



Studies on the factors inducing fraudulent behaviors

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Doctoral Dissertation

Studies on the factors inducing fraudulent behaviors

(不正行為を引き起こす要因に関する研究)

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Contents

Chapter 1: Overview of Dissertation	1
Chapter 2: Detecting Financial Statement Fraud in Chinese Listed Companies	4
1. Introduction	5
2. Institutional background	8
3. Literature review on fraud factors	10
3.1 Fraud Triangle	10
3.2 Fraud Diamond	11
3.3 GONE Theory	12
3.4 Theory of Fraud Risk Factors	13
4. Hypothesis development based on 5 fraud factors and manifestations	14
4.1 Five Factors Model for Fraud	14
4.2 The Triangle of Fraud Action	14
4.3 Hypotheses development	15
4.3.1 Motivation/Pressure	15
4.3.2 Opportunity	20
4.3.3 Attitude/Rationalization.....	23
4.3.4 Capability.....	24
4.3.5 Exposure and Punishment	26
4.3.6 Other factors for fraud detection.....	28
5. Methodology	30
5.1 Data and sample selection.....	30
5.2 Analysis model	31
6. Empirical results	31
6.1 Descriptive statistics.....	31
6.2 Univariate logistic regression.....	36
6.3 Multivariate logistic regression	39
6.3.1 Multivariate logistic regressions by each group.....	39
6.3.2 Multivariate logistic regression by all independent variables.....	40
7. Conclusion and discussion	49
Reference	50
Appendix	54
Appendix 1: Variables definition	54
Appendix 2: Correlation Matrix	58

Chapter 3: Explore a new fraud factor beyond the Fraud Triangle	61
—How does capability affect misreporting behaviors?	61
1. Introduction	62
2. Theory and Hypotheses	67
2.1 The Fraud Triangle	67
2.2 Fraud Diamond and Capability	68
2.3 Research questions and hypotheses	69
2.3.1 The effect of Capability on misreporting	69
2.3.2 The associations between Capability, Opportunity and misreporting	69
2.3.3 The effect of capability and actual misreporting on participants' attitude changes	70
3. Research method	72
3.1 Experiments design	73
3.2 Variables and analyses	74
4. Results	77
4.1 Manipulation checks	77
4.2 Descriptive statistics	78
4.3 Results of Hypotheses tests	80
4.4 Additional test and robust check	85
4.4.1 Additional test for Hypothesis 1	85
4.4.2 Additional test for Hypothesis 2	87
5. Discussion and limitation	90
Reference	91
Appendix	93
Appendix 1: Survey	93
Appendix 2: Experiment procedures	96
Appendix 3: Post Questionnaire	97
Appendix 4: Screenshots of slider task	98
Appendix 5: Variables definition	99
Appendix 6: Correlation Matrix of variables in Hypothesis 1	101
Chapter 4: A meta-analysis of the corporate fraud factors	102
1. Introduction	103
2. Overview of fraud research	104
3. Methodology	106
3.1 Meta-analysis technique	106
3.2 Criteria for inclusion and exclusion	106
3.3 Search strategy	107

3.4 Variables data collection and meta-analysis techniques	118
4. Results.....	119
4.1 Financial variables at firm-level	122
4.2 Non-financial variables at firm-level.....	124
4.3 Non-financial variables at individual-level.....	125
4.4 Non-financial variables at external level.....	125
5. Conclusion and discussion	127
Reference.....	129
Appendix.....	135
Chapter 5: Conclusion of Dissertation.....	138

Chapter 1: Overview of Dissertation

This dissertation digs into the factors that may lead to fraudulent behaviors. Drawing from existing fraud theories, this research develops a new theoretical framework called the “Five Factors Model for Fraud”. This model encompasses Motivation, Opportunity, Rationalization, Capability, and Exposure and Punishment. The foundational theory is the Fraud Triangle, a widely recognized and extensively utilized theory in fraud research. After reviewing the Fraud Diamond, the GONE theory, and the Theory of Fraud Risk Factors, two additional factors – Capability, and Exposure and Punishment – were integrated into this new theory.¹

To assess the validity and applicability of this fraud factors theory, an empirical study was conducted on the Chinese stock market. The objective was to examine all five factors for their effectiveness in detecting financial statement fraud. The results of the empirical study identified significant proxy variables related to financial statement fraud within each dimension, providing partial confirmation of the theory’s utility. The final model incorporates seven variables, revealing that corporate financial statement fraud is significantly associated with factors such as overvalued stock price, increased media attention, greater debt levels, more frequent board meetings, lower dividend yields, less concentrated shares, and younger executives. While these findings demonstrate the utility of the Five Factors Model for Fraud in capturing a more comprehensive view of fraud, the results related to Capability and Exposure were contrary to the hypotheses. Given the challenges of incorporating individual variables like Capability at the firm level, a subsequent experimental study was designed.

The experimental study aimed to clarify the influence of an individual factor (i.e., Capability) on fraudulent behavior. To mirror financial statement fraud in corporations, participants in the experiment were tasked with reporting their performance. Misreporting was considered indicative of fraudulent behavior. Participants were asked to complete a slider task, report their performance, and be informed that their payment would depend on their reporting during the reporting process. Capability was directly assigned to participants who performed well in the experiment. The findings indicated a positive and direct effect of Capability on misreporting behaviors, although not overwhelmingly robust, providing the possibility that Capability can lead to fraud. Other findings suggest that individuals with assigned Capability perceive greater opportunities for misreporting and feel less guilt about such behaviors, implying that Capability can lead to higher perceived opportunity and more unethical attitudes afterwards. These findings reveal that the

¹ However, in this dissertation, while both Exposure and Punishment are considered as factors reflecting the bad consequences of fraud, the research results are limited to only the Exposure factors. Therefore, the discussion of the research findings herein is confined to Exposure factors.

Capability can not only directly impact misreporting decisions, but also influence other Fraud Triangle factors, and consequently, lead to fraudulent activities.

The third research is a comprehensive review of previous studies results, utilizing the meta-analysis technique. A significant unresolved question at the firm level is determining which variables are significantly related to fraud. Numerous fraud studies involve the same variable but yield divergent results, such as in the case of ROA (as seen in Lennox et al., 2013, and Troy et al., 2011). Consequently, a primary research interest of this meta-analysis is to synthesize a combined result that clarifies the significance and direction of frequently used variables. Besides, another research interest is to assess whether the meta-analysis results align with the five fraud factors.

The findings reveal discrepancies between the simple average results and the weighted average results. Given the influence of sample size, the weighted results are deemed more robust. In the weighted calculations, variables that can be classified as “Motivation” factors indicate that fraud firms are more likely to be in a poor financial condition, experience higher returns volatility, engage in M&A activities, be overvalued in market value, and carry more debt. Firms exhibiting fewer fraudulent activities tend to have a higher proportion of outside directors, more board meetings, more concentrated share ownership, and are state-owned enterprises, all of which relate more closely to “Opportunity”. Additionally, firms subject to greater analyst scrutiny are less likely to engage in fraud. This variable is considered indicative of “Exposure”, suggesting that the number of analysts may be a better proxy for measuring exposure in the context of fraud. These results indicate that the applicability of the Five Factors for Fraud theory, but also reveal that it is hard to incorporate individual factors such as Attitude and Capability into a firm-level study. This study underscores the necessity of employing diverse approaches to examine the impact of Attitude and Capability, and therefore reinforce the research significance of the experimental study.

To sum up, this dissertation employs three distinct research methodologies to evaluate the validity of the fraud factors theory. The cumulative results indicate that these five factors for fraud are generally applicable and offer a broader scope for exploring potential fraud factors. However, the incorporation of the two newer factors, Capability and Exposure, poses challenges in terms of direct observation and integration into the model. Therefore, alternative methodologies are necessary. The findings regarding Capability suggest that it can increase the probability of unethical behaviors to some extent, and indeed heighten participants’ perceived opportunity for fraudulent behavior and lead to more unethical attitudes. As for Exposure, the number of analysts following a firm is posited as a suitable proxy variable. This choice is based on the premise that increased analyst scrutiny can effectively represent the “Exposure” dimension, thereby validating its relevance as a factor in fraud dynamics to a certain degree.

The structure of the dissertation is organized as follows: Chapter 2 presents an empirical study that applies the Five Factors for Fraud theory to develop independent variables and examine fraudulent firms in China. Chapter 3 conducts an experimental study mainly focusing on the influence of Capability on misreporting behaviors. Chapter 4 is the meta-analysis on fraud factors and provide more comprehensive results. Chapter 5 concludes this dissertation.

Chapter 2: Detecting Financial Statement Fraud in Chinese Listed Companies

Abstract: Previous studies focusing on building fraud detection models to differentiate between fraudulent and non-fraudulent firms generally lack a theoretical framework that can comprehensively capture the dimensions of fraud. Furthermore, although the use of non-financial measures in fraud detection has been discussed a lot, they have not been included in a detecting model yet. To compensate for these two research gaps, this study develops a new theoretical framework to identify fraud factors more comprehensively, introducing non-financial measures as predictors of fraud. I summarize four previous theories on fraud factors and extract five significant factors that can explain why fraud occurs inclusively; these are Motivation/ Pressure, Opportunity, Attitude/Rationalization, Capability, and Exposure and Punishment. Then, considering that both, the causes and external evidence of fraud are indispensable in the fraud detection process, I generate predictors of fraud concerning two aspects: factors responsible for fraud, and manifestations of fraud. My sample contains 890 Chinese listed firms, that were sanctioned by Chinese regulators between 2007 and 2016. One control sample is matched for each fraud sample. In the final results, three financial and four non-financial ratios are found to be significantly associated with financial statement fraud. To conclude, fraudulent firms are inclined to be overvalued in their stock price. They tend to hold more board meetings and their ownership of equities is more dispersed. They are more likely to be reported by the media, and their executives are inclined to be younger. These results shed light on the usage of non-financial measures and provide new empirical evidence for developing fraud detection measures, demonstrating the usability of the theoretical framework.

Keywords: Fraud Factors, Fraud Detection, Fraud Theory, Non-Financial Measures

1. Introduction

Corporate fraud not only exerts a significant negative impact on its shareholders, but can also impact the whole society adversely. For example, the firms responsible for fraudulent actions will be fined heavily by regulators and will need to bear litigation costs if they are sued by investors (Zeidan, 2013). Besides, the public announcement of fraud cases can result in a negative and remarkable market reaction, due to which investors will suffer financial losses due to a fall in stock price (Wang et al., 2019). Company employees involved in fraud are likely to be terminated from work and may have difficulty finding employment in the future, and could even be incarcerated (Karpoff et al., 2008). If the fraudulent company goes bankrupt, its employees will lose their jobs and creditors will face problems in recovering their money. The negative impact will spill over to non-investors. The tax revenue of the local government where the company is located will also decrease because of its bankruptcy. Regulators may need to formulate new regulations to ensure the smooth operation of the capital market, resulting in another cost (Zehra et al., 2005).

To avoid the above-mentioned disadvantages of fraud, much research has been dedicated to financial fraud detection techniques. Investors can make appropriate investment decisions by avoiding high-risk investments if there is a reliable detecting model (Dechow et al., 2011). Regulators can use the detecting model to appropriately allocate regulatory resources to companies with high fraud possibilities to protect investors better (Dechow et al., 2011; Dong et al., 2018). Timely and accurate detection can increase transparency in the stock market and attract new investors, which can, in turn, attract new entrepreneurs, thereby promoting the growth of the economy. In order for accurate detection, it is important to effectively predict fraud. This study aims to explore usable measures for fraud detection, thereby enhancing the detecting ability.

This study focuses on companies listed in China. As a huge emerging economy, China is receiving great attention from both, practitioners and researchers (Cumming et al., 2016). With a different political system from the mainstream capitalistic developed countries such as America and Japan, China is of great interest for research, especially to determine whether the findings are different from those of developed countries. Another advantage of choosing companies listed in China for research is the relatively higher occurrence of fraud in China's stock market. According to Perols et al. (2017), one of the challenges in fraud detection research is the lack of fraud observations. This results in two problems: First, a lack of fraud observations and a considerable number of non-fraud observations

can result in false negative rates. Second, the “data dimensionality problem,” that is, small numbers of observations but a large number of independent variables, can result in over-fitting, leading to an ineffective detecting model. Due to the relatively higher occurrence of fraud, China can provide more observations, thereby being suitable for this research topic.

The representative previous studies of fraud detection are M-score and F-score, developed by Beneish (1999), and Dechow et al. (2011), respectively. M-score contains eight financial variables and is known for predicting the accounting manipulation of Enron. Dechow et al. (2011) constructed F-score with seven financial variables with an approximately 67% accuracy rate of detection. Although Dechow et al. (2011) attempted to use non-financial information during the model building process, they were not included in the final model. In China, the representative study on fraud detection is C-score by Qian et al. (2015). C-score has been constructed specifically for China’s stock market, and includes nine variables related to financial performance and the stock market. C-score has a prediction accuracy of over 70%, and according to Qian et al. (2015), is more suitable for China’s stock market than M-score and F-score.

The first issue in prior research is that almost all the representative studies include only variables related to the financial situation and neglect the use of non-financial variables. However, certain non-financial variables have been confirmed to have a significant correlation with fraud (Brazel et al., 2009; Chen et al., 2006). Secondly, a theoretical framework for the development of fraud predictors is also generally lacking. Researchers mostly like to use Fraud Triangle as the basic theory, and some of them omit to mention the logical theory of their variable development. Therefore, this study will attach importance to both, the use of non-financial measures, and the theoretical property of developing fraud predictors.

This study examines the characteristics of fraud listed companies in China by generating measures from two aspects: the causes of fraud and the manifestation of fraud, with the aim of identifying effective variables to detect financial statement fraud in China. First, to build the theoretical framework for fraud factors, I summarize four previous theories on factors responsible for fraud, and extract five significant points from them: Motivation/Pressure, Opportunity, Attitude/Rationalization, Capability, and Exposure and Punishment. Compared to other theories, these five fraud factors are considered to capture both, the benefits and costs of fraud, thus it can explain why fraud occurs more inclusively. Additionally, besides these factors, considering the necessity of external evidence in the detecting process, variables of fraud manifestations that are suggested as useful in fraud

detection by previous studies, are included in the model to enhance its logicity and detecting ability. Thus, all the variables are developed based on above-mentioned five fraud factors and external manifestations. I selected 890 fraud Chinese listed companies as the sample and matched one control sample for each of them by year, industry, and size. I ran univariate logistic regressions for each measure and multivariate regressions for each group and all the measures.

The univariate results show that all six dimensions (five factors and manifestation) are confirmed as related to the occurrence of fraud, suggesting the usefulness of the theoretical framework proposed by this study. The results of multivariate regressions by groups are similar to the univariate results. Finally, I conducted a multivariate regression for all the variables and used backward elimination to exclude ineffective variables. After that, I re-added the eliminated variables into the model to confirm if there are any variables that can still be used. Four out of seven final variables are nonfinancial measures, confirming their usability in the fraud detecting field. According to the final results, fraudulent firms are more likely to be overvalued in their stock price and their executives are overconfident. Their board meetings are more frequent and the ownership of equities is more decentralized. They are more likely to be exposed to the media and they have younger executives.

This study has the following two major contributions. First, it develops a theoretical framework on the factors contributing to fraud, containing both the advantages and disadvantages of fraud that the potential fraudster will consider, thus trying to include fraud factors more comprehensively. Fraud predictors are developed based on these five factors and the manifestation of fraud, which are expected to capture the real condition of fraud firms. Second, non-financial measures are introduced into this model, and have been proved useful in distinguishing fraudulent and non-fraudulent firms. The final results can be a reference for practitioners and policymakers. They can focus on these significant measures, such as overvaluation in stock price and dividend policy, as red flags of fraud.

The remainder of the paper is organized as follows. The next section introduces the institutional background. Section 3 reviews the previous studies on fraud factors. Section 4 develops the Five Factors Model for Fraud and introduces the Triangle of Fraud Action. Then hypotheses are developed based on the five fraud factors and manifestations. Section 5 explains the data and sample selection. Section 6 presents the empirical results and Section 7 provides the conclusion, discussing the limitations as well.

