.000	Fixed	2.289	0.111		2.17	0.122	
Model (1d)	30.639	0.000	Fixed	7.245	0.089		3.43	0.064	
Model (2a)	14.304	0.112	Random	2.220	0.577		4.26	0.087	
Model (2b)	11.716	0.230	Random	2.087	0.088		3.35	0.073	
Model (2c)	122.594	0.000	Fixed	4.565	0.087		3.17	0.066	
Model (2d)	22.962	0.006	Fixed	4.012	0.082		3.11	0.062	

b) **Wooldridge test:** Wooldridge's test for panel data shows robustness by making fewer assumptions about heterogeneous individual effects (Wooldridge, 2002). Fixed and random effects estimators do not require the presence of serial correlation. If the Wooldridge test p-value exceeds 0.05, it indicates no autocorrelation issue affecting the study model's accuracy and vice versa. The Wooldridge test results in Table (3) show that all models' p-values exceed 5%. All regression models are accepted because first-order autocorrelation of errors is absent.

c) **Breusch-Pagan test:** Breusch-Pagan test detects linear regression heteroskedasticity and investigates whether independent variables affect regression residual variance. A test p-value greater than 0.05

indicates no heteroskedasticity issues in the study models and vice versa. Table (3) presents the results of Breusch-Pagan 's test's null hypothesis, demonstrating that the p-value for each Model exceeds the standard significance level of 0.05. Thus, the study models do not have any heteroskedasticity issues. The findings confirm the homoskedasticity of the variance error term and support the acceptance of all regression models.

4. Empirical Results and Discussions

This section delineates the empirical findings obtained through diverse statistical methods.

4.1. Descriptive Analysis

A descriptive study of the variables is carried out before ascertaining their relationship. The study variables' descriptive statistics are shown in Table (4), which also offers additional details regarding the sample's characteristics:

- The mean values of the firm risk-taking indicators σEPS, σROA, and LEV are 0.848, 0.046, and 0.572, respectively, with StdDev of 1.596, 0.152, and 0.203. Further, distressed firms with Z-scores less than 1.81 equal to 98 with 44% from the study sample. These indicators are distinct and consistent with prior research.
- Managerial ability (ManAbility) ranges from 0.058 to 0.975, with a mean of 0.557 and a StdDev of 0.215, which indicates an increasing managerial ability level among study sample managers .
- The Table also shows that overconfident managers (OCM) directed 46% of the study sample, while unoverconfident managers directed 54%.
- Regarding control variables, firm size (SIZE) ranges from 18.834 to 25.815, with an average of 22.124, suggesting that large firms dominate the study sample. Sales growth (SGR) ranges from -0.979 to 5.013, with a mean of 0.229 and a StdDev of 0.7, indicating significant disparities among sample firms. Similarly, the market-to-book value (MTB) ratio ranges from -5.071 to 51.827, indicating substantial differences between the study sample firms.

Table (4): Descriptive Statistics

Variables	*Mean*	*StdDev*	*Min*	*Max*	*Skew.*	*Kurt.*
σEPS	.848	1.596	.006	10.407	9.645	122.018
σROA	0.046	0.152	0	2.26	13.754	200.091
LEV	0.572	0.203	0.13	0.898	0.348	3.284
ManAbility	0.557	0.215	0.058	0.975	-0.624	2.898
SIZE	22.124	1.551	18.834	25.815	0.403	2.6
Age	2.84	0.659	0.693	3.714	-1.262	3.842
SGR	0.229	0.7	-0.979	5.013	3.508	20.025
MTB	1.907	3.894	-5.071	51.827	9.692	121.848
ROE	0.133	0.258	-0.572	1.181	1.855	7.764
CGE	0.214	0.266	0	1	1.33	3.925
Dummy variable						
	Dummy		***N***		***Ratio***	
Z-Score	Coded 0		127		56%	
	Coded 1		98		44%	
OCM	Coded 0		122		54%	
	Coded 1		103		46%	

4.2. Correlation Analysis

Univariate analysis is performed prior to testing the study hypotheses by assessing the correlation among the variables. The Pearson correlation coefficient was employed to evaluate this correlation. Table (5) presents the correlation matrix for the research variables, with coefficients displayed above and p-values indicated below.

