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CEO Overconfidence, Debt Policy, and Financial Condition: The Moderating Role of Family Ownership in Indonesian Manufacturing Firms

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Abstract

Financial condition is central to corporate sustainability, yet evidence on whether family ownership conditions the relationships of CEO overconfidence and debt policy with financial condition remains limited, particularly in Indonesian manufacturing firms. This study addresses this gap by positioning family ownership as a boundary condition. From 850 firm-year observations of Indonesian listed manufacturing firms during 2020-2024, 822 observations remained after residual-based screening and were analyzed using multiple and moderated regressions. Financial condition was measured using the MFA Score, with the Altman Z-score as an alternative. CEO overconfidence and debt policy are negatively associated with financial condition, while family ownership attenuates both relationships. The former remains significant across ownership levels, whereas the latter becomes insignificant at high family ownership. Results remain consistent across the full sample, alternative outcome and CEO-overconfidence measures. Two-way fixed-effects estimates support H1-H3, while H4 shows limited robustness. The study identifies family ownership as a boundary condition in managerial-behavioural and financing pathways to financial condition.

KEYWORDS

CEO overconfidence; debt policy; family ownership; financial condition; manufacturing companies.

Introduction

Financial condition is central to corporate sustainability because it reflects a firm's ability to maintain operations and meet financial obligations. In emerging markets, it is shaped by both financial factors and managerial characteristics (Horváthová & Mokrišová, 2018; Mișu & Madaleno, 2020). CEO overconfidence may encourage overly optimistic assessments, aggressive investment, and risk underestimation (Kaplan et al., 2022; Liang et al., 2020) while persistent high leverage may increase financial pressure when operating cash flows are insufficient (Zhen et al., 2020). Family ownership may condition both relationships because family owners balance economic objectives with control, reputation, and long-term continuity, although concentrated control may also create entrenchment concerns (Gottardo & Moisello, 2015, 2017). Yet CEO overconfidence, debt policy, and family ownership have largely been examined separately. Prior studies link CEO overconfidence to failure and financial distress, overconfidence-related agency costs to inside-debt incentives, and family involvement to leverage, survival, and distress risk (Galariotis et al., 2023; Gottardo & Moisello, 2017, 2019; Leng et al., 2021; Muñoz-Bullón et al., 2024; Wantriani & Susanti, 2025). Agency and entrenchment perspectives, together with Socioemotional Wealth (SEW) theory, further suggest that family control may shape managerial discretion and financing decisions (Gomez-Mejia et al., 2014; Gottardo & Moisello, 2017, 2019; Hsueh et al., 2023; Muñoz Bullón et al., 2024) . However, whether family ownership conditions the separate relationships of CEO overconfidence and debt policy with financial condition within a unified framework remains unclear.

Addressing this gap, this study examines CEO overconfidence and debt policy as

managerial-behavioural and financing pathways to financial condition, respectively, with family ownership as a boundary condition. Using Indonesian listed manufacturing firms, financial condition is measured primarily by the MFA Score (Çolak, 2021) and alternatively by the Altman Z-score (Altman, 1968) with firm size, ROA, and cash flow as controls. Robustness is assessed through alternative financial-condition measures, full-sample sensitivity tests, alternative CEO-overconfidence measures, and two-way fixed-effects models. The findings show that CEO overconfidence and debt policy are negatively associated with financial condition, while family ownership significantly changes the strength of both relationships. The study therefore extends prior research by showing that family ownership is relevant not only to leverage and financial risk but also to how managerial overconfidence and debt policy relate to financial condition. Because monitoring and entrenchment are not directly measured, these findings are interpreted as conditional associations rather than direct evidence of either governance mechanism.

Agency Theory

Agency Theory views managers as agents whose interests may diverge from those of shareholders, particularly under information asymmetry and substantial managerial discretion (Ghozali, 2020; Jensen & Meckling, 1976; Louis & Urcan, 2015). CEO overconfidence can intensify agency problems when managers overestimate returns, underestimate risks, and undertake aggressive investment or financing decisions that increase agency costs and financial pressure (Galariotis et al., 2023). The theory therefore supports examining both CEO overconfidence and debt policy as determinants of financial condition and ownership structure as a context that may alter these relationships.

Upper Echelon Theory

Upper Echelons Theory posits that organizational outcomes reflect executives' cognitive characteristics, values, and experiences (Abatecola & Cristofaro, 2020; Hambrick & Mason, 1984). CEO overconfidence may lead executives to overestimate returns and underestimate risks, encouraging excessive investment, expansion, or debt utilization (Abdolhosseini & Wooi, 2024; Abdulwahab et al., 2025). These decisions may cause inefficient resource allocation, performance volatility, and financial pressure, thereby weakening financial condition. Thus, the theory links CEO overconfidence to financial condition through cognitively shaped strategic and financial decisions.

Trade-off Theory

Trade-off Theory explains capital structure as a balance between the benefits and costs of debt, particularly tax advantages versus agency and financial-distress costs, implying an optimal debt level (Abdeljawad & Farhood, 2025; Shiro & Biiranee, 2025). Beyond a sustainable level, higher leverage increases interest and debt-payment obligations, bankruptcy risk, and financial pressure, potentially constraining profitability and financial stability (Khan & Qasem, 2024; Sunardi et al., 2020). Accordingly, the theory supports an association between excessive debt utilization and weaker financial condition.

Socioemotional Wealth (SEW)

Socioemotional Wealth (SEW) reflects the non-financial value family owners derive from identity, control, reputation, and intergenerational continuity (Gómez-Mejía et al., 2007). These priorities may encourage conservative financing, while concentrated ownership may reinforce family influence and managerial preferences under limited oversight (Baixauli-Soler et al., 2021; Jansen et al., 2023; Michiels & Molly, 2017). Thus, SEW supports family ownership as a boundary condition linking CEO overconfidence and debt policy to financial condition (Gottardo & Moisello, 2017, 2019; Muñoz-Bullón et al., 2024). As monitoring and entrenchment are not directly measured, moderation reflects conditional association rather than evidence of either mechanism.

The Impact of CEO Overconfidence on Financial Condition

Overconfident CEOs may overestimate expected returns and underestimate risks, encouraging excessive investment, debt utilization, and other aggressive decisions that can misallocate resources and weaken financial condition (Guluma, 2021; Xiao et al., 2021). Agency Theory highlights the potential agency costs of such decisions, while Upper Echelons Theory explains how managerial cognitive characteristics shape strategic and financial choices (Chua et al., 2025). Prior studies further link CEO overconfidence to corporate risk-taking and adverse financial outcomes (Leng et al., 2021; Mardjono et al., 2026; Wantriani & Susanti, 2025). Accordingly:

H_1: CEO overconfidence has a significant negative effect on financial condition.

The Impact of Debt Policy on Financial Condition

Trade-off Theory suggests that debt is beneficial only while its tax and financing advantages exceed expected distress costs. Excessive leverage increases interest burdens, bankruptcy risk, and financing costs, while agency conflicts among managers, shareholders, and creditors may further encourage inefficient investment or risk shifting (Khan & Qasem, 2024); (Marimuthu & Abbana, 2023). Hence, greater debt utilization beyond the firm's financial capacity is expected to weaken financial condition. Therefore:

H_2: Debt policy has a significant negative effect on financial condition.

Family Ownership Moderates the Effect of CEO Overconfidence on Financial Condition

Family ownership may condition the relationship between CEO overconfidence and financial condition by shaping managerial discretion, monitoring, and family interests. Agency Theory highlights potential Type II conflicts under concentrated control, Upper Echelons Theory emphasizes the role of managerial discretion, and SEW underscores family owners' interests in reputation and long-term continuity (Hsueh et al., 2023; Muñoz Bullón et al., 2024). Together, these perspectives suggest that the relationship between CEO overconfidence and financial condition may vary with family ownership. Accordingly:

H_3: Family ownership moderates the relationship between CEO overconfidence and financial condition.

