

Testing the Fraud Pentagon in Indonesian Manufacturing Companies: Pressure, Rationalization, and Capability as Determinants of Financial Statement Fraud during 2019–2023

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ABSTRACT

Financial statement fraud is a serious issue because it can mislead investors, weaken corporate credibility, and harm stakeholders. This study aims to analyze the effects of external pressure, financial stability, nature of industry, auditor change, director change, and changes in the number of CEO photographs on financial statement fraud from the perspective of the Fraud Pentagon in manufacturing companies listed on the Indonesia Stock Exchange during the 2019–2023 period. This study employed a quantitative approach with a causal-comparative design. The sample was selected using purposive sampling, resulting in 10 companies with a total of 50 observations from financial statements and annual reports. Data were analyzed using multiple linear regression, classical assumption tests, simultaneous tests, partial tests, and the coefficient of determination. The results show that external pressure, financial stability, auditor change, and director change have significant effects on financial statement fraud. In contrast, nature of industry and changes in the number of CEO photographs do not have significant effects. Simultaneously, the six variables have a significant effect, with the model explaining 55.4% of the variation. These findings indicate that the Fraud Pentagon remains relevant, but operates selectively, as the dimensions of pressure, rationalization, and capability are more dominant than the dimensions of opportunity and arrogance. This study concludes that fraud detection in manufacturing companies should focus more strongly on financial pressure and changes in key corporate actors.

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Introduction

Financial statement fraud remains a serious issue because it damages the credibility of accounting information, weakens investor confidence, and can cause substantial economic losses. Although its frequency is not always higher than other forms of fraud, financial statement fraud has a highly material impact because it directly affects the quality of stakeholders' decisions. ACFE Indonesia (2020) shows that financial statement fraud remains one form of fraud that needs to be carefully monitored in the Indonesian context. At the global level, ACFE (2024) also emphasizes that financial statement fraud is among the costliest categories of fraud, although the number of cases is relatively smaller than asset misappropriation and corruption. These facts indicate that the quality of financial reporting cannot be separated from issues of governance, financial pressure, and managerial motives and capacity.

One framework that is widely used to explain financial statement fraud is the Fraud Pentagon. This model views fraud as being influenced by five main elements: pressure, opportunity, rationalization, capability/competence, and arrogance. In this study, these elements are operationalized through external pressure, financial stability, nature of industry, auditor change, director change, and changes in the number of CEO photographs. This framework is relevant because financial statement fraud does not only arise from financial pressure, but may also be related to opportunities for manipulation, justification of actions, changes in key actors, and symbolic dominance of corporate leadership.

However, previous studies show that the Fraud Pentagon does not always operate uniformly. Putra and Kusnoegroho (2021) found that several Fraud Pentagon indicators, particularly the pressure dimension, play a role in detecting financial statement fraud. Haqq and Budiwitjacksono (2019) showed that some Fraud Pentagon indicators can be used to detect fraud, although the effectiveness of each proxy is not the same. Rimadanti et al. (2022) found different results, showing that nature of industry and the frequent number of CEO pictures influence financial statement fraud. Meanwhile, Aslira et al. (2024) reaffirmed that pressure is associated with financial statement fraud, whereas opportunity does not always have an effect. These differences indicate that the strength of each Fraud Pentagon element depends heavily on sectoral context, observation period, and the proxies used.

The research gap of this study lies in three aspects. First, previous studies still show inconsistent results, particularly regarding nature of industry, auditor change, director change, and the number of CEO photographs. Second, some previous studies used periods before or during the early phase of economic recovery, whereas the 2019–2023 period covers the pre-pandemic phase, a period of economic pressure, and the recovery period, so the potential pressure on financial reporting may differ. Third, the Fraud Pentagon is often treated as a model in which all elements have relatively equal strength, whereas recent literature shows that fraud proxies are often fragmented and are not always directly comparable across studies. Soltani et al. (2023) emphasize that financial statement fraud detection studies still face diversity in approaches, methods, and contexts, making more specific testing by sector and period necessary.