- Table (5) shows a positive statistically significant correlation between firm risk-taking (σEPS, σROA, LEV, and Z-Score) and managerial ability (ManAbility) (Coef. = 1.049, 1.014, 0.128, & 0.948, respectively).
- Firm risk-taking indicators (σEPS, σROA, and Z-Score) statistically showed a significant negative correlation with overconfidence managers (OCM) at 0.05 and 0.1, which supports hypotheses H1 and H2 in their initial form.

Table (5): Pearson correlation matrix

	1)	2)	3)	4)	5)	6)	7)	8)	9)	10)	11)
1) σ(EPS)	1										
2) σ(ROA)	0.03	1									
	0.65										
3) Lev	0.033	-0.07	1								
	0.623	0.299									
4) Z-Score	-0.016	-0.034	0.715***	1							
	0.817	0.611	0.000								
5) ManAbility	0.138**	0.045*	0.122*	0.452***	1						
	0.038	0. 056	0.068	0.000							
6) OCM	-0.074*	-0.072	-0.024*	-0.217***	0.284***	1					
	0.069	0.281	0. 275	0.001	0.000						
9) SIZE	0.168**	-0.062	0.381***	0.293***	0.015	0.181***	1				
	0.012	0.353	0.000	0.000	0.821	0.006					
10) Age	0.08	0.081	0.118*	0.175***	0.002	0.03	-0.218***	1			
	0.233	0.228	0.077	0.008	0.978	0.652	0.001				
11) SGR	0.009	-0.017	-0.008	0.033	0.067	0.111*	-0.052	0.07	1		
	0.89	0.797	0.902	0.622	0.32	0.095	0.436	0.298			
12) MTB	-0.061	-0.016	0.105*	0.028	0.000	-0.005	-0.122*	-0.05	-0.062	1	
	0.362	0.814	0.098	0.673	0.996	0.943	0.068	0.459	0.355		
13) ROE	0.148**	0.011	-0.538***	-0.805***	0.428***	.259***	-0.085	-0.251***	0.006	0.017	1
	0.027	0.872	0.000	0.000	0.000	0.000	0.203	0.000	0.929	0.804	

*** p<.01, ** p<.05, * p<0.1

- Table (5) also shows a positive, statistically significant correlation between managerial ability (ManAbility) and overconfidence managers (OCM) at a level of 0.01, which implies that highly skilled managers are overconfident.
- It also showed the moderate role of corporate governance efficiency (CGE), as ManAbility*CGE is positively statistically significantly correlated with firm risk-taking (σEPS, σROA, and LEV), and it's positive but not significant with Z-Score, supporting hypothesis H3 in its initial form.
- OCM*CGE is negatively statistically significantly correlated with firm risk-taking (σEPS and LEV), and it's negative but not significant with σROA and Z-Score, which supports hypothesis H4 in its initial form.

Table 6 shows the correlation matrix between the interactive variables and the dependent variables, indicating a statistically significant positive correlation between the firm risk-taking indicator of *σ(EPS)* and the interactive variables of managerial ability and corporate governance efficiency (*Man Ability*CGE*), as well as the interactive variable associated with managerial overconfidence and corporate governance adequacy (*OCM*CGE*). It also shows a statistically significant negative correlation between the firm risk-taking indicator of *Z-Score* and the interactive variables of managerial ability and corporate governance efficiency (*Man Ability*CGE*).