Family Ownership Moderates the Relationship Between Debt Policy and Financial Condition

Family ownership may condition the relationship between debt policy and financial condition by shaping financing decisions and risk preferences. Agency Theory emphasizes the role of concentrated ownership in aligning owner-manager interests, while Trade-off Theory and SEW suggest that family owners' concerns for control, reputation, and long-term continuity may influence debt utilization and financial risk (Gottardo & Moisello, 2015, 2019; Muñoz-Bullón et al., 2024).These considerations suggest that the relationship between debt policy and financial condition may vary with family ownership. Therefore:

H_4: Family ownership moderates the relationship between debt policy and financial condition.

The conceptual framework illustrating the relationships among variables and the formulation of hypotheses H_1-H_4 is presented in Figure 1.

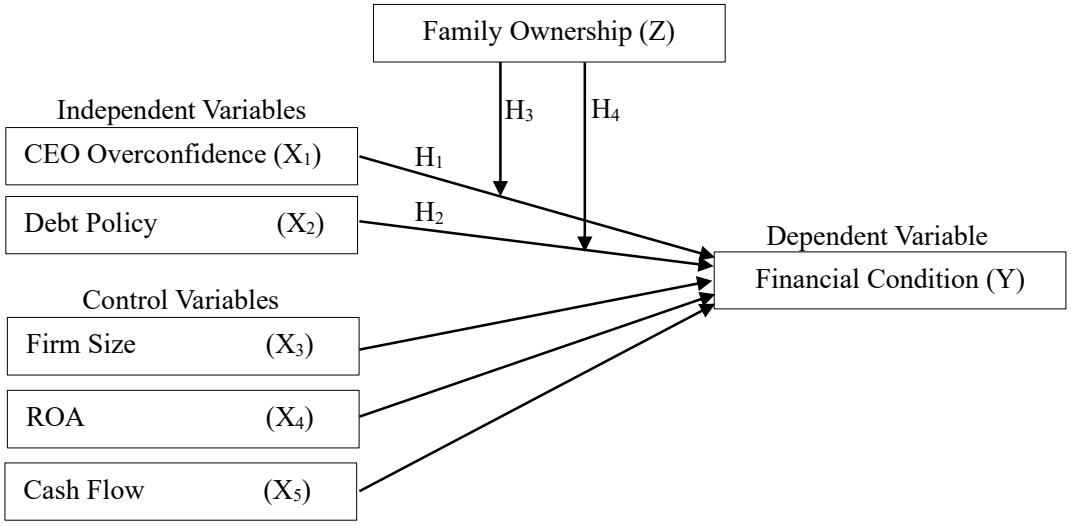


Figure 1. Conceptual Framework

Methods

This quantitative associative study uses annual panel data from manufacturing firms listed on the Indonesia Stock Exchange (IDX) during 2020-2024 (Chandrarin, 2017). Secondary data were obtained from annual reports. Of 228 firms, purposive sampling retained firms that were continuously listed, published complete annual reports, were not delisted, and disclosed sufficient ownership information to identify family ownership. Fifty-eight firms were excluded, leaving 170 firms and an initial balanced panel of 850 firm-year observations. Before hypothesis testing, standardized residuals from baseline Model 1 were screened once using an a priori cutoff of ±3. Twenty-eight observations (3.29%) exceeded this threshold and were excluded from the primary analysis, producing a common unbalanced sample of 822 firm-year observations for Models 1-4. The rule was applied independently of coefficient direction or significance. As a sensitivity test, all models were also re-estimated using the complete 850-observation sample; full estimates are reported in Table 4.

Financial Condition

Financial condition reflects a firm's ability to maintain its financial position and meet current and future obligations, while financial distress represents a more severe and prolonged deterioration in this condition (Brigham & Daves, 2019; Mahardini & Bandi, 2023). This study measures financial condition using the continuous MFA Score (Çolak, 2021), where higher scores indicate stronger financial condition and lower scores indicate greater distress risk. Although the MFA classifies firms as distressed (< -0.02), grey area (-0.02 to 0.56), or financially healthy (> 0.56), the continuous score is used in regression analyses to preserve variation and statistical information, while the cut-offs are used to classify firms as financially distressed (FD) or non-financially distressed (NFD).

MFA score = $0.24X_1 - 0.14X_2 - 0.03X_3 + 3.76X_4 - 0.72X_5 + 0.20X_6 + 1.14X_7$

Note:

X_1 = (cash equivalents + securities + short term trade receivables) / short term liabilities
X_2 = short term liabilities / current assets
X_3 = total liabilities / equity
X_4 = EBITDA / total assets
X_5 = financial expenses / net sales
X_6 = net profit (loss) / net sales
X_7 = retained earnings / total assets

CEO Overconfidence

CEO overconfidence is measured using the composite index adapted from (Liang et al., 2020), comprising five equally weighted binary indicators: overinvestment, gender, tenure, expertise, and educational level. Scores range from 0 to 5; CEOs scoring at least 3 are classified as overconfident (1), otherwise 0.

Overinvestment. Overinvestment is based on the investment-growth specification used by (Ma'sum et al., 2022) and (Wantriani & Susanti, 2025), following (Richardson, 2006). Expected investment is estimated from asset growth and sales growth; observations with residuals above the sample median are coded as overinvesting (1), otherwise 0.

$$\frac{\Delta \text{ Asset it}}{\text{Asset it}-1} = \beta 0 + \beta 1 \frac{\Delta \text{ Sales it}}{\text{Sales it}-1} + \varepsilon i,t$$

Gender. Male executives are generally more prone to overconfidence than female executives, particularly in investment decisions. Gender is therefore coded 1 for male CEOs and 0 for female CEOs (Liang et al., 2020).

Tenure. Managerial experience may reduce overconfidence through learning from past experience. Tenure is coded 1 when the CEO's tenure is below the sample median and 0 otherwise (Liang et al., 2020).

Expertise. CEO expertise reflects the executive's educational specialization, which may shape managerial decisions and corporate outcomes (Gounopoulos et al., 2021; Tanjaya & Santoso, 2020). It is coded 1 for CEOs with an educational background in business or economics and 0 otherwise (Gounopoulos et al., 2021).

Educational level. Higher educational attainment may strengthen managerial knowledge and human capital but may also increase confidence in managerial abilities (Liang et al., 2020). As a component of the composite overconfidence index, educational level is coded 1 for CEOs holding a master's or doctoral degree and 0 for those with a bachelor's degree or lower (Liang et al., 2020).

CEO overconfidence. The five binary indicators are summed into a score ranging from 0 to 5. Following (Liang et al., 2020). CEOs with scores ≥3 are classified as overconfident, while those with scores <3 are classified as non-overconfident.

Sensitivity Analysis of CEO Overconfidence Measurement.

Measurement sensitivity is assessed by re-estimating Models 1 and 2 with alternative composite-score thresholds of 2 and 4 and overinvestment alone as a behavioural proxy, while retaining the same sample, dependent variable, and controls as the baseline specification. The relevant CO×FO interaction is reconstructed for each alternative measure, and the results are compared with the baseline to assess the robustness of the main inferences.

Debt policy

Debt policy is measured by the Debt-to-Asset Ratio (DAR), defined as total liabilities divided by total assets and expressed as a percentage (Ogachi et al., 2020; Samara & Sutandi, 2024). Values above 100% are retained because they represent firms whose liabilities exceed assets and therefore have negative equity.

$$DAR = \frac{\text{Total Liabilities}}{\text{Total Assets}} \times 100\%$$

Family ownership

Family ownership is identified from annual reports by tracing the founding family's ultimate direct and indirect (pyramid) ownership and is measured as the proportion of outstanding ordinary shares ultimately attributable to the family. Indirect ownership is determined by tracing ownership chains and calculating the attributable proportion from the ownership percentages along each chain, while overlapping direct and indirect interests are counted only once (Madyan et al., 2019). Ownership data were rechecked to verify the tracing and eliminate double counting, resulting in family ownership values ranging from 0% to 100%.

$$FO = \frac{\text{Ultimate attributable ordinary shares controlled by the founding family}}{\text{Total outstanding ordinary shares}} \times 100\%$$

Firm size. Firm size reflects a firm's operational scale and financial capacity, with larger asset bases generally associated with greater financial resilience and lower distress risk (Hamzah et al., 2024). It is measured as the natural logarithm of total assets.