Based on these gaps, this study positions the Fraud Pentagon as a framework that needs to be tested contextually, rather than as a model that works homogeneously in all situations. The focus of this study is to examine whether external pressure, financial stability, nature of industry, auditor change, director change, and changes in the number of CEO photographs affect financial statement fraud in manufacturing companies listed on the Indonesia Stock Exchange during the 2019–2023 period. Thus, this article not only retests the Fraud Pentagon but also examines which dimensions are most dominant and which are weaker in explaining fraud indications in the context of Indonesian manufacturing companies.

This study is directed by four main questions. First, do external pressure and financial stability affect financial statement fraud? Second, do nature of industry, auditor change, director change, and changes in the number of CEO photographs have equally strong ability to explain

fraud? Third, are the six Fraud Pentagon variables able to simultaneously explain variations in financial statement fraud? Fourth, if the results across variables are not uniform, which dimension is most dominant in detecting fraud indications in manufacturing companies during the 2019–2023 period?

Based on the above explanation, this study provides an empirical contribution by showing that the Fraud Pentagon does not always operate uniformly. In the context of Indonesian manufacturing companies during the 2019–2023 period, this study examines the possibility that the dimensions of pressure, rationalization, and capability are more dominant than the dimensions of opportunity and arrogance. Therefore, the findings are expected to provide input for auditors, investors, regulators, and future researchers in assessing financial statement fraud risk in a more selective, contextual, and proxy-based manner.

Method

This study employed a quantitative approach with a causal-comparative research design. This approach was selected because the study aimed to examine the effects of several independent variables from the Fraud Pentagon perspective on one dependent variable, namely financial statement fraud. The causal-comparative design was used to explain the relationships among variables based on numerical data obtained from companies' financial statements and annual reports. Nevertheless, causal interpretation in this study was carried out cautiously because the data used were secondary and non-experimental. In research based on observational data, statistical analysis can be used to test relationships among variables, but causal conclusions need to consider the limitations of the design and data context (Maier et al., 2023).

The objects of this study were manufacturing companies listed on the Indonesia Stock Exchange (IDX) during the 2019–2023 period. The manufacturing sector was selected because it has relatively high complexity in transactions, inventories, receivables, assets, and production processes, which may create opportunities for financial statement manipulation. The unit of analysis was firm-year observation, namely the financial statements and annual reports of manufacturing companies over the five-year observation period. Thus, this study was not conducted through surveys of individuals, but through documentary analysis of officially published corporate reports.

The population of this study consisted of all manufacturing companies listed on the IDX during the 2019–2023 period. Based on the initial data, there were 220 manufacturing companies in the population. The sample was determined using purposive sampling, namely sample selection based on certain criteria aligned with the research data requirements. The sample selection criteria included: (1) manufacturing companies listed on the IDX during the 2019–2023 period; (2) companies that published complete financial statements and annual reports during the research period; (3) companies that had the data needed to measure financial statement fraud and all Fraud Pentagon proxies; and (4) companies with report formats and data units that could be compared consistently. Based on these criteria, 10 companies were obtained, with a total of 50 observations.

The research data were collected using documentation techniques. The documents used included annual financial statements and annual reports of the sampled companies during the 2019–2023 period. Documentation was selected because all research variables were measured using company archival data, such as total assets, total liabilities, receivables, inventories, sales, profit, auditor change, director change, and the number of CEO photographs in annual reports. The stages of data collection included population identification, sample selection, downloading company documents, extracting financial and non-financial data, coding variables, and preparing the dataset before statistical analysis. In document-based research, data validity does not depend on questionnaire instruments, but on clear operational definitions, consistency in data extraction, and traceability of document sources.

Operational Definition of Variables

The dependent variable in this study is financial statement fraud, or indications of fraudulent financial statements. This variable was measured using the F-Score Model. This model was selected because it can detect indications of misstatement or financial statement manipulation risk based on a combination of accrual quality and changes in corporate financial performance. The F-Score is not interpreted as legal evidence that a company has committed fraud, but rather as an early detection tool to identify possible financial statement fraud risk.

The F-Score in this study consists of two main components: Accrual Quality and Financial Performance. The Accrual Quality component is used to assess the quality of a company's accruals, particularly changes in accrual accounts that may reflect accounting policies or managerial estimates. The Financial Performance component is used to capture changes in financial performance that may signal manipulation risk, such as changes in receivables, inventories, cash sales, and earnings. The higher the F-Score value, the greater the indication of financial statement fraud risk.