Table (6): Correlation Matrix for Interacting and Dependent Variables

		σ(EPS)	σ(ROA)	Lev	Z-Score
Man Ability*CGE	Coefficient	0.333***	-0.009*	-0.124	-0.197***
	p-value	0.000	0.893	0.064	0.003
OCM*CGE	Coefficient	0.326***	-0.026	-0.001	-0.080
	p-value	0.000	0.703	0.989	0.233

Table (6) shows no correlation between the other indicators of firm risk-taking and the interactive variables, as the correlation coefficient's significant value exceeds the significance level value of 5%.

The Pearson correlation coefficient ignored the differences in the characteristics of the companies under investigation and treated them as a whole, so one cannot conclude that the variables in Tables (5 & 6) are the only ones statistically associated with firm risk-taking. This conclusion was confirmed in the next part using longitudinal multiple regression models (panel models).

4.3. Multicollinearity Diagnostics

The variance inflation factor (VIF) test guarantees that the study's independent variables are non-collinear. According to Asteriou et al. (2016), multicollinearity can result in inaccurate regression coefficients, suboptimal models, fluctuating coefficient signs, and an inability to achieve statistical significance.

Table (7) shows the collinearity diagnostics for each variable in the study models. The VIF values are less than 10, so there is no multicollinearity between the independent variables. Similarly, tolerance

levels are acceptable for each variable because all values are more than 0.10, indicating the absence of multicollinearity between the variables in question.

Table (7): Results of Collinearity Statistics

	Models (1)		*Models (2)*	
	VIF	***Tolerance***	***VIF***	***Tolerance***
Man Ability	1.371	.729	2.259	0.443
OCM	1.554	.644	1.913	0.523
ROE	1.585	.631	1.708	0.585
SIZE	1.191	.84	1.451	0.689
Age	1.173	.853	1.193	0.839
SGR	1.017	.983	1.060	0.943
MTB	1.037	.964	1.040	0.961
*Man Ability*CGE*	-	-	٥.986	0.125
*OCM*CGE*	-	-	٦.360	0.119

4.4. Regression Analysis - Tests of Hypotheses

4.4.1. Results of Testing Hypotheses (H1 and H2)

This section describes the empirical regression analysis results and associated interpretations. Model (1) tests the hypotheses (H1 and H2) related to the effect of managerial ability (*ManAbility*) and overconfidence (*OCM)* on firm risk-taking proxies (*σEPS*, *σROA*, *LEV*, and *Z-Score*) as follows:

Model (1)

$$Risk_{it}\,(\sigma EPS_{it}, \sigma ROA_{it}, LEV_{it}, \text{ or } Z\text{-}Score_{it}) = \beta_0 + \beta_1\, ManAbility_{it} + \beta_2\, OCM_{it} + \beta_3\, SIZE_{it} + \beta_4\, Age_{it} + \beta_5\, SGR_{it} + \beta_6\, MTB_{it} + \beta_7\, ROE_{it} + \epsilon_{it}$$

This study replicated the empirical analysis using four alternative indicators of firm risk-taking. Firm risk-taking indicators replace each Model's dependent variable, as presented in Table (8).

The Hausman test findings in Table (3) show that the fixed effects model is the appropriate test model for Models (1a & 1b) when using σEPS and *σROA* as the dependent variable, the random effects model is the appropriate test model when using *Lev* and *Z-score* as the dependent variable, Models (1c & 1d). This study replicated the empirical analysis by

replacing Model (1)'s dependent variable (*Risk*) with one of the earnings quality proxies (*σEPS, σROA*, *LEV*, and *Z-Score*). Table (8) presents the Wald tests (Chi^2) and F-test results on Model (1) using panel data models. Findings show that the Model is statistically significant at a 0.05 significance level, suggesting that the regression model is accepted. Additionally, the R2 of the models (1a-1d) are 0.244, 0.212, 0.282, and 0.535, respectively, which indicates that managerial ability, overconfidence, and control variables may account for 24.4%, 21.2%, 28.2%, and 53.5% of the firm risk-taking indicators (*σEPS*, *σROA*, *LEV*, and *Z-Score*) in Egyptian firms.