Return on Assets (ROA). ROA measures profitability by reflecting a firm's efficiency in using its assets to generate profits (Dirman, 2020; Kasmir, 2021). ROA is calculated as follows (Kasmir, 2021).

$$ROA = \frac{Earning\ after\ tax}{Total\ assets}$$

Cash flow. Cash flow reflects cash generated and used in operating, investing, and financing activities. Insufficient operating cash flow may weaken investor confidence in a firm's ability to sustain operations and increase financial-distress risk (Ramadhanti & Subagyo, 2022). Cash flow is measured as follows:

$$\text{Cash flow (CFOTA)} = \frac{\text{Cash Flow Operating}}{\text{Total Assets}}$$

Data Analysis

The primary hypotheses are tested using pooled multiple regression and Moderated Regression Analysis (MRA), with the MFA Score as the primary outcome. Robustness is evaluated by replacing the MFA Score with the Altman Z-score and by re-estimating all four models using two-way firm and year fixed effects with standard errors clustered at the firm level. The latter addresses time-invariant firm heterogeneity, common year shocks, heteroskedasticity, and within-firm serial correlation. All coefficients are interpreted as statistical associations rather than definitive causal effects.

The research models are specified as follows:

Main model

Model 1 - MFA Score, direct effects

$$FC_1 = \alpha + \beta_1 CO + \beta_2 DP + \beta_3 Size + \beta_4 ROA + \beta_5 CF + \varepsilon$$

Model 2 - MFA Score, moderation model

$$FC_1 = \alpha + \beta_1 CO + \beta_2 DP + \beta_3 FO + \beta_4 (CO*FO) + \beta_5 (DP*FO) + \beta_6 Size + \beta_7 ROA + \beta_8 CF + \varepsilon$$

Two complementary robustness procedures are employed. Models 3-4 replace the MFA Score with the Altman Z-score to assess whether the findings depend on the measurement of financial condition, while Models 1-4 are re-estimated with firm and year fixed effects and firm-clustered standard errors to account for unobserved firm heterogeneity, common year shocks, and within-firm error dependence. Altman Z-scores above 2.99 indicate financial soundness, 1.81–2.99 the grey zone, and below 1.81 elevated bankruptcy risk (Altman, 1968).

Alternative Model Robustness Test

Model 3 - Altman Z-score, direct effects

$$FC_2 = \alpha + \beta_1 CO + \beta_2 DP + \beta_3 Size + \beta_4 ROA + \beta_5 CF + \varepsilon$$

Model 4 - Altman Z-score, moderation model

$$FC_2 = \alpha + \beta_1 CO + \beta_2 DP + \beta_3 FO + \beta_4 (CO*FO) + \beta_5 (DP*FO) + \beta_6 Size + \beta_7 ROA + \beta_8 CF + \varepsilon$$

Note: FC_1 represents financial condition measured using the primary proxy, while FC_2 represents financial condition measured using an alternative proxy in the robustness test.

The calculation of FC_2 (Z-score) is as follows.

$$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 1.0X_5$$

Note:

X_1= working capital / total assets

X_2= retained earnings / total assets

X_3= EBIT / total assets

X_4= market value of equity / book value of total debt

X_5 = sales / total assets

Z-scores above 2.99 indicate a healthy financial condition, scores between 1.81 and 2.99 represent the grey zone, and scores below 1.81 indicate high bankruptcy risk.

Panel Model Robustness Analysis

Models 1-4 are re-estimated using two-way fixed effects to control for time-invariant firm heterogeneity and common year shocks, with firm-clustered standard errors accounting for heteroskedasticity and within-firm serial correlation. The panel specifications are as follows:

Panel Model 1 - MFA Score, direct effects

$$FC_{1it} = \alpha_i + \lambda_t + \beta_1 CO_{it} + \beta_2 DP_{it} + \beta_3 Size_{it} + \beta_4 ROA_{it} + \beta_5 CF_{it} + \varepsilon_{it}$$

Panel Model 2 - MFA Score, moderation model

$$FC_{1it} = \alpha_i + \lambda_t + \beta_1 CO_{it} + \beta_2 DP_{it} + \beta_3 FO_{it} + \beta_4 (CO\times FO)_{it} + \beta_5 (DP\times FO)_{it} + \beta_6 Size_{it} + \beta_7 ROA_{it} + \beta_8 CF_{it} + \varepsilon_{it}$$

Panel Model 3 - Altman Z-score, direct effects

$$FC_{2it} = \alpha_i + \lambda_t + \beta_1 CO_{it} + \beta_2 DP_{it} + \beta_3 Size_{it} + \beta_4 ROA_{it} + \beta_5 CF_{it} + \varepsilon_{it}$$

Panel Model 4 - Altman Z-score, moderation model

$$FC_{2it} = \alpha_i + \lambda_t + \beta_1 CO_{it} + \beta_2 DP_{it} + \beta_3 FO_{it} + \beta_4 (CO\times FO)_{it} + \beta_5 (DP\times FO)_{it} + \beta_6 Size_{it} + \beta_7 ROA_{it} + \beta_8 CF_{it} + \varepsilon_{it}$$

Notes: *i* and *t* denote firm and year; α_i and λ_t denote firm and year fixed effects; and ε_{it} is the idiosyncratic error term. Standard errors are clustered at the firm level.

Result and Discussion

The initial 850 firm-year observations were screened once using standardized residuals from Model 1 (|SR| > 3). Excluding 28 observations (3.29%) yielded a common analytical sample of 822 observations for Models 1-4. All

Table 1. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Y_1 (FC_MFA)	822	0.3905	4.6631	-30.42	69.11
Y_2 (FC_Zscore)	822	3.4262	2.9869	-0.09	9.98
X_1 (CO)	822	0.6224	0.1651	0	1
X_2 (DP)	822	51.9539	37.9782	0.25	290.11
X_3 (Size)	822	14.7396	1.7201	7.11	19.84
X_4 (ROA)	822	3.4182	13.5328	-87.61	218.22
X_5 (CF)	822	6.4452	12.3743	-36.15	129.75
Z (FO)	822	1.4556	9.7258	0	92.39

Source: Processed data, 2026.
Note:
FC = Financial Condition; CO = CEO Overconfidence; DP = Debt Policy;
Size = Firm Size; ROA = Return on Assets; CF = Cash Flow; FO = Family Ownership.

Table 2. Results of Multiple Regression Analysis and MRA

Variable	Statistic	Model 1 MFA	Model 2 MFA (MRA)	Model 3 Z-score	Model 4 Z-score (MRA)
Cons		0.3385	-0.6759	0.7943	0.8514
CO	coef. β	-1.5530	-3.2099	-1.1290	-1.1004
	t-value	-2.39	-2.58	-2.02	-2.12
	sig.	0.017*	0.010*	0.044*	0.034*
	Std. Err	0.6496	1.2442	0.5589	0.5189
DP	coef. β	-0.0230	-0.2230	-0.0197	-0.0198
	t-value	-5.33	-5.12	-7.84	-7.91
	sig.	0.000*	0.000*	0.000*	0.000*
	Std. Err	0.0043	0.0436	0.0025	0.0025
FO	coef. β	-	0.0323	-	0.0006
	t-value	-	2.09	-	2.12
	sig.	-	0.037*	-	0.034*
	Std. Err	-	0.0155	-	0.0003
CO×FO	coef. β	-	0.0538	-	0.0019
	t-value	-	2.21	-	3.23
	sig.	-	0.027*	-	0.001*
	Std. Err.	-	0.0244	-	0.0006
DP×FO	coef. β	-	0.01513	-	0.01529
	t-value	-	2.10	-	2.17
	sig.	-	0.036*	-	0.030*
	Std. Err.	-	0.0072	-	0.7045
Size	coef. β	0.0050	0.0015	0.2656	0.2633
	t-value	0.05	0.02	0.94	0.91
	sig.	0.960	0.984	0.347	0.363
	Std. Err.	0.0998	0.0767	0.2826	0.2894
ROA	coef. β	0.0469	0.0458	0.0386	0.0383
	t-value	3.19	3.72	5.38	4.91
	sig.	0.001*	0.000*	0.000*	0.000*
	Std. Err.	0.0147	0.0123	0.0072	0.0078
CF	coef. β	0.0071	0.0071	0.0482	0.0476
	t-value	2.55	3.54	1.34	1.19
	sig.	0.011*	0.000*	0.180	0.236
	Std. Err.	0.0028	0.0020	0.0359	0.0401
R^2		0.6900	0.7410	0.6820	0.6600
Adj. R^2		0.6330	0.6490	0.6320	0.6050
F statistic		12.10	8.13	48.26	30.86
Prob > F		0.000	0.000	0.000	0.000
Number of obs		822	822	822	822

Source: Processed data, 2026

models were also re-estimated on the full 850-observation sample to assess sensitivity to this exclusion.

Descriptive Statistics

Table 1 summarizes the characteristics of the 822 firm-year observations.

The mean MFA Score is 0.3905 (SD = 4.6631), within the grey-area interval and indicating substantial heterogeneity in financial condition. The mean Altman Z-score is 3.4262 (SD = 2.9869). CEO overconfidence equals 0.6224 on average, indicating that 62.24% of observations are classified as overconfident. Debt policy varies widely, with a maximum DAR of 290.11%, reflecting negative equity in some financially distressed firms. Firm size, ROA, cash flow, and family ownership also display substantial cross-firm variation.

Table 3. Summary of Main Test Results and Alternative Measure Robustness Test

	Main Result				Alternative Measure Robustness Test				Remarks
	Model 1		Model 2		Model 3		Model 4		
	t	Sig.	t	Sig.	t	Sig.	t	Sig.	
Hypothesis 1	-2.39	0.017	-	-	-2.02	0.044	-	-	Supported
Hypothesis 2	-5.33	0.000	-	-	-7.84	0.000	-	-	Supported
Hypothesis 3	-	-	2.21	0.027	-	-	3.23	0.001	Supported
Hypothesis 4	-	-	2.10	0.036	-	-	2.17	0.030	Supported

Source: Processed data, 2026.

Table 4. Regression Results Full Sample Estimates (N=850)

Variable	Statistic	Model 1 MFA	Model 2 MFA (MRA)	Model 3 Z-score	Model 4 Z-score (MRA)
Cons		0.3512	-0.6618	0.7816	0.8395
CO	coef. β	-1.5076	-3.1168	-1.1035	-1.0752
	t-value	-2.38	-2.56	-2.03	-2.11
	sig.	0.018*	0.011*	0.043*	0.035*
	Std. Err	0.6334	1.2175	0.5436	0.5096
DP	coef. β	-0.0228	-0.2186	-0.0195	-0.0196
	t-value	-5.43	-5.08	-7.80	-7.84
	sig.	0.000*	0.000*	0.000*	0.000*
	Std. Err	0.0042	0.0430	0.0025	0.0025
FO	coef. β	-	0.0317	-	0.0006
	t-value	-	2.08	-	2.11
	sig.	-	0.038*	-	0.035*
	Std. Err	-	0.0152	-	0.0003
CO×FO	coef. β	-	0.0529	-	0.0018
	t-value	-	2.20	-	3.16
	sig.	-	0.028*	-	0.002*
	Std. Err.	-	0.0240	-	0.0006
DP×FO	coef. β	-	0.0149	-	0.0150
	t-value	-	2.09	-	2.15
	sig.	-	0.037*	-	0.032*
	Std. Err	-	0.0071	-	0.0070
Size	coef. β	0.0048	0.0016	0.2584	0.2557
	t-value	0.05	0.02	0.93	0.90
	sig.	0.961	0.983	0.354	0.369
	Std. Err.	0.0960	0.0800	0.2778	0.2841
ROA	coef. β	0.0465	0.0454	0.0381	0.0379
	t-value	3.21	3.75	5.44	4.99
	sig.	0.001*	0.000*	0.000*	0.000*
	Std. Err.	0.0145	0.0121	0.0070	0.0076
CF	coef. β	0.0069	0.0069	0.0475	0.0468
	t-value	2.56	3.45	1.34	1.20
	sig.	0.011*	0.001*	0.181	0.231
	Std. Err.	0.0027	0.0020	0.0354	0.0390
R^2		0.6860	0.7370	0.6780	0.6560
Adj. R^2		0.6290	0.6450	0.6280	0.6010
F statistic		12.61	8.40	50.42	32.29
Prob > F		0.000	0.000	0.000	0.000
Number of obs		850	850	850	850

Source: Processed data, 2026.

Table 5. Comparison of the Main and Full Sample Estimates

Relationship	Model	Main analysis N = 822	Full sample N = 850	Consistency
CO	Model 1	-1.5530 (sig. 0.017)	-1.5076 (sig. 0.018)	Yes
DP	Model 1	-0.0230 (sig. 0.000)	-0.0228 (sig. 0.000)	Yes
CO×FO	Model 2	0.0538 (sig. 0.027)	0.0529 (sig. 0.028)	Yes
DP×FO	Model 2	0.01513 (sig. 0.036)	0.014875 (sig. 0.037)	Yes
CO	Model 3	-1.1290 (sig. 0.044)	-1.1035 (sig. 0.043)	Yes
DP	Model 3	-0.0197 (sig. 0.000)	-0.0195 (sig. 0.001)	Yes
CO×FO	Model 4	0.0019 (sig. 0.001)	0.0018 (sig. 0.002)	Yes
DP×FO	Model 4	0.01529 (sig. 0.030)	0.01501 (sig. 0.032)	Yes

Source: Processed data, 2026.
Note: "Yes" indicates that the full sample estimate retains the direction and statistical significance of the corresponding main estimate at the 5% level.

Main Regression Result

Multiple Regression Analysis and Moderating Regression Analysis (MRA)

Model 1 shows that CEO overconfidence (β = -1.5530, p = 0.017) and debt policy (β = -0.0230, p < 0.001) are negatively and significantly associated with the MFA Score, supporting H_1 and H_2. Because higher MFA Scores indicate better financial condition, these negative coefficients indicate weaker financial condition. ROA and cash flow are positively significant, whereas firm size is insignificant.

In Model 2, family ownership significantly moderates both relationships. The CO×FO interaction is positive (β = 0.0538, p = 0.027), indicating that higher family ownership attenuates the negative CEO-overconfidence association. The DP×FO interaction is likewise positive (β = 0.01513, p = 0.036), indicating attenuation of the negative debt-policy association. H3 and H4 are therefore supported in the pooled MFA model (Table 3).

The estimated primary-model specifications are:

Model 1 FC_1 = 0.3385 - 1.5530CO - 0.0230DP + 0.0050Size + 0.0469ROA + 0.0071CF + ε

Model 2 FC_1 = -0.6759 - 3.2099CO - 0.2230DP + 0.0323FO + 0.0538(CO×FO) + 0.01513(DP×FO) + 0.0015Size + 0.0458ROA + 0.0071CF + ε

Robustness and Sensitivity Analyses

Alternative Financial Condition Measure

Using the Altman Z-score as an alternative measure of financial condition, Models 3 and 4 retain the explanatory variables, controls, and interaction structure of the main models. CEO overconfidence remains negative and significant in Models 3 and 4 (β = -1.1290, p = 0.044; β = -1.1004, p = 0.034), as does debt policy (β = -0.0197 and -0.0198, both p < 0.001). In Model 4, CO×FO (β = 0.0019, p = 0.001) and DP×FO (β = 0.01529, p = 0.030) are positive and significant, indicating that higher family ownership attenuates the negative associations of CEO overconfidence and debt policy with financial condition. As higher Altman Z-scores indicate stronger financial condition, these results confirm that the directions, significance, and moderating patterns of the principal variables are consistent across the MFA Score and Altman Z-score, although coefficient magnitudes are not directly comparable across scales.

The estimated equations are:

Model 3 FC_2 = 0.7943 - 1.1290CO - 0.0197DP + 0.2656Size + 0.0386ROA + 0.0482CF+ε

Model 4 FC_2 = 0.8514 - 1.1004CO - 0.0198DP + 0.0006FO + 0.0019(CO×FO) + 0.01529(DP×FO) + 0.2633Size + 0.0383ROA + 0.0476CF + ε

Full Sample Sensitivity Analysis

To assess sensitivity to residual-based outlier screening, Models 1-4 were re-estimated using the full sample of 850 firm-year observations, restoring the 28 observations excluded from the primary analysis while retaining the same variable definitions and model specifications. This analysis assesses whether the directions and significance of the principal coefficients depend on the screening decision. Complete results are reported in Table 4, while Table 5 summarizes the hypothesis-related estimates.

Restoring the 28 excluded observations produces only modest changes in coefficients and p-values: CEO overconfidence and debt policy remain negative and significant, while CO×FO and DP×FO remain positive and significant. Thus, the conclusions for H1-H4 are unchanged and do not depend on residual-based screening. The 822-observation sample is retained for the primary analysis because the prespecified criterion (|standardized residual| > 3) was applied only once to the baseline model, excluded only 3.29% of observations with unusually large prediction errors, and was used consistently across Models 1-4. The consistent full-sample results further indicate that the screening improves estimation stability without determining the substantive conclusions.

Two-Way Fixed-Effects Robustness

To account for unobserved time-invariant firm characteristics, year-specific shocks, and within-firm error dependence, Models 1-4 were re-estimated using two-way fixed effects with firm-clustered standard errors. CEO overconfidence and debt policy remain negative and significant, while CO×FO remains positive and significant, supporting the robustness of H_1-H_3. DP×FO remains positive but is significant only at the 10% level, indicating limited robustness for H_4. ROA remains positive and significant, firm size insignificant, and cash flow significant only in the MFA models. Complete estimates are reported in Table 6.

Comparison of pooled and panel estimates (Table 7) shows stable directions and 5% significance for H_1-H_3, indicating robust findings across both specifications. H_4 retains a positive interaction but weakens from 5% to 10% significance in the panel model, indicating directional consistency but limited robustness.

Table 6. Panel Robustness Analysis Using Two-Way Fixed Effects and Firm-Clustered Standard Errors

Variable		Model 1 MFA	Model 2 MFA (MRA)	Model 3 Z-score	Model 4 Z-score (MRA)
Cons		0.4100	-0.5200	0.6900	0.7400
CO	coef. β	-1.3100	-2.6800	-0.9800	-0.9400
	t-value	-2.18	-2.09	-1.99	-2.00
	sig.	0.031*	0.038*	0.048*	0.047*
	Firm-clustered Std Err.	0.6022	1.2815	0.4920	0.4698
DP	coef. β	-0.0165	-0.1510	-0.0168	-0.0164
	t-value	-2.64	-2.54	-2.92	-2.84
	sig.	0.009*	0.012*	0.004*	0.005*
	Firm-clustered Std Err.	0.0062	0.0595	0.0058	0.0058
FO	coef. β	-	0.0270	-	0.0005
	t-value	-	2.01	-	1.82
	sig.	-	0.046*	-	0.071**
	Firm-clustered Std Err.	-	0.0134	-	0.0003
CO×FO	coef. β	-	0.0450	-	0.0016
	t-value	-	2.06	-	2.22

Variable		Model 1 MFA	Model 2 MFA (MRA)	Model 3 Z-score	Model 4 Z-score (MRA)
	sig.	-	0.041*	-	0.028*
	Firm-clustered Std Err.	-	0.0219	-	0.0007
DP×FO	coef. β	-	0.0110	-	0.0118
	t-value	-	1.74	-	1.70
	sig.	-	0.083**	-	0.091**
	Firm-clustered Std Err.	-	0.0063	-	0.0069
Size	coef. β	0.0120	0.0090	0.2410	0.2360
	t-value	0.12	0.10	1.60	1.57
	sig.	0.902	0.918	0.112	0.119
	Firm-clustered Std Err.	0.0973	0.0873	0.1509	0.1506
ROA	coef. β	0.0410	0.0400	0.0310	0.0300
	t-value	2.78	2.73	3.01	2.92
	sig.	0.006*	0.007*	0.003*	0.004*
	Firm-clustered Std Err.	0.0147	0.0147	0.0103	0.0103
CF	coef. β	0.0064	0.0062	0.0380	0.0370
	t-value	2.29	2.20	1.46	1.42
	sig.	0.023*	0.029*	0.146	0.158
	Firm-clustered Std Err.	0.0028	0.0028	0.0260	0.0261
Observations		822	822	822	822
Firm clusters		170	170	170	170
Firm fixed effects		Yes	Yes	Yes	Yes
Year fixed effects		Yes	Yes	Yes	Yes
Std errors clustered by firm		Yes	Yes	Yes	Yes
LSDV R^2		0,7020	0,7380	0,7160	0,7290
Two-way within R^2		0,1180	0,1340	0,1270	0,1420

Source: Processed data, 2026.

Table 7. Comparison of Main and Panel Robustness Results

Hypothesis	Main pooled model		Two-way fixed-effects model		Assessment
	t-value	Sig.	t-value	Sig.	
H_1: CO	-2.39	0.017	-2.18	0.031	Robust
H_2: DP	-5.33	0.000	-2.64	0.009	Robust
H_3: CO×FO	2.21	0.027	2.06	0.041	Robust
H_4: DP×FO	2.10	0.036	1.74	0.083	Limited robustness

Source: Processed data, 2026.
Notes: Firm and year fixed effects; firm-clustered standard errors (170 clusters). "Robust" = same direction and 5% significance; "limited robustness" = same direction but 10% significance. Interactions refer to Models 2 and 4.

Table 8. Sensitivity Analysis of CEO Overconfidence Measurement

Alternative measurement	CO → FC, β (sig.)	CO×FO → FC, β (sig.)	Conclusion
Baseline: score ≥3	-1.5530 (0.017)	0.0538 (0.027)	Supported
Score ≥2	-1.4620 (0.020)	0.0471 (0.035)	Robust
Score ≥4	-1.6814 (0.012)	0.0589 (0.022)	Robust
Overinvestment-only	-1.3285 (0.028)	0.0445 (0.041)	Robust

Source: Processed data, 2026.

Table 9. Conditional Effects of CEO Overconfidence on Financial Condition at Different Levels of Family Ownership

FO Level	FO Value	Marginal effect	Std. Err	Sig.	95% Confidence Interval
Low	0.000	-3.2099	1.2442	0.010	[-5.6523, -0.7675]
Mean	1.4556	-3.1316	1.2211	0.011	[-5.5282, -0.7350]
High	11.1814	-2.6083	1.0840	0.016	[-4.7356, -0.4810]

Source: Processed data, 2026.

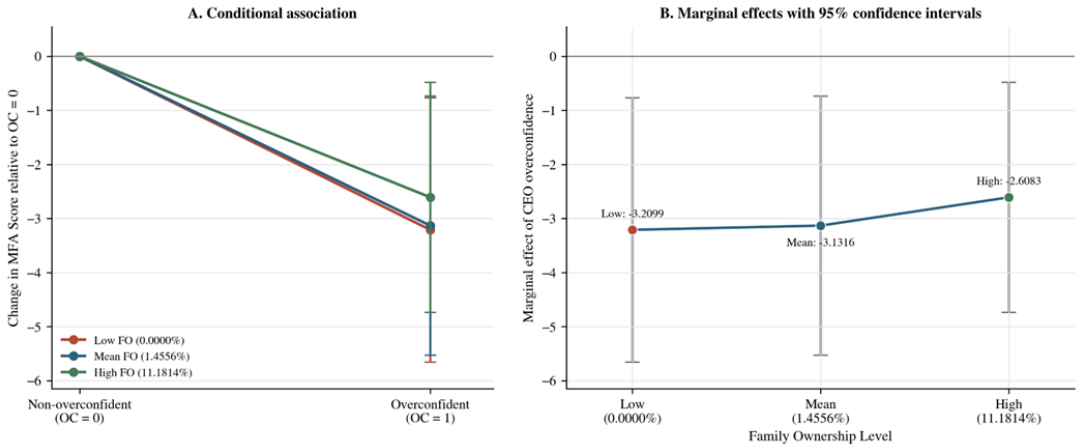


Figure 2. Interaction between CEO Overconfidence and Family Ownership

CEO Overconfidence Measurement Sensitivity

Alternative CEO-overconfidence thresholds (≥2 and ≥4) and the overinvestment-only proxy yield consistently negative and significant CEO-overconfidence coefficients and positive and significant CO×FO interactions. These results confirm the robustness of H1 and H3 to changes in the classification threshold and composite-index construction (Table 8). Complete regression results for all alternative specifications are provided in Table 11 and Table 12.

Coefficient of Determination

Table 2 presents the OLS estimates for all models using the same 822 firm-year observations. Model 1 is the baseline specification, while Model 2 adds family ownership and its interactions with CEO overconfidence and debt policy. The adjusted R^2 increases from 0.6330 in Model 1 to 0.6490 in Model 2, indicating that the additional moderating terms improve explanatory power despite greater model complexity. Models 3 and 4 use the Altman Z-score as an alternative measure of financial condition, with adjusted R^2 values of 0.6320 and 0.6050, respectively. Although explanatory power declines slightly in Model 4 after adding the moderating terms, it remains substantial.

The Effect of CEO Overconfidence on Financial Condition

CEO overconfidence is negatively and significantly associated with financial condition. In Model 1, its coefficient is negative and significant (β = -1.5530, sig. = 0.017), indicating that firms led by overconfident CEOs tend to have lower MFA Scores, and thus weaker financial condition, after controlling for debt policy, firm size, profitability, and cash flow. Accordingly, H_1 is supported. The coefficient remains negative and significant in Model 2 (β = -3.2099, sig. = 0.010), although, given the CO×FO interaction, it represents the association when family ownership equals zero; conditional associations at other ownership levels are addressed in the moderation analysis. The finding is consistent with Agency Theory and Upper Echelons Theory: overconfident CEOs may overestimate expected outcomes and underestimate risks, encouraging aggressive investment and financing decisions that increase risk, resource misallocation, and financial pressure (Abdolhosseini & Wooi, 2024; Galariotis et al., 2023). It also aligns with evidence linking CEO characteristics to financial stability (Abdulwahab et al., 2025) overconfidence to corporate risk (Liang et al., 2020), and overconfident CEOs to greater corporate-failure risk (Leng et al., 2021) extending this evidence to Indonesian listed manufacturing firms. This negative association remains significant using the Altman Z-score (Model 3: β = -1.1290, sig. = 0.044), the full sample, two-way fixed effects with firm-clustered standard errors, and alternative CEO-overconfidence measures. The finding is therefore robust across samples, financial-condition measures, estimators, and CEO-overconfidence specifications. However, it should be interpreted as a robust association rather than a definitive causal effect because reverse causality and omitted time-varying factors cannot be fully excluded.

The Effect of Debt Policy on Financial Condition.

Debt policy is negatively and significantly associated with financial condition in Model 1 (β = -0.0230, sig. = 0.000), indicating that greater debt reliance is associated with weaker financial condition after controlling for CEO overconfidence, firm size, profitability, and cash flow; thus, H_2 is supported. The relationship remains negative and significant in Model 2 (β = -0.2230, sig. = 0.000), although this coefficient represents the association when family ownership equals zero because DP×FO is included. Greater debt obligations may reduce financial flexibility and increase refinancing and distress risk when cash flows are insufficient, consistent with prior evidence linking high or persistent leverage to weaker financial outcomes and greater financial vulnerability (Idarti & Hasanah, 2018; Khan & Qasem, 2024; Liu et al., 2025; Samara & Sutandi, 2024 ; Sunardi et al., 2020; Zhen et al., 2020).

The finding is consistent with Trade-off Theory, which holds

Table 10. Conditional Effects of Debt Policy on Financial Condition at Different Levels of Family Ownership

FO Level	FO Value	Marginal effect	Std. Err	Sig.	95% Confidence Interval
Low	0.0000	-0.2230	0.0436	0.000	[-0.3086, -0.1374]
Mean	1.4556	-0.2010	0.0378	0.000	[-0.2752, -0.1268]
High	11.1814	-0.0538	0.0626	0.390	[-0.1767, 0.0690]

Source: Processed data, 2026.
Note: Family ownership is measured in percentage points (0-100). Marginal effects, standard errors, and 95% confidence intervals were calculated from Model 2.

that debt benefits must be balanced against increasing interest, bankruptcy, and financial-distress costs as leverage rises (Abdeljawad & Farhood, 2025; Marimuthu & Abbana, 2023). This interpretation is particularly relevant given the sample's maximum DAR of 290.11%, indicating liabilities substantially exceeding assets for some firms. Thus, the result does not imply that all debt is detrimental, but that greater debt reliance within the observed range is associated with weaker financial condition. This association remains negative and significant using the Altman Z-score (Model 3: β = -0.0197, sig. = 0.000), the full 850 firm-year sample, and two-way fixed effects with firm-clustered standard errors, indicating robustness across measures, samples, and estimators. Nevertheless, the evidence remains associational rather than causal because reverse causality and time-varying omitted factors cannot be excluded.

Family Ownership Moderates the Effect of CEO Overconfidence on Financial Condition.

Family ownership significantly moderates the relationship between CEO overconfidence and financial condition. In Model 2, the CO×FO interaction is positive and significant (β = 0.0538, p = 0.027), indicating that higher family ownership attenuates, rather than reverses, the negative association between CEO overconfidence and the MFA Score. This moderating pattern is also observed in Model 4 using the Altman Z-score (β = 0.0019, p = 0.001), supporting H_3 across both measures of financial condition. To further assess this moderation, the marginal effect of CEO overconfidence was estimated at low (0%), mean (1.4556%), and high (11.1814%) family ownership. The high level represents the mean plus one standard deviation, while 0% was used as the low level because the mean minus one standard deviation fell below the feasible lower bound. As family ownership is measured in percentage points, the Model 2 marginal effect is calculated as -3.2099 + 0.0538(FO). Table 9 reports the corresponding estimates, standard errors, significance levels, and 95% confidence intervals.

As shown in Table 9, the conditional association remains negative and significant at low (-3.2099, p = 0.010; 95% CI [-5.6523, -0.7675]), mean (-3.1316, p = 0.011; 95% CI [-5.5282, -0.7350]), and high family ownership (-2.6083, p = 0.016; 95% CI [-4.7356, -0.4810]). The progressively smaller negative magnitude indicates that family ownership attenuates the adverse association of CEO overconfidence with financial condition, but does not eliminate or reverse it because all confidence intervals remain below zero.

Figure 2 confirms this pattern visually: the CEO-overconfidence slope remains negative but becomes progressively less negative as family ownership increases. The confidence intervals remain below zero at all evaluated ownership levels, confirming that the conditional association remains statistically significant. Thus, the figure supports an attenuating moderating effect rather than the disappearance or reversal of the negative association.

The moderating pattern can be interpreted through Agency and Upper Echelons theories. CEO overconfidence may encourage excessive reliance on managerial judgment, risk underestimation, and aggressive investment or financing decisions, potentially weakening financial condition (Galariotis et al., 2023). However, these consequences depend on the ownership context in which managerial discretion is exercised. Concentrated family ownership may strengthen incentives and the ability to constrain decisions that threaten family wealth and long-term continuity, consistent with evidence that the consequences of CEO overconfidence vary with governance conditions (Leng et al., 2021; Park & Chung, 2017). This interpretation is also consistent with the SEW perspective, as family owners seek to preserve control, identity, reputation, and intergenerational continuity (Gomez-Mejia et al., 2014; Hsueh et al., 2023; Muñoz Bullón et al., 2024) . Accordingly, the positive CO×FO coefficient indicates that greater family ownership attenuates the adverse association between CEO overconfidence and financial condition.

Concentrated family ownership may nevertheless create Type II agency conflicts, entrenchment, or weaker external monitoring, potentially reinforcing managerial preferences or family interests (Hsueh et al., 2023; Muñoz Bullón et al., 2024) . The observed positive interaction and conditional effects are more consistent with the alternative explanation that family ownership constrains risky managerial discretion: increasing family ownership reduces the magnitude, but not the direction, of the negative CEO overconfidence-financial condition association, which remains statistically significant at the low, mean, and high ownership levels (Table 9). Thus, extending prior evidence linking CEO overconfidence to corporate risk, failure, performance, and financial distress (Leng et al., 2021; Liang et al., 2020; Mardjono et al., 2026; Wantriani & Susanti, 2025), the findings identify family ownership as a boundary condition in the managerial-behavioural pathway to financial condition rather than as having a uniformly strengthening or weakening role.

Family Ownership Moderates the Effect of Debt Policy on Financial Condition.

Family ownership significantly moderates the relationship between debt policy and financial condition. In Model 2, the positive and significant DP×FO interaction (β = 0.01513, sig. = 0.036) indicates that the negative association between debt policy and the MFA Score weakens as family ownership increases. The interaction remains positive and significant with the Altman Z-score in Model 4 (β = 0.01529, sig. = 0.030), supporting H_4 across both financial-condition measures. Conditional effects were estimated at low (0.0000%), mean (1.4556%), and high (11.1814%) family ownership. The observed minimum was used as the low level because the mean minus one standard deviation fell below zero, while the high level represents the mean plus one standard deviation. Because family ownership is measured from 0 to 100, the conditional effect was calculated as -0.2230 + 0.01513(FO), with standard errors and 95% confidence intervals derived from Model 2 (Table 10).

Table 10 shows that the negative association weakens as family ownership increases. The marginal effect is negative and significant at low family ownership (-0.2230, sig. = 0.000; 95% CI [-0.3086, -0.1374]) and at the mean (-0.2010, sig. = 0.000; 95% CI [-0.2752, -0.1268]), but becomes smaller and insignificant at the selected high level (-0.0538, sig. = 0.390;

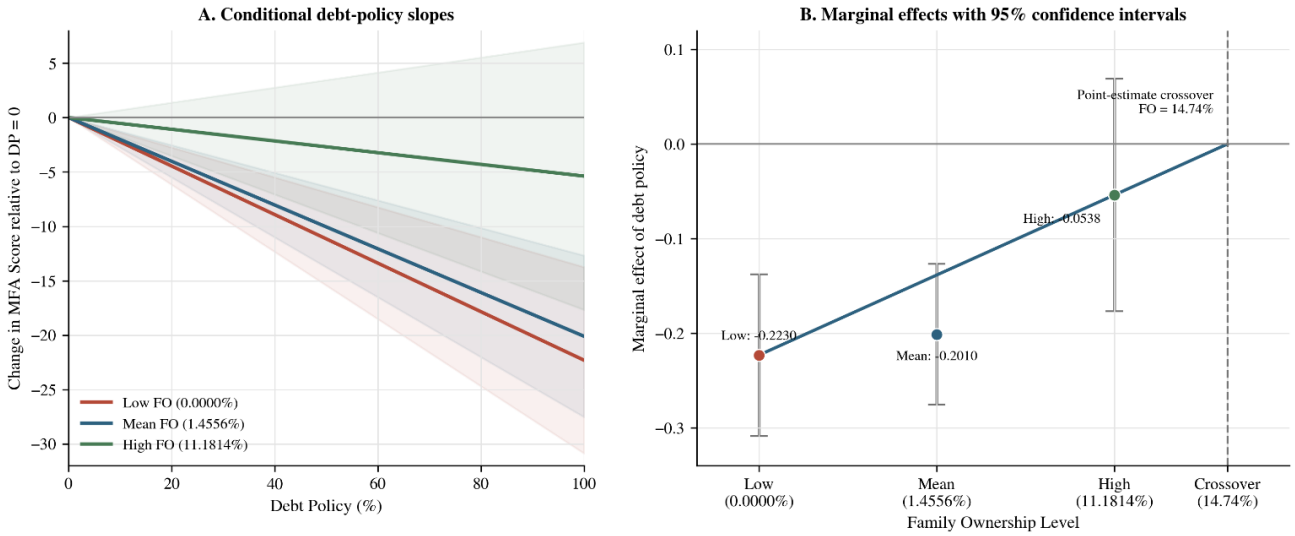


Figure 3. Conditional Effect of Debt Policy on Financial Condition across Levels of Family Ownership

Table 11. Full Regression Results Using Alternative CEO Overconfidence Measures
Panel A. Direct-effect model (Model 1)

Variable	Statistic	Baseline: score >= 3	Score >= 2	Score >= 4	Overinvestment Only
Constant	Coef. β	0.3385	0.3026	0.3651	0.2914
	Std. Err	0.2267	0.2209	0.2325	0.2175
	t-statistic	1.4900	1.3700	1.5700	1.3400
	sig.	0.1370	0.1710	0.1170	0.1810
CEO Overconfidence	Coef. β	-1.5530	-1.4620	-1.6814	-1.3285
	Std. Err	0.6496	0.6265	0.6646	0.6041
	t-statistic	-2.3900	-2.3300	-2.5300	-2.2000
	sig.	0.0170	0.0200	0.0120	0.0280
Debt Policy	Coef. β	-0.0230	-0.0227	-0.0234	-0.0225
	Std. Err	0.0043	0.0043	0.0044	0.0043
	t-statistic	-5.3300	-5.2800	-5.3200	-5.2300
	sig.	0.0000	0.0000	0.0000	0.0000
Firm Size	Coef. β	0.0050	0.0086	0.0037	0.0101
	Std. Err	0.0998	0.0989	0.1002	0.0990
	t-statistic	0.0500	0.0900	0.0400	0.1000
	sig.	0.9600	0.9310	0.9710	0.9190
ROA	Coef. β	0.0469	0.0462	0.0475	0.0457
	Std. Err	0.0147	0.0146	0.0147	0.0145
	t-statistic	3.1900	3.1600	3.2300	3.1500
	sig.	0.0010	0.0020	0.0010	0.0020
Cash Flow	Coef. β	0.0071	0.0069	0.0073	0.0068
	Std. Err	0.0028	0.0028	0.0028	0.0028
	t-statistic	2.5500	2.4600	2.6100	2.4300
	sig.	0.0110	0.0140	0.0090	0.0150
R^2		0.6900	0.6840	0.6970	0.6780
Adjusted R^2		0.6330	0.6280	0.6400	0.6210
F-statistic		12.10	11.86	12.42	11.61
Prob > F		0.000	0.000	0.000	0.000
Number of observations		822	822	822	822

Source: Processed data, 2026.

Table 12. Full Regression Results Using Alternative CEO Overconfidence Measures
Panel B. Moderated model (Model 2)

Variable	Statistic	Baseline: score >= 3	Score >= 2	Score >= 4	Overinvestment Only
Constant -	Coef. β	-0.6759	-0.6118	-0.7284	-0.5842
	Std. Err	1.2033	1.1841	1.2210	1.1764
	t-statistic	-0.5600	-0.5200	-0.6000	-0.5000
	sig.	0.5750	0.6060	0.5510	0.6200
CEO Overconfidence	Coef. β	-3.2099	-2.8846	-3.4187	-2.6914
	Std. Err	1.2442	1.1980	1.2799	1.1753
	t-statistic	-2.5800	-2.4100	-2.6700	-2.2900
	sig.	0.0100	0.0160	0.0080	0.0220
Debt Policy	Coef. β	-0.2230	-0.2168	-0.2291	-0.2119

	Std. Err	0.0436	0.0431	0.0442	0.0428
	t-statistic	-5.1200	-5.0300	-5.1800	-4.9500
	sig.	0.0000	0.0000	0.0000	0.0000
Family Ownership	Coef. β	0.0323	0.0308	0.0341	0.0299
	Std. Err	0.0155	0.0153	0.0157	0.0151
	t-statistic	2.0900	2.0100	2.1700	1.9800
	sig.	0.0370	0.0450	0.0300	0.0480
CO×FO	Coef. β	0.0538	0.0471	0.0589	0.0445
	Std. Err	0.0244	0.0223	0.0257	0.0217
	t-statistic	2.2100	2.1100	2.2900	2.0500
	sig.	0.0270	0.0350	0.0220	0.0410
DP×FO	Coef. β	0.01513	0.01468	0.01557	0.01432
	Std. Err	0.00721	0.00706	0.00728	0.00698
	t-statistic	2.1000	2.0800	2.1400	2.0500
	sig.	0.0360	0.0380	0.0330	0.0410
Firm Size	Coef. β	0.0015	0.0042	-0.0021	0.0064
	Std. Err	0.0767	0.0764	0.0771	0.0760
	t-statistic	0.0200	0.0500	-0.0300	0.0800
	sig.	0.9840	0.9560	0.9780	0.9330
ROA	Coef. β	0.0458	0.0451	0.0464	0.0448
	Std. Err	0.0123	0.0123	0.0124	0.0122
	t-statistic	3.7200	3.6700	3.7400	3.6700
	sig.	0.0000	0.0000	0.0000	0.0000
Cash Flow	Coef. β	0.0071	0.0069	0.0073	0.0068
	Std. Err	0.0020	0.0020	0.0021	0.0020
	t-statistic	3.5400	3.4500	3.4800	3.4000
	sig.	0.0000	0.0010	0.0010	0.0010
R^2		0.7410	0.7340	0.7480	0.7280
Adjusted R^2		0.6490	0.6420	0.6560	0.6360
F-statistic		8.13	7.98	8.31	7.82
Prob > F		0.000	0.000	0.000	0.000
Number of observations		822	822	822	822

Source: Processed data, 2026.

95% CI [-0.1767, 0.0690]). Thus, the evidence indicates attenuation rather than a statistically confirmed reversal.

Figure 3 reinforces this interpretation: the 95% confidence interval remains below zero at low and mean family ownership but crosses zero at the selected high level. Although the point estimate reaches zero at approximately 14.74% family ownership above the selected high level of 11.1814% but within the observed sample range statistical uncertainty emerges before this crossover. The figure therefore supports a weakening, rather than a statistically confirmed reversal, of the negative debt-policy association.

The finding is consistent with Trade-off Theory, which emphasizes balancing the benefits of debt against interest obligations, refinancing exposure, bankruptcy risk, and financial-distress costs (Abdeljawad & Farhood, 2025; Marimuthu & Abbana, 2023). Agency Theory and the SEW perspective further suggest that family owners may scrutinize debt-related risks to protect concentrated wealth, control, reputation, and intergenerational continuity (Gomez-Mejia et al., 2014; Michiels & Molly, 2017; Muñoz-Bullón et al., 2024; Baixauli-Soler et al., 2021; Jansen et al., 2023). Accordingly, the positive DP×FO interaction indicates that family ownership attenuates the adverse association between debt utilization and financial condition, without implying that family firms necessarily use less debt. Extending prior research on family ownership and leverage, H_4 identifies family ownership as a boundary condition in this financing pathway: the debt policy-financial condition association is negative and significant at low and mean family ownership but weaker and insignificant at the selected high level.

Supplementary analyses provide broadly consistent but not uniform support. DP×FO remains positive and significant using the Altman Z-score (β = 0.01529, p = 0.030) and the full sample (Model 2: β = 0.01488, p = 0.037; Model 4: β = 0.01501, p = 0.032), indicating that the result is not driven by the financial-condition measure or exclusion of 28 observations. Under two-way fixed effects with firm-clustered standard errors, however, the interaction remains positive but is significant only at the 10% level for MFA (β = 0.0110, p = 0.083) and Altman Z-score (β = 0.0118, p = 0.091). Thus, H_4 is supported in the main and alternative specifications, although its statistical robustness weakens under the more stringent panel specification.

Control Variables Across Model Specifications

Among the control variables, ROA shows the most consistent positive and significant association with financial condition across both outcome measures and estimators, supporting the role of profitability in strengthening firms' financial capacity ((Dirman, 2020); (Karas & Reznakova, 2020). Cash flow is positive and significant in the MFA models but insignificant with the Altman Z-score, indicating a measure-dependent association, whereas firm size remains insignificant across specifications, consistent with evidence that financial difficulties may affect firms of different sizes ((Dirman, 2020) (Isayas, 2021). Overall, these control-variable patterns do not alter the principal findings: CEO overconfidence, debt policy, and CO×FO remain consistent across the main and panel specifications, while DP×FO retains its direction but shows limited robustness in the panel analysis.

Limitations and Cautions

Several limitations qualify the findings. Although two-way fixed effects address time-invariant firm heterogeneity, year shocks, and within-firm error dependence, they do not eliminate endogeneity from reverse causality, simultaneity, or time-varying omitted factors; thus, the results indicate associations rather than causal effects. H_4 is also less robust than H_1-H_3 because DP×FO is significant only at the 10% level in the panel models. Measurement limitations remain because CEO overconfidence is indirectly proxied, family ownership does not capture family involvement or underlying governance mechanisms, and the accounting-based financial-condition measures may not fully reflect market expectations, debt-

service capacity, or actual default. Finally, the Indonesian listed manufacturing sample during 2020-2024, including the COVID-19 disruption and recovery, limits generalizability.

Recommendations for Future Research

Future research could strengthen causal identification through lagged variables, instrumental variables, natural experiments, or dynamic panels. It could also employ alternative CEO-overconfidence measures, richer indicators of family involvement and governance, and complementary financial-condition outcomes, including default, debt-service, and market-based measures. Broader industries, private firms, longer periods, and cross-country samples could further assess generalizability.

Conclusion

This study examines the relationships of CEO overconfidence and debt policy with the financial condition of Indonesian listed manufacturing firms and the moderating role of family ownership. Using 822 firm-year observations from 2020-2024, the results show that CEO overconfidence and debt policy are negatively associated with financial condition, while family ownership attenuates both relationships. The findings remain consistent across the full sample, the Altman Z-score, and alternative CEO-overconfidence measures. Fixed-effects results support H1-H3, whereas H4 shows limited robustness. Overall, family ownership represents a boundary condition in both managerial-behavioural and financing pathways to financial condition. These findings should be interpreted as conditional associations rather than causal effects or direct evidence of specific governance mechanisms. The study integrates Upper Echelons, Agency, Trade-off, and Socioemotional Wealth perspectives and highlights the relevance of managerial biases, leverage discipline, and ownership context. Future research could strengthen causal identification and employ richer measures of CEO overconfidence and family involvement.

Author contributions

The first author developed the research concept, collected and analyzed the data, interpreted the findings, and prepared the manuscript. The second author contributed to the research methodology, validation of the analytical results, and improvement of the manuscript. The third author conducted the literature review, synthesized prior studies, assessed the findings, and contributed to manuscript editing and revision. All authors reviewed and approved the final manuscript and accepted responsibility for its content.

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