2. Institutional background

China's stock market began in 1990, with more than 4,000 companies listed currently. The categories of stock in China's stock market are generally divided into A-share and B-share. A-shares are stocks that are denominated and traded in CNY (i.e., Chinese yuan), mainly for the investors in mainland China. B-shares are stocks denominated in CNY but traded in foreign currency, so they are mainly for foreign investors. It is noteworthy that a single firm can simultaneously be listed in both the A-share and B-share markets. There are two stock exchanges in mainland China: the Shanghai Stock Exchange (hereafter SSE) and the Shenzhen Stock Exchange (hereafter SZSE). The regulatory institution in China is the China Securities Regulatory Commission (CSRC), which is a government ministry that set regulations and sanction fraud firms. The current Generally Accepted Accounting Principle (i.e., GAAP) in China is the Accounting Standard for Business Enterprises that came into effect in January 2007 and was once amended in 2014. The current Generally Accepted Auditing Standards (i.e., GAAS) is called National Auditing Standards of the People's Republic of China that became effective in January 2011. Zhang &Ye (2020) investigated the level of China's convergence of accounting standards towards International Financial Reporting Standards (IFRS). They analyzed the disclosure differences between IFRS and CAS (i.e., Chinese Accounting Standards) reported by dual-listed firms that have to disclose both following IFRS and CAS from 2006 to 2017. Their results show that the disclosure difference is decreasing, which indicates CAS and IFRS are gradually and substantially converged.

To determine the financial fraud situation in China, I collected companies that had committed financial fraud between 2007 and 2016 and roughly calculated the probability of fraud. All the data are from CSMAR (China Stock Market & Accounting Research Database). CSMAR is one of the most widely-used and research-oriented databases focusing on China's finance and economy. There were 950 fraud firms and 2,547 firm-year observations after collection. The 2,547 fraud observations are grouped into 2,524 A share observations and 23 B share observations. The number of the whole A share observations I get from CSMAR from 2007 to 2016 is 22,921. The number of the whole B share observations in the same period is 1,070. After calculation, the fraud probabilities in the A-share market and B-share market are 11.01% and 2.15%.² Considering some fraud firms

² Using data from CSMAR, the probability of fraud in the A-share market is calculated to be 11.01% (2524/22921), while in the B-share market it is 2.15% (23/1070). It is important to note that as a single firm can be listed concurrently in both A-shares and B-shares markets, there may be overlapping data in this calculation.

may not have been found to be fraudulent, the real occurrence rate of fraud can be even higher than these figures. However, if I assume that this figure indicates the incidence of fraudulent activities, then the fraud probabilities in both the A-share market and B-share market far exceed the medium level of 0.6% stated by Perols (2011). Perols (2011) examined the characteristics of the US listed companies and take the companies investigated by the SEC for fraudulent reporting from 1998 to 2005 as fraud firms. He added the additional fraud firms designated by Beasley (1996) and combined them with firms reported by SEC as the fraud sample. He finally obtained 51 usable fraud observations and 15,934 non-fraud observations, which suggests that the probability of fraud in the US is approximately 0.3%.

There are two possible reasons for high fraud occurrence in China. The current laws and regulations in China are not well developed, and the punishments for fraud are not very stringent (Wang et al., 2017; Zhou et al., 2018). The first one can be attributed to China's unique regulations called ST and *ST, which represents the performance standards for listed companies.

ST stands for special treatment. The listed companies will be marked as ST under serious situations, such as their production activities and operating activities being seriously affected or their main bank accounts being frozen, which indicates the existence of investment risk for investors. *ST is a worse warning than the ST, which suggests that the *ST stocks face the possibility of delisting. Both SSE and SZSE set several rules related to corporate performance. For example, if the net profit of the last two fiscal years has been negative continuously, or the ending net assets of the latest fiscal year are negative, the firms will be marked as *ST. If the losses continue, the company will be suspended for 3 consecutive years of losses and delisted for 4 consecutive years of losses. Compare to Japan, there are no performance requirements for delisting.³ The regulations in China are much stricter than those in Japan and increase the possibility of myopic or even fraudulent behaviors of managers whose companies are in bad financial condition.

The other reason for the high probability of fraud is that the penalties for financial fraud in China are very light, with the maximum penalty being CNY 600,000 before 2020 and being raised to CNY 5 million (about \$780,000) after 2020. This seems very light compared to the penalties imposed by the SEC in the US. Luckin Coffee, a Chinese coffee chain company listed in NASDAQ, was fined \$180 million for falsifying sales. This figure is

³ According to the Japan Exchange Group, the criteria for delisting encompass various factors. These include the number of shareholders, the quantity of outstanding stocks, trading volume, total market value, and net assets. Notably, these standards do not encompass any performance-related requirements.

more than 230 times the maximum fine imposed by the CSRC. Lenient sanctions are less likely to motivate obedience to regulations, and less effective to prevent financial fraud (Wang et al., 2017). Wang et al. (2019) compared the enforcement actions among the regulatory authorities in China, the US, and the UK. They emphasized that, compared with regulators in the US and the UK, which can raise civil actions against fraudsters, relying more on monetary punishments, regulators in China are not able to take civil actions with reliance on nonmonetary sanctions. Additionally, firms that have committed fraud will not be delisted directly because the laws are unclear about whether the fraudulent act of the company is severe enough to result in delisting (Zhou et al., 2018). Therefore, in terms of the institutional context, companies in China are still in a relatively loose environment, which may trigger fraudulent behaviors more easily.

However, on December 31 in 2020, the SSE and SZSE released new regulations on delisting. They clearly specified that companies with 2 consecutive years of financial fraud, whose falsely stated amount in revenue, net profit, total profits, or balance sheet exceed 500 million CNY, and the falsely stated amount accounts for more than 50% of the total amount in the two consecutive years, will be delisted. It can be seen in this new regulation, they set 3 conditions for delisting. One is that the fraud period needs to be more than two consecutive years. The second condition is the amount needs to exceed 500 million CNY. Third, the percentage of fraud amount needs to exceed 50% of the total amount in two years. Compare to the maximum amount of penalty (i.e., 5 million CNY), the threshold value for delisting is 500 million CNY, which is 100 times greater than the penalty. Even with the release of new regulations, the risk and benefit of financial fraud in the Chinese stock market may remain to be unbalanced. Therefore, in terms of the institutional context, companies in China are still in a relatively loose environment.

3. Literature review on fraud factors

This study compares the detection process of financial fraud to the reasoning process of crime and establishes useable variables for detecting financial statement fraud from two aspects: the causes of fraud and the external manifestations of fraud.

3.1 Fraud Triangle

The most well-known theory on fraud factors is the Fraud Triangle theory. Proposed by the American criminologist Donald R. Cressey (1953), it considers Motivation/Pressure, Opportunity, and Attitude/Rationalization as the three fraud factors. Motivation/Pressure refers to the financial strain that cannot be shared with others (Dorminey et al., 2010, 2012),

for example, sudden financial requirements, exorbitant medical bills etc. Furthermore, people with strong egos or pride are reluctant to ask for help or share their problems with others, therefore they have to bear the financial pressure themselves. Opportunity is the feasibility of perpetrating fraud. Weak internal controls or an unethical working environment can make potential fraudsters to be aware of opportunities for fraud, thereby facilitating its implementation. Finally, fraudsters will feel that their behaviors are unethical and even illegal; therefore, they try to avoid the feeling of “I did something wrong,” and seek reasons to rationalize their misconduct. The joint effect of these three factors causes fraudulent activity. If a person finds out that he can make use of the opportunity to solve his significant financial problem by fraud, and he can find reasons to persuade himself to do so, this person is likely to commit fraud. This is the most accepted theory that explains why fraud occurs.

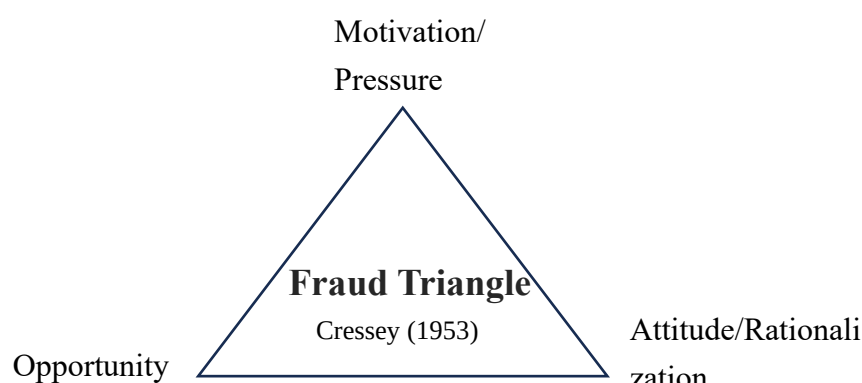


Figure 1: Fraud Triangle

3.2 Fraud Diamond

The second theory on fraud factors is called Fraud Diamond, put forward by Wolfe and Hermanson (2004). This theory consists of four factors: Pressure, Opportunity, Rationalization, and Capability. The new factor, capability, implies the ability to identify feasible opportunities for fraud and execute it. Wolfe and Hermanson (2004) believe that fraud cannot be accomplished if there is only opportunity but not enough capability. For example, if the CEO intends to take advantage of the internal control weakness that allows for the contract date to be changed artificially, they can force the CFO and sales manager to change the contract date for the sales revenue to be confirmed earlier. However, if the CEO does not have the ability to identify this weakness, or if this weakness is identified not by the CEO, but some other employee, then even though the opportunity exists, the

fraudulent activity cannot be realized due to the lack of capability. This is why capability is necessary as a fraud factor.

In addition to compensating for the theoretical deficiency of the Fraud Triangle, the Fraud Diamond also improves research convenience by adding capability as a new factor. Personal financial pressure and the excuses used by fraudsters to rationalize are, in fact, unobservable. The newly added factor, capability, is relatively observable, which complements the shortcomings of the Fraud Triangle (Dorminey et al., 2010). For example, measures such as educational background, tenure, and position, which represent the capability of the fraudster, can be observed and measured more easily.

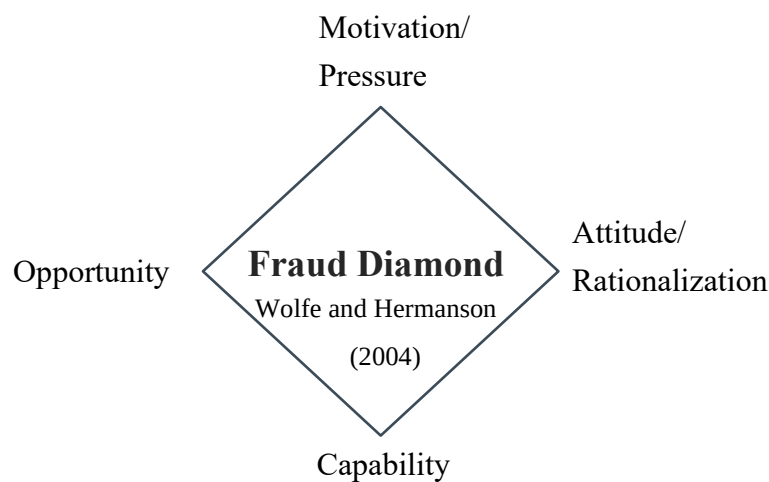


Figure 2: Fraud Diamond

3.3 GONE Theory

Bologna et al. (1993) proposed another four-factor theory called the GONE theory. The GONE theory on fraud includes the factors of Greed, Opportunity, Need, and Exposure. These four factors interact with each other and lead to fraud. Need and Greed are similar to the factors of Pressure and Rationalization in the Fraud Triangle. Greed is the inner thought of a person, influencing his attitude and helping him rationalize his wrong behavior. The financial pressure in Fraud Triangle equates to the need for money in GONE Theory. In other words, the GONE theory can be understood as Fraud Triangle with a new factor of exposure, which represents the possibility of being exposed in the future and shows the potential cost of fraud, but has been neglected by the Fraud Triangle.

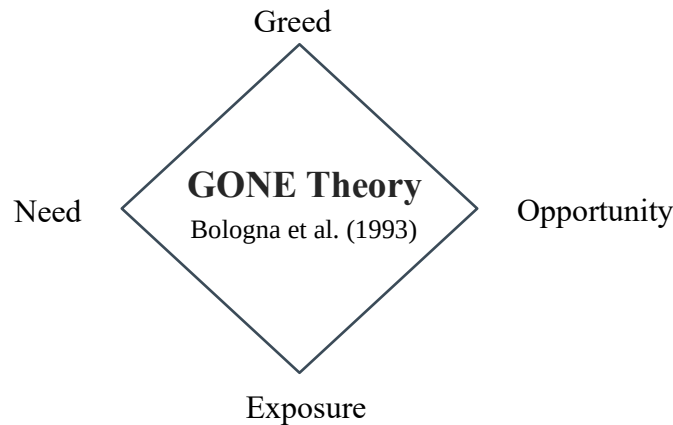


Figure 3: GONE Theory

3.4 Theory of Fraud Risk Factors

Bologna and Lindquist (1995) developed a more comprehensive fraud factor theory, based on the GONE theory, called the Theory of Fraud Risk Factors. They divided the fraud risk factors into personal and general factors. Personal factors refer to morality and motivation, which are controlled by an individual. Personal morality represents the moral level of an individual, similar to the rationalization in the Fraud Triangle. General factors refer to the opportunity for fraud, the probability of getting caught, and the nature and severity of punishment, if discovered. These factors are controlled by the organization or regulators. It can be considered that the Theory of Fraud Risk Factors adds the factors of exposure and punishment to the Fraud Triangle, which represent the negative effects of fraud for fraudsters. Potential fraudsters not only consider what they can gain from fraud but also think about what they may lose due to it. The trade-off between gain and loss is necessary for their decision-making process.

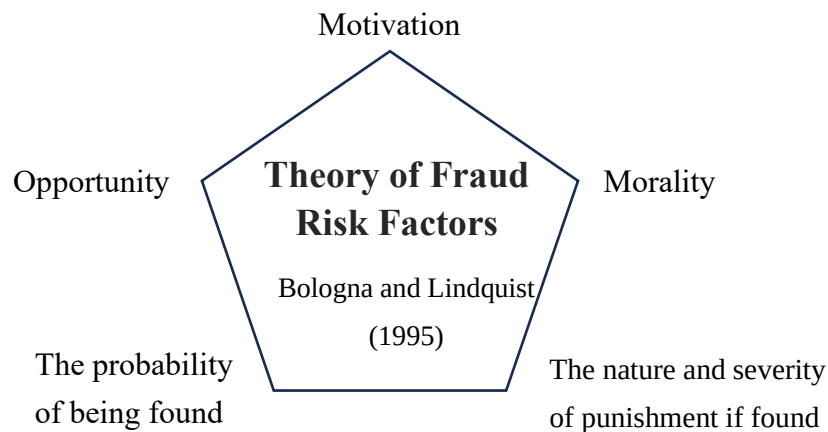


Figure 4: Theory of Fraud Risk Factors

4. Hypothesis development based on 5 fraud factors and manifestations

4.1 Five Factors Model for Fraud

Reflecting on the above four theories, it can be considered that the Fraud Triangle states three basic fraud factors, whereas the other three theories supplement it, attempting to compensate for its incompleteness from different perspectives. In this study, I keep the three classical factors from the Fraud Triangle theory as the basic elements. Considering its necessity as a fraud factor, I add “Capability” to the detecting model. Additionally, the four factors above consider only the benefits of fraud but ignore the disadvantages and losses of fraud; thus, I add “Exposure and Punishment” as the fifth factor to reflect the potential bad consequence of fraud, and present the entire decision-making process of fraudsters. Consequently, the following five factors: Motivation/Pressure, Opportunity, Attitude/Rationalization, Capability, and Exposure and Punishment, are regarded as the necessary fraud factors for constructing a fraud detection model.

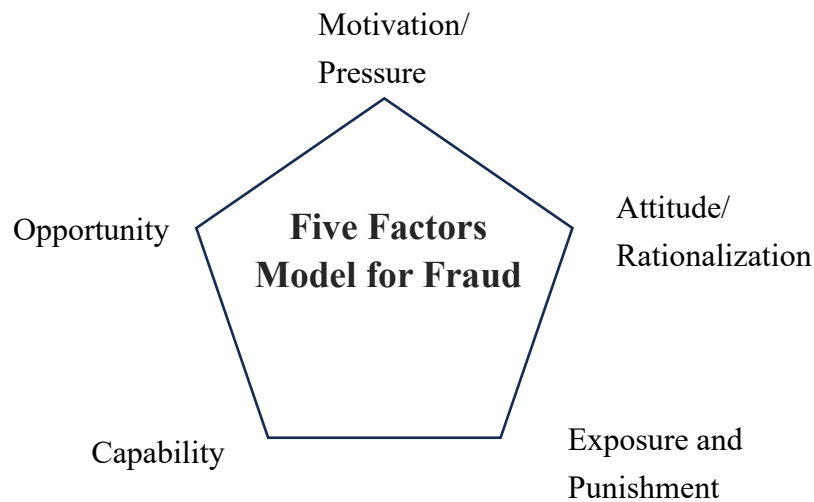


Figure 5: Five Factors Model for Fraud

4.2 The Triangle of Fraud Action

However, it is not enough to detect fraud by only theoretically considering the causes of fraud. The external manifestations, implying the "evidence" of fraudulent behaviors, also

need to be considered. If evidence of a crime is lacking, it is difficult to convict the criminal by only considering their motives in the process of solving a criminal case. Then, how do we find the observable manifestations of fraud? Dorminey et al. (2012) constructed a new triangle of observable fraud behavior called the Triangle of Fraud Action, consisting of three elements: the act, conversion, and concealment. The act is the method of committing fraud, such as misappropriation of assets or misrepresentation of financial reports. Concealment is the effort to hide fraudulent acts, for example, by destroying files. Conversion is the act of changing illegal benefits into legitimate ones, for example, by money laundering. In this study, considering the research convenience, I locate variables about the external manifestations of fraud directly from prior studies, and add them as additional variables to the model.

4.3 Hypotheses development

Five factors for fraud are expected to explain the causes of fraud inclusively, and in turn, detect fraud more effectively. I consider measures from multiple aspects based on five factors and, as some of them are difficult to observe, I try to find proxy variables to reflect them. A comprehensive fraud detecting model with effective measures is supposed to be developed in this way.

4.3.1 Motivation/Pressure

The motivation/pressure in Fraud Triangle was considered to be financial pressure that cannot be shared with others when the Fraud Triangle was first raised (Dorminey et al., 2010). This assumption is consistent with the assumption of the economic man in economics. An economic man always acts based on economic rationality (i.e., maximization of economic utility). Based on this assumption, the fraudster commits fraud to maximize his economic utility, specifically to gain economic benefits or to avoid economic losses.

First, I consider economic motivations for fraud. The economic motivations can be linked to the financial condition of the company or the individual. The unexpectedly expensive medical bills, huge losses from gambling, or huge costs of drugs can be examples of un-shareable financial pressure for individuals (Dorminey et al., 2010). However, it is very difficult to obtain information about the personal financial situation of the managers, so in this research, only the variables related to the firm's financial situation are taken into account.

Stock overvaluation

Burns et al. (2006) and Efendi et al. (2007) have suggested that managers are inclined to maximize their interests through accounting manipulations. Efendi et al. (2007) examined whether the managers will make misstatements in order to maintain the overvalued stock prices. Compared to the external investors, the CEO has the information advantage and knows when the stock is overvalued. Therefore, he can make use of this information for his personal interest. Efendi et al. (2007) selected 95 firms that restated their quarterly or annual financial statements from January 2001 to June 2002 as the fraud sample. Their results showed that the market-to-book ratio and the market-adjusted annual return of fraudulent firms before the first fraudulent year are significantly higher than control firms. In addition, the percentage of in-the-money stock options in CEO compensation from fraud firms before the misstatement and after the restatement announcement changed sharply. Before the misstatement, the average percentage of in-the-money stock options in CEO compensation of the material accounting fraud firms was 99.3%, and after the restatement announcement, the percentage decreased to 24.1%. The percentage of control firms did not change much. It is clear that the stock price of the fraudulent company was overvalued.

Therefore, I consider the degree of stock overvaluation as the possible predictor for financial fraud. I select 3 financial ratios related to the market to be the proxy variables for stock overvaluation to investigate whether the stock overvaluation can be correlated to fraud. I assume that the degree of stock overvaluation in fraud firms is higher than control firms.

Hypothesis 1.1: The stock price of fraud firms is more likely to be overvalued than control firms.

Hypothesis 1.2: The Price-to-Book ratio is more likely to be higher in fraud firms than in control firms.

Hypothesis 1.3: The Price-to-Earnings ratio is more likely to be higher in fraud firms than in control firms.

Hypothesis 1.4: The Market-to-Sales ratio is more likely to be higher in fraud firms than in control firms.

The need of financing

Companies are motivated to window-dress their performance to meet the expectations of external investors. Therefore, the new equity issuance can be related to corporate fraud. Dechow et al. (2011) proved that the actual issuance of securities in fraud years is positively and significantly associated with fraud. However, considering the time lag, companies that have financing needs usually prepare for that in advance; thus, in this study, I choose the

ratio of Tobin-Q to analyze whether the company has the need for financing in the future. If so, they are more likely to manipulate their financial statements to raise financing. Tobin-Q equals the market value of the firm divided by its book value. The greater the Q value, the higher the market valuation, which means that the market expects the company to be greater than its current size. In conclusion, there is a need for the company to gain financial support to increase its investment.

Hypothesis 2: The Tobin-Q ratio is more likely to be higher in fraud firms than in control firms.

Consecutive losses

Besides the increase of financial interest, another motivation for fraudsters is to avoid potential loss. Concerning the loss avoidance, the consecutive losses before the first fraud year can be considered as a significant bad signal and it is possible to cause fraud. Similarly, the need of avoiding violating the financial covenant, pressure from institutional investors and analysts, and relative performance can also bring a lot of pressure to managers (Efendi et al., 2007; Shi et al., 2017; Fung, 2015).

There is a unique system in China's stock market called Special Treatment (i.e., ST or *ST). As mentioned above, the company will be marked with ST if its bank account is frozen or its board meeting cannot be held normally, or other circumstances which should be marked as ST identified by the stock exchange or CSRC. ST indicates the existence of investment risk. Once a company was marked as ST, the daily rising and falling level of its stock price will be limited to 5%. The stock exchange in China (i.e., SSE and SZSE) also set another system called *ST. *ST means delisting risk warning, indicating that the *ST stocks face the possibility of delisting. The daily rising and falling level of *ST stock price will also be limited to 5%. *ST is related to the relatively poor financial condition of the company. Company with negative net assets or operating revenue less than 10 million CNY, or 2 fiscal years consecutive loss will be marked as *ST.

Being marked as ST or *ST can be huge pressure for companies listed on SSE and SZSE. They want this warning to be revoked because if not, they may face the consequences of suspending or even delisting. For example, the company will be identified as *ST if its net profit has been negative for continuous 2 fiscal years, and will be suspended for continuous 3 years and delisted for continuous 4 years. The strict conditions might cause myopic or even fraudulent behaviors.

Zhou et al. (2018) investigate the impact of delisting pressure on corporate fraud in China. They assumed that fraud companies were facing higher delisting pressure due to their poor performance. The unique delisting system in China is the reason for this assumption. In

terms of the number of delisting firms, there were only 83 delisting firms from 2001 to 2015 in the A-share market. 54 of them were delisted due to consecutive losses. The rest were due to M&As or voluntary delisting. Therefore, it can be seen that the majority of the companies delisted because of poor financial performance. On the other hand, as mentioned above, the punishment for fraudulent companies in China is very light. Until 2020, fraudulent companies will not be directly delisted for fraud. Although the Securities Law requires that companies with serious violations should be suspended or delisted, it did not provide a clear measure. That can explain why most of the companies delisted before 2015 are due to financial performance.

Zhou et al. (2018) collect data from 2007 to 2014 and use all the A-share companies as the observations. The fraud firms are the violating firms designated by CSRC. They use a dummy variable showing whether a company suffers loss in the previous two years or not to represent the pressure. Their results show that the pressure dummy variable is positively related to fraud at the 1% level. This result supports that delisting pressure based on the ST system motivates the occurrence of fraud.

Accordingly, I choose whether the company has a 2-year consecutive loss before its first fraud as the proxy variable of the possibility of being delisted. If the company has a 2-year continuous loss before fraud, it is exposed to the risk the delisting and is more likely to window-dress its financial condition.

Hypothesis 3: The fraud firms are more likely to have experienced a two-year consecutive loss before the first fraud year, than control firms.

Fixed coverage

The creditors usually set financial covenants to protect their interests. Financial covenants generally contain financial ratios that the companies need to comply with. Efendi et al. (2007) found that firms constrained by the debt covenant are more likely to commit fraud. They tested 2 types of debt covenants. One is the ratio of long-term debt to assets, which is called leverage and is related to the balance sheet. The other one is the ratio of interest to income, which is called interest coverage and is related to the income statement. The results showed that interest coverage is positively and significantly correlated to fraud. The debt-to-assets ratio is also positively related to fraud but not significant. This suggests that covenants can be the predictor of fraud.

In this research, I select fixed charge coverage as the proxy variable. The fixed charge coverage ratio represents how many times does a company's profit equals the fixed costs each period, which shows the company's profitability and solvency. If the firm's fixed cost

is hard to be covered by its profit, it may indicate that its default risk is high. In this situation, the company is more likely to over-value its earnings.

Hypothesis 4: The fixed charge coverage is more likely to be lower in fraud firms, than in control firms.

HHI index

Zahra et al. (2005) pointed out that the external pressure from the intense competition will influence the fraudulent intentions of firms. The fiercer the industry's competition is, the greater the pressure of firms and the stronger their fraudulent intentions will be. Fung (2015) suggested that the reference gains and reference losses of companies will change the managers' propensity for misconduct. In this research, I choose the Herfindahl-Hirschman Index (HHI index) to show market competitiveness. A greater HHI index means the market is highly concentrated, indicating the competitiveness is relatively lower.

Hypothesis 5: The HHI index of the fraud company's industry is more likely to be lower than that of the control sample.

Debt to equity ratio and dividend policy

In addition to economic motivations, non-economic motivations also should be taken into account. Non-economic motivations are mainly associated with managers' overconfidence. When the managers are overconfident about their operating ability or the company's prospect, they are more likely to take aggressive measures. Once the performance target cannot be realized, they are inclined to use fraudulent ways to keep the trend.

This overconfidence can be assessed by the firm-level investing and financing activities. According to Schrand and Zechman (2012), the debt-to-equity ratio and the dividend policy can be regarded as proxy measures of managerial overconfidence. A greater debt to equity ratio indicates the overconfidence of the managers, because overconfidence will cause an optimistic assessment of the investment payoffs and as a result, the managers will prefer debt financing. In order to preserve cash for desirable investment, overconfident executives are less likely to pay dividends. Schrand and Zechman (2012) suggested that firms with zero dividend yield are more likely to have overconfident managers.

Hypothesis 6.1: The executives are more likely to be overconfident in fraud firms than in control firms.

Hypothesis 6.2: The debt-to-equity ratio is more likely to be higher in fraud firms than in control firms.

Hypothesis 6.3: The dividend yield is more likely to be lower in fraud firms than in control firms.

4.3.2 Opportunity

Opportunity refers to the opportunity to realize fraud. There are two ways to prevent fraud occurrence: reducing the existing opportunity for fraud and preventing people from perceiving the opportunity of fraud. Reducing the opportunity for fraud is generally achieved through strict internal controls and corporate governance. However, it is important to acknowledge that regardless of the stringency of internal controls and governance measures, it is challenging to eliminate fraud completely. Consequently, strategies aimed at preventing individuals from perceiving opportunities to commit fraud can also be effective. Nevertheless, this study focuses on variables that can be quantified at the firm level, as obtaining data on the personal perceptions towards fraud opportunity is difficult.

The proportion of independent directors to all directors

Corporate governance is generally related to fraud opportunity. Beasley (1996) assumed that external directors have the motivation to enhance their reputation by supervising, thus they have no incentive to collude with top managers. He matched 75 fraudulent and 75 non-fraudulent firms as the final sample and his results show that control firms have a significantly higher percentage of external directors as compared to fraudulent firms. Accordingly, I select variables that reflect the strictness of supervision and intend to examine the relationship between them and occurrence of fraud. I choose the proportion of independent directors to all directors as the first proxy variable for corporate governance, in accordance with Beasley (1996). The higher the proportion of independent directors, the stricter the supervision will be. As a consequence, the likelihood of fraud occurrence will be decreased.

Hypothesis 7: The proportion of independent directors to all directors in fraud firms is more likely to be lower than in control firms.

Board meeting

Besides the proportion of independent directors, the number of the board meeting can also reflect the governance situation. When the board meetings become more frequent, it may represent that the directors can get more information from the meetings and become more familiar with the company's operating conditions. As a consequence, the effectiveness of supervision becomes better. The number of board meetings is negatively correlated with fraud from this perspective. However, more board meetings can also indicate that the

company is facing some problems that require frequent board meetings to deal with. The content of the meetings may lead the company to take aggressive measures or even to commit fraud. It is difficult to determine the direction of the relationship between the number of meetings and fraud only based on theoretical analysis.

There are some empirical researches studying board meetings and fraud. Chen et al. (2006) studied the characteristic of the board and its effect on fraud in China. They used the number of board meetings as one of the explanatory variables to determine the relationship between it and corporate financial fraud. They collected 169 regulatory enforcement actions as a fraud firm-year sample from 1999 to 2003. Their results show that the number of board meetings hold in a year has a significant and positive association with fraud, indicating that fraud firms have more board meetings.

Jia et al. (2009) examined the role played by supervisory boards and the association between it and the severity of enforcement faced by fraud firms. They adopt the number of supervisory board meetings to reflect the impact of the board's oversight activities. They collected 362 fraud observations from 2001 to 2006 in China's stock market and the results showed that fraud firms which hold meetings more frequently are more likely to receive more severe enforcement sanctions.

Based on the two previous research, I suggest that the frequency of meetings may be more likely to result in unfavorable behaviors. Therefore, I assume that number of board meetings is positively related to fraud.

Hypothesis 8: The frequency of board meetings is significantly related to financial statement fraud.

Higher meeting attendance of independent directors can be considered as another proxy variable of governance effectiveness. However, since the total number of board meetings varies from company to company, I choose the meeting absence rate⁴ by independent directors to represent the lack of supervision effectiveness, which can better reflect the real supervising situation.

Hypothesis 9: The meeting absence rate of independent directors is more likely to be higher in fraudulent firms than in control firms.

Internal control validity

It was found that internal control deficiencies are associated with corporate fraud. Donelson et al. (2017) found that internal control deficiencies are strongly associated with the occurrence of fraud. They collected opinions on internal control from auditors and

⁴ The absence rate equals the number of absences, divided by the number of expected attendances for independent directors.

determined whether the internal control deficiencies exist or not based on these opinions. The fraud sample is based on lawsuit cases and SEC enforcement actions during 2005-2010. The results showed that there is a statistically and economically significant and positive association between internal control deficiencies and the occurrence of fraud. Accordingly, I take the validity of internal control as a possible predictor of fraud to investigate if there is an association between it and fraud.

Hypothesis 10: The internal control is more likely to be invalid in fraud firms than in control firms.

The equity concentration in firms

When the ownership of equity is concentrated, the major shareholder will have more rights and stronger incentives to oversee the company's operations. Consequently, misconduct will be reduced. However, if the equity concentration is too high, the shareholders possess excessive power and may take advantage of this power for their interest. This action may harm the company's interest and even facilitate fraudulent action. As for the empirical evidence, both Chen et al. (2006) and Hass et al. (2016) found that the ownership of equity is inclined to be dispersed in fraudulent firms, indicating the lack of supervision. However, from the opportunity perspective, high concentration may lead the major shareholders to take opportunistic action for their personal gains. Considering that, the direction of the correlation between equity concentration and fraud is still difficult to determine. Therefore, I only assume that they are significantly related.

Hypothesis 11: The level of equity concentration is significantly related to financial statement fraud.

Related party transaction

According to the Accounting Standard for Business Enterprises No.36 issued by the Ministry of Finance of China, related party transaction refers to the transfer of resources or obligations between a listed company and its related person (including related legal person and related natural person). Related party transactions are normal business activities of companies; however, they may also become the means of manipulating profits and evading taxes. Thereby it can harm the interests of the shareholders. For example, round-trip transactions with the related party can be a notable instance of fraud (Gordon et al., 2007).

In addition, dealing with related parties may be a habitual behavior or characteristic of a company. Gordon et al. (2007) found that companies which choose to window-dress their financial statement through related transactions are more likely to choose related auditors with them. This suggests that related party transactions can be viewed as a potential red

flag of fraud. After interviewing 128 external auditors and asking them to evaluate the effectiveness of 42 red flags of fraud risk, Moyes (2008) found that the significant related party transactions are ranked as the fifth most effective red flag of fraud risk among all the red flags. In this research, I consider the existence of related party transactions as the potential red flag of fraudulent behavior and assume that in fraud firms, it is more likely to have related party transactions than control firms.

Hypothesis 12: The related party transactions in fraud firms is likely to be more frequent than in control firms.

4.3.3 Attitude/Rationalization

Fraud is generally considered as wrongdoing. Therefore, the decision to commit fraud is different from the social norms and the fraudster's usual values. As a consequence, cognitive dissonance occurs. Rationalization is an effort to reduce the cognitive dissonance and guilt of fraudsters (Albrecht et al., 2015; Murphy, 2012).

Prior research that studies rationalization generally obtains data from experiments. After studying the impact of individual personality and attitude towards fraud by conducting an experiment, Murphy (2012) summarized 9 categories of the rationalization used by fraudsters: (1) Moral justification: explain the wrongdoing in a moral way like "Because this money is necessary for me"; (2) Advantage comparison: compare the wrongdoing to a worse action to make it look better; (3) Euphemistic labeling: glorify the wrongdoing with long and complex words; (4) Minimize the bad consequences: "No one will suffer a loss, right?"; (5) Admit the bad consequences but denying the victims: "I don't know the users of the report, so I'm not responsible for them"; (6) Displacing responsibility: "The wrong part was made by someone else, not me"; (7) Diffusing responsibility: "Other people did this too, not only me"; (8) Entitlement: "That's my right."; (9) Disbelief: "I don't believe there is anyone who will really use the information from the report."

However, it is very difficult to obtain data about how unethical managers rationalize their wrong behaviors and how moral managers think differently. Therefore, finding appropriate proxy variables to evaluate managers' ethics is necessary.

The issuance of CSR report

Corporate social responsibility is attracting more and more attention from all the society. It refers to that companies should not only pursue profits for themselves but also should take responsibility for creating values for the whole society. Companies are expected to carry out some organizational activities that will have a good impact on their employees, consumers, investors, and the environment. Therefore, CSR activities can be viewed as

actions with more morality. Rodgers et al. (2015) showed a theoretical model to prove that ethical consideration can reduce fraudulent behaviors and improve CSR in the organization, indicating that fraud and CSR activity are opposite to each other.

Therefore, CSR activities can be the manifestation showing that the company is behaving ethically. The issuance of CSR reports is considered to be used as a proxy variable of the ethical attitude of the company in this research. I assume that the company that issued the CSR report will be less likely to commit fraud. Additionally, the willingness of the disclosure also can be taken as the proxy variable to show the company's attitude towards ethical activities. The firms that disclose CSR reports voluntarily are considered to be more positively engaging in moral activity and less likely to be involved in fraudulent activities.

Hypothesis 13.1: Fraud firms are less likely to issue CSR reports than control firms.

Hypothesis 13.2: The willingness to disclose CSR reports is likely to be lower in fraud firms than in control firms.

4.3.4 Capability

According to the Fraud Diamond proposed by Wolfe and Hermanson (2004), capability is an indispensable factor for the accomplishment of fraud. It will be difficult to commit fraud without capability, even if the opportunity exists. Capability can be evaluated by the fraudster's position, educational background, and age based on previous studies.

Educational background and age

The ACFE's 2020 report collected information about the educational background of fraudsters and found that fraudsters with some university and higher degrees account for 78% of the total. Additionally, the higher the educational background is, the higher the median loss will be caused. The median loss caused by the fraudsters with a high school degree or less is \$80,000, while the fraudsters with a postgraduate degree cause a median loss of \$200,000. Therefore, I assume that fraudsters are more likely to possess a higher degree of education.

The older age generally means that one has more experience and knowledge than the young, therefore his ability will be regarded as higher. ACFE also gathered information about the average age of fraudsters. The age distribution shows that 67% of fraudsters are under 45, while the fraudster who is older than 45 accounts for 31%. It seems that fraudsters are relatively younger than expected. Therefore, I assume a significant association between the average age of executives and financial statement fraud without determining the direction.

Hypothesis 14.1: The average age of executives is significantly related to financial statement fraud.

Hypothesis 14.2: The average degree of education of executives is more likely to be higher in fraud firms than in control firms.

CSR score

I try to explain capability from the firm's perspective. Although fraudulent firms have the ability to commit fraud, they are generally inept at operations, so they need to manipulate financial information rather than achieve the desired results directly. The lack of operating ability may also be reflected in their CSR activities. Therefore, CSR performance can be regarded as a proxy variable for operating capability at the firm level. Liao et al. (2019) selected Chinese listed firms from 2009 to 2014 as the sample, and found that CSR performance is significantly and negatively associated with fraudulent actions. However, Li et al. (2021) demonstrated that CSR activity can also be a tool to cover illegal behaviors. They identified 131 fraudulent firms from 1995 to 2016, and found that the CSR performance of such firms is significantly better compared not only to the control firms, but also to their own performance when they did not commit fraud.

In this study, I use data from CSMAR to evaluate CSR performance. CSMAR summarizes 13 aspects of the company's CSR report.⁵ One point will be added for each aspect, so the total CSR score is 13 points. Companies not disclosing their CSR reports will be directly assigned a score of 0. From the perspective of capability, a higher CSR score represents higher capability at the firm level, so the CSR score is supposed to be negatively associated with fraud. However, based on Li et al.'s (2021) research, CSR performance may also be improved intentionally by fraud firms, which makes it difficult to predict the direction of correlation between CSR performance and fraud. Therefore, I only assume that CSR performance is significantly related to financial statement fraud.

Hypothesis 15: CSR performance is significantly related to financial statement fraud.

⁵ The 13 aspects are: (1) Inspected by the third party institution or not; (2) Referring to GRI Sustainability Reporting Guidelines or not; (3) Disclosing protection of shareholder interests or not; (4) Auditor belonging to the four large accounting firms or not; (5) Disclosing protection of creditor interests or not; (6) Disclosing protection of employee interests or not; (7) Disclosing protection of supplier interests or not; (8) Disclosing protection of interests of clients and consumers or not; (9) Disclosing environment and sustainability measures or not; (10) Disclosing public relations and social & public welfare or not; (11) Disclosing social responsibility system construction and improvement or not; (12) Disclosing safety production or not; (13) Disclosing deficiencies of the company or not.

4.3.5 Exposure and Punishment

The potential fraudsters will not only consider what they can gain from fraud but also need to consider the bad consequences of fraud. Once the fraudulent act is exposed, they can face material losses worse than imagination. Karpoff et al. (2008) tracked the consequences of 2,206 people who were responsible for misrepresentation cases to examine the impact of misrepresentation on them. The study revealed that 93.4% of them lost their jobs within the execution period. Most of them were dismissed.⁶ In addition, many fraud managers also have difficulty finding a new job in the future: SEC has barred 693 of them (31%) from being employed as executives of listed companies. The average fine from the SEC is 5.7 million dollars. 617 people were prosecuted and 469 of them were sentenced to jail terms of average 4.3 years. It is obvious that fraud managers will take responsibility by bearing serious consequences. Therefore, potential cheaters will also consider the consequences and the probability of being exposed. The more likely one's fraudulent behavior is to be reported, the less likely for him to commit it.

In this research, I investigate the impact of exposure from both internal and external aspects.⁷

Working place consistency of independent directors and listed firms

Detecting fraud internally is worthy to be paid attention and should not be ignored. ACFE 2020 report shows that the proportion of internal whistleblowing by employees reached 50%, while external reporting by outsiders such as consumers and vendors accounts for the other half of exposure. According to this proportion, internal whistleblowing and external reporting are both important. Good governance is considered to be a measure to prevent fraud from happening. In this research, in addition to the characteristics of the board, I take the working place consistency of independent directors and listed companies as a potential predictor of fraud to investigate if there is a significant association between them. The working place consistency refers to whether the working place of the independent director is consistent with the registered address of the listed company.⁸ Inconsistency may represent that it is more difficult for independent directors to determine the real situation of firms and conduct the supervision.

⁶ This means that the fraudsters are not voluntarily leaving their jobs.

⁷ Variables related to punishments are not considered for the time being. The similarity of industry, size, and region between penalized and other firms need to be analyzed to speculate the deterrent effect on potentially fraudulent firms if the punishment variables are considered to be included in the model. This process is more complex and will be considered in detail in further study.

⁸ The independent directors here are subjected to the independent directors with a professional accounting title. As long as there is one independent director with an accounting professional

Previous research has studied the impact of geographical distance between listed firms and regulators. Kedia and Rajgopal (2011) assumed that companies close to SEC offices geographically are less likely to misstate their financial statements. The reason is that considering the time and budget, SEC will adopt a cheaper way to conduct investigations. As a consequence, SEC is more likely to investigate the firms closer to its office. Conversely, the firms will consider the budget constraints of SEC and make decisions. Kedia and Rajgopal (2011) used the geographic distance between the location of the firm's headquarters and the SEC's office as a proxy variable of the budget constraints. They collected restated firms from 1997 to 2002 and 331 firms are included in the final sample. The results support their hypothesis that companies that are far away from SEC offices are more likely to restate their reports. Therefore, it is possible to apply geographical characteristics in fraud detection. The working place consistency of independent directors and listed companies reflects the difficulties of independent directors' supervision as well. I assume the consistency is negatively associated with financial statement fraud.

Hypothesis 16: The working place consistency of independent directors and listed firms is more likely not to exist in fraud firms than in control firms.

Media coverage

Attentions from the media can be considered as another way to prevent fraud. Companies are not only investigated by regulators but also overseen by the whole society. Therefore, fraud firms have to consider how to conceal their wrongdoing to be not detected by the public. When firms receive more attention from external parties, they may think that the possibility of being discovered becomes higher if they take fraudulent actions. Although it is not a study about fraud, Chen et al. (2021)'s study supports the supervisory effect of the media. Chen et al. (2021) examined the media's monitoring role in inhibiting earnings management. They used US publicly listed firms from 2000 to 2016 as the sample and tested the correlation between media coverage and earnings management. They defined the number of news articles for a firm in a year as the variable to measure media coverage. They examined both accrual-based earnings management and real earnings management. Their results show that both two kinds of earnings management are negatively and significantly related to news coverage, indicating that firms with higher attention from the media are less likely to engage in earnings management.

However, on the other hand, reported by the media can drive companies to misstate their reports intentionally. The media are not professional financial institutions; thus, they are

title whose working place is different from the registered address of the company, it is regarded as that the working places are different.

more likely to report on the final results rather than analyze the real financial situations of the companies. For example, if a company manipulates earnings to make the company look profitable, the media is very likely to only report the financial results without confirming whether they are true or not. Such reports may attract more naive investors for the company and make financing easier. When the companies become aware of this, it is possible for them to adopt aggressive accounting measures and even manipulation.

Considering this two-sided effect of media coverage, in this study, I assume that there is a significant association between the change in media coverage and financial statement fraud, without predicting the direction.

Hypothesis 17: The media coverage of fraud firms changes significantly from the years prior to the fraud years, compared with the control firms.

4.3.6 Other factors for fraud detection

As mentioned in section 4.2, only using the causes of fraud to construct a detecting model can be considered insufficient because the evidence of fraud is neglected. Therefore, I decided to search for additional variables related to the manifestations of fraud to provide a complementary detecting ability for the model.

The most influential prior studies in the field of fraud detection are Beneish (1999) and Dechow et al. (2011). Beneish (1999) used 74 companies that manipulated earnings from 1982 to 1992 as earnings manipulator samples and matched 2,332 non-manipulating companies by industry and year.

Beneish (1999) constructed the M-score model by selecting 8 financial variables from three perspectives directly. First, Beneish (1999) considered that earnings manipulation will probably happen in a company whose prospect is poor. From this perspective, he chose the changing rate of gross margin, asset quality index, sales, and the index of sales, general and administrative expenses to sales as fraud predictors. Second, Beneish (1999) considered variables related to cash flow and accounting accruals. Based on this perspective he selected the changing rate of days' sales in receivable, depreciation, and total accruals. Finally, Beneish (1999) suggested that earnings management can be brought out by contract-based motives. He selected the change of leverage as the independent variable for this hypothesis. Based on these 8 variables, M-score was shown statistically significant to distinguish manipulators and non-manipulators. However, the correct rate of its classification of manipulators is only 50 percent approximately.

Dechow et al. (2011) selected variables that may be related to financial misstatement in five dimensions: accruals quality, performance, non-financial information, off-balance-sheet information, and market. Unlike Beneish (1999), Dechow et al. (2011) considered

nearly thirty independent variables that are possibly related to misstatement at first. They identified 676 misstated firms from 1982 to 2005 and investigated their characteristics. After testing the correlations of variables and misstatements, they selected 7 variables to construct the final F-score model. The final F-score model contains the accrual-based index, the proportion of soft assets, actual issuance, changes in receivables, inventory, cash sales, and ROA. Its correct detecting rate is approximately 67%, which is higher than M-score. It is notable that both Beneish (1999) and Dechow et al. (2011) selected variables primarily based on year-to-year changes, so adding variables of changing ratio is expected to optimize the detecting model. However, Beneish (1999) and Dechow et al. (2011) did not adopt identical variables in their research. Therefore, I choose these two variables both involved in the prior research as the additional variables for this study: accounts receivable and accruals. I assume that changes in accounts receivable and the total accruals are related to fraud.

Hypothesis 18: Changes in accounts receivable are positively related to financial statement fraud.

Hypothesis 19: Total accruals are positively related to financial statement fraud.

Besides the financial ratios, there are researchers studying on using non-financial information to detect financial fraud. Brazel et al. (2009) found that fraud firms usually have greater inconsistency between the non-financial measures (NFM) and financial measures. This inconsistency can be a signal of high fraud risk. One advantage of using NFM to detect fraud is that, compare with financial measures, it's hard to be manipulated. Brazel et al. (2009) collected 50 fraud firms identified by SEC or AAERs or other sources from 1987 to 2007 as fraud samples. He chose the number of employees as the representative of NFM and showed that the probability of fraud is positive and significantly related to the difference between revenue growth and NFM growth, which means that the difference can be a useful measure to assess fraud risk. Accordingly, in this research, I use the difference between revenue growth and employee number growth as an additional variable for fraud. In addition, I replace the revenue with net profit to create another variable reflecting the difference in the growth of financial measures and non-financial measures.

Hypothesis 20.1: The differences between revenue growth and employee number growth are greater in fraud firms than in control firms.

Hypothesis 20.2: The differences between net profit growth and employee number growth are greater in fraud firms than in control firms.

5. Methodology

5.1 Data and sample selection

The fraud sample is based on the companies that are sanctioned by CSRC from 2007 to 2016. I choose 2007 as the start year of this research because the new Accounting Standard for Business Enterprises came into effect in January 2007. The other important law, Security Law, was also amended in 2005 for the first time and has been effective in January 2006. Given consideration to the change of these two kinds of regulations may make the legal environment different, I choose the start year as 2007 to mitigate this problem.

I collected fraud firm data from the Summary of Violation Information database of CSMAR. The violation types of enforcement are divided into 16 categories by CSMAR and I choose four types that can be regarded as financial statement fraud in this research. Specifically, I choose Fictitious Profit, Fictitious Assets, False Recordation (Misleading Statements), and Material Omission as the fraudulent behaviors.

In my fraud sample period from 2007 to 2016, there were 950 fraud firms and 2,547 firm-year observations.⁹ I use the first fraud year of each A-share fraud firm as the fraud observations. There are 938 A-share firms and 8 B-share firms whose total assets and industry code can be acquired. I rule out B-share firms because they are traded in foreign currency and cannot represent Chinese companies as well as A-share companies. I delete companies whose total asset information cannot be acquired in CSMAR. The final fraud sample contains 890 fraud firms and I match the control sample for each fraud firm by size, industry, and year.¹⁰

All data utilized in this study were sourced from CSMAR, with the exception of media coverage data. The number of newspaper reports for the initial year of fraud and the two years preceding it was manually gathered using the China Core Newspaper Full-Text Database. For control firms, the number of reports was collected based on the corresponding period of their matched fraud counterparts. The frequency of newspaper reports serves as a proxy variable for media exposure. This study calculates the changes in media coverage preceding and subsequent to the occurrence of fraud.

⁹ The 2547 fraud firm-year observations are calculated based on the fraud behavior (including all 4 types), which means I do not distinguish the types here.

¹⁰ The control sample are from the same industry with the fraud firms. The difference in total assets cannot exceed 50%.

5.2 Analysis model

In this study, there are 24 variables based on five fraud factors, four additional variables based on previous studies, and one control variable. I ran univariate logistic regressions for each variable to confirm how are they related to fraud. Then, I ran multivariate regressions for each factor group and manifestation group. Finally, I conducted multivariate regression for all variables and selected helpful variables for the final result. The statistical models for each regression are as follows.

Univariate logistic regression:

$$\text{FRAUD}_{i,t} = \beta_0 + \beta_1 \text{INDEPENDENT}_{i,t} + \varepsilon$$

Multivariate logistic regressions (by each group):

$$\text{FRAUD}_{i,t} = \beta_0 + \sum_{k=1}^n \beta_k \text{INDEPENDENT}_{i,t} + \varepsilon$$

Multivariate logistic regressions (by all independent variables):

$$\text{FRAUD}_{i,t} = \beta_0 + \sum_{k=1}^m \beta_k \text{INDEPENDENT}_{i,t} + \beta_j \text{CONTROL}_{i,t} + \varepsilon$$

(i = each firm, t = the first year of fraud)

6. Empirical results

There are 24 variables based on five fraud factors, for additional variables based on previous studies, and 1 control variable in this study. I use the logistic model to run univariate regressions for each variable to explore the association between each variable and fraud. In the following steps, I separate the variables into six groups: five fraud factors groups and one manifestation group. Then I run multivariate regressions for each group. Finally, I conduct multivariate regression for all variables and analyze the association between each variable and financial fraud based on the regression results.

6.1 Descriptive statistics

The descriptive statistics are presented in Tables 1 and 2. Table 1 displays the industry distribution and the frequency of fraudulent activities by year for the companies under investigation. Panels A and B of Table 1 include only the first year of fraudulent activity for each firm, resulting in a total of 890 fraud firm-years. Panels C and D encompass all the fraud firm-years from 2007 to 2016, counting 2,502 and 2,547 fraud firm-years

respectively. The discrepancy between Panels C and D is attributed to missing data, as some firms lack industry classification information.

It can be clearly seen that firms in the manufacturing industry account for more than 65% from Panel A. The next three largest industries are the information technology industry, retail industry, and real estate industry. The four industries with the highest proportion of fraudulent companies are roughly the same as in Dechow et al.'s (2011) study. In their study, the industries with the largest number of fraudulent firms were computers, durable manufacturing, retail, and services. The difference is that the percentages of fraudulent companies in these four industries are 20.4%, 19.4%, 12.9%, and 12.7%, respectively, that is, more evenly distributed compared to the current study. The different industry distribution may be a consequence of the different national conditions between the US and China, or it may be due to the fact that the rapid growth of high-tech companies in the US earlier has made them more aggressive in accounting measures.

The distribution of fraud years in Panel B shows that the years with the largest number of fraud cases are 2007, 2011, 2012, 2015, and 2016. Each year accounts for about 12%. The number of fraud cases seems to follow a wavy pattern, which goes down and rises repeatedly.

Table 1 Frequency of fraud firms by industry and year

Panel A: Fraud firms' industries distribution		
Industry classification	Fraud firms	Percentage
Manufacturing	586	65.84%
Information transmission, software and information technology services	49	5.51%
Wholesalers and retailers	42	4.72%
Real estate	39	4.38%
Agriculture, forestry, animal husbandry and fishery	26	2.92%
Construction	26	2.92%
Electricity, heat, gas and water production and supply	25	2.81%
Miscellaneous	19	2.13%
Transportation, warehousing and postal services	18	2.02%
Mining	17	1.91%
Finance	13	1.46%
Water conservancy, environment and public facilities management	10	1.12%

Leasing and business services	7	0.79%
Culture, sports and entertainment	4	0.45%
Scientific research and technical services	3	0.34%
Accommodation and restaurant Services	2	0.22%
Health and social work	2	0.22%
Residential services, repairs and other services	1	0.11%
Education	1	0.11%
Total	890	100.00%

Panel B: Fraud years distribution

Year	Fraud Firms	Percentage
2007	126	14.16%
2008	53	5.96%
2009	48	5.39%
2010	72	8.09%
2011	109	12.25%
2012	103	11.57%
2013	80	8.99%
2014	78	8.76%
2015	115	12.92%
2016	106	11.91%
Total	890	100%

Panel C: Fraud frequency among all listed firms by industry

Industry classification	Fraud firm-years	All firm-years	Frequency
Accommodation and restaurant Services	22	109	20.18%
Agriculture, forestry, animal husbandry and fishery	70	407	17.20%
Education	1	7	14.29%
Miscellaneous	54	419	12.89%
Construction	67	571	11.73%
Residential services, repairs and other services	5	44	11.36%
Manufacturing	1,641	14,517	11.30%
Wholesalers and retailers	141	1,299	10.85%

Leasing and business services	27	252	10.71%
Water conservancy, environment and public facilities management	21	200	10.50%
Real estate	123	1,200	10.25%
Health and social work	3	30	10.00%
Information transmission, software and information technology services	117	1,198	9.77%
Culture, sports and entertainment	19	209	9.09%
Mining	47	571	8.23%
Transportation, warehousing and postal services	61	789	7.73%
Finance	27	408	6.62%
Electricity, heat, gas and water production and supply	50	777	6.44%
Scientific research and technical services	6	124	4.84%
Total	2,502	23,131	10.82%

Panel D: Fraud frequency among all listed firms by year

Year	Fraud firm-years	All firm-years	Frequency
2007	142	1,661	8.55%
2008	164	1,715	9.56%
2009	185	1,864	9.92%
2010	200	2,218	9.02%
2011	288	2,452	11.75%
2012	328	2,580	12.71%
2013	297	2,624	11.32%
2014	259	2,739	9.46%
2015	335	2,927	11.45%
2016	349	3,221	10.84%
Total	2,547	24,001	10.61%

Panel C shows that the four industries with the highest frequency of fraud, are accommodation and restaurant services, agriculture, education, and miscellaneous, which is significantly different from the fraud distribution. The average fraud frequency among all listed firm-year observations by industry is 10.82%, which can still be considered very

high. Finally, it is clear from Panel D that the fraud frequency by year is on a rising trend. The overall fraud frequency from 2007 to 2016 is 10.61%, which is alarming.

Table 2 shows the results of descriptive statistics for 29 variables, including the control variable.¹¹ The number of observations in Table 2 varies due to instances of missing data. The maximum values of the seven variables: PB, PE, MS, TQ, FIX, DE, and RELAT far exceed the mean values, and the minimum values of FIX and DE are much smaller than the mean value. Therefore, these seven variables are winsorized at 1% and 99% to mitigate the impact of potential abnormal values. Similarly, DIFF_REVE and DIFF_PRO also face the problem of abnormal values. Therefore, I winsorize these two variables at 1% and 99% as well.

Table 2 Descriptive statistics

Variables	Obs.	Mean	Std. Dev.	Min	Max
1. Motivation/Pressure variables					
PB	1,684	4.533	5.085	0.497	92.682
PE	1,530	114.962	360.362	2.564	10993.210
MS	1,698	8.626	65.366	0.138	2448.445
TQ	1,698	2.175	1.511	0.806	22.098
ConLoss	1,780	0.046	0.208	0.000	1.000
FIX	1,775	4.757	31.029	-540.942	679.821
HHI	1,779	0.165	0.208	0.019	1.000
DE	1,780	1.256	5.466	-96.827	166.252
MDE	1,698	0.265	0.190	0.003	0.932
DY	1,780	0.706	0.456	0.000	1.000
2. Opportunity variables					
IND	1,780	0.373	0.065	0.200	0.667
MEETING	1,778	9.594	3.726	2.000	35.000
ABSENCE	1,641	0.041	0.186	0.000	2.667
VALID	1,324	0.992	0.087	0.000	1.000

¹¹ The definitions of all variables are shown in Appendix 1.

H10	1,780	0.162	0.116	0.001	0.799
TOP10	1,780	0.575	0.160	0.090	0.969
RELAT	1,780	0.954	0.210	0.000	1.000
3. Attitude/Rationalization variables					
CSRI	1,780	0.997	0.053	0.000	1.000
DW	1,775	1.896	0.305	1.000	2.000
4. Capability variables					
AveAGE	1,780	47.977	3.219	35.600	59.000
AveEDU	1,736	3.226	0.516	1.000	5.000
CSRS	1,780	4.975	3.370	0.000	13.000
5.Exposure variables					
PCONSIS	1,753	0.485	0.500	0.000	1.000
CH_MEDIA	1,686	0.158	0.824	-1.000	2.000
6.Others variables					
CH_RE	1,547	0.010	0.061	-0.851	0.367
TATA	1,565	-0.007	0.096	-1.121	0.498
DIFF_REVE	1,602	1.099	37.117	-119.095	1460.547
DIFF_PRO	1,602	25.167	1021.450	-474.731	40864.810
Control variable					
SIZE	1,780	21.655	1.191	18.158	29.192

6.2 Univariate logistic regression

I run univariate regressions for each independent variable to test their associations with fraud initially. Table 3 reflects the association between all independent variables and fraud. Seven out of the ten motivation/pressure variables are significantly related to fraud. The directions of all motivation/pressure variables are consistent with the predicted signs. PB is positively correlated with fraud at the 10% level. PE and MS are positively correlated with fraud at the 1% level. All three variables exhibit the overvaluation of stock prices. Hypothesis 1 is supported. Hypothesis 4 is also supported by the fact that FIX is negatively associated with fraud at the 1% level, indicating that fraudulent firms have more difficulties in covering fixed costs. DE and MDE are positively associated with fraud, whereas DY is negatively associated with fraud at the 1% level, indicating that fraudulent firms prefer borrowing money and distributing fewer dividends, thereby supporting Hypothesis 6.

Four out of seven opportunity variables are significantly associated with fraud. MEETING is positively correlated with fraud at the 1% level, indicating that fraudulent firms tend to hold more meetings. ABSENCE is positively related to fraud at the 5% level, suggesting that independent directors of fraudulent firms miss more meetings. This supports Hypothesis 8. Both H10 and TOP10 are negatively associated with fraud at the 1% level, which means that fraudulent firms have a lower concentration of ownership, which may cause inefficiency of supervision.

VALID is omitted in the univariate regression. The prediction matrix between VALID and Fraud is presented in Table 4. It clearly indicates that when VALID equals 0, suggesting an assessment of internal control as invalid, it perfectly predicts the occurrence of fraud. Consequently, this variable is automatically excluded from the regression analysis and will also be omitted in subsequent multivariate regressions.

Among the rationalization variables, only DW is positively associated with fraud at the 10% level. The possible explanation for this result may be consistent with Li et al. (2021), suggesting that fraud firms are likely to use CSR activities to pretend to be ethical, and cover their accounting misconduct. Besides, CSRI is not significant. Among the capability variables, the average age of executives is negatively associated with fraud at the 10% level. This suggests that younger executives are more likely to engage in fraud. Finally, regarding the exposure variables, CH_MEDIA is positively associated with fraud at the 5% level of significance. This indicates that fraudulent firms received more attention in the fraud year, which is contrary to the assumption between exposure and fraud. The possible explanation is that companies are more concerned about attracting potential investors than the increase of exposure. Finally, the four additional variables, CH_RE, DIFF_REVE, and DIFF_PRO are associated with fraud at the 5%, 10%, and 5% levels, respectively.

Table 3 Univariate logistic regressions

variables	pred sign	N	Coef.	z	P> z
1. Motivation/Pressure variables					
PB	+	1,684	0.027	1.88*	0.060
PE	+	1,530	0.001	4.11***	0.000
MS	+	1,698	0.021	3.26***	0.001
TQ	+	1,698	0.008	0.21	0.830
ConLoss	+	1,780	0.234	1.02	0.307
FIX	-	1,775	-0.014	-3.02***	0.003

HHI	-	1,779	-0.000	-0.00	0.999
DE	+	1,780	0.205	5.12***	0.000
MDE	+	1,698	1.085	4.19***	0.000
DY	-	1,780	-0.737	-6.91***	0.000
2. Opportunity variables					
IND	-	1,780	0.193	0.26	0.792
MEETING	\	1,778	0.051	3.83***	0.000
ABSENCE	+	1,779	5.631	2.34**	0.019
VALID	-	1,314	Omitted	/	/
H10	\	1,780	-2.063	-4.88***	0.000
TOP10	\	1,780	-1.000	-3.34***	0.001
RELAT	+	1,692	0.0008	0.50	0.618
3. Attitude/Rationalization variables					
CSRI	-	1,780	1.390	1.24	0.214
DW	-	1,775	0.296	1.89*	0.059
4. Capability variables					
AveAGE	\	1,780	-0.031	-2.10*	0.036
AveEDU	+	1,736	-0.073	-0.78	0.433
CSRS	\	1,780	-0.016	-1.17	0.243
5.Exposure variables					
PCONSIS	-	1,753	-0.107	-1.12	0.262
CH_MEDIA	\	1,686	0.117	1.97**	0.049
6.Others					
CH_RE	+	1,547	-2.035	-2.24**	0.025
TATA	+	1,565	-0.411	-0.77	0.439
DIFF_REVE	+	1,602	0.134	1.85*	0.064
DIFF_PRO	+	1,602	-0.022	-2.41**	0.016

(***, **, and * represent $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively)

Table 4 Cross-tabulation between VALID and FRAUD

VALID	FRAUD		Total
	0	1	
0	0	10	10
1	650	664	1,314
Total	650	674	1,324

6.3 Multivariate logistic regression

6.3.1 Multivariate logistic regressions by each group

In the multivariate regressions, I used the robust standard error to mitigate the impact of the heteroskedasticity problem. Therefore, all the results shown in Table 5 are based on White standard error.

The results of multivariate logistic regressions by each group are shown in column 1 of Table 5. Four variables were found to be significantly associated with fraud in the motivation/pressure group. The two stock-overvaluation variables, PE and MS are positively associated with fraud at the 1% and 10% levels respectively, which still proves that the stock prices of fraudulent firms are overestimated. TQ is negatively associated with fraud at the 10% level, which is contrary to the prediction. DY is negatively associated with fraud at the 1% level, suggesting that fraudulent firms are less likely to distribute dividends, supporting the hypothesis of overconfidence.

After removing VALID from the opportunity group, the results of multivariate regression show that MEETING is positively related to fraud at the 1% level, H10 is negatively related to fraud at the 1% level, and ABSENCE is positively related to fraud at the 5% level. All of them are consistent with the results in univariate regression. Among the rationalization variables, DW is positively related to fraud at the 5% level, still indicating that fraud firms tend to voluntarily disclose CSR reports. CSRI is omitted because of collinearity, so this variable will be dropped in the overall regression later. For the capability variables, the average age of executives remains negatively associated with fraud at the 10% level. In the exposure variables, CH_MEDIA is also positively correlated with fraud at the 5% level. The significant variables in the additional group remain the same as the results in the univariate regression.

6.3.2 Multivariate logistic regression by all independent variables

Finally, I ran a regression for all 27 variables.¹² The size variable was added to the model as a control variable. The results are shown in column 2 of Table 5. In the overall regression, the number of variables significantly associated with fraud decreases remarkably. Only seven significant variables remain: PE, DE, and DY from the motivation/pressure group, MEETING, H10, and TOP10 from the opportunity group, and TATA from the additional group. There is no significant variable in the rationalization, capability, and exposure variables. In other words, with the increase in variables, the number of significant variables declines. This indicates the existence of variables that interfere with each other, resulting in multicollinearity in the model.

To solve this problem, I did the Variance Inflation Factor (VIF) test on the set of all independent variables and the control variable, the results are shown in Table 6. It reveals that multicollinearity does not appear to pose a significant threat to the integrity of the regression model. The mean VIF of 1.76 falls well below the commonly accepted threshold of 10, which suggests that the predictive variables retain a considerable degree of independence from one another. The highest VIF value is recorded for the variable MDE at 4.71, followed by TQ with a VIF of 4.56, and PB with a VIF of 3.9. These values, although the highest within the dataset, are still below the critical value that would indicate problematic levels of multicollinearity. In conclusion, the VIF test results indicate that each independent variable contributes unique explanatory power to the model without unduly inflating the variance of the estimated coefficients.

Nevertheless, I estimated the correlation coefficients between the variables and attempted to delete those based on the correlation coefficients and their significance in the multivariate regressions.¹³ It was observed that PB and TQ have a correlation of 0.7213, MDE and DE are correlated at 0.7163, and H10 and TOP10 at 0.6929. Consequently, it was necessary to omit one variable from each pair. First, for PB and TQ, two separate regressions were conducted, each omitting one variable, to compare the explanatory effects of the models. However, the differences were minimal (Pseudo R²= 0.0614 for the model without PB and Pseudo R²= 0.0615 for the model without TQ). Given that PB is one of the predictors for Hypothesis 1, while TQ is the only predictor for Hypothesis 2, PB was excluded first.

¹² VALID and CSRI were omitted in group multivariate regressions earlier so I deleted them from the multivariate regression.

¹³ The correlation coefficient can be referred to in Appendix 2 Correlation Matrix.

Regarding MDE and DE, both of them are variables related to Hypothesis 6.2, with DE using book value and MDE using market value. Following a similar approach, it was found that the model excluding MDE (Pseudo R²= 0.0616) offered greater explanatory power than the model excluding DE (Pseudo R²= 0.0578). Additionally, considering MDE's lack of significance in multivariate regressions, it was excluded.

For TOP 10 and H10 which are related to Hypothesis 11, TOP10 is calculated as a sum of simple percentages, whereas H10 is calculated as the sum of the square of percentages. It is considered that squaring can reflect an amplified influence of major shareholders. The model's Pseudo R² was lower when H10 (Pseudo R²= 0.0514) was excluded compared to the exclusion of TOP 10 (Pseudo R²= 0.0588). Therefore, after comprehensive consideration, TOP10 was the chosen variable for exclusion. The outcomes of the multivariate logistic regression, following the exclusion of PB, MDE, and TOP10, are presented in column 3 of Table 5. It is observed that while the count of significant variables remains unchanged, the specific variables deemed significant have altered. Within the motivation/pressure group, MS attains significance at the 10% level, and DE reaches 1% significance following the removal of PB and MDE. In the Exposure group, CH_MEDIA emerges as significant at the 10% level after the deletion.

After the exclusion of these three variables, I used backward elimination to continue to delete useless variables according to Dechow et al. (2011). The variables are deleted based on the significance level in multivariate regressions¹⁴ and their theoretical importance¹⁵. I deleted the variable that is the least significantly related to fraud in multivariable regressions and relatively not crucial in logicity.

After backward elimination, six variables remained significantly related to fraud, as shown in Table 7. Then I tried to add the deleted variables into this model stepwise to examine whether the newly added variables can enhance the explanatory ability of the model. As a consequence, AveAGE remains significantly associated with fraud and it does not change the association between fraud and the other independent variables when it is added.

¹⁴ The significance level in multivariate regressions refers to the significance level in the multivariate regressions by each group and the multivariate regression by all independent variables.

¹⁵ This study focuses on the usability of the five fraud factors and the manifestations of fraud in fraud detection. Therefore, first, I try to maintain the diversity of independent variables. Second, prior studies on fraud detection mostly used financial variables to construct the detecting model; thus, in this study, I attach importance to the inclusion of non-financial variables in the model. Thus, in the backward elimination, I am inclined to remove financial variables and variables that are in the group with a larger number of measures, when other conditions are similar.

According to the final results, motivation/pressure variables possess the highest explanatory ability for fraud which account for three variables. Fraud companies tend to be over-evaluated in their stock prices and the managers are inclined to be overconfident. Two opportunity variables remain in the final result, suggesting that fraud firms are inclined to hold more board meetings and their ownership of equity is more likely to be dispersed. The decentralization of ownership may result in weak supervision and fraudulent acts. The negative association between fraud and the average age of executives suggests that younger executives are more likely to be engaged in fraud. Although higher age can represent more experience and higher capability, younger executives may be inclined to be bolder and more aggressive in accounting measures. Fraudulent firms attracted more attention in fraud years. Thus, fraud firms may use misstated information to attract new investors.

Table 5 Multivariate logistic regressions

Variables	pred sign	(1) Logistic regressions by each group				(2) Logistic regression by all variables				(3) Logistic regression by all variables after excluding PB, MDE, and TOP10			
		N	Coef.	z	P> z	N	Coef.	z	P> z	N	Coef.	z	P> z
1.Motivation/Pressure variables		1,518											
PB	+		0.047	1.60	0.109		0.002	0.05	0.961		/	/	/
PE	+		0.001	2.84***	0.005		0.001	2.17**	0.030		0.001	1.93*	0.054
MS	+		0.019	1.92*	0.055		0.015	1.14	0.255		0.023	1.68*	0.093
TQ	+		-0.132	-1.72*	0.086		-0.043	-0.43	0.666		-0.059	-0.92	0.355
ConLoss	+		-0.414	-1.36	0.173		-0.232	-0.60	0.546		-0.122	-0.33	0.741
FIX	-		-0.009	-1.64	0.101		-0.010	-1.25	0.213		-0.006	-0.77	0.440
HHI	-		0.013	0.05	0.959		0.112	0.35	0.725		0.141	0.45	0.651
DE	+		0.112	1.17	0.242		0.319	2.35**	0.019		0.289	3.65***	0.000
MDE	+		0.503	0.83	0.405		0.021	0.03	0.979		/	/	/
DY	-		-0.459	-3.36***	0.001		-0.489	-3.03***	0.002		-0.479	-3.03***	0.002
Wald chi2				55.54									
P > chi2				0.000									
Pseudo R2				0.0299									
2.Opportunity variables		1,689											
IND	-		0.252	0.33	0.743		0.605	0.64	0.521		0.624	0.67	0.505

MEETING	\	0.046	3.17***	0.002	0.035	1.86*	0.063	0.040	2.14**	0.033
ABSENCE	+	5.013	1.92*	2.323	3.221	0.88	0.377	2.488	0.97	0.334
H10	\	-2.478	-3.85***	0.000	-3.209	-3.99***	0.000	-1.986	-3.52***	0.000
TOP10	\	0.320	0.73	0.463	1.312	2.14**	0.032	/	/	/
RELAT	+	0.001	0.68	0.498	-0.003	-0.96	0.339	-0.002	-0.81	0.417
Wald chi2			37.8							
P > chi2			0.000							
Pseudo R2			0.0186							

3.Attitude/Rationalization variables

1,775

CSRI	-	Omitted	/	/	/	/	/			
DW	-	0.296	1.89*	0.059	0.192	0.90	0.367	0.242	1.15	0.251
Wald chi2			3.56							
P > chi2			0.0591							
Pseudo R2			0.0015							

4. Capability variables

1,736

AveAGE	\	-0.028	-1.85*	0.064	-0.016	-0.67	0.503	-0.020	-0.88	0.378
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AveEDU	+	-0.073	-0.78	0.435	-0.138	-1.10	0.273	-0.128	-1.04	0.299
CSRS	\	-0.010	-0.65	0.515	0.005	0.23	0.816	0.005	0.24	0.813
Wald chi2			5.27							
P > chi2			0.1528							
Pseudo R2			0.0022							

5.Exposure variables

1,661

PCONSIS	-	-0.128	-1.30	0.193	-0.053	-0.42	0.673	-0.084	-0.67	0.504
CH_MEDIA	\	0.128	2.13**	0.033	0.132	1.50	0.133	0.146	1.68*	0.093
Wald chi2			6.30							
P > chi2			0.0429							
Pseudo R2			0.0028							

6.Other variables

1,528

CH_RE	+	-2.279	-2.48**	0.013	-1.285	-0.96	0.337	-0.486	-0.37	0.711
TATA	+	0.237	0.42	0.676	1.711	1.86*	0.063	1.044	1.24	0.217
DIFF_REVE	+	0.169	2.24**	0.025	0.114	1.16	0.245	0.090	0.93	0.353
DIFF_PRO	+	-0.022	-2.17**	0.030	-0.009	-0.59	0.553	-0.009	-0.6	0.547
Wald chi2				14.56						

P > chi2	0.0057						
Pseudo R2	0.0074						
SIZE	0.114	1.22	0.261	0.100	1.11	0.269	
Wald chi2		83.59			77.51		
P > chi2		0.000			0.000		
Pseudo R2		0.061			0.058		
	1,153		1,159				
(***, **, and * represent p<0.01, p<0.05, and p<0.1, respectively)							

Table 6 The VIF test of independent variables

Variable	VIF	1/VIF
MDE	4.71	0.212468
TQ	4.56	0.219095
PB	3.9	0.256475
DE	3.49	0.286248
SIZE	2.58	0.387443
TOP10	2.49	0.401959
H10	2.24	0.446761
MS	1.88	0.531008
RELAT	1.53	0.653128
PE	1.44	0.694817
DW	1.26	0.792263
AveAGE	1.25	0.801146
DY	1.24	0.806756
CSRS	1.22	0.821253
TATA	1.21	0.825787
MEETING	1.21	0.827282
CH_RE	1.2	0.835913
ConLoss	1.18	0.848051
FIX	1.16	0.861997
DIFF_REVE	1.11	0.900353
DIFF_PRO	1.11	0.904476
AveEDU	1.09	0.917327
HHI	1.08	0.923722
PCONSIS	1.07	0.933555
CH_MEDIA	1.06	0.940126
IND	1.05	0.954213
VALID	1.04	0.965219
ABSENCE	1.02	0.983998
Mean VIF	1.76	

Table 7 Logistic regression after backward elimination

	Model 1 Significant variables			Model 2 Add capability variable		
variables	Coef.	z	P	Coef.	z	P
PE	0.001	2.890***	0.004	0.001	2.880***	0.004
DE	0.237	4.070***	0.000	0.249	4.270***	0.000
DY	-0.440	-3.270***	0.001	-0.432	-3.200***	0.001
MEETING	0.040	2.570**	0.010	0.038	2.460**	0.014
H10	-2.070	-4.210***	0.000	-2.047	-4.170***	0.000
CH_MEDIA	0.226	3.390***	0.001	0.205	3.030***	0.002
AveAGE				-0.033	-1.85*	0.064
_cons	-0.162	-0.750	0.452	1.402	1.600*	0.110
Pseudo R2	0.0442			0.0459		
N	1,453			1,453		

(***, **, and * represent $p < 0.01$, $p < 0.05$, $p < 0.1$, respectively)

7. Conclusion and discussion

This study provides a theoretical model and empirical evidence of effectual variables for detecting fraud. I developed the Five Factors Model for Fraud, based on prior studies that analyzed the causes of fraud. The five fraud factors are Motivation/Pressure, Opportunity, Attitude/Rationalization, Capability, and Exposure and Punishment. Motivation/Pressure refers to the economic or non-economic pressure that motivates managers for misconduct. Opportunity indicates the opportunity to realize fraud, which generally can be indicated by governance. Attitude/Rationalization refers to the process of rationalizing misbehaviors and also represents the ethical level of fraudsters. Capability means the fraudster's ability to realize, and use the opportunity for fraud. However, it is notable that the operating ability of the company may, simultaneously, be deficient. The final factor, Exposure and Punishment, highlights the adverse consequences of fraud to be considered by fraudsters. In this study, I included only two proxy variables of Exposure. Punishment variables are expected to be involved in further study. Besides the fraud factors, variables showing the manifestations of fraud are supposed to be added because the evidence of fraud cannot be neglected.

I conducted an analysis on 890 firms that committed financial statement fraud from 2007 to 2016, and investigate their characteristics. About 24 variables of the five fraud factors and four variables of manifestations of fraud are assumed to be related to fraud occurrence. The results in univariate logistic regressions show variables that are significantly associated with fraud in each group. The final model contains seven significant measures: price-to-earnings ratio, debt-to-equity ratio, dividend yield, the number of the board meetings, Herfindahl index of top 10 shareholders, changes in media coverage, and the average age of executives. Four non-financial variables are successfully included in the final results. This study sheds light on the use of non-financial variables in fraud detection, confirming that non-financial information can be used as a red flag of fraud. Stakeholders of the company can pay more attention to these four kinds of non-financial information in their decision-making process.

There are several limitations to this study. First, the paper provides a potential model for fraud detection, but the detection ability is not confirmed yet. Second, it is better to include punishment variables and examine whether they are helpful to detect fraud or not. Punishment factors are also expected to perform well in fraud detection. Additionally, as these involve external information, it is difficult to be tampered with by a particular company, thereby implying more reliability. Third, I regard both, misreporting and material omission, as the research objects. However, due to the nature of these two categories of misconduct, intentional misreporting is considered an active type of fraud because the fraudsters need to window-dress the financial statement

proactively. Material omission means that the fraudsters do not disclose complete information, omitting something that may affect stakeholders' decisions. Therefore, the falsification and manipulation of financial information are not necessary for the material omission. The techniques vary significantly in these kinds of fraud. Therefore, it is better to divide the observations into two groups to investigate their characteristics. The result can be different for varying groups. Finally, this study aims to find helpful measures to detect fraud, so most of the data are subject to fraud years. Besides detecting, predicting the risk of financial fraud in the future is also an issue that remains to be solved.

Therefore, further tests are needed for the confirmation of detecting accuracy. Involving punishment variables and division of fraud types are expected to be carried out in the further investigation. Building a prediction model is also expected to be undertaken in further studies.

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Appendix

Appendix 1: Variables definition

Table 8 Variables definition					
		Variables	Abbrevia tion	Pred. sign	Calculation
Dependent variable		Financial statement fraud	FRAUD		dummy variable equal to 1 for financial statement fraud year and 0, otherwise
Independent variables	Motivation /Pressure	Price-to-Book ratio	PB	+	Closing Price / (Ending Total Owners’ Equity / Ending Paid-in Capital)
		Price-to-Earnings ratio	PE	+	Closing Price / (Net Profit Released in Annual Report / Ending Paid-in Capital)
		Market-to-Sales ratio	MS	+	Market Value of Equity /Total Operating Revenue
		Tobin-Q	TQ	+	(Market Value of Equity + Total Liabilities) /Total Assets
		Consecutive losses	ConLoss	+	Equal to 1 if the net profit is negative for two consecutive years before the occurrence of fraud and 0, otherwise
		Fixed charge coverage	FIX	-	(Total Profit + Financial Expenses + Depreciation of Fixed Assets, Oil and Gas Assets, and Bearer Biological Assets + Amortization of Intangible Assets + Amortization of Long-term Deferred Expenses) / (Financial Expenses + Depreciation of Fixed Assets, Oil and Gas Assets, and Bearer Biological Assets + Amortization of Intangible Assets + Amortization of Long-term Deferred Expenses).

		Herfindahl-Hirschman Index	HHI	-	$HHI = \sum_i^N (X_i/X)^2$, where X is the total assets of the companies.
		Debt-to-equity ratio	DE	+	Total Liabilities / Total Owners' Equity
		Market debt-equity ratio	MDE	+	Total Liabilities / Market Value of Equity
		dividend yield	DY	-	Equal to 1 if the company pay dividend and 0 otherwise
	Opportunity	The proportion of independent directors to all directors	IND	-	The number of independent directors/the number of all directors
		The number of board meetings	MEETING	\	The number of board meetings in a year
		The meeting absence rate of independent directors	ABSENCE	+	The number of absences of the meeting by independent directors / the number of expected attendances of independent directors
		Internal control validity	VALID	-	Equal to 1 if the internal control is valid and 0 otherwise
		Herfindahl_10 Index	H10	\	Sum of squares of shareholding percentage of top ten shareholders
		Top 10 shareholding	TOP10	\	Sum of shareholding percentage of top ten shareholders
		Related party transaction	RELAT	+	The number of related party transactions during the year
	Attitude/Rationalization	CSR report issuance	CSRI	-	Equal to 1 if the company issued CSR report in the year
		Disclosure Willingness of CSR report	DW	-	Equal to 1 if the company voluntarily discloses CSR report
	Capability	Average age	AveAGE	\	The average age of all executives

		Average educational background AveEDU +	The average score of all executives, the points assigned to each degree are as below: 1 = Technical secondary school and below, 2 = Associate degree, 3 =Bachelor, 4 = Master, 5 = PhD Sum of the score of 13 indicators, 1 point will be assigned if one indicator is met. The 13 indicators are: (1)Certification(Inspected by the Third Party Institution or Not); (2)GRI(Referring to GRI Sustainability Reporting Guideline or Not); (3)Shareholders Protection(Disclosing Protection of Shareholder Interests or Not); (4)Big4(Auditor from Big Four Accounting Firms or Not); (5)Creditor Protection (Disclosing Protection of Creditor Interests or Not); (6)Staff Protection(Disclosing Protection of Employee Interests or Not); (7)Delivery Protection(Disclosing Protection of Supplier Interests or Not); (8)Customer Protection(Disclosing Protection of Interests of Clients and Consumers or Not); (9)Environment Protection(Disclosing Environment and Sustainability or Not); (10)Public Relations(Disclosing Public Relations and Social & Public Welfare or Not); (11)System Construction(Disclosing Social Responsibility System Construction and Improvement or Not); (12)Work Safety(Disclosing Safety Production or Not); (13)Deficiency Disclosing(Deficiencies of Company or Not)
		CSR score CSRS \	

	Exposure	Working places consistency of independent directors and listed firms	PCONSIS	-	Equal to 1 if the working place of independent director is consistent with the registered address of the listed company and 0, otherwise
		Changes in media coverage	CH_MEDIA	\	$CH_MEDIA = \left(MEDIA_t - \frac{MEDIA_t + MEDIA_{t-1} + MEDIA_{t-2}}{3} \right) / \frac{MEDIA_t + MEDIA_{t-1} + MEDIA_{t-2}}{3}$ Media coverage in year t is considered to be involved in minuend to decrease null value.
	Others	Changes in accounts receivable	CH_RE	+	Changes in accounts receivable/Total assets
		Total accruals	TATA	+	(Operating Profit - Net Cash Flow from Operating Activities)/Total assets
		The difference between revenue growth and employee number growth	DIFF_REVE	+	$DIFF_REVE = \frac{REVENUE_t - REVENUE_{t-1}}{REVENUE_{t-1}} - \frac{EMPLOYEE_t - EMPLOYEE_{t-1}}{EMPLOYEE_{t-1}}$
		The difference between net profit growth and employee number growth	DIFF_PRO	+	$DIFF_PRO = \frac{PROFIT_t - PROFIT_{t-1}}{PROFIT_{t-1}} - \frac{EMPLOYEE_t - EMPLOYEE_{t-1}}{EMPLOYEE_{t-1}}$
	Control	The size of the companies	SIZE	/	$SIZE = \log (Total\ Assets)$

Appendix 2: Correlation Matrix

Table 9 Correlation Matrix

	FRAUD	PB	PE	MS	TQ	ConLoss	FIX
FRAUD	1						
PB	0.046*	1					
PE	0.1098***	0.2695***	1				
MS	0.082***	0.3222***	0.2947***	1			
TQ	0.0052	0.7213***	0.2929***	0.453***	1		
ConLoss	0.0243	0.1845***	0.1691***	0.1283***	0.1062***	1	
FIX	-0.0728***	0.0932***	-0.1227***	0.0581**	0.0863***	-0.0237	1
HHI	0	0.0235	-0.0378	-0.0175	0.0174	-0.0178	0.0371
DE	0.1256***	0.1103***	-0.0401	0.024	-0.2079***	0.158***	-0.0594**
MDE	0.1021***	-0.366***	-0.1641***	-0.193***	-0.5377***	0.0277	-0.1112***
DY	-0.1652***	-0.1209***	-0.2437***	-0.1364***	-0.1008***	-0.2375***	0.1429***
IND	0.0062	0.0113	-0.0682***	0.0084	0.0365	-0.0093	0.0212
MEETING	0.0919***	0.0219	-0.0028	0.0265	-0.0236	-0.0269	0.0314
ABSENCE	0.0521**	0.0233	0.0201	0.0367	-0.0007	0.0319	-0.0448*
VALID	-0.0857***	0.0096	0.0113	-0.0097	-0.0212	0.0146	0.0092
H10	-0.117***	-0.0342	-0.0866***	-0.1737***	-0.1632***	-0.0252	0.0854***
TOP10	-0.0793***	0.0107	-0.1282***	-0.1752***	-0.1837***	-0.0757***	0.1579***
RELAT	0.0268	0.0171	-0.0226	-0.039**	-0.0034	0.0223	-0.0426*
CSRI	0.0318	0.0362	-0.004	0.0136	0.0253	0.0116	0.0086
DW	0.0449*	0.1026***	0.0797***	-0.048**	0.0413*	0.0744***	-0.1068***
AveAGE	-0.0498**	-0.1525***	-0.036	-0.0126	-0.068***	-0.0188	-0.0156
AveEDU	-0.0188	0.0874***	0.0072	0.0932***	0.0949***	0.078***	0.0819***
CSRS	-0.0277	-0.1368***	-0.0173	-0.0317	-0.0584***	-0.0576***	0.0609**
PCONSIS	-0.0268	-0.0017	0.032	-0.0195	0.02	-0.0214	0.0465*
CH_MEDIA	0.048**	0.1143***	0.0306	0.0133	-0.0023	-0.0249	0.0855***
CH_RE	-0.0583**	-0.1217***	-0.148***	-0.1322***	-0.0511**	-0.1495***	0.0433*
TATA	-0.0196	-0.0628**	-0.1444***	-0.0302	-0.0586**	-0.0783***	0.1723***
DIFF_REVE	0.0466*	0.1108***	0.0186	-0.0021	0.0408*	0.0768***	0.0673***
DIFF_PRO	-0.0612**	0.0376	-0.0551***	-0.0306	0.0216	-0.0981***	0.0714***
SIZE	0.0014	-0.3098***	-0.1878***	-0.1196***	-0.3382***	-0.1072***	0.0434*
	HHI	DE	MDE	DY	IND	MEETING	ABSENCE

HHI	1						
DE	0.0324	1					
MDE	0.0373	0.7163***	1				
DY	0.0881***	-0.2508***	-0.1358***	1			
IND	0.0525**	-0.0386*	-0.0507**	0.0581**	1		
MEETING	0.0251	0.1566***	0.1467***	0.0035	0.0148	1	
ABSENCE	-0.0364	0.0223	0.0057	-0.0696***	-0.005	0.0356	1
VALID	0.0041	-0.076***	-0.0666**	0.0552**	-0.0079	-0.0173	0.0144
H10	0.0498***	0.0378	0.117***	0.1102***	0.0499**	-0.017	-0.0224
TOP10	0.0837***	-0.1061***	-0.037	0.2713***	0.0331	-0.0171	-0.0196
RELAT	-0.0022	0.1137***	0.1628***	-0.0243	-0.0096	0.0761***	-0.0129
CSRI	-0.0068	0.0104	-0.0193	-0.0343	-0.0038	-0.0229	0.0122
DW	-0.0054	-0.1108***	-0.1716***	-0.0621***	-0.0177	-0.0975***	0.0343
AveAGE	-0.0586**	0.1071***	0.1658***	0.0004	0.0353	-0.0325	-0.053**
AveEDU	0.047*	0.0446*	-0.0173	0.0136	0.079***	0.1596***	-0.0078
CSRS	-0.0075	0.0234	0.0926***	0.1102***	0.0476**	0.082***	-0.0878***
PCONSIS	0.1108***	-0.0446*	-0.0432*	0.0702***	0.0123	0.0147	-0.0125
CH_MEDIA	-0.0099	-0.0677***	-0.1191***	0.0451*	-0.0572**	-0.0288	0.0456
CH_RE	0.0848***	-0.1234***	-0.0524**	0.2329***	0.0656***	0.0558**	-0.1227***
TATA	0.0427*	-0.1241***	-0.1118***	0.2232***	0.0817***	0.1297***	-0.0538**
DIFF_REVE	-0.0054	0.0633**	0.0074	-0.0476*	-0.0221	0.0895***	-0.0203
DIFF_PRO	0.0119	-0.0723***	-0.1028***	0.1781***	-0.0033	0.0212	-0.031
SIZE	0.0478**	0.4186***	0.5867***	0.1299***	0.033	0.2836***	-0.0657***

	VALID	H10	TOP10	RELAT	CSRI	DW	AveAGE
VALID	1						
H10	0.0351	1					
TOP10	0.0554**	0.6929***	1				
RELAT	-0.019	0.0342	-0.043*	1			
CSRI	-0.0054	0.0397*	0.0285	-0.0117	1		
DW	0.0208	-0.0112	0.0642***	-0.066***	.	1	
AveAGE	-0.0056	0.0361	-0.1025***	0.0876***	-0.0183	-0.1843***	1
AveEDU	-0.0021	0.0553**	0.0695***	0.0259	-0.0231	-0.0973***	-0.0287
CSRS	-0.0105	0.0394*	0.0358	0.109***	0.0784***	-0.3347***	0.2279***
PCONSIS	-0.0184	0.0669***	0.0189	-0.0254	-0.0337	0.0064	0.0489**

CH_MEDIA	0.0428	0.086***	0.1994***	-0.0684***	0.0185	0.0923***	-0.1568***
CH_RE	-0.0157	0.0589**	0.1703***	-0.023	0.0046	-0.0254	-0.0023
TATA	-0.0289	0.0615**	0.143***	-0.0174	-0.0257	-0.0311	-0.0753***
DIFF_REVE	-0.0716**	0.0203	0.0285	-0.0059	-0.0097	0.038	-0.0517**
DIFF_PRO	0.0796***	0.0055	0.0376	-0.0285	-0.004	-0.0063	0.0044
SIZE	-0.0267	0.1629***	0.0629***	0.1724***	-0.0574**	-0.3955***	0.3582***

	AveEDU	CSRS	PCONSIS	CH_MEDIA	CH_RE	TATA	DIFF_REVE
AveEDU	1						
CSRS	0.0793***	1					
PCONSIS	0.0741***	-0.0137	1				
CH_MEDIA	-0.0315	-0.1379***	-0.0204	1			
CH_RE	0.0154	0.088***	0.0853***	-0.0138	1		
TATA	0.0216	0.0336	0.0187	-0.0023	0.3676***	1	
DIFF_REVE	0.0064	-0.0498**	-0.0186	0.043*	0.1192***	0.0529**	1
DIFF_PRO	-0.0269	0.0098	-0.0222	0.0153	0.0878***	0.1239***	0.0271
SIZE	0.1517***	0.3605***	-0.0276	-0.1543***	0.0934***	0.0464*	0.0209

	DIFF_PRO	SIZE					
DIFF_PRO	1						
SIZE	0.0351	1					

(***, **, and * represent $p < 0.01$, $p < 0.05$, $p < 0.1$, respectively)

Chapter 3: Explore a new fraud factor beyond the Fraud Triangle

—How does capability affect misreporting behaviors?

Abstract: This study aims to develop a new framework by adding and exploring the rationality of a new fraud factor: Capability. The Fraud Triangle is a well-known theory for explaining why fraud occurs and consists of three factors: Motivation/Pressure, Opportunity, and Attitude/Rationalization. However, it has been criticized as inadequate for inclusively capturing fraud factors. To make the Fraud Triangle more comprehensive, a new factor, Capability, was proposed by previous studies. Capability refers to a certain degree of the ability to commit fraud, which is considered necessary to achieve fraud besides the Fraud Triangle. However, few studies have confirmed the effect of Capability on fraudulent decision-making. Especially for firm-level research, it is hard to involve individual factors like Capability in the analysis model. Therefore, to investigate how people's capability can affect fraudulent decision-making, and furthermore, to analyze the relationship between Capability and the Fraud Triangle's factors, an online experiment was conducted by this study.

In this study, participants were required to complete specific tasks, after which they reported on their performance. The capability to report a higher amount was linked to their actual task performance, aiming to simulate real-world scenarios of “promotion” and “positional advantage”. It was hypothesized that participants assigned with “capability” would be more inclined to misreport their performance. Although the results indicate an increased likelihood of misreporting among capable participants, the evidence is not overwhelmingly robust. Moreover, capability significantly influenced participants' perception of misreporting opportunities, potentially contributing to their inclination to misreport. The study also found that the presence of capability changed participants' attitudes. Specifically, it reduced feelings of guilt among those who engaged in misreporting, highlighting the impact of perceived capability on participant's ethics.

Keywords: Fraud Theory, Fraud Diamond, Capability, Online Experiment

1. Introduction

Financial fraud has always been an important social and academic concern in capital markets. It has many negative consequences, including not only economic losses but also potential non-property losses. For example, the stock prices of firms affected by fraud may slump and cause direct property losses among investors (Wang et al., 2019). Firms affected by fraud may also experience consumer boycotts or litigation from stakeholders, leading to financial losses for the firms themselves (Zeidan, 2013). In addition to direct monetary losses, the bankruptcy of a fraudulent company can negatively impact society by increasing unemployment (Zehra et al., 2005). Worse, the fraudulent behavior of public firms can result in a loss of public trust in the capital market, even causing the collapse of the stock market. The impact of fraud can therefore be serious and widespread, and proactive prevention is necessary.

The first step to preventing fraud is analyzing the causes of fraud. When the causes are clear, fraud can be prevented by considering each cause. As a basic theory of why fraudulent behavior occurs, the Fraud Triangle is widely used, by both current and former researchers (Huang et al., 2016; Nakashima, 2017; Sakawa and Watanabel, 2022). The Fraud Triangle was firstly introduced by American criminologist Cressey in 1953, including three factors: (1) Motivation/pressure, (2) Opportunity, and (3) Attitude/Rationalization. These are the three causal factors for fraudulent behavior (Dorminey et al., 2010). However, is the Fraud Triangle adequate to explain why fraud occurs?

Many researchers have attempted to complete the Fraud Triangle by proposing complementary factors. As one of the most influential studies on new fraud factors, Wolfe and Hermanson (2004) believe that, besides materially existing opportunities, the capability to make use of opportunities is also indispensable. They stress that opportunity means that “fraud is possible”; however, capability means “turn an opportunity for fraud into reality” (Wolfe and Hermanson, 2004, p.38). This new fraud factor model is called the Fraud Diamond, a model that provides researchers with a new perspective for studying fraud occurrence, adding Capability as a new fraud factor. Previous research investigating fraud opportunity focused mainly on corporate governance and internal control (Beasley, 1996; Chen et al., 2006; Donelson et al., 2017), which shows the influence of the external environment. However, when considering the causes of fraud, we must note that fraud is a behavior that originates from people. Therefore, not only should the material opportunity be considered, but how people can exploit an existing opportunity is also worthy of investigation.

However, whether Capability is adequate to be added as the fourth factor besides Fraud Triangle, is still not confirmed in academe. Educational background and age are considered to

reflect personal capability. The ACFE (Association of Certified Fraud Examiners)'s reports (2012, 2014, 2016, 2018, 2020, 2022) examine fraudsters' educational background, organizational positions, tenure, and age worldwide and state that fraudsters with higher educational degrees, higher positions, higher tenure lead to higher median losses, but without statistical analyses. Research using archival data to study Capability is at a very limited number and cannot provide valid evidence of the Capability's effect. Survey data can provide limited evidence. However, in the previous studies (Harrison et al., 2018; Latan et al., 2021), answerers' intention of misreporting or whistleblowing was measured by questionnaires, whether their answers truly reflect their actual behaviors remains unknown.

In one experimental study, Boyle et al. (2015) tasked auditors with evaluating fraud risk factors using both the Fraud Diamond and Fraud Triangle frameworks. The findings revealed that assessments based on the Fraud Diamond yielded significantly higher fraud risk evaluations compared to those using the Fraud Triangle practice aid. This suggests that auditors recognize capability as a critical fraud risk factor. However, the study did not directly observe actual fraudulent decision-making. Thus, designing an experiment that captures participants' actual misreporting behaviors could offer more reliable evidence. Finding appropriate proxy variables for Capability at firm-level is tough and some proxy variables may lead to unexpected results. There is a firm-level study arguing that the relationship between fraud occurrence and managerial capability (Wang et al., 2017).¹⁶ Utilizing a firm performance-related measure as a proxy for managers' capability, their study concluded that firms with highly capable managers are less prone to committing financial statement fraud. However, identifying suitable proxy variables for individual capability presents significant challenges. Consequently, an experiment incorporating a "capability treatment" and focusing on participants' actual misreporting behaviors may fill this research gap and contribute novel insights to this area of study.

In light of the foregoing explanation, an online experiment was conducted with the primary research interest being the investigation of the impact of individuals' capability on their decision to misreport. Wolfe and Hermanson (2004) categorize capability into five dimensions: Position,

¹⁶ If managers have the ability to discover opportunities, as described by Wolfe and Hermanson (2004), their managerial expertise and capability would not be as low. To address this issue, Wang et al. (2017) focused on managerial capabilities. According to the Fraud Triangle, managers are motivated to commit fraud when firms are in financial distress or face enormous financial pressure. When managers are more competent, the likelihood of a firm falling into financial distress is lower, and fraud motivation is reduced. In addition, regulators are more interested in firms with low managerial capability than in firms with high managerial capability, as the latter conveys information to outsiders that the firm's value is credible. Therefore, firms with highly competent managers are less likely to release fraudulent financial statements. Wang et al. (2017) use a sample of listed firms in China from 2007 to 2012 and test the correlation between fraud and managerial ability. Their empirical result supports this hypothesis.

Intelligence, Confidence, Authority, and Lie. Although the concept of capability can be multiple and various, this study focuses specifically on the aspect of capability akin to positional advantage.

The primary reason for examining the impact of positional advantage-like capability on misreporting behaviors is its controllability within an organization and its potential widespread effect across companies. Although lacking statistical analysis, the reports from the ACFE suggest a relation between fraudsters' positions and median losses incurred by fraud. Table 1 and Figure 1, using data from six ACFE reports, display the frequency and median financial losses attributed to fraudsters, segmented by their positions within the organization. It can be noted from the data that although the frequency of fraud perpetration by managers and owners/executives is lower than that of regular employees, the financial impact is significantly greater. Managers tend to cause losses that are 2-3 times higher than those caused by regular employees, while owners/executives can incur losses 4-5 times greater than managers. This disparity underscores the research importance of understanding the influence of positional capability on misreporting behaviors. Consequently, exploring the effects of positional capability is not only of theoretical relevance but also offers practical insights for readers in the field.

Table 1 Frequency, Median losses of the perpetrators by ACFE

	2012	2014	2016	2018	2020	2022
<i>Frequency of perpetrator based on position</i>						
Employee	41.60%	42.00%	40.90%	44.00%	41.00%	37.00%
Manager	37.50%	36.20%	36.80%	34.00%	35.00%	39.00%
Owner/Executive	17.60%	18.60%	18.90%	19.00%	20.00%	23.00%
Other	3.20%	3.20%	3.40%	3.00%	3.00%	2.00%
<i>Median losses by perpetrator based on position</i>						
Employee	60,000	75,000	65,000	50,000	60,000	50,000
Manager	182,000	130,030	173,000	150,000	150,000	125,000
Owner/Executive	573,000	500,000	703,000	850,000	600,000	337,000
Other	100,000	250,000	104,000	189,000	230,000	133,000

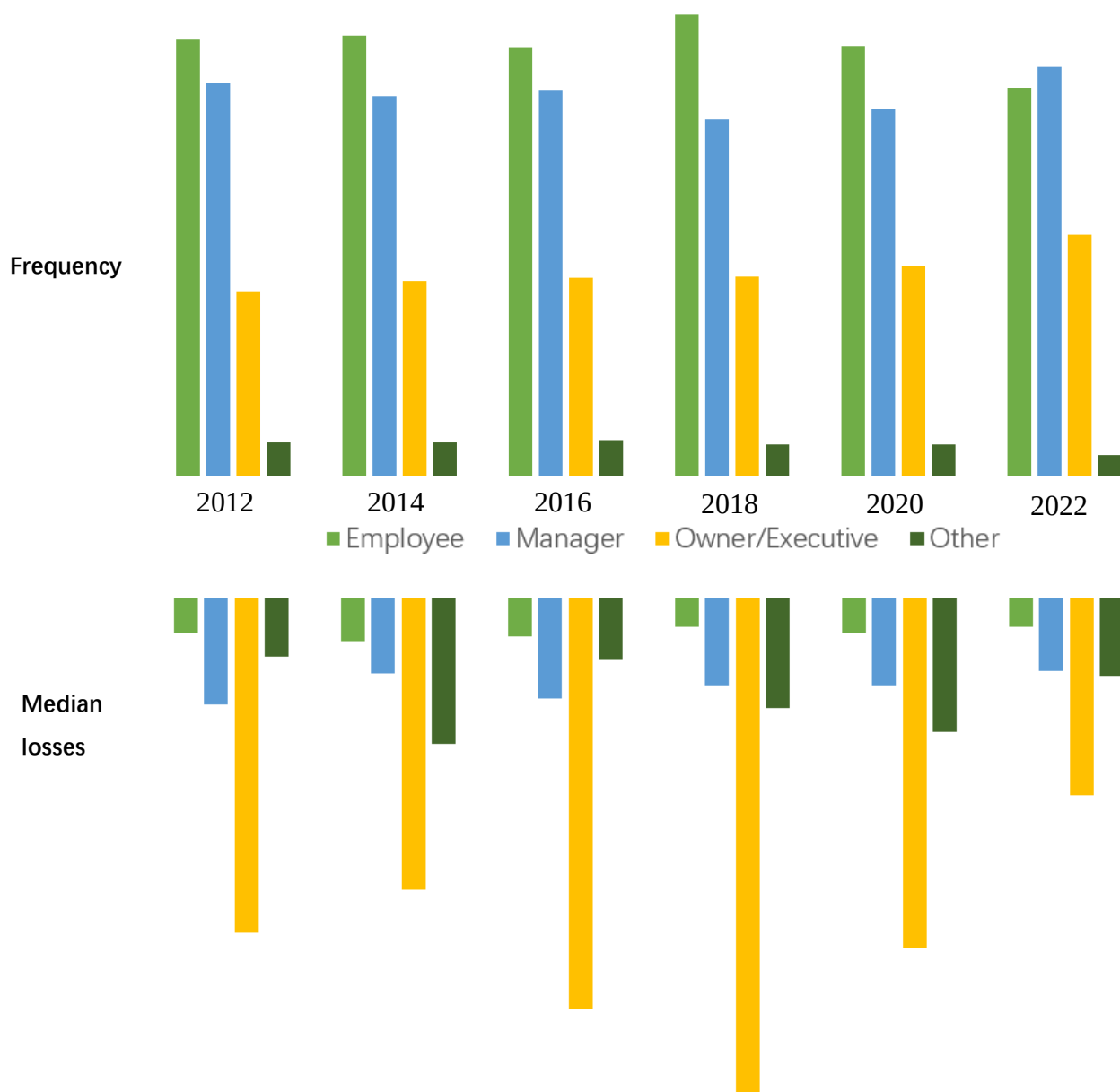


Figure 1 Frequency and Median losses of the perpetrators by ACFE

Another reason for focusing exclusively on capability akin to positional advantage is that two other forms of capability have already been somewhat explored in previous research. The influence of authority on misreporting behaviors has been explored in an experimental study by Mayhew and Murphy (2014). Schrand and Zechman (2012) employed multiple proxy variables for managers' overconfidence in a firm-level study to illustrate its potential link to fraudulent

activities. Additionally, considering practical constraints, it is challenging to access and measure intelligence and capability to lie through an experiment. Consequently, this experiment utilizes a directly assigned form of capability to mirror real-world scenarios more effectively. Therefore, capability for misreporting was directly assigned to participants who performed well in the task, simulating a promotion scenario in a real-world company setting.

Participants who performed above the average level in this study were endowed with the capability to report higher amounts during the reporting process. Performance was evaluated using a slider task, a straightforward task that requires participants to move the slider to the center using their mouse. This task, proposed by Gill and Prowse (2012), represents a real effort task in experimental settings. While previous studies, such as those by Murphy (2012) and Mayhew and Murphy (2014), have used quizzes to assess participant performance, the slider task offers simplicity and clarity, reducing potential ambiguities in understanding for participants. Recently, the accounting research field has also begun to adopt this slider task as a method for evaluating participants' performance (Sawada, 2021). Therefore, this study employs the slider task to assess participants' performance and subsequently provides those above the average level with the capability to examine their reporting behaviors.

Participants in this study were initially asked to report their performance without the "capability" condition and then to report again under the "capability" context. The hypothesis was that participants, who were endowed with this assigned capability, would tend to report higher performance figures during the second reporting. Furthermore, the experiment investigated the association between Capability and other elements of the Fraud Triangle. It was posited that Capability could influence misreporting behavior by enhancing the perceived opportunity for fraudulent actions, thereby potentially leading to misreporting. Additionally, it was hypothesized that Capability might increase the participants' propensity towards unethical attitudes. Given that this study is conducted beyond the Fraud Triangle, elements within this framework (namely Motivation, Opportunity, and Attitude) were examined and controlled for in the analysis. Other factors that might impact misreporting behaviors were also assessed and controlled for in this research.¹⁷

Based on the study results, it was observed that the positive effect of capability on misreporting decision-making is proven to some extent. Participants with capability are more likely to misreport, although the effect was not overwhelmingly strong. Surprisingly, a negative relationship was observed between participants' fondness for money and their propensity for

¹⁷ Other control variables considered in this study include participants' attitudes towards money, the actual complete number during the slider task, and their initial reporting behaviors. Additionally, demographic characteristics such as age, sex, and employment status were also considered as control variables.

misreporting. To address this unexpected result, an additional test was conducted using a revised proxy variable for attitudes towards money, focusing on their financial incentives. This adjustment leads to the results that are more closely with initial expectations.

Furthermore, the study clearly demonstrated the impact of capability on other elements of the Fraud Triangle. It revealed that participants with capability perceived and greater opportunity for misreporting. However, they also recognized that their actual opportunities for misreporting remained unchanged, despite this perceived increase. In terms of attitudes, the presence of capability was found to reduce feelings of guilt among participants who misreported, suggesting a greater tolerance for such behavior.

The findings of this study highlight the complex interaction between capability and the factors of opportunity and attitude within the Fraud Triangle framework. While capability may not remarkably influence misreporting behavior, considering its significant effect on perceived opportunities and the increase of unethical attitudes, it is reasonable to consider it as a potential fraud factor and include it in assessments of fraud risk.

2. Theory and Hypotheses

2.1 The Fraud Triangle

The Fraud Triangle was proposed by American criminologist Donald R. Cressey (1953) with the fraud factors of (1) Motivation/Pressure, (2) Opportunity, and (3) Attitude/Rationalization. According to Dorminey et al. (2010, 2012), when the Fraud Triangle was first raised, Pressure referred to the financial pressure that could not be shared with others; examples include sudden financial shortfalls and unexpectedly high medical bills. Furthermore, this pressure becomes non-shareable because people with big egos or high pride are reluctant to ask others for help or to share their problems. Next, Opportunity refers to the possibility of perpetrating fraud, as perceived by potential fraudsters. Weak internal controls and unethical working environments can generate opportunities for potential fraudsters. Finally, although fraudsters are aware that their wrongdoing is unethical and even illegal, they will try to avoid the feeling of having done something wrong, and will be willing to search for reasons to rationalize their wrongdoing. The joint effect of these three factors leads potential perpetrators to commit fraud. In summary, under certain motivations or pressures, if a person finds an opportunity to solve their problems by fraud, and if they can persuade themselves that it is reasonable enough to do this, fraudulent action can be generated. The Fraud Triangle is the most generally accepted theory that explains why fraud occurs.

2.2 Fraud Diamond and Capability

Although the Fraud Triangle is still the most widely used theory in fraud research, it has been pointed out that it may not be sufficiently comprehensive in terms of fraud factors. The Fraud Diamond—proposed by Wolfe and Hermanson (2004)—is a subsequent theory that attempts to complete the Fraud Triangle. According to Wolfe and Hermanson (2004), perpetrating fraud usually requires the capability to make use of existing opportunities. Under the same external condition, for people who are equipped with “the capability to turn a possibility into reality,” fraud can be easier to realize (Wolfe and Hermanson, 2004, p.38).

They provide an assumptive example of how CEOs can make use of their expertise and position to commit fraud: A CEO finds that there is an internal control flaw in the sales system, which makes it possible for the contract date to be artificially tampered with. The CEO can then use his positional authority to force the CFO to change the contract date so that sales revenue can be confirmed earlier, while a normal employee cannot do so. It follows, then, that if a CEO cannot recognize the existence of a fraud opportunity, they cannot commit fraud. In this context, a higher position and expertise can represent a higher capability and success rate. High capability is needed to perpetrate fraud, and it can increase the feasibility of fraudulent behavior. Considering the above, Capability is selected as the fourth fraud factor, to demonstrate its reasonability by reviewing previous studies.

Wolfe and Hermanson (2004)’s proposition arouse interest both in academic and practice (Free, 2015, Harrison et al., 2018; Rustiarini et al., 2019), but has not been officially applied by audit bodies on a large scale (Free, 2015). Harrison et al. (2018) conducted a survey to examine the effects of perceived capability. They measured the participants’ perceptions of their capabilities and investigated how perceived capabilities related to perceived opportunity and willingness to rationalize. They received 303 usable responses and the results show that both perceived opportunity and willingness of rationalization are positively and significantly related to perceived capabilities. There are researchers studying similar factors of Capability. Albrecht et al. (2015) provide propositions about the effects of power on financial statement fraud. Power includes personal power and social power, which are believed to influence the fraud decision. Personal power refers to the ability that enable a person to achieve his will and social power means the ability to control external resources and outcomes. They state that people with greater power may be more likely to commit fraud by feeling external pressure and perceiving opportunity more easily. Following the fraud diamond model, Latan et al. (2021) also use a survey result to prove that capability can also positively affect people’s whistleblowing intention, which extends the scope of the capability’s application.

2.3 Research questions and hypotheses

2.3.1 The effect of Capability on misreporting

The primary research question of this study is to confirm the effect of “Capability” on fraudulent behaviors and subsequently, and the rationality of including it as a new factor in fraud analysis. The criterion for confirming its effect is whether the occurrence of fraud is significantly higher with assigned capability compared to the situation without such capability. As mentioned in Wolfe and Hermanson (2004), the connotations of “Capability” can be realized through five different aspects: Position, Intelligence, Confidence, Authority, and Lie. From their explanation, positional capability means the capability that enables a person to use their role in an organization to commit fraud. Intelligence means smart enough to understand and exploit weak spots in internal control. Confidence refers to the belief that they won’t get caught or can get out of trouble. Authority means they can force others into fraud. Lie is about effectively and consistently deceiving others.

In previous studies examining capability, most have relied on survey responses as proxy variables to measure capability (Latan et al., 2021, Harrison et al., 2018).¹⁸ In this study, “Capability” was not measured through survey responses, nor was it based on individual intelligence, personal confidence, authority, or the ability to deceive effectively. Instead, “Capability” was directly assigned through experimental conditions designed to mimic “promotion” in real-world scenarios, primarily reflecting the “Position” dimension of capability. This approach allowed for an objective confirmation of the existence of such capability. It is hypothesized that participants with assigned capability are more prone to engage in fraudulent reporting. Besides, to investigate “Capability” as a critical factor alongside the traditional elements of the Fraud Triangle (i.e., Motivation, Opportunity, and Attitude), these factors will also be examined and controlled.

Hypothesis 1: Individuals are more likely to misreport when they are told that they have the capability to misreport, with other factors held constant.

2.3.2 The associations between Capability, Opportunity and misreporting

Another research focus of this study is to elucidate the relationship between Capability and other elements of the Fraud Triangle. Examining the impact of Capability on these factors is particularly intriguing. Capability is often challenging to distinguish from Opportunity. A key

¹⁸ Latan et al. (2021) employed statements like “Being in a good position to speak out”, “Having the confidence to disclose it”, and “Mental ability to think effectively about speaking out” to gauge participants' capability. Similarly, Harrison et al. (2018) utilized phrases such as “I am confident I have the skills...” and “I have the skills necessary to...” for assessing capability. However, while survey responses may reflect participants' personal perception of their capability, they may not accurately represent objectively existing capabilities, particularly those akin to positional advantage.

distinction is that while Opportunity is an external factor for fraudsters, often linked to organizational weaknesses, Capability reflects an individual's personal attribute to exploit these weaknesses (Boyle et al., 2015). Despite this, there is an insufficiency of research investigating the potential association between Opportunity and Capability. This study hypothesizes that both Capability and Opportunity influence misreporting behaviