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Managerial Overconfidence, Corporate Financial Decisions and Firm Performance: Evidence from Non-Financial Firms Listed on the Pakistan Stock Exchange.

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A B S T R A C T

Purpose— This study examines whether managerial (CEO) overconfidence, proxied by observable corporate behaviour, is associated with investment, financing, dividend, and hedging decisions and with firm performance in non-financial firms listed on the Pakistan Stock Exchange (PSX). Hedging is analysed separately from financing because it is a risk-management decision, not a capital-structure choice.

Study Design/methodology/approach—A balanced panel of 267 non-financial firms over 2016–2025 (2,670 firm-years) is estimated in EViews using panel regressions for continuous outcomes and a binary-choice model for hedging (use of derivatives). Because CEO-level psychometric and option-exercise data are unavailable for PSX firms, overconfidence is proxied by five archival firm-level indicators classified against industry benchmarks: over-financing, over-investment, research and development (R&D) and advertising intensity, capital expenditure, and CEO ownership. Results are read as associations consistent with the bias, not as direct measures of it.

Findings—The associations are selective and proxy-specific. Firms with above-industry debt show higher leverage but lower ROA, ROE, and Tobin's Q; firms with above-industry capital expenditure show higher investment, ROA, ROE, and Tobin's Q. Dividend decisions show no significant association with any proxy. Only CEO ownership is significant for hedging, with the opposite sign to that predicted.

Practical Implications—Boards should review debt-financed capital expenditure more closely, and the Securities and Exchange Commission of Pakistan (SECP) and the PSX should require fuller disclosure of derivative use, including instrument type.

Originality/Value—The study tests four corporate decisions and three performance measures in one framework on a ten-year archival panel, including the rarely studied hedging decision, and offers an archival, firm-level approach where CEO-level behavioural data are unavailable.

Keywords: Managerial overconfidence, CEO overconfidence, Capital structure, Dividend policy, Investment decisions, Hedging decisions, Firm performance, Pakistan Stock Exchange

JEL Classification Codes: G32, G31, G34, G35, G41, L25

1 | INTRODUCTION

1.1 | Background and Context

Corporate finance is concerned with how firms invest, raise capital, distribute profits and manage risk, and these decisions ultimately determine firm performance. Classical theory assumes that managers make them rationally, but a growing behavioural literature shows that the personal traits of the people who make them matter. Managerial (CEO) overconfidence, the tendency to overestimate one's own abilities, future returns, and control over outcomes, is among the most widely studied of these traits (Ben-David et al., 2013; Malmendier & Tate, 2005). This study examines how overconfidence-related behaviour is associated with investment, financing, dividend, and hedging decisions and with the performance of non-financial firms listed on the Pakistan Stock Exchange (PSX).

The traditional view in corporate finance theory is that managers are rational agents whose decisions aim to maximize shareholder wealth (Modigliani & Miller, 1958, 1963). In this neoclassical view, financing, investment, dividend, and hedging decisions result from a cost–benefit optimization process in which managers' behaviour is unaffected by psychological bias. Over the past three decades, however, studies in behavioural corporate finance have offered a contrary view: the personal psychological characteristics of chief executive officers (CEOs), especially overconfidence, routinely distort corporate financial decision-making (Ben-David et al., 2013; Heaton, 2002; Malmendier & Tate, 2005, 2008; Malmendier et al., 2011). Managerial overconfidence is the tendency of executives to overestimate the returns on their investment initiatives, underestimate the chance of project failure, and overestimate their control over project outcomes (Malmendier & Tate, 2005). These cognitive biases are not merely psychological: because CEOs have considerable discretion over how resources are allocated within their firms, the biases are reflected directly in corporate policy. Overconfident executives overestimate their ability to create success and expect good results, which leads them to overestimate the returns on investment projects and to over-invest (Hsu & Lee, 2025). This tendency has been observed in a broad range of corporate outcomes, including dividend policy, corporate risk management, mergers and acquisitions (M&A), cash holdings, tax strategy, investment policy, and capital structure (Adam et al., 2015; Effah & Su, 2026; Khoo et al., 2025). Recent research shows that CEO overconfidence has become an established construct in the corporate finance and management literature. With substantial contributions from scholars in China, the United States, and the United Kingdom, research on CEO overconfidence has greatly expanded our understanding of corporate governance and strategic decision-making (Effah & Su, 2026). Results on the overconfidence–performance relationship, however, have been inconsistent across countries, and a recent meta-analysis (Cherkaoui & Oudrhough, 2025b) suggests that the link is frequently indirect and moderated by governance mechanisms, national culture and firm-specific contingencies. Behavioural aspects of managerial decision-making may be even more relevant in emerging markets such as Pakistan than in developed markets, because of weaker external governance arrangements, family dominance of ownership, less developed capital markets and a regulatory framework that is still developing under the oversight of the Securities and Exchange Commission of Pakistan (SECP). High ownership concentration, CEO duality, and wide managerial discretion over capital allocation provide a fertile context in which to explore the association between CEO overconfidence and four major financial decisions of non-financial firms listed on the PSX: investment, financing, dividend, and hedging. Contrary to

conventional theory, recent evidence from the PSX shows that CEO overconfidence has a positive effect on dividend payout and dividend yield (Khan et al., 2025), even though theory suggests that overconfidence should reduce the free cash flow available for dividend distribution.

1.2 | Problem Statement

Although the literature on managerial overconfidence is growing, the evidence from Pakistan remains fragmented. Existing studies are limited to a single financial decision (usually capital structure or dividend policy), use relatively short panels or small samples, or rely on survey data rather than long-run archival panel data (Ahmed & Duellman, 2013; Qasim et al., 2019). Earlier Pakistani research based on questionnaires administered to firm CEOs found a significant positive association between overconfidence and leverage, but found that risk perception did not significantly explain this association, and it did not examine how overconfidence relates to investment, financing, dividend, and hedging decisions in the same firms over a long horizon. Moreover, the evidence on the overconfidence–leverage relationship is inconclusive. Some studies report a positive relationship, arguing that overconfident CEOs prefer higher leverage because they hold positive expectations about firm performance (Ho, 2025; Mundi & Kaur, 2022), while others report a negative relationship, arguing that overconfident CEOs avoid debt to retain control or reduce risk (Ting et al., 2015; Yung & Long, 2022). This question has not been tested systematically on a large, long-run database of Pakistani non-financial firms that uses over-investment, over-financing, R&D and advertising intensity, capital expenditure and CEO ownership as proxies for overconfidence. Corporate hedging is a further gap. Internationally, overconfident managers have been found to increase speculative derivative positions when markets are rising and to reduce them when markets are falling (Adam et al., 2015), yet few studies have investigated whether overconfident CEOs of PSX-listed non-financial firms systematically under-hedge currency, interest-rate and commodity-price exposures. For Pakistani non-financial firms, the joint association of managerial overconfidence with all four decision areas (investment, financing, dividend and hedging) and with firm performance (Tobin's Q, ROA and ROE) has not been documented over a ten-year panel (2016–2025).

The latest studies sharpen this gap. Work published in 2025–2026 examines single outcomes in single settings, such as dividends on the PSX (Khan et al., 2025), investment on the Nairobi Securities Exchange (Nzunga & Jagongo, 2026), financial distress in the United States (Ho, 2025), ESG performance across 51 countries (Ogundipe et al., 2026), and meta-analytic summaries of performance effects (Cherkaoui & Oudrhough, 2025b; Effah & Su, 2026). None of them tests investment, financing, dividend, and hedging decisions and firm performance together for Pakistani non-financial firms, so the relative importance of overconfidence across decisions remains unknown. This study addresses that gap.

1.3 | Research Objectives

The study's research goals are listed below;

1. To examine the impact of overconfidence on financial decisions in all non-financial firms listed on the Pakistan Stock Exchange.
2. To analyze the impact of overconfidence on firm performance in all non-financial firms listed on the Pakistan Stock Exchange.

1.4 | Research Questions

Accordingly, the study addresses two research questions:

RQ1. Is managerial overconfidence, proxied by over-financing, over-investment, R&D and advertising intensity, capital expenditure, and CEO ownership, associated with the investment, financing, dividend, and hedging decisions of non-financial firms listed on the PSX?

RQ2. Is managerial overconfidence, measured by the same proxies, associated with the performance (Tobin's Q, ROA and ROE) of these firms?

The two questions are answered separately because the financial decisions (Equations 1-4) and firm performance (Equations 5-7) are distinct sets of dependent variables.

1.5 | Underlying Theories

Three sets of theories frame the study. Upper echelons theory (Hambrick & Mason, 1984) argues that the characteristics of top managers shape strategic choices and outcomes. Behavioural corporate finance (Heaton, 2002; Malmendier & Tate, 2005) adds that overconfident managers overestimate returns and underestimate risk, which distorts investment and financing. Classical theories of capital structure (trade-off and pecking order), dividends (signalling and free-cash-flow agency), and hedging (Smith & Stulz, 1985) provide the rational benchmarks against which the behavioural predictions are assessed. These links are developed in the literature review.

1.6 | Significance of the Study

This study contributes in three ways. Theoretically, it extends upper echelons theory (Hambrick & Mason, 1984) and behavioural corporate finance (Malmendier & Tate, 2005, 2008) to an emerging-market setting by testing investment, financing, dividend and hedging decisions and firm performance in one framework, whereas Pakistani studies have usually examined a single decision (Batool et al., 2021; Khan et al., 2025). Empirically, it uses ten years of archival data on 267 non-financial PSX firms instead of survey responses. Practically, the findings inform the SECP, boards of directors, and institutional investors about the monitoring of managerial bias in capital allocation and about risk-management disclosure (Khoo et al., 2025).

2 | LITERATURE REVIEW

2.1 | Theoretical Foundations: Upper Echelons Theory and Behavioural Corporate Finance

Upper echelons theory (Hambrick & Mason, 1984), which holds that managers' background characteristics, such as cognitive biases and personality, partly shape organizational outcomes such as strategic decisions and performance, is the theoretical foundation of this study. Behavioural corporate finance developed from this foundation as a research programme that studies how the psychological biases of corporate decision-makers, in addition to market frictions, affect observed corporate financial policies (Heaton, 2002; Malmendier & Tate, 2005). It focuses on how managers' psychological biases can affect corporate financial decision-making, from investment appraisal to capital structure and dividend policy (Cervellati & Angelini, 2025). In the psychology and finance literature, overconfidence is generally divided into three closely related components: (i) overestimation of one's actual performance, (ii) overreplacement, or

the belief that one is better than others (the "better-than-average" effect), and (iii) excessive certainty about the accuracy of one's beliefs, often called miscalibration (Ben-David et al., 2013; Moore & Healy, 2008). Empirical measures of overconfidence include the CEO's stock-option exercise behaviour (Malmendier & Tate, 2005, 2008), media attention to the CEO (Malmendier & Tate, 2008), earnings-forecast optimism (Ben-David et al., 2013) and, most importantly for this study, residuals from corporate investment, financing and R&D intensity models, all of which reflect systematic deviations from optimal corporate behaviour (Ahmed & Duellman, 2013; Richardson, 2006; Schrand & Zechman, 2012).

2.2 | Linking the Theories to the Study's Constructs and Hypotheses

Upper echelons theory provides the overall logic: an executive trait (overconfidence) influences strategic choices (investment, financing, dividends and hedging) that in turn determine performance. Behavioural corporate finance specifies the mechanism: overestimating returns and underestimating risk moves each decision away from its rational benchmark. For investment (H1), the benchmark is NPV-maximizing investment, and overconfidence predicts over-investment (Malmendier & Tate, 2005). For financing (H2), the pecking-order and trade-off theories give the benchmark, and the view that overconfident managers regard their equity as undervalued predicts a preference for debt (Hackbarth, 2008). For dividends (H3), signalling and free-cash-flow theories give competing benchmarks, so overconfidence may lower payouts through cash retention or raise them as a signal. For hedging (H4), corporate hedging theory (Froot et al., 1993; Smith & Stulz, 1985) implies hedging to reduce distress and tax costs, whereas overconfident managers underestimate risk and hedge less or speculate (Adam et al., 2015). For performance (H5), these distortions can reduce value through the agency costs of free cash flow (Jensen, 1986) or raise returns through bolder risk-taking. Corporate size and capital intensity are control variables because they shape the same decisions through access to capital, collateral, and economies of scale, independently of managerial psychology.

2.3 | Capital Structure Theory and Managerial Overconfidence

Classical capital structure theory begins with the Modigliani–Miller irrelevance proposition (Modigliani & Miller, 1958), which asserts that, under ideal capital markets, a firm's value is independent of its capital structure. The trade-off theory (Kraus & Litzenberger, 1973; Myers, 1984) suggests that firms choose a leverage ratio that balances the tax benefits of debt against the costs of bankruptcy and financial distress. The pecking-order theory (Myers & Majluf, 1984) asserts that, because of information asymmetry between managers and shareholders, firms prefer internal financing to debt and debt to equity. The disciplining effect of debt on the free-cash-flow problem, which limits managers' ability to over-invest in negative net present value (NPV) projects, offers a further explanation of capital structure choice (Jensen, 1986; Jensen & Meckling, 2019). Managerial overconfidence theory adds a behavioural element to these classical theories. Hackbarth (2008) shows analytically that managers who overestimate their firms' value believe that the market undervalues their firms and therefore prefer borrowing to selling shares, which they regard as underpriced; they consequently choose higher leverage than rational managers would. Consistent with this reasoning, some studies indicate that overconfident CEOs prefer higher financial leverage because they have high expectations of firm performance (Fairchild, 2005; Hackbarth, 2008; Ho, 2025; Ho et al., 2016; Mundi, 2023; Mundi & Kaur, 2022). Other studies, however, report the opposite: a negative relationship, because overconfident CEOs may be less inclined to issue debt in order to retain control or reduce perceived risk (Ting et al., 2015; Yung

& Long, 2022). Consistent with upper echelons theory, a recent study in Saudi Arabia shows that the relationship is also moderated by CEO characteristics (age, tenure, education, and board membership) and by corporate policies (dividend policy and liquidity) (Alosaimi, 2026). Likewise, recent meta-analytic evidence pooling 27 studies and more than 12,000 firm-years finds a statistically significant, though not large, effect of executive overconfidence on corporate debt decisions, moderated by CEO age, gender, education and tenure (Cherkaoui & Oudrhough, 2025b). For Pakistan, survey data from top executives of 200 PSX-listed companies show a strong positive correlation between overconfidence and leverage and a significant negative correlation between overconfidence and risk perception, but the overconfidence–leverage relationship is not significantly explained by risk perception (Batool et al., 2021). This study builds on that research but uses archival panel data instead of survey responses, over a much longer period.

2.4 | Dividend Theory and Managerial Overconfidence

Classical dividend theory begins with the Miller and Modigliani (1961) divident irrelevance proposition and continues with the bird-in-hand theory (Bhattacharya, 1979; Gordon, 1963). signalling theory (Miller & Rock, 1985), agency-cost explanations of dividends (Easterbrook, 1984; Jensen, 1986), the dividend life-cycle theory (DeAngelo et al., 2006) and catering theory (Baker & Wurgler, 2004). According to signalling theory, dividends convey private information about the firm's expected cash flows, while Jensen (1986) free-cash-flow agency theory suggests that dividends discipline managers by reducing the discretionary cash flow that they can invest in value-destroying projects. Behavioural extensions of dividend theory examine how managerial overconfidence supplements these classical mechanisms. This literature builds on the earlier agency-based and information-based approaches to dividend irrelevance and focuses on how managers' psychological biases affect dividend policy within investment-appraisal and capital-structure decisions (Hoang, 2020). Overconfident managers who believe that they have better investment opportunities, and that external financing is more costly than is actually the case, may lower dividends in order to retain internal funds for investments that they perceive to offer higher returns. The empirical evidence is, however, mixed and context-dependent. Some studies report a negative relationship between managerial overconfidence and dividend policy (Deshmukh et al., 2013), whereas others report mixed results: a study of 222 industrial firms listed in Vietnam finds a higher dividend yield, but no difference in the payout ratio, for firms with overconfident CEOs (Hoang, 2020). Recent evidence from Pakistan, in contrast, shows a positive relationship: for a sample of 170 non-financial companies over 2011–2022, estimated with fixed-effects and dynamic system-GMM techniques, CEO overconfidence positively affects the dividend payout ratio and dividend yield, and the results hold for other dividend proxies (Khan et al., 2025). The authors warn, however, that managerial confidence may benefit shareholders in the short run through higher payouts but may harm them in the long run if firms lack the retained earnings needed to fund capital-intensive projects; dividends and retained earnings should therefore be aligned with long-run investment needs (Khan et al., 2025). By comparison, earlier Pakistani evidence indicated a weak positive association between managerial overconfidence and dividend payout, in contrast to the stronger effect observed in Western economies, implying that the overconfidence–dividend relationship in Pakistan may be changing over time. This contrast with more recent Pakistani studies highlights the value of the 2016–2025 panel used in this study, which can capture how the relationship has evolved as the PSX governance codes have developed.

2.5 | Overconfidence and Investment Decisions

Investment is the area in which managerial overconfidence has been most widely studied. The underlying rationale (Malmendier & Tate, 2005) is that overconfident managers are more likely to over-invest when internal funds are readily available and more likely to under-invest when they face external financing that they regard as unattractive. Empirical evidence from the Nairobi Securities Exchange, Kenya, shows a substantial correlation between CEO overconfidence and corporate investment over 2010–2022 (Nzunga & Jagongo, 2026). Other evidence indicates that corporate governance moderates the relationship between CEO overconfidence and corporate performance, and that overconfidence is significantly related to Tobin's Q and ROA (Silva et al., 2026). Over-investment is typically measured with the residual-based model of Richardson (2006), which estimates a firm's expected investment level from growth opportunities, leverage, cash, firm age, and firm size; positive residuals are treated as over-investment and negative residuals as under-investment. Numerous studies have used Richardson (2006) model to distinguish optimal from non-optimal investment behaviour (Lo & Shiah-Hou, 2022). In addition, empirical and archival evidence shows that overconfident managers tend to overestimate the returns on their investments and therefore delay recognizing losses until a project can be viewed as having a positive NPV, which increases the likelihood of over-investment (Ahmed & Duellman, 2013; Hribar & Yang, 2016). Over-investment is also linked with the availability of free cash flow (Richardson, 2006), and overconfidence is thought to amplify this sensitivity.

2.6 | Overconfidence and Financing Decisions

Beyond the narrow question of leverage, overconfident CEOs are hypothesised to engage in more general "over-financing", that is, to raise more external financing than their projects need because they overestimate the profitability of those projects (Malmendier et al., 2011). This behaviour appears to be restrained by the credit-rating system: overconfident CEOs believe that external financing is more expensive than it actually is, which dampens their desire to over-invest; firms are expected to reduce their acquisition volume when their credit rating is at risk; and rating warnings act as a learning mechanism that influences CEOs' subsequent acquisition and financing decisions (Khoo et al., 2025; Malmendier & Tate, 2015). In the Pakistani context, this suggests that external monitoring may, to some extent, discipline overconfident financing behaviour.

2.7 | Overconfidence and Dividend Decisions

Dividends are a residual claim that depends on the overconfident CEO's investment and financing decisions. Because overconfident CEOs wish to retain cash for investments that they perceive to be high-return, dividend payouts would be expected to decline, ceteris paribus (Deshmukh et al., 2013). The Pakistani evidence is less straightforward, however: a recent study of PSX firms with a large sample over 2011–2022 found a positive overconfidence–dividend relationship (Khan et al., 2025). This may indicate that overconfident CEOs signal, albeit over-optimistically, strong prospects through high dividends, which is consistent with signalling theory (Miller & Rock, 1985) and operates alongside, rather than in place of, the free-cash-flow retention motive.

2.8 | Overconfidence and Hedging Decisions

According to corporate hedging theory, hedging can raise firm value by reducing expected tax liabilities, financial distress costs, agency costs and information asymmetry costs (Froot et al., 1993; Smith & Stulz, 1985). The evidence supporting these traditional theories of corporate risk management has, however, been

only partial and inconsistent (Adam et al., 2015), and managerial overconfidence may help to explain this puzzle. In a sample of actual corporate derivative positions, Adam et al. (2015) found that more overconfident managers engaged more in speculative derivative activity after speculative gains and less after speculative losses, consistent with selective self-attribution, whereby gains increase, and losses reduce, managers' speculative activity. Overconfident managers also tend to under-hedge genuine economic exposures and to over-hedge speculative derivative positions, because they believe that their forecasts of future prices, interest rates or exchange rates are more accurate than they really are (Adam et al., 2015; Voon et al., 2024). Evidence based on the ISO 31000:2018 risk-management framework also points to significant relationships between overconfidence and enterprise risk management (Suslov, 2025). These findings are relevant to the 2016–2025 panel used in this study, which covers the COVID-19 shock and subsequent macroeconomic volatility on the PSX, conditions that may have affected managerial overconfidence.

2.9 | CEO Ownership, Corporate Size, and Capital Intensity

CEO or managerial ownership is often used both as a proxy for overconfidence and as a governance mechanism in its own right, because it indicates managerial confidence in the firm and, at high levels, aligns managerial incentives with those of outside shareholders (Malmendier & Tate, 2005; Ting et al., 2015). Firm size and capital intensity are routinely included as control variables in the overconfidence literature because they affect financing, investment, dividend, and hedging outcomes independently of managerial psychology (Irawan & Okimoto, 2021; Richardson, 2006).

2.10 | Overconfidence and Firm Performance

The relationship between managerial overconfidence and firm performance is theoretically unsettled and empirically inconclusive, which is why performance is included in this study as an outcome alongside the four financial decisions. On the one hand, overconfidence can foster risk-taking, innovation, and assertive decision-making that rational, risk-averse managers might avoid, which can lead to higher accounting returns such as ROA and ROE (Effah & Su, 2026). An analysis of digital banking data from Indonesia indicates that CEO overconfidence has a positive effect on firm returns, but the direct effect is not statistically significant; the effect is instead mediated by strategic risk-taking. On the other hand, unchecked overconfidence can lead to over-investment in negative-NPV projects and to excessive leverage, and may reduce long-run, market-based valuation measures such as Tobin's Q (Adam et al., 2015; Malmendier & Tate, 2005). Evidence on Pakistani listed companies over 2010–2018 showed a substantial positive correlation between CEO overconfidence and both Tobin's Q and ROA (Silva et al., 2026), whereas the net effect of managerial overconfidence on firm performance remains debated (Cherkaoui & Oudrhough, 2025a). More broadly, a meta-analytic review set in a cross-cultural and entrepreneurial-orientation context describes the ongoing scholarly discussion of the variables that influence the net effect of CEO overconfidence on firm performance, which may be positive, negative, or zero (Cherkaoui & Oudrhough, 2025b).

2.11 | Recent Evidence (2025-2026): Convergence, Divergence and Critical Synthesis

Recent studies converge on three points. First, overconfidence is linked with investment distortions: Nzunga and Jagongo (2026) report a significant relationship with corporate investment on the Nairobi Securities Exchange, and Hsu and Lee (2025) link overconfidence to overestimated returns and over-investment. Second, overconfidence matters for financial risk: Ho (2025) shows that overconfident CEOs

make biased investment decisions that reduce shareholder wealth, and Khoo et al. (2025) show that credit-rating signals restrain overconfident firms. Third, reviews and meta-analyses (Cherkaoui & Oudrhough, 2025b; Effah & Su, 2026) conclude that the evidence has grown strong but depends on context.

The evidence diverges on four issues. (i) Leverage: some studies find that overconfident CEOs borrow more (Ho, 2025; Mundi & Kaur, 2022) and others that they avoid debt (Ting et al., 2015; Yung & Long, 2022). (ii) Dividends: Khan et al. (2025) report a positive link on the PSX, whereas Deshmukh et al. (2013) report lower payouts. (iii) Performance: Silva et al. (2026), Miao et al. (2025) and Effah and Su (2026) report positive links with accounting or market returns, while Ogundipe et al. (2026), using firms from 51 countries, find that overconfidence lowers ESG performance through higher risk-taking, and Ho (2025) finds that CEOs described as overconfident in the press face a lower risk of financial distress, a counterintuitive result. (iv) Hedging: evidence outside samples of derivative positions remains thin (Adam et al., 2015; Voon et al., 2024).

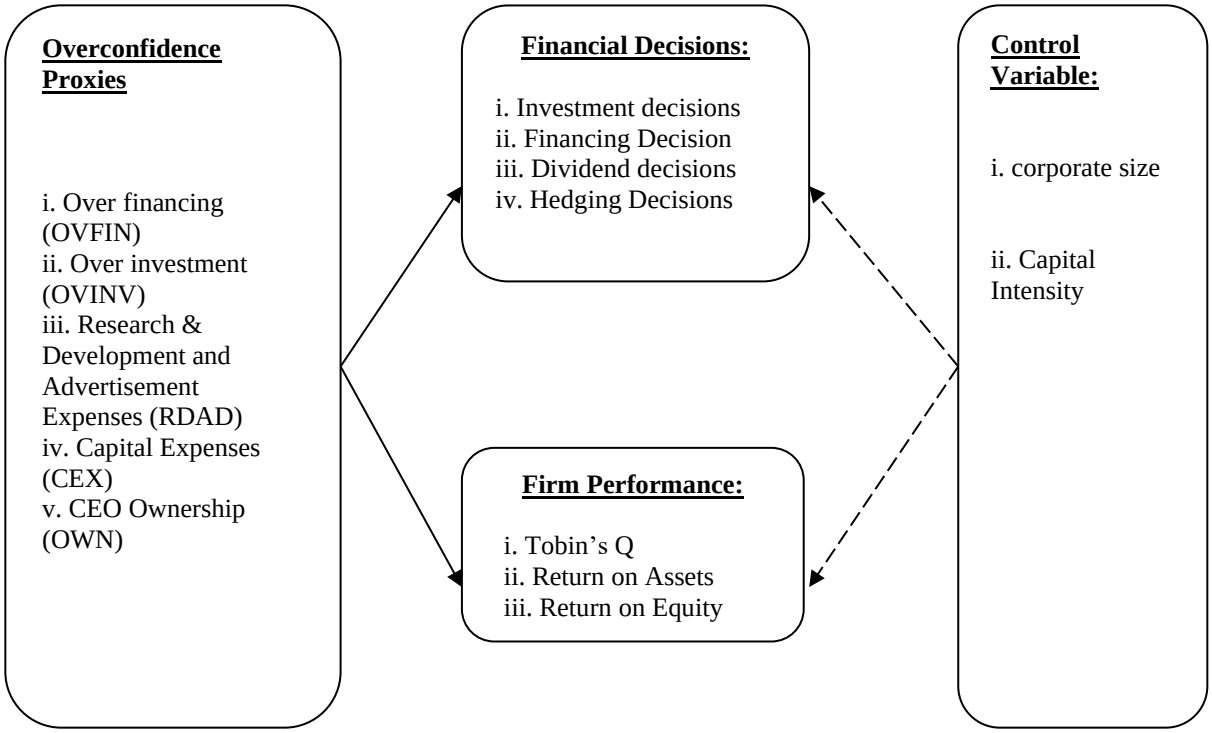
These differences largely reflect how overconfidence is measured (CEO option holdings, press coverage, forecasts or firm-level proxies), the market studied, and whether governance and credit-market discipline are considered. Most studies examine one or two outcomes, mostly in developed or East Asian markets. Evidence for Pakistan is concentrated on a single outcome (Khan et al., 2025) or on survey data (Batool et al., 2021; Qasim et al., 2019). To our knowledge, no study tests investment, financing, dividend, and hedging decisions and three performance measures jointly on a ten-year archival panel of PSX non-financial firms. This is the research gap and the novelty of the present study: a single framework, a common set of proxies, and an explicit treatment of hedging and of binary outcomes. Because the proxies are firm-level, the contribution is to the evidence on overconfidence-related corporate behaviour and not a new measure of CEO psychology.

2.12 | Research Gap and Conceptual Framework

The framework below shows the overall flow of the research model. Overconfidence-related behaviour is expected to be associated with the long-term financial decisions and performance of non-financial firms listed on the Pakistan Stock Exchange.

Figure 1

Conceptual Framework



Note. Corporate size and capital intensity are control variables with direct paths to the decision and performance outcomes. They are not moderators, so the framework and the models contain no moderating path and no interaction term.

Synthesizing the literature reviewed above, three gaps motivate this study. First, no prior Pakistani study has jointly modelled all four financial decisions (investment, financing, dividend and hedging) using a single, consistent, multi-proxy operationalization of overconfidence (OVFIN, OVINV, RDAD, CEX, OWN) across a long panel of non-financial firms. Second, the Pakistani hedging-overconfidence relationship remains almost entirely unexamined empirically, despite strong theoretical grounds (Adam et al., 2015) and despite Pakistani firms' well-documented exposure to exchange-rate and interest-rate volatility. Third, the joint performance consequences of overconfidence-related decisions (captured through Tobin's Q, ROA and ROE simultaneously) have not been assessed over a panel spanning both boom and crisis periods (2016–2025), including the COVID-19 pandemic. Based on this synthesis, the study proposes the following hypotheses:

H1. *Managerial overconfidence is significantly and positively associated with corporate investment decisions.*

H2. *Managerial overconfidence is significantly associated with corporate financing decisions (leverage).*

H3. *Managerial overconfidence is significantly associated with corporate dividend decisions.*

H4. *Managerial overconfidence is significantly and negatively associated with corporate hedging decisions.*

H5. *Managerial overconfidence is significantly associated with firm performance (Tobin's Q, ROA, ROE).*

H6. *Corporate size and capital intensity, which are included as control variables and not as moderators, are significantly related to corporate financial decisions and firm performance.*

Hypothesis rationale. H1: Overconfident managers overestimate returns and invest more (Malmendier & Tate, 2005). H2: overconfident managers regard external equity as undervalued and prefer debt (Hackbarth, 2008; Mundi & Kaur, 2022), but may also avoid debt to retain control (Ting et al., 2015), so no direction is predicted. H3: Dividends may fall as cash is retained for projects (Deshmukh et al., 2013) or rise as a signal (Khan et al., 2025), so no direction is predicted. H4: Overconfident managers underestimate risk and hedge less (Adam et al., 2015). H5: performance may rise through risk-taking (Effah & Su, 2026) or fall through over-investment and leverage (Malmendier & Tate, 2005), so no direction is predicted. H6: Size and capital intensity are expected to matter independently of overconfidence (Richardson, 2006). Each hypothesis is evaluated separately for each of the five proxies.

3 | METHODOLOGY & DESIGN

3.1 | Research Design

This study uses a quantitative, positivist, explanatory design to test a priori hypotheses derived from upper echelons theory, behavioural corporate finance and the capital structure, dividend and hedging theories. It relies on secondary, archival panel data and econometric estimation to assess the statistical association between overconfidence-related corporate behaviour and corporate financial decisions and performance. It does not claim to identify causal effects.

3.1.1. Comparison of Methodological Alternatives and Justification

Several designs could address the research questions. Questionnaire surveys of CEOs, as used in earlier Pakistani studies (Batool et al., 2021; Qasim et al., 2019), measure perceived confidence directly but rely on small samples, self-reports, and a single period. CEO-level archival measures such as stock-option exercise or press portrayal (Malmendier & Tate, 2005, 2008) are the international standard but require option and media databases that are not available for PSX firms. Event studies suit announcement effects and not recurring policy choices. A long archival panel of observable firm decisions therefore best fits the objectives: it covers many firms and ten years, avoids response bias, and allows unobserved firm heterogeneity to be controlled. Within panel methods, pooled OLS ignores firm effects; fixed-effects and random-effects models handle them and are chosen by formal tests (Breusch & Pagan, 1980; Hausman, 1978; Wooldridge, 2010); and dynamic GMM (Arellano & Bond, 1991) is unnecessary for a static specification with ten annual observations per firm. Binary outcomes require logit or probit estimators.

Behavioural finance does not require primary data. Following Malmendier and Tate (2005), overconfidence is treated as a revealed-preference construct: it is inferred from managers' observable choices, such as persistently higher-than-benchmark debt, investment, or capital spending, and not from what managers say. The study therefore builds proxies from publicly reported financial data and tests whether firms classified as overconfident behave differently. The limitation is that such proxies may also capture growth opportunities, financing constraints, or ownership structure, so the results are interpreted as associations consistent with overconfidence and not as direct proof of it.

3.2 | Population and Sample, Data Source and Collection Procedure.

The population of interest comprises all companies listed on the PSX and regulated by the SECP, in two broad categories: financial and non-financial firms. The PSX is divided into 38 sectors with 485 listed firms. The financial sectors comprise 104 firms (21.44%) and the non-financial sectors 381 firms (78.56%). This study targeted all listed non-financial firms and used financial data for 2016–2025. Complete ten-year data were not available for 114 firms, so the final sample comprises 267 non-financial firms, or 70.08% of all listed non-financial firms. The data were taken from the firms' financial statements, which are available on company websites and on the PSX website.

3.2.1. Sampling Justification.

Financial firms (banks, insurers and investment companies) are excluded because their leverage, investment and dividend decisions are shaped by prudential regulation and are not comparable with those of non-financial firms. A balanced ten-year panel is required because several variables are built from industry averages and year-to-year changes, and because a common period supports fixed-effects and random-effects estimation. The 267 firms retained represent 70.08% of the 381 non-financial firms (2,670 firm-years). The 114 firms excluded for incomplete data may differ systematically (for example, newly listed or delisted firms), so some survivorship bias is possible and is acknowledged as a limitation. The period 2016–2025 spans the COVID-19 shock and later macroeconomic volatility, so the sample covers both normal and stressed conditions.

3.3 | Variable Measurement

3.3.1. Independent Variables

This study uses five proxies of overconfidence-related behaviour as independent variables: over-financing (OVFIN) (Ho et al., 2016), over-investment (OVINV) (Pikulina et al., 2017; Xia et al., 2010), research and development and advertising intensity (RDAD) (Chen et al., 2014), capital expenditure (CEX) and CEO ownership (OWN) (Chen et al., 2014).

3.3.2. Justification of the Proxies.

Each proxy represents a decision that overconfident managers are expected to distort. Over-financing (OVFIN): managers who believe the market undervalues their firm prefer debt to equity (Hackbarth, 2008; Ho et al., 2016); a firm is classified as over-financed when its debt ratio exceeds the industry average. Over-investment (OVINV): overestimation of project returns leads to assets growing faster than sales (Malmendier & Tate, 2005; Xia et al., 2010). R&D and advertising (RDAD): confident managers overestimate the payoff of innovation and brand spending (Chen et al., 2014). Capital expenditure (CEX): capital spending above the industry norm indicates aggressive expansion (Malmendier & Tate, 2005). CEO ownership (OWN): a CEO who increases his or her shareholding signals confidence in the firm's prospects (Malmendier & Tate, 2005; Ting et al., 2015). Industry-average benchmarks control for sector differences.

3.3.3. Coding and Limitations of the Proxies.

Table 1 defines the proxies with values of 0, 1, and 2, but Table 2 shows that only 1 and 2 occur. Each proxy is therefore effectively a two-category variable in which category 1 denotes the overconfident classification (above the industry benchmark, or an increase in CEO shares) and category 2 denotes the opposite. The proxies are categorical and not continuous, and they are interpreted as differences between two

groups of firms. Two further limitations are acknowledged. First, the proxies are firm-level indicators of corporate behaviour and not direct measures of a CEO's psychology. Second, OVFIN, OVINV and CEX are built from the same accounting items as leverage and investment, which creates a partly mechanical link with the financing and investment decisions, so these results are interpreted with caution.

3.3.4. Control Variables

Corporate size (CS) and capital intensity (CI) are included as control variables because firm characteristics affect financing, investment, dividends, hedging, and performance independently of managerial psychology (Listiani et al., 2025; Richardson, 2006; Zahra & Muid, 2025). Larger firms have easier access to debt and derivative markets, and capital-intensive firms have more collateral and different investment needs. They enter the regressions as additional regressors alongside the proxies and are not treated as moderators; no interaction terms are estimated, which is why the conceptual framework shows them as control variables.

3.3.5. Dependent Variables

This study uses corporate financial decisions and firm performance as dependent variables. The four financial decisions are investment, financing, dividend, and hedging. Firm performance is measured by Tobin's Q (TQ), return on equity (ROE) and return on assets (ROA). ROE and ROA are the most common accounting-based measures of firm performance, and Tobin's Q is the most common market-based measure (Miao et al., 2025). Tobin's Q is considered more reliable because it incorporates the market parameters that affect share prices and that investors consider when analysing firm performance.

Hedging is treated as a separate decision, and not as part of the financing decision, because it manages risk exposure and does not change the firm's capital structure; its theoretical drivers (distress and tax costs, agency costs and information asymmetry) differ from those of the debt-equity choice (Froot et al., 1993; Smith & Stulz, 1985). The hedging decision (HD) is binary (1 = derivatives used, 0 = otherwise), so it is modelled with a binary-choice (logit) specification and not with ordinary least squares.

Table 1

Variables and Their Measurement.

Name of Variable	Symbol	Explanation / Measurement
Dependent Variables: *Corporate Financial Decisions & Performance*		
1. Investment Decision	ID	Capital investment INVD = (Change in Net Fixed Assets + Depreciation) / Total Assets
2. Financing Decision	FD	Leverage LV = Total Debt / Total Assets
3. Dividend Decision	DD	Dividend Payout Ratio DPR = Dividend Per Share / Earnings Per Share
4. Hedging Decision	HD	"1" if the firm used derivatives, and "0" otherwise
5. Tobin's Q	TQ	(Total Liabilities + Number. of Shares Outstanding x Share Price) / Total Assets.
6. Return on Assets	ROA	Net Income/Average Total Assets
7. Return on Equity	ROE	Net income / average shareholder's equity
Independent Variables: *CEO Overconfidence*		
1. Over financing	OVFIN	"1" if the debt ratio is greater than the industry average, "2" if the ratio is less than the industry average, and "0" otherwise

2.	Over-investment	OVINV	"1" if assets are growing faster than sales, "2" if assets are growing slower than sales, and "0" otherwise
3.	Research & Development and Advertisement Expenses	RDAD	1" if research & development and advertising expenditures are greater than the industry average, "2" if research and development and advertising expenditures are less than the industry average, and "0" otherwise
4.	Capital Expenditure	CEX	"1" if the ratio of capital expenditure to total assets is greater than the industry average, "2" if the ratio is less than industry average, and "0" otherwise
5.	CEO Ownership	OWN	If the number of shares held by the CEO in the current year exceeds the number in the previous year, the CEO is defined as overconfident, and the variable takes the value "1"; otherwise it takes the value "0".
Control Variables			
1.	Corporate Size	CS	Natural Logarithm of total assets
2.	Capital Intensity	CI	Fixed Assets / Number of Employees (log-transformed)

Note. The proxies OVFIN, OVINV, RDAD, CEX and OWN are defined with categories 0, 1 and 2, but only categories 1 and 2 occur in the data (Table 2). Category 1 denotes the overconfident classification and category 2 the opposite. Capital intensity is reported in logarithmic form, which explains its narrow range in Table 2.