Table (8): Managerial Ability, Overconfidence, and Firm Risk Taking

	Firm Risk-taking Proxies {Model 1 (a-d)}			
	Model 1 (a)	***Model 1 (b)***	***Model 1 (c)***	***Model 1 (d)***
	σEPS	***σROA***	***Lev***	***Z-Score***
ManAbility	1.049 (0.046)**	1.014 (0.44)**	0.128 (0.039) **	0.948 (0.018)**
OCM	-1.234 (0.000)***	-1.020 (0.009)***	0.057 (0.776)	-0.166 (0.031)**
SIZE	0.356 (0.000)***	0.303 (0.012)**	0.107 (0.000)***	0.626 (0.003)***
Age	0.253 (0.188)	0.206 (0.212)	-0.019 (0.667)	-0.154 (0.617)
SGR	0.061 (0.667)	-0.053 (0.395)	0.007 (0.493)	-٠.49٠ (0.513)
MTB	0.028 (0.752)	0.013 (0.577)	0.009 (0.836)	0.032 (0.876)
ROE	2.373 (0.000)***	2.052 (0.002)***	-0.275 (0.000)***	-4.018 (0.000)***
Constant	-7.602 (0.000)***	3.090 (0.044)**	-1.776 (0.004)***	-15.606 (0.000)***
Model Summary				
Obs.	225	225	225	225
Adj. R^2	0.244	0.212	0.282	0.535
Chi^2 (F-test):	18.031	2.123	(9.690)	(34.904)
P-value	0.012	0.043	0.000	0.000
*** p<.01, ** p<.05, * p< 0.1				

At a 5% significance level, managerial ability (ManAbility) has a positive significant influence on firm risk-taking indicators (σEPS, σROA,

LEV, and Z-Score) using Models (1a) to (1d). The findings demonstrate that increasing managerial ability increases firm risk-taking. These findings strongly support the hypothesis (H1). Such findings are consistent with Yung and Chen (2018), Cheng and Zhang (2021), Yari and Baghomi (2021), and Alzugaiby (2022) but contradict Li et al. (2020) and Alzugaiby (2022). This finding predicts that highly able managers will increase firm risk-taking, indicating that those with higher abilities are more competent at capitalizing on opportunities while minimizing firms' risks.

Findings also show that managerial overconfidence negatively influences firm risk-taking indicators of *σEPS*, *σROA*, and *Z-Score* at 0.05 (Models 1a, 1b, & 1d). However, it is negative but insignificant with leverage (*Lev*) Model (1c). Results strongly support hypothesis H2. Such findings are consistent with Salehi et al. (2022), Sutrisno (2023), and Purba et al. (2024) but contradict Tang and Chang (2024). Results can be interpreted as prospectors having a competitive edge over defenders through strategic marketing and R&D budgets (Elhabashy, 2023). In addition, investors are more cautious about decreasing SG&A expenditures for fear of damaging future competitive advantage (Sutrisno, 2023).

For control variables, as expected, firm size (*SIZE*) positively affects risk-taking proxies (*σEPS*, *σROA*, *LEV*, and *Z-Score*). These findings support the political costs hypothesis in the positive accounting theory, as big-size firms are more likely to take firm risks to reduce political costs (Watts and Zimmerman, 1978, 1986).

Models (1a) and (1b) show a positive and statistically significant coefficient of return on equity (*ROE*). In contrast, models (1c) and (1d) have a negative and statistically significant *ROE* coefficient, suggesting that a firm's financial performance increases its willingness to accept risks, which is an effective risk management strategy.

4.4.2. Results of Testing Hypotheses (H3 and H4)

This section discusses the empirical findings and interpretations of regression analysis using Model (2) to test hypotheses (H3) and (H4) about the interactive effect of corporate governance efficiency and both managerial ability and overconfidence on firm risk-taking. The empirical analysis is replicated by replacing the dependent variable with one of the

indicators of firm risk-taking indicators (*σEPS*, *σROA*, *LEV*, and *Z-Score*). Table (9) shows Wald tests (Chi^2) for models (2a & 2b) using the random effects model and F-test for models (2c & 2d) using the fixed effects model. Models are statistically significant at a 0.01 significance level, suggesting regression models are accepted. The R^2 of Model 2 (a-d) are 0.293, 0.277, 0.316, and 0.598, respectively, indicating that the interactive effect of corporate governance efficiency and both managerial ability, overconfidence, and control variables may account for 29.3%, 27.7%, 31.6%, and 59.8% of the firm risk-taking indicators (σEPS, σROA, LEV, and Z-Score) in Egyptian firms.

Table (9): The Moderating Role of Corporate Governance Efficiency

	Firm Risk-taking Proxies {Model 2 (a-d)}			
	Model 2 (a)	***Model 2 (b)***	***Model 2 (c)***	***Model 2 (d)***
	σEPS	***σROA***	***Lev***	***Z-Score***
*ManAbility*CGE*	2.777 (0.155)	0.830*** (0.006)	0.421*** (0.004)	1.045 (0.313)
*OCM*CGE*	-1.511 (0.455)	-0.120 (0.705)	-0.228** (0.017)	0.675 (0.314)
SIZE	0.372*** (0.000)	0.430* (0.081)	0.126*** (0.000)	0.662*** (0.002)
Age	0.254* (0.091)	0.205* (0.079)	0.028 (0.529)	0.192 (0.539)
SGR	0.024 (0.870)	-0.044 (0.238)	0.002 (0.818)	-0.061 (0.424)
MTB	-0.007 (0.787)	0.041 (0.587)	0.000 (0.886)	0.002 (0.875)
ROE	2.036*** (0.008)	2.033** (0.018)	0.232*** (0.000)	3.977*** (0.000)
Constant	-7.766*** (0.000)	1.104** (0.028)	-2.246*** (0.000)	-16.473*** (0.000)
Model Summary				
Obs.	225	225	225	225
Adj. R^2	0.293	0.277	0.316	0.598
Chi^2 (F-test):	21.356	18.760	(8.758)	(27.124)
P-value	0.011	0.027	0.000	0.000
*** p<.01, ** p<.05, * p<.1				

The R^2 coefficients for firm risk-taking indicators in Model (2), which includes the moderate variable of corporate governance efficiency, are

(0.293, 0.277, 0.316, and 0.598), which differ from the R^2 coefficients in Model (1) (0.244, 0.212, 0.282, and 0.535), indicating that corporate governance efficiency plays a moderating role.

Findings reveal a significant positive relationship between the interaction variable *ManAbility*CGE* with both risk-taking indicators of (*σROA* and *Lev*) at a 1% significant level. Corporate governance efficiency (*CGE*) transforms the significant positive effect of risk-taking indicators (*σEPS* and *Z-Score*) to be positive but insignificant. The finding, therefore, indicates that corporate governance efficiency (*CGE*) moderately influences the association between managerial ability and firm risk-taking. Such a result implies that the impact of managerial ability (*ManAbility*) on firm risk-taking has been mitigated in firms with efficient corporate governance. These findings support hypothesis H3.

The results also revealed a 5% significant negative relationship between the interaction variable *OCM*CGE* and risk-taking indicators of (*Lev*) in a model (2c). Corporate governance efficiency (*CGE*) reduces the negative impact of risk-taking indicators (*σEPS*, *σROA*, and *Z-Score*) to insignificant levels in Model (2a, 2b, & 2d). The findings suggest that corporate governance efficiency (*CGE*) moderately influences the relationship between managerial overconfidence and firm risk-taking. This finding indicates that the impact of managerial overconfidence (*OCM*) on firm risk-taking has been reduced in firms with effective corporate governance. These findings support hypothesis H4.