The independent variables consist of six Fraud Pentagon proxies. First, external pressure represents the external pressure dimension and is measured by the company's leverage level. The higher the pressure from external parties, the greater the possibility that management will face pressure to maintain the image of financial performance. Second, financial stability represents pressure resulting from changes in corporate financial stability. This variable is measured by changes in total assets. Sharp changes in assets may indicate pressure on corporate stability and may encourage management to maintain the image of performance through financial reporting. Third, nature of industry represents the opportunity dimension. This variable is measured by changes in the ratio of receivables to sales. Receivables are used because this account involves estimates and accounting policies that may create room for manipulation in financial reporting. Fourth, auditor change represents the rationalization dimension. This variable is measured using a dummy variable, assigned a value of 1 if the company changed auditors in the observation year and 0 if it did not. Auditor change may signal a change in the company's relationship with its external examiner.

Fifth, director change represents the capability dimension. This variable is also measured using a dummy variable, assigned a value of 1 if the company changed directors in the observation year and 0 if it did not. Director change is considered relevant because changes in key actors may influence policies, internal control, and opportunities for manipulation. Sixth, changes in the number of CEO photographs represent the arrogance dimension. This variable is measured based on the frequency of CEO photographs appearing in the annual report. This indicator is used to observe the degree of symbolic prominence of the corporate leader. However, this indicator is still interpreted carefully because the number of CEO photographs does not always directly reflect managerial arrogance.

Table 1. Operational Definition of Variables

Variable	Fraud Pentagon Dimension	Measurement Indicator	Scale
Financial Statement Fraud	Dependent variable	F-Score Model based on accrual quality and financial performance	Ratio
External Pressure	Pressure	Company leverage level	Ratio
Financial Stability	Pressure	Changes in company total assets	Ratio
Nature of Industry	Opportunity	Changes in the ratio of receivables to sales	Ratio
Auditor Change	Rationalization	Dummy: 1 if auditor change occurs, 0 if not	Nominal
Director Change	Capability	Dummy: 1 if director change occurs, 0 if not	Nominal

Variable	Fraud Pentagon Dimension	Measurement Indicator	Scale
Changes in the Number of CEO Photographs	Arrogance	Frequency of CEO photographs appearing in the annual report	Ratio

Data Analysis Technique

Data analysis was conducted in several stages. The first stage was descriptive statistics to describe the characteristics of the data, such as minimum, maximum, mean, and standard deviation values. The second stage was classical assumption testing, including normality, multicollinearity, heteroskedasticity, and autocorrelation tests. The multicollinearity test was conducted by examining Variance Inflation Factor (VIF) and tolerance values to ensure that the independent variables did not have excessively high correlations. Detecting multicollinearity is important because high correlations among independent variables can disrupt the stability of regression coefficients and make test results less reliable (Shrestha, 2020).

The third stage was multiple linear regression testing. Multiple linear regression was used because this study examined the effects of six independent variables on one dependent variable. The independent variables in the model included external pressure, financial stability, nature of industry, auditor change, director change, and changes in the number of CEO photographs, while the dependent variable was financial statement fraud measured using the F-Score Model. The fourth stage was hypothesis testing through the t-test, F-test, and coefficient of determination. The t-test was used to determine the partial effect of each independent variable on financial statement fraud. The F-test was used to determine the simultaneous effect of all independent variables. The coefficient of determination was used to determine the ability of the model to explain variations in the dependent variable. R^2 and Adjusted R^2 values can show the proportion of variation in the dependent variable explained by the regression model, thereby helping to assess the model's explanatory power (Gao, 2024). The significance level used in this study was 5%, or 0.05.

Results

Summary of the Fraud Pentagon Regression Results

The findings show that not all elements of the Fraud Pentagon operate with the same strength in explaining fraudulent financial statements among manufacturing companies listed on the Indonesia Stock Exchange during the 2019–2023 period. Of the six variables tested, four variables were found to have a significant effect, namely external pressure, financial stability, auditor change, and director change. Meanwhile, nature of industry and changes in the number of CEO photographs did not have a significant effect. The summary of the regression results is presented in Table 1.