3.4 | Econometric Model Specification

The study estimates the following seven panel regression equations. The models are estimated using EViews statistical software.

Estimation strategy. Equations (1), (2), (3), (5), (6) and (7) have continuous dependent variables and are estimated by panel least squares. The suitability of pooled OLS, fixed-effects, and random-effects estimators is assessed with the Breusch-Pagan LM test and the Hausman (1978) test (Breusch & Pagan, 1980; Wooldridge, 2010), and the random-effects results are summarized in Table 11. A system-GMM estimator (Arellano & Bond, 1991) is not used because the models are static, no lagged dependent variable is specified, and with ten annual observations per firm, valid instruments would be hard to defend. Because the hedging decision is binary, Equation (4) is estimated as a binary logit, Pr(HDit = 1) = Λ(δ0 + δ1OVFINit + δ2OVINVit + δ3RDADit + δ4CEXit + δ5OWNit + δ6CSit + δ7CIit), where Λ(·) is the logistic function, and the results are reported as marginal effects. [Authors: insert the Breusch-Pagan and Hausman test statistics and p-values here.]

$$ID = \alpha_0 + \alpha_1 OVFIN_{it} + \alpha_2 OVINV_{it} + \alpha_3 RDAD_{it} + \alpha_4 CEX_{it} + \alpha_5 OWN_{it} + \alpha_6 CS_{it} + \alpha_7 CI_{it} + \varepsilon \text{--------(1)}$$

$$FD = \beta_0 + \beta_1 OVFIN_{it} + \beta_2 OVINV_{it} + \beta_3 RDAD_{it} + \beta_4 CEX_{it} + \beta_5 OWN_{it} + \beta_6 CS_{it} + \beta_7 CI_{it} + \varepsilon \text{--------(2)}$$

$$DD = \gamma_0 + \gamma_1 OVFIN_{it} + \gamma_2 OVINV_{it} + \gamma_3 RDAD_{it} + \gamma_4 CEX_{it} + \gamma_5 OWN_{it} + \gamma_6 CS_{it} + \gamma_7 CI_{it} + \varepsilon \text{----------(3)}$$

$$HD = \delta_0 + \delta_1 OVFIN_{it} + \delta_2 OVINV_{it} + \delta_3 RDAD_{it} + \delta_4 CEX_{it} + \delta_5 OWN_{it} + \delta_6 CS_{it} + \delta_7 CI_{it} + \varepsilon \text{------(4)}$$

$$TQ = \kappa_0 + \kappa_1 OVFIN_{it} + \kappa_2 OVINV_{it} + \kappa_3 RDAD_{it} + \kappa_4 CEX_{it} + \kappa_5 OWN_{it} + \kappa_6 CS_{it} + \kappa_7 CI_{it} + \varepsilon \text{------(5)}$$

$$ROA = \lambda_0 + \lambda_1 OVFIN_{it} + \lambda_2 OVINV_{it} + \lambda_3 RDAD_{it} + \lambda_4 CEX_{it} + \lambda_5 OWN_{it} + \lambda_6 CS_{it} + \lambda_7 CI_{it} + \varepsilon \text{--------(6)}$$

$$ROE = \tau_0 + \tau_1 OVFIN_{it} + \tau_2 OVINV_{it} + \tau_3 RDAD_{it} + \tau_4 CEX_{it} + \tau_5 OWN_{it} + \tau_6 CS_{it} + \tau_7 CI_{it} + \varepsilon \text{------(7)}$$

Where,

ID = investment decision; *FD* = financing decision; *DD* = dividend decision; *HD* = hedging decision; *TQ* = Tobin's Q; *ROA* = return on assets; *ROE* = return on equity (all dependent variables); *OVFIN* = over-financing; OVINV = over-investment; RDAD = research and development and advertising expenditure; CEX

= capital expenditure; *OWN* = CEO ownership (all independent variables); *CS* = corporate size; *CI* = capital intensity (both control variables); i = firm; t = year; ε = error term.

4 | RESULTS AND ANALYSIS

This section reports the descriptive statistics, correlations and regression results, followed by a discussion that links the findings to prior studies and theory. The regression results are interpreted as associations between overconfidence-related behaviour and the outcomes, and not as causal effects.

4.1 | Descriptive Statistics

Descriptive statistics summarise the basic properties of the data. They describe the sample and its measures in a concise and manageable form.

Table 2

Descriptive Statistics

Variables	Obs.	Minimum	Maximum	Mean	Std. Dev.
Investment Decision	2,670	-1.5361	2.1718	0.0547	0.1441
Financing Decision	2,670	0.0000	11.3430	0.3005	0.4314
Dividend Decision	2,670	-36.3813	127.4499	0.3214	2.9777
Hedging Decision	2,670	0.0000	1.0000	0.8850	0.3191
Tobin's Q	2,670	0.1166	25.4245	1.3323	1.5926
Return on Assets	2,670	-160.3000	67.5900	5.3196	12.8048
Return on Equity	2,670	-451.9700	368.0200	10.0098	43.3034
Over financing	2,670	1.0000	2.0000	1.7948	0.4040
Over-investment	2,670	1.0000	2.0000	1.5292	0.4992
R& D and advertising	2,670	1.0000	2.0000	1.7139	0.4520
Capital Expenditure	2,670	1.0000	2.0000	1.7944	0.4042
CEO Ownership	2,670	1.0000	2.0000	1.8704	0.3359
Corporate Size	2,670	15.1610	27.1647	21.9702	1.7579
Capital Intensity	2,670	0.4508	6.8554	3.4166	0.6670

Table 2 reports the descriptive statistics for 2,670 firm-year observations (267 firms over ten years). The investment decision has a mean of 0.0547 (minimum -1.5361, maximum 2.1718, standard deviation 0.1441). The financing decision (leverage) has a mean of 0.3005 (0.0000 to 11.3430; standard deviation 0.4314). The dividend payout ratio has a mean of 0.3214 (-36.3813 to 127.4499; standard deviation 2.9777). The hedging indicator has a mean of 0.8850, which means that about 88.5% of firm-years (roughly 2,363 of 2,670) are classified as derivative users and the remaining 11.5% as non-users; the data do not separate forwards, futures, options, and swaps. Standard deviations are expressed in the units of each variable and are not percentages.

Tobin's Q has a mean of 1.3323 (0.1166 to 25.4245; standard deviation 1.5926). ROA has a mean of 5.3196 (-160.30 to 67.59; standard deviation 12.8048), and ROE has a mean of 10.0098 (-451.97 to 368.02; standard deviation 43.3034), both in percentage points.

The five proxies take only the values 1 and 2. Because the mean of a variable coded 1 or 2 equals one plus the share of observations coded 2, the share of firm-years in category 1 (classified as overconfident) is about 20.5% for over-financing (mean 1.7948), 47.1% for over-investment (1.5292), 28.6% for R&D and

advertising (1.7139), 20.6% for capital expenditure (1.7944) and 13.0% for CEO ownership (1.8704). Their standard deviations (0.3359 to 0.4992) are those of two-category variables.

Corporate size has a mean of 21.9702 (15.1610 to 27.1647; standard deviation 1.7579) and is the natural logarithm of total assets. Capital intensity has a mean of 3.4166 (0.4508 to 6.8554; standard deviation 0.6670) and is in logarithmic form.

Explanation of the extreme values. A closer look at Table 2 shows that several figures are on the high or low side, and each has an accounting explanation. (i) ROA (-160.30 to 67.59) and ROE (-451.97 to 368.02): firms with large losses or with very small or negative equity produce extreme ratios, because the denominator is small. (ii) Dividend payout (-36.38 to 127.45; standard deviation of 2.98 against a mean of 0.32): the ratio of dividend per share to earnings per share becomes extreme or negative when earnings per share are close to zero or negative. (iii) Leverage (maximum 11.34): a value above 1 means that liabilities exceed assets, which occurs in firms with negative equity. (iv) Investment (-1.54 to 2.17): large asset disposals or revaluations, and sharp expansions relative to opening assets, produce these values. (v) Tobin's Q (maximum 25.42): small firms with high market value relative to book assets. These values are plausible, but they inflate the variances and weaken the fit of the models.