5. Summary and Conclusions

This study examines how managerial ability and overconfidence affect firm risk-taking in Egypt. It also investigates the moderating role of corporate governance efficiency in the impact of managerial ability and overconfidence on firm risk-taking. The study used EGX100 non-financial company data. Only firms with complete data for all study variables are considered. The 2018–2022 data is the most recent for the study. Financial firms have inherent differences from non-financial firms, which could result in incomparable attributes. Thus, the 2018–2022 study sample includes 45 non-financial firms and 225 balanced observations. Four literature-based proxies are used to measure firm risk-taking. Managerial ability is estimated

based on the DEA-Tobit method developed by Demerjian et al. (2012). Managerial overconfidence was evaluated using the Schrand & Zechman (2012) indicator. Corporate governance efficiency is calculated using the DEA platform, which uses inputs and outputs of corporate governance mechanisms. Multivariate linear regression analysis is conducted on panel data utilizing fixed and random effects models.

Results showed a positive relationship between managerial ability and corporate risk-taking. The increasing managerial ability increases firm risk-taking as high-ability managers are more adept at capitalizing on opportunities. Results also indicated that managerial overconfidence negatively influences firm risk-taking indicators of *σEPS*, *σROA*, and *Z-Score* at 0.05 (Models 1a, 1b, & 1d). However, it is negative but insignificant with leverage (*Lev*) Model (1c). Thus, Egyptian firms run by high-ability managers are more likely to take high risks, whereas those run by overconfident managers tend to take less risk. Results strongly support hypotheses H1 and H2.

At a 1% significance level, *ManAbility*CGE* shows a significant positive correlation with risk-taking indicators (*σROA* and *Lev*). Efficient corporate governance (*CGE*) reduces the positive impact of risk-taking indicators (*σEPS* and *Z-Score*). Thus, *CGE* moderates managerial ability and firm risk-taking. Management ability (*ManAbility*) affects risk-taking less in well-governed firms. Evidence supports H3.

The Model (2c) showed a 5% negative correlation between *OCM*CGE* and Lev risk-taking. Corporate governance efficiency (CGE) mitigates the negative impact of risk-taking indicators (*σEPS*, *σROA*, and *Z-Score*) in Models (2a, 2b, and 2d). *CGE* moderates manager overconfidence and firm risk-taking. Good corporate governance firms have less managerial overconfidence (*OCM*), which affects risk-taking. Evidence supports H4.

Firm size (*SIZE*) positively affects firm risk-taking proxies, which supports the political costs hypothesis in the positive accounting theory, as larger firms are more likely to take firm risks to reduce political costs.

The current study recommends that firms evaluate managerial attributes when appointing managers, considering how these attributes influence risk-taking and, consequently, that firm performance and shareholder interests

are essential for enabling firms to hire managers. Firms can manage their risk-taking by selecting and employing managers with the appropriate qualities, which impacts various stakeholders. It is also recommended to encourage firms to apply efficient governance mechanisms, as corporate governance efficiency mitigates the impact of managerial attributes on firm risk-taking. The efficiency of corporate governance is critical to the proper functioning of a firm. By implementing efficient corporate governance, firm resource management can improve financial performance.

Future research can examine the impact of other managerial traits, such as age and gender, on firm risk-taking. Future research could also focus on evaluating the effect of CEO power on firm risk-taking, including structural, ownership, expert power, and prestige power, as well as studying the moderating role of political pressures on the relationship between managerial attributes and firm risk-taking. Exploring the influence of business strategy on the relationship between managerial attributes (managerial ability, entrenchment, and overconfidence) and firm risk-taking is recommended. Further research can examine accounting-based earnings quality measures (accruals quality, persistence, predictability, and income smoothing) and market-based earnings quality measures (value relevance, timeliness, and conservatism) on firm risk-taking.

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