Table 1. Summary of Fraud Pentagon Regression Results on Fraudulent Financial Statements

Variable	Fraud Pentagon Dimension	Coefficient	Std. Error	t-Statistic	Sig.	Direction of Effect	Decision	VIF
Constant	-	0.482	0.168	2.869	0.006	-	Significant	-
External pressure	Pressure	0.612	0.116	5.276	0.000	Positive	Significant effect	1.284
Financial stability	Pressure	0.274	0.129	2.124	0.040	Positive	Significant effect	1.171
Nature of industry	Opportunity	0.187	0.106	1.768	0.084	Positive	No significant effect	1.236

Variable	Fraud Pentagon Dimension	Coefficient	Std. Error	t-Statistic	Sig.	Direction of Effect	Decision	VIF
Auditor change	Rationalization	0.356	0.117	3.043	0.004	Positive	Significant effect	1.092
Director change	Capability	0.391	0.121	3.231	0.002	Positive	Significant effect	1.148
Changes in the number of CEO photographs	Arrogance	0.058	0.053	1.101	0.277	Positive	No significant effect	1.067

The Pressure Dimension in the Fraud Pentagon as the Main Trigger of Fraudulent Financial Statements

The first finding shows that the two variables representing the pressure dimension, namely external pressure and financial stability, have a significant effect on fraudulent financial statements. External pressure has a coefficient of 0.612 with a significance value of 0.000, while financial stability has a coefficient of 0.274 with a significance value of 0.040. Both significance values are below the 0.05 significance level, indicating that external pressure and financial stability have a significant effect on indications of financial statement fraud.

The positive direction of the coefficients indicates that the higher the external pressure and the greater the pressure on a company's financial stability, the higher the indication of fraudulent financial statements. This finding shows that the pressure dimension is the most prominent factor in the Fraud Pentagon model among manufacturing companies during the 2019–2023 period. Thus, financial statements do not only function as a medium for reporting performance, but may also become a defensive instrument when companies face financing pressure, performance demands, or financial instability.

Opportunity and Arrogance Are Not Significant Predictors

The second finding shows that nature of industry and changes in the number of CEO photographs do not have a significant effect on fraudulent financial statements. Nature of industry has a coefficient of 0.187 with a significance value of 0.084, while changes in the number of CEO photographs have a coefficient of 0.058 with a significance value of 0.277. Both significance values are greater than 0.05; therefore, these two variables cannot be stated as significant predictors in this research model.

This result indicates that the indicators used to represent the opportunity and arrogance dimensions are not strong enough to explain indications of financial statement fraud in the research sample. In other words, not all elements of the Fraud Pentagon operate uniformly in the context of Indonesian manufacturing companies. This finding emphasizes that the strength of each fraud indicator needs to be interpreted contextually based on sector, observation period, and the proxies used.

Rationalization and Capability Remain Significant in Explaining Fraud

The third finding shows that auditor change and director change have a significant effect on fraudulent financial statements. Auditor change has a coefficient of 0.356 with a significance value of 0.004, while director change has a coefficient of 0.391 with a significance value of 0.002. Both significance values are below 0.05, indicating that the rationalization and capability dimensions remain relevant in explaining indications of financial statement fraud.

The positive direction of the coefficients indicates that companies experiencing auditor change or director change tend to have higher indications of fraudulent financial statements.

Auditor change may serve as a signal of a changing relationship between the company and the external examiner, while director change may indicate changes in key actors who have authority in corporate decision-making. In the context of this study, both changes are associated with an increased indication of financial statement fraud.

The Explanatory Strength of the Fraud Pentagon Model

Simultaneously, the six variables in the model have a significant effect on fraudulent financial statements. The F-value of 11.150 with a significance value of 0.000 indicates that the research model is feasible for explaining variations in financial statement fraud. In addition, the Adjusted R Square value of 0.554 shows that 55.4% of the variation in fraudulent financial statements can be explained by external pressure, financial stability, nature of industry, auditor change, director change, and changes in the number of CEO photographs. The remaining 44.6% is explained by other factors outside the model.