Table 3

Correlation Analysis

Table 3														
Pearson Correlation Matrix														
Variable	**ID**	**FD**	**DD**	**HD**	**TQ**	**ROA**	**ROE**	**OVFIN**	**OVINV**	**RDAD**	**CEX**	**OWN**	**CS**	**CI**
ID	1.000													
FD	-0.022**	1.000												
DD	0.018**	-0.033**	1.000											
HD	0.104	0.004*	-0.058**	1.000										
TQ	-0.016**	0.117	0.020**	-0.133	1.000									
ROA	0.023**	-0.250	0.042**	0.027**	0.292	1.000								
ROE	0.040**	-0.109	0.031**	0.017**	0.254	0.569	1.000							
OVFIN	-0.050**	-0.083***	0.005*	-0.142	0.062***	0.046**	0.018**	1.000						
OVINV	0.072***	0.022**	0.004*	-0.006*	-0.000*	-0.103	-0.069**	-0.017**	1.000					
RDAD	0.002**	0.074***	-0.009*	0.071**	-0.081**	-0.042**	-0.022**	-0.010**	-0.013**	1.000				
CEX	-0.120	0.065***	-0.004*	-0.105	-0.071**	-0.217	-0.152	0.361	-0.164	-0.006*	1.000			
OWN	0.000*	0.012**	0.005*	-0.069**	0.017**	-0.040**	-0.018**	-0.033**	0.023**	0.002*	0.002*	1.000		
CS	0.057**	-0.177	0.000*	0.341	-0.026**	0.235	0.139	-0.528	0.021**	0.007*	-0.531	-0.024**	1.000	
CI	0.119	-0.034**	-0.023**	0.183	-0.028**	-0.007**	0.021**	-0.286	0.024**	-0.028**	-0.232	0.018*	0.472	1.000

***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Table 3 shows that the highest correlation is 0.569 between ROA and ROE, which is expected because both ratios use net income as the numerator. All other coefficients are lower, and none approaches the 0.80 level usually taken to signal serious multicollinearity among explanatory variables. ROA and ROE are dependent variables entered in separate regressions, so their correlation does not affect the estimates.

4.2 | Regression Analysis

This section reports seven regression models (Tables 4 to 10) and an overall summary (Table 11). Four points guide the interpretation. First, OVFIN, OVINV, RDAD, CEX and OWN are two-category variables (1 = classified as overconfident, 2 = not), so a coefficient is the average difference in the dependent variable between category 2 and category 1 firms, holding the other variables constant; it is not the effect of a one percent change. Second, corporate size (log of assets) and capital intensity are continuous, so their coefficients refer to a one-unit change. Third, the hedging decision is binary, so Equation (4) requires a binary-choice (logit) model; Table 7 shows linear estimates as a preliminary result. Fourth, the explanatory power is low in every model, so the results should be read as associations.

4.3 | Regression Analysis-1

$$(ID= \alpha_{0+} \alpha_1 OVFIN_{it} + \alpha_2 OVINV_{it} + \alpha_3 RDAD_{it} + \alpha_4 CEX_{it} + \alpha_5 OWN_{it} + \alpha_6 CS_{it} + \alpha_7 CI_{it} + \varepsilon)$$

Table 4

Regression Analysis –1

Variables	Dependent Variable: Investment Decision		
	Coefficient	**t-statistics**	**p-value**
Constant	0.143885	2.268048	0.0234**
Over financing	-0.00302	-0.378283	0.7053
Over-investment	0.014884	2.700298	0.0070***
R & D and advertising	0.001697	0.282949	0.7772
Capital Expenditure	-0.04144	-5.124931	0.0000***
CEO Ownership	-0.00183	-0.226787	0.8206
Corporate Size	-0.00552	-2.533861	0.0113**
Capital Intensity	0.026256	5.66491	0.0000***
R2	0.028704		
Adj. R2	0.02615		

Note: ***, **, * significant at 1%, 5% and 10% respectively.

Table 4 reports the results of Equation (1) for the investment decision (ID). Over-financing (OVFIN: $\beta = -0.0030$, $p = 0.7053$) and R&D and advertising intensity (RDAD: $\beta = 0.0017$, $p = 0.7772$) show no significant association with investment, so H1 is not supported for these two proxies. Over-investment (OVINV) is significant at the 1% level ($\beta = 0.0149$, $p = 0.0070$): firms in category 2 (assets growing slower than sales) have an investment ratio 0.0149 units higher than category 1 firms, so firms classified as over-investing show lower measured investment, which is contrary to H1. Capital expenditure (CEX) is also significant at the 1% level ($\beta = -0.0414$, $p = 0.0000$): firms in category 2 (capital expenditure below the industry average) have an investment ratio 0.0414 units lower than category 1 firms, which is the expected direction but is partly

mechanical because CEX is built from capital spending. CEO ownership (OWN) is insignificant (β = -0.0018, p = 0.8206). H1 therefore receives partial support, through CEX only.

Among the control variables, corporate size has a negative and significant association with investment at the 5% level (β = -0.0055, p = 0.0113): a one-unit increase in CS is associated with an investment ratio 0.0055 units lower. Capital intensity has a positive and significant association at the 1% level (β = 0.0263, p = 0.0000): a one-unit increase in CI is associated with an investment ratio 0.0263 units higher. The R-squared of Table 4 is 0.0287 (adjusted 0.0262), so the model explains under 3% of the variation in investment. The model therefore has low explanatory power, and its coefficients are associations, not predictions.

4.4 | Regression Analysis-2

$$FD = \beta_{0+} \beta_1 OVFIN_{it} + \beta_2 OVINV_{it} + \beta_3 RDAD_{it} + \beta_4 CEX_{it} + \beta_5 OWN_{it} + \beta_6 CS_{it} + \beta_7 CI_{it} + \varepsilon$$

Table 5

Regression Analysis –2

Variables	Dependent Variable: Financing Decision		
	Coefficient	t-statistics	p-value
Constant	1.69242	7.37444	0.0000***
Over financing	-0.0862	-3.4669	0.0005***
Over-investment	0.01005	0.74454	0.4566
R&D and advertising	0.04699	2.8789	0.0040***
Capital Expenditure	-0.0088	-0.4302	0.6671
CEO Ownership	-0.0105	-0.5173	0.6050
Corporate Size	-0.0675	-7.2749	0.0000***
Capital Intensity	0.05432	3.19991	0.0014***
R2	0.024349		
Adj. R2	0.021783		

Note: ***, **, * significant at 1%, 5% and 10% respectively.

Table 5 reports the results of Equation (2) for the financing decision (leverage, FD). Over-financing is significant at the 1% level (β = -0.0862, p = 0.0005): firms in category 2 (debt ratio below the industry average) have leverage 0.0862 units lower than category 1 firms. This is the expected direction for H2, but the result is partly mechanical because OVFIN is built from the debt ratio. R&D and advertising intensity are significant at the 1% level (β = 0.0470, p = 0.0040): category 2 firms (R&D and advertising below the industry average) have leverage 0.0470 units higher, which fits the trade-off view that intangible-intensive firms carry less debt. Over-investment (β = 0.0101, p = 0.4566), capital expenditure (β = -0.0088, p = 0.6671) and CEO ownership (β = -0.0105, p = 0.6050) are insignificant. H2 is therefore partially supported.

Corporate size is negatively and significantly associated with leverage (β = -0.0675, p = 0.0000): a one-unit increase in CS is associated with leverage 0.0675 units lower. Capital intensity is positively and significantly associated with leverage (β = 0.0543, p = 0.0014): a one-unit increase in CI is associated with leverage 0.0543 units higher. The R-squared of Table 5 is 0.0243 (adjusted 0.0218), so the model explains about 2% of the variation in leverage.

4.5 | Regression Analysis-3

$DD = \gamma_0 + \gamma_1 OVFIN_{it} + \gamma_2 OVINV_{it} + \gamma_3 RDAD_{it} + \gamma_4 CEX_{it} + \gamma_5 OWN_{it} + \gamma_6 CS_{it} + \gamma_7 CI_{it} + \varepsilon$—

Table 6

Regression Analysis –3

Variables	Dependent Variable: Dividend Decision		
	Coefficient	t-statistics	p-value
Constant	0.12969	0.09597	0.9235
Over financing	0.04343	0.25542	0.7984
Over-investment	0.02413	0.20572	0.8370
R&D and advertising	-0.0637	-0.4988	0.6179
Capital Expenditure	-0.0267	-0.1549	0.8769
CEO Ownership	0.05531	0.3219	0.7476
Corporate Size	0.0266	0.57274	0.5669
Capital Intensity	-0.1329	-1.3455	0.1786
R2	0.000848		
Adj. R2	-0.001779		

Note: ***, **, * significant at 1%, 5% and 10% respectively.

Table 6 reports the results of Equation (3) for the dividend decision (payout ratio, DD). None of the proxies is significant: over-financing ($\beta = 0.0434$, $p = 0.7984$), over-investment ($\beta = 0.0241$, $p = 0.8370$), R&D and advertising ($\beta = -0.0637$, $p = 0.6179$), capital expenditure ($\beta = -0.0267$, $p = 0.8769$) and CEO ownership ($\beta = 0.0553$, $p = 0.7476$). H3 is therefore not supported.

Corporate size ($\beta = 0.0266$, $p = 0.5669$) and capital intensity ($\beta = -0.1329$, $p = 0.1786$) are also insignificant. The R-squared of Table 6 is 0.00085 (adjusted -0.0018), which means that the model explains almost none of the variation in dividend payout. The payout ratio has a mean of 0.32 but ranges from -36.38 to 127.45, with a standard deviation of 2.98, so a few extreme observations dominate its variance, and two-category regressors cannot explain such dispersion. A negative adjusted R-squared means that the model fits no better than the sample mean. The dividend result should therefore be read as the absence of a detectable association, and robustness checks with winsorised payout ratios or dividend yield are recommended.

4.6 | Regression Analysis-4

$HD = \delta_0 + \delta_1 OVFIN_{it} + \delta_2 OVINV_{it} + \delta_3 RDAD_{it} + \delta_4 CEX_{it} + \delta_5 OWN_{it} + \delta_6 CS_{it} + \delta_7 CI_{it} + \varepsilon$

Table 7

Regression Analysis –4

Variables	Dependent Variable: Hedging Decision		
	Coefficient	**t-statistics**	**p-value**
Constant	-0.6669	-4.0751	0.0000***
Over financing	-0.0037	-0.2285	0.8193
Over-investment	-0.0004	-0.0517	0.9588
R&D and advertising	-0.0003	-0.0318	0.9747
Capital Expenditure	0.01885	1.4253	0.1542
CEO Ownership	-0.0263	-2.0219	0.0433**
Corporate Size	0.07125	10.4764	0.0000***
Capital Intensity	0.00291	0.25406	0.7995
R2	0.046085		
Adj. R2	0.043577		

Note. ***, **, * significant at 1%, 5% and 10% respectively.

Table 7 reports linear-probability estimates of Equation (4) for the binary hedging decision (HD = 1 if derivatives are used). These estimates are preliminary because both HD and the proxies are binary and a logit model is the appropriate specification (see the note below). Over-financing (β = -0.0037, p = 0.8193), over-investment (β = -0.0004, p = 0.9588), R&D and advertising (β = -0.0003, p = 0.9747) and capital expenditure (β = 0.0189, p = 0.1542) show no significant association with hedging.

CEO ownership is significant at the 5% level (β = -0.0263, p = 0.0433): firms in category 2 (CEO shareholding did not increase) have a probability of hedging 2.63 percentage points lower than firms in category 1, so firms in which the CEO increased his or her shareholding are more likely to hedge. This is opposite to the negative relation predicted in H4, so H4 is not supported.

Corporate size is positively and significantly associated with hedging (β = 0.0713, p = 0.0000): a one-unit increase in CS raises the probability of using derivatives by about 7.1 percentage points, which fits the economies-of-scale argument in hedging theory (Smith & Stulz, 1985). Capital intensity is insignificant (β = 0.0029, p = 0.7995). The R-squared of Table 7 is 0.0461 (adjusted 0.0436), so the model explains under 5% of the variation in hedging.

[Authors: Equation (4) must be re-estimated as a binary logit (EViews: Quick > Estimate Equation > Method: BINARY - Binary Choice, Logit). Report coefficients, average marginal effects, McFadden R-squared, and the percentage correctly predicted in a new table that replaces Table 7, and revise the three paragraphs above to match.]

4.7 | Regression Analysis –5

$$TQ= \kappa_{0+} \kappa_1 OVFIN_{it} + \kappa_2 OVINV_{it} + \kappa_3 RDAD_{it} + \kappa_4 CEX_{it} + \kappa_5 OWN_{it} + \kappa_6 CS_{it} + \kappa_7 CI_{it} + \varepsilon$$

Table 8

Regression Analysis –5

Variables	Dependent Variable: Tobin Q		
	Coefficient	**t-statistics**	**p-value**
Constant	1.95551	2.29839	0.0216**
Over financing	0.1881	2.40054	0.0164**
Over-investment	-0.0186	-0.4564	0.6481
R&D and advertising	-0.0149	-0.2982	0.7656
Capital Expenditure	-0.2074	-3.337	0.0009***
CEO Ownership	0.00399	0.06547	0.9478
Corporate Size	-0.0241	-0.6676	0.5044
Capital Intensity	-0.0039	-0.0695	0.9446
R^2	0.005957		
Adj. R^2	0.003343		

Note. ***, **, * significant at 1%, 5% and 10% respectively.

Table 8 reports the results of Equation (5) for Tobin's Q. Over-financing is significant at the 5% level (β = 0.1881, p = 0.0164): firms in category 2 (debt ratio below the industry average) have a Tobin's Q 0.188 units higher than category 1 firms, so firms classified as over-financed have a lower market valuation. Capital expenditure is significant at the 1% level (β = -0.2074, p = 0.0009): category 2 firms (capital expenditure below the industry average) have a Tobin's Q 0.207 units lower, so above-average capital expenditure is associated with a higher valuation. Over-investment (β = -0.0186, p = 0.6481), R&D and advertising (β = -0.0149, p = 0.7656) and CEO ownership (β = 0.0040, p = 0.9478) are insignificant.

Corporate size (β = -0.0241, p = 0.5044) and capital intensity (β = -0.0039, p = 0.9446) are insignificant. The R-squared of Table 8 is 0.0060 (adjusted 0.0033), so the model explains only about 0.6% of the variation in Tobin's Q and has low explanatory power.

4.8 | Regression Analysis–6

$$ROA= \lambda_{0+} \lambda_1 OVFIN_{it} + \lambda_2 OVINV_{it} + \lambda_3 RDAD_{it} + \lambda_4 CEX_{it} + \lambda_5 OWN_{it} + \lambda_6 CS_{it} + \lambda_7 CI_{it} + \varepsilon$$

Table 9

Regression Analysis –6

Variables	Dependent Variable: Return on Assets		
	Coefficient	**t-statistics**	**p-value**
Constant	-13.268	-2.0655	0.0390**
Over financing	3.3097	4.72527	0.0000***
Overinvestment	-2.6317	-6.9046	0.0000***
R&D and advertising	0.10482	0.22765	0.8199
Capital Expenditure	-4.1339	-7.1206	0.0000***
CEO Ownership	-0.3932	-0.6881	0.4914
Corporate Size	1.64305	6.34182	0.0000***
Capital Intensity	-3.352	-7.028	0.0000***
R2	0.066916		
Adj. R2	0.064462		

Note. ***, **, * significant at 1%, 5% and 10% respectively.

Table 9 reports the results of Equation (6) for ROA, measured in percentage points. Over-financing is significant at the 1% level (β = 3.3097, p = 0.0000): category 2 firms (debt ratio below the industry average) earn an ROA 3.31 points higher than category 1 firms, so firms classified as over-financed have a lower ROA. Over-investment is significant at the 1% level (β = -2.6317, p = 0.0000): category 2 firms (assets growing slower than sales) earn an ROA 2.63 points lower. Capital expenditure is significant at the 1% level (β = -4.1339, p = 0.0000): category 2 firms earn an ROA 4.13 points lower, so above-average capital spenders have a higher ROA. R&D and advertising (β = 0.1048, p = 0.8199) and CEO ownership (β = -0.3932, p = 0.4914) are insignificant.

Corporate size is positively and significantly associated with ROA (β = 1.6431, p = 0.0000): a one-unit increase in CS is associated with an ROA 1.64 points higher. Capital intensity is negatively and significantly associated with ROA (β = -3.3520, p = 0.0000): a one-unit increase in CI is associated with an ROA 3.35 points lower. The R-squared of Table 9 is 0.0669 (adjusted 0.0645), the highest among the models, but it still means that about 93% of the variation in ROA is unexplained.

4.9 | Regression Analysis–7

$$ROE = \tau_{0+} \tau_1 OVFIN_{it} + \tau_2 OVINV_{it} + \tau_3 RDAD_{it} + \tau_4 CEX_{it} + \tau_5 OWN_{it} + \tau_6 CS_{it} + \tau_7 CI_{it} + \varepsilon$$

Table 10

Regression Analysis –7

Variables	Dependent Variable: Return on Equity		
	Coefficient	t-statistics	p-value
Constant	-42.183	-1.8988	0.0577*
Over financing	11.4689	4.29445	0.0000***
Over-investment	-6.5077	-4.1761	0.0000***
R&D and advertising	0.08052	0.04392	0.9650
Capital Expenditure	-12.222	-5.1932	0.0000***
CEO Ownership	-0.8157	-0.3508	0.7258
Corporate Size	3.59081	4.25604	0.0000***
Capital Intensity	-4.1012	-2.3902	0.0169**
R2	0.029634		
Adj. R2	0.027082		

Note. ***, **, * significant at 1%, 5% and 10% respectively.

Table 10 reports the results of Equation (7) for ROE, measured in percentage points. Over-financing is significant at the 1% level (β = 11.4689, p = 0.0000): category 2 firms have an ROE 11.47 points higher than category 1 firms. Over-investment is significant at the 1% level (β = -6.5077, p = 0.0000): category 2 firms have an ROE 6.51 points lower. R&D and advertising are insignificant (β = 0.0805, p = 0.9650).

Capital expenditure is significant at the 1% level (β = -12.2220, p = 0.0000): category 2 firms have an ROE 12.22 points lower, so above-average capital spenders have a higher ROE. CEO ownership is insignificant (β = -0.8157, p = 0.7258).

Corporate size is positively and significantly associated with ROE (β = 3.5908, p = 0.0000), and capital intensity is negatively and significantly associated with it (β = -4.1012, p = 0.0169, 5% level), per one-unit

change. The R-squared of Table 10 is 0.0296 (adjusted 0.0271), so the model explains about 3% of the variation in ROE.

Table 11

Regression Analysis - Random Effect (Overall Results)

Variable	ID	FD	DD	HD	TQ	ROA	ROE
Const.	0.0234**	0.0000***	0.9235	0.0000***	0.0216**	0.0390**	0.0577*
OVFIN	0.7053	0.0005***	0.7984	0.8193	0.0164**	0.0000***	0.0000***
OVINV	0.0070***	0.4566	0.8370	0.9588	0.6481	0.0000***	0.0000***
RDAD	0.7772	0.0040***	0.6179	0.9747	0.7656	0.8199	0.9650
CEX	0.0000***	0.6671	0.8769	0.1542	0.0009***	0.0000***	0.0000***
OWN	0.8206	0.6050	0.7476	0.0433**	0.9478	0.4914	0.7258
CS	0.0113**	0.0000***	0.5669	0.0000***	0.5044	0.0000***	0.0000***
CI	0.0000***	0.0014***	0.1786	0.7995	0.9446	0.0000***	0.0169**
R2	0.0287	0.0243	0.0008	0.0461	0.0060	0.0669	0.0296
Adj. R2	0.0262	0.0218	-0.0018	0.0436	0.0033	0.0645	0.0271

Table 11 summarizes the p-values and the R-squared and adjusted R-squared values of Tables 4 to 10. The signs below refer to the move from category 1 (classified as overconfident) to category 2 for OVFIN, OVINV, RDAD, CEX and OWN, and to a one-unit increase for CS and CI.

1. Over-financing (OVFIN) is:
   a. Significant at the 1% level for FD (-), ROA (+), and ROE (+).
   b. Significant at the 5% level for TQ (+).
   c. No relationship with ID, DD & HD.
2. Over-investment (OVINV) is:
   a. Significant at the 1% level for ID (+), ROA (-), and ROE (-).
   b. No relationship with FD, DD, HD & TQ.
3. Research and development and advertising expenses (RDAD) are:
   a. Significant at the 1% level for FD (+).
   b. No relationship with ID, DD, HD, TQ, ROA & ROE.
4. Capital expenditure (CEX) is:
   a. Significant at the 1% level for ID (-), TQ (-), ROA (-), and ROE (-).
   b. No relationship with FD, DD & HD.
5. CEO ownership (OWN) is:
   a. Significant at the 5% level for HD (-).
   b. No relationship with ID, FD, DD, TQ, ROA & ROE.
6. Corporate size (CS), a control variable, is:
   a. Significant at the 1% level for FD (-), HD (+), ROA (+), and ROE (+).
   b. Significant at the 5% level for ID (-).

c. No relationship with DD & TQ.

7. Corporate intensity (CI) is:
   a. Significant at the 1% level for ID (+), FD (+), and ROA (-).
   b. Significant at the 5% level for ROE (-).
   c. No relationship with DD, HD & TQ.

5 | DISCUSSION

5.1 | Investment

The significant associations of investment with over-investment and capital expenditure echo the findings of Malmendier and Tate (2005) that overconfidence distorts investment, and the evidence of Nzunga and Jagongo (2026) and Hsu and Lee (2025). The two proxies, however, point in different directions: firms with above-average capital expenditure invest more, as theory predicts, whereas firms classified as over-investing by asset growth relative to sales show lower measured investment. Under upper echelons theory, the behavioural effect is therefore proxy-specific and not uniform, and the capital expenditure result is partly mechanical because the proxy and the dependent variable share the same accounting items.

5.2 | Financing

Firms with above-industry debt show higher leverage, which is consistent with the view that overconfident managers prefer debt because they regard their equity as undervalued (Hackbarth, 2008; Ho et al., 2016; Mundi & Kaur, 2022). Because OVFIN is built from the debt ratio, this result confirms the classification more than it tests behaviour. The negative association of leverage with R&D and advertising intensity is better explained by trade-off theory (Kraus & Litzenberger, 1973; Myers, 1984), since intangible-intensive firms have less collateral, than by pecking-order theory (Myers & Majluf, 1984).

5.3 | Dividends

No proxy is significantly related to dividends. This confirms neither the positive signalling relation reported for the PSX by nor the lower payouts reported by Deshmukh et al. (2013). Possible reasons are the heavy-tailed payout ratio (Table 2), dividend smoothing, and family ownership that makes dividends less sensitive to the CEO's beliefs. Given the near-zero R-squared, the result is read as the absence of a detectable association and does not support either signalling or free-cash-flow retention.

5.4 | Hedging

Among the proxies, only CEO ownership is significant, and in the opposite direction to the prediction of Adam et al. (2015) that overconfident managers hedge less; the result also comes from linear-probability estimates, which should be confirmed with logit estimates. The strong positive role of firm size agrees with hedging theory, in which larger firms exploit economies of scale in derivative use (Froot et al., 1993; Smith & Stulz, 1985). Because the binary indicator cannot distinguish hedging from speculation, the study cannot test the under-hedging channel directly.

5.5 | Performance

Firms with above-industry debt show lower ROA, ROE, and Tobin's Q, which agrees with the argument that excessive leverage and free-cash-flow problems reduce value (Jensen, 1986; Malmendier & Tate, 2005). Firms with above-industry capital expenditure show higher ROA, ROE, and Tobin's Q, which agrees with

studies in which bolder risk-taking raises returns (Effah & Su, 2026; Miao et al., 2025; Silva et al., 2026). The signs differ across proxies, which fits the mixed evidence in the literature (Cherkaoui & Oudrhough, 2025a) and suggests that the overconfidence-performance link depends on how overconfidence is expressed in corporate decisions.

5.6 | Magnitude and Binary Proxies

The coefficients on the dummy-type proxies are small for the decision variables (for example, 0.0149 for investment), and the R-squared values range from 0.0008 to 0.0669. Because the proxies are binary, each coefficient is a difference in group means, not a marginal response, and statistical significance in a sample of 2,670 observations does not by itself imply economic importance. The findings are therefore best read as modest, proxy-specific associations that are consistent with, but do not prove, an effect of overconfidence, and they remain open to endogeneity and omitted-variable concerns.

6 | CONCLUSION

This study examined whether managerial overconfidence, proxied by over-financing, over-investment, R&D and advertising intensity, capital expenditure intensity and CEO ownership, is associated with the investment, financing, dividend and hedging decisions and with the performance (Tobin's Q, ROA and ROE) of 267 non-financial firms listed on the PSX over 2016–2025 (2,670 firm-years). Panel regressions were estimated in EViews, with a binary-choice model for the hedging decision.

Overall, the evidence supports a partial and proxy-specific role for overconfidence, not a uniform effect. The proxies are archival, firm-level indicators and not direct measures of CEO psychology, and the models explain between 0.1% and 6.7% of the variation in the outcomes. The findings are therefore reported as associations and not as causal effects.

Objective 1 (financial decisions)

Investment is significantly associated with over-investment ($\beta = 0.0149$) and capital expenditure ($\beta = -0.0414$), which gives partial support to H1; the sign for over-investment is opposite to the expected one. Financing is significantly associated with over-financing ($\beta = -0.0862$, $p = 0.0005$) and R&D and advertising intensity ($\beta = 0.0470$, $p = 0.0040$), partly because over-financing is built from the debt ratio, so H2 is partially supported. Dividend decisions show no significant association with any proxy, so H3 is not supported. In the preliminary linear estimates, only CEO ownership is significant for hedging ($\beta = -0.0263$, $p = 0.0433$), and not in the direction predicted by H4. Corporate size is significantly related to investment, leverage, and hedging, which supports H6 for these outcomes.

Objective 2 (firm performance).

Firms with above-industry debt show lower ROA, ROE and Tobin's Q. Firms with above-industry capital expenditure show higher ROA, ROE and Tobin's Q, and firms whose assets grow faster than sales show higher ROA and ROE. H5 is therefore supported for some proxies, with signs that differ across proxies, which is consistent with the mixed evidence on the overconfidence-performance relation (Cherkaoui & Oudrhough, 2025c; Miao et al., 2025). Corporate size is positively, and capital intensity is negatively associated with ROA and ROE.

6.1 | Theoretical Implications

The findings give qualified support to upper echelons theory (Hambrick & Mason, 1984) and behavioural corporate finance (Malmendier & Tate, 2005, 2008) in an emerging market: overconfidence-related behaviour is linked with investment, leverage and performance, but not with dividends, and its link with hedging is weak. The study extends this literature by testing four decisions and three performance measures in one framework, and it shows that the behavioural effect differs by decision and by proxy.

6.2 | Practical and Policy Implications

The policy implications below are limited to what the empirical results support. They are based on associations and do not imply that every firm flagged by a proxy has an overconfident CEO.

Capital-budgeting and leverage oversight. Over-financing and capital expenditure are significantly associated with leverage, investment and ROA, ROE and Tobin's Q (Tables 4, 5 and 8 to 10). Boards of non-financial firms could therefore require independent review of large capital expenditure proposals and of debt-financed expansion where these indicators exceed industry norms (Khoo et al., 2025). Hedging disclosure. Hedging is significantly related only to CEO ownership and firm size (Table 7), and about 88.5% of firm-years use derivatives, but the data cannot show the instrument type or whether the purpose is hedging or speculation. The SECP and PSX could require firms to disclose the type, notional amount, and purpose of derivative positions, so that future research can test the under-hedging and speculation channel (Adam et al., 2015).

Limits of the evidence. Dividends show no significant association with any proxy (Table 6), so the study makes no recommendation on dividend policy. Investors and credit-rating agencies should treat high ROA or ROE in firms with high capital expenditure with caution only where other evidence of overconfidence is available, because the proxies explain a small share of performance. Training programmes for executives and changes to board composition were not tested in this study and are left for future research.

6.3 | Limitations and Future Direction

This study investigated the role of overconfidence bias in corporate financial decision-making and, ultimately, in firm performance. Several limitations were observed, most of them relating to ownership and management structures. First, in several firms owned by a single family, almost all directors belong to that family. Second, some firms change their chief executive officer frequently: almost every year a new CEO is appointed, and each new CEO has a different shareholding. Third, in some family-owned businesses, the chief executive has no shareholding or only a nominal one. Fourth, in other firms, the chief executive holds a major share of the company. Fifth, some companies neither changed their shareholding pattern nor issued new shares during the period, so the chief executive's shareholding at the end of the period was the same as at the start.

Although this study makes several novel contributions, future research could extend it in a number of ways. The analysis could be replicated with other behavioural biases, supported by theoretical justification; for example, the effects of director training programmes and of confirmation bias could be tested in the same setting. This study analysed Pakistani non-financial firms, but financial firms could be analysed in the same way. The same model could also be applied to firms in other countries, such as the United States, the United Kingdom and European countries, and results from developing and developed countries could be compared,

which would be of considerable interest. Finally, other quantitative techniques could be developed and used to measure these constructs and to test the robustness of the results.

Additional limitations. First, the proxies are firm-level and partly overlap with the dependent variables (OVFIN with leverage, and OVINV and CEX with investment), so the associations may be partly mechanical. Second, the proxies are dichotomous, the models have low explanatory power, and the dividend and performance variables contain extreme values. Third, the hedging variable is binary and does not identify the instrument or its purpose. Fourth, the balanced-panel requirement excludes 114 firms and may introduce survivorship bias. Fifth, endogeneity cannot be ruled out, and future work could use lagged proxies, instrumental variables, or CEO-level measures such as option holdings and press coverage.

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