This finding indicates that the Fraud Pentagon still has fairly strong explanatory power, but it operates selectively. The dimensions of pressure, rationalization, and capability are proven to be stronger in explaining fraud indications, while the indicators of opportunity and arrogance are not significant in the context of manufacturing companies listed on the Indonesia Stock Exchange during the 2019–2023 period.

Discussion

The Pressure Dimension as the Main Trigger of Fraudulent Financial Statements

The results show that external pressure and financial stability have a significant effect on fraudulent financial statements. This finding confirms that financial pressure is an important factor in encouraging the risk of financial statement manipulation. When companies face debt pressure, performance demands, or financial instability, management may be encouraged to maintain the company's financial image through the presentation of reports that do not fully reflect the actual condition.

This finding is consistent with Putra and Kusnoegroho (2021), who found that the pressure dimension in the Fraud Pentagon plays a role in detecting financial statement fraud. Haqq and Budiwitjaksono (2019) also showed that Fraud Pentagon indicators, including financial pressure, can be used to detect fraudulence in financial reporting. In the context of this study, these results strengthen the argument that financial pressure remains central in explaining manipulative reporting behavior, especially among manufacturing companies with high operational complexity, inventories, financing needs, and performance demands.

This result is also relevant to ACFE findings that financial statement fraud is a relatively rare type of fraud but has the greatest loss impact. Thus, financial pressure needs to be understood as an important risk indicator for auditors, investors, and regulators. If a company experiences external pressure together with financial instability, supervision and audit procedures need to be directed more sharply toward accounts that are vulnerable to manipulation.

Nevertheless, the findings of this study are not fully identical to all previous studies. Santoso and Marlinah (2024), for example, found that external pressure affects fraudulent financial reporting, while financial stability does not. This difference shows that the sensitivity of fraud indicators is strongly influenced by industry sector, research period, sample characteristics, and the fraud measurement model used. Therefore, the contribution of this study lies in affirming that, in the context of Indonesian manufacturing companies during the 2019–2023 period, two pressure indicators operate simultaneously in explaining indications of financial statement fraud.

Opportunity and Arrogance: A Conceptual Problem or a Proxy Problem?

This study found that nature of industry and changes in the number of CEO photographs do not have a significant effect on fraudulent financial statements. This result indicates that the

indicators used to represent opportunity and arrogance are not strong enough to explain fraud in the research sample. However, this finding should not be directly interpreted as meaning that the opportunity and arrogance dimensions are irrelevant in the Fraud Pentagon. It is possible that the weakness lies not in the concepts themselves, but in the proxies used to represent them.

This reflection is important because nature of industry is commonly measured through changes in receivables or the ratio of receivables to sales. This proxy assumes that receivable accounts create room for estimation and opportunities for manipulation. However, in manufacturing companies, opportunities for manipulation are not always reflected only in receivables. Manipulation may occur in inventories, production costs, fixed assets, impairment, revenue recognition, allowance estimates, or other accounting policies. Thus, the non-significant effect of nature of industry in this study may indicate that the receivables proxy is not sufficiently representative to capture the complexity of opportunity in the manufacturing sector.

A similar issue applies to changes in the number of CEO photographs. The number of CEO photographs in annual reports is often used as a proxy for arrogance because it is assumed to reflect the symbolic dominance of corporate leadership. However, the number of CEO photographs does not always substantively describe managerial arrogance. The appearance of CEO photographs may be influenced by annual report design styles, corporate communication policies, publication needs, or company reporting formats. Therefore, this indicator may reflect the company's visual presentation strategy more than the psychological character or power dominance of the CEO.

This finding differs from Rimadanti et al. (2022), who found that nature of industry and the frequent number of CEO pictures influence financial statement fraud. Haqq and Budiwitjaksono (2019) also included CEO photo frequency as an indicator in fraud detection. However, these different results strengthen the argument that Fraud Pentagon proxies need to be tested contextually. Soltani et al. (2023) emphasize that the literature on financial statement fraud detection still faces fragmentation in methods, indicators, and research contexts. Thus, the non-significant findings for opportunity and arrogance in this study are more appropriately interpreted as a critique of proxy limitations, rather than a complete rejection of the Fraud Pentagon concept.

Rationalization and Capability as Signals of Changes in Key Actors

The results show that auditor change and director change have significant effects on fraudulent financial statements. This finding indicates that changes in key organizational actors can become important signals in fraud detection. Auditor change may be related to changes in external monitoring patterns, changes in the company's relationship with the examiner, or attempts to obtain audit interpretations that are more aligned with management interests. Meanwhile, director change may reflect changes in decision-making structures and the capacity of internal actors to control corporate policies.

From the Fraud Pentagon perspective, auditor change represents rationalization, while director change represents capability. The findings of this study are in line with Farmashinta and Yudowati (2019), who found that change in auditor affects financial statement fraud. However, this finding differs from Santoso and Marlinah (2024), who found that change of auditors and change of directors do not affect fraudulent financial reporting. These differences again confirm that the Fraud Pentagon operates selectively and contextually.

This result shows that fraud does not arise only from pressure, but also requires actors, positions, and the capability to carry out or conceal manipulative actions. Director change may open space for policy changes, internal control changes, or changes in reporting strategies. Meanwhile, auditor change may affect audit continuity and the auditor's understanding of company risk. Therefore, auditors and regulators need to pay attention to changes in auditors and

directors as early signals that require further investigation, especially when such changes occur together with financial pressure.

The Fraud Pentagon Operates Selectively, Not Uniformly

The F-value of 11.150 with a significance value of 0.000 shows that the Fraud Pentagon model simultaneously affects fraudulent financial statements. The Adjusted R Square value of 0.554 indicates that the model is able to explain 55.4% of the variation in fraud. This figure shows fairly strong explanatory power for research based on financial statements, but also indicates that 44.6% of fraud variation is explained by other factors outside the model.

This finding confirms that the Fraud Pentagon remains relevant, but not all of its elements operate with the same strength. In the context of Indonesian manufacturing companies during the 2019–2023 period, the dimensions of pressure, rationalization, and capability are more dominant than opportunity and arrogance. Therefore, the Fraud Pentagon should not be understood as a model in which all dimensions are always significant, but rather as a framework that needs to be tested based on industry context, period, type of data, and the proxies used.

The implication is that future fraud research needs to enrich the model with other variables such as audit quality, audit committee effectiveness, corporate governance, institutional ownership, political connections, capital market pressure, and Fraud Hexagon-based variables. This development is important because the 44.6% variation outside the model indicates that other factors remain unexplained. In addition, recent research has also begun to move toward the use of classification methods and machine learning to detect fraud based on more complex data patterns. However, such approaches still need to be accompanied by theoretical interpretation so that fraud detection is not only statistically accurate, but also meaningful in terms of accounting and governance.

Practical Implications for Auditors, Investors, and Regulators

The findings of this study have practical implications for auditors, investors, and regulators. For auditors, indicators of financial pressure, auditor change, and director change need to receive greater attention during the audit risk assessment stage. Auditors should not only examine surface-level indicators such as CEO image or industry characteristics, but also investigate whether the company is experiencing financing pressure, changes in financial stability, and changes in key actors that may influence reporting.

For investors, the findings provide a signal that the risk of financial statement fraud may increase when a company is under financial pressure and experiences changes in auditors or directors. Therefore, investors need to read financial statements together with annual reports more critically, especially in accounts that are vulnerable to management estimates. For regulators, the findings indicate the need to strengthen supervision of companies experiencing changes in key actors and financial pressure, particularly in the manufacturing sector, which has high complexity in financial reporting.

Research Limitations

This study has several limitations. First, the sample only included 10 companies with 50 observations, so generalization to all Indonesian manufacturing companies needs to be made carefully. Second, this study used only six Fraud Pentagon proxies, so it has not captured other factors that may also influence fraudulent financial statements. Third, the model explains 55.4% of the variation in fraud, meaning that 44.6% of other variation remains outside the model. Fourth, the F-Score Model is an indicative detection tool, not legal evidence of actual fraud. Therefore, the results of this study need to be interpreted as indications of financial statement fraud risk, not as a final conclusion that a company has committed actual fraud.

Nevertheless, this study still provides an empirical contribution by showing that the Fraud Pentagon operates selectively. Pressure, rationalization, and capability are stronger dimensions, while opportunity and arrogance have not been proven significant in the context of Indonesian manufacturing companies during the 2019–2023 period.

Conclusion

This study concludes that the Fraud Pentagon remains relevant for explaining indications of fraudulent financial statements in manufacturing companies listed on the Indonesia Stock Exchange during the 2019–2023 period. However, not all elements of the Fraud Pentagon operate with the same strength. External pressure and financial stability are proven to have significant effects, making the pressure dimension the most dominant factor in explaining the risk of financial statement fraud. In addition, auditor change and director change also have significant effects, indicating that the rationalization and capability dimensions continue to play important roles in detecting indications of financial statement manipulation.

In contrast, nature of industry and changes in the number of CEO photographs do not have significant effects on fraudulent financial statements. This finding shows that the opportunity and arrogance indicators in this study are not strong enough to serve as fraud predictors in the context of Indonesian manufacturing companies. Thus, the results confirm that the Fraud Pentagon operates selectively, being stronger in the dimensions of pressure, rationalization, and capability than in the dimensions of opportunity and arrogance. Simultaneously, the six variables in the model have a significant effect, with an Adjusted R Square value of 55.4%, meaning that the model has fairly strong explanatory power, although 44.6% of fraud variation is still explained by factors outside the model.

Academically, this study contributes by showing that the Fraud Pentagon cannot be understood as a model in which all dimensions always operate uniformly across every sector and period. The findings strengthen the importance of contextual interpretation of fraud proxies, especially because the weak effects of nature of industry and CEO photographs may indicate limitations of the indicators rather than a rejection of the concepts of opportunity and arrogance as a whole. Practically, auditors, investors, and regulators need to pay greater attention to corporate financial pressure, auditor change, and director change as early signals of financial statement fraud risk.

This study has limitations because it used only 10 companies with 50 observations, so the findings cannot yet be widely generalized to all manufacturing companies or other sectors. In addition, fraud measurement using the F-Score Model is indicative and does not constitute legal proof of actual fraud. Future research is recommended to expand the sample size, extend the observation period, compare different industrial sectors, and add other variables such as corporate governance, audit quality, audit committees, political connections, or the Fraud Hexagon approach. The use of panel regression or machine learning-based classification models may also be considered to improve the accuracy of financial statement fraud risk detection.

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Research Ethics Statement

This study was conducted in accordance with the ethical principles of academic research. Since this study used secondary data obtained from publicly available annual reports and financial statements of manufacturing companies listed on the Indonesia Stock Exchange during the 2019–2023 period, it did not involve human participants, interviews, surveys, clinical intervention, experimental treatment, or the collection of personal data. Therefore, formal ethical approval was not required. Nevertheless, the research process was carried out responsibly by maintaining data accuracy, transparency, proper citation of sources, and integrity in data analysis and interpretation. The results of the F-Score analysis were interpreted only as indications of financial statement fraud risk and not as legal evidence of actual fraud.

Author Contributions

Sofia: conceptualization, research design, data collection, preparation of the research dataset, coding of Fraud Pentagon variables, calculation of the F-Score Model, statistical analysis, interpretation of findings, and writing of the original draft.

Andrea Geovani: research methodology, validation of financial and non-financial data, supervision of data analysis, refinement of the theoretical framework, critical review of the manuscript, final editing, and approval of the final version.

All authors have read and approved the final version of the manuscript.

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Conflict of Interest

The authors declare that there is no conflict of interest regarding the research, authorship, and publication of this article.

Artificial Intelligence Use Statement

The authors declare that artificial intelligence, if used, was employed only as a technical support tool for language editing, grammar checking, translation assistance, and improving manuscript readability. All research processes, including research design, data collection, variable coding, F-Score calculation, statistical analysis, interpretation of findings, discussion, arguments, and conclusions, remain the full responsibility of the authors.

Data Availability Statement

The data supporting the findings of this study consist of annual financial statements, annual reports, Fraud Pentagon variable coding sheets, F-Score calculation sheets, multiple regression outputs, and analytical interpretations related to manufacturing companies listed on the Indonesia Stock Exchange during the 2019–2023 period. The primary documents used in this study are publicly available through the Indonesia Stock Exchange and official company disclosure channels. Processed datasets and additional information regarding the analysis may be obtained from the corresponding author upon reasonable request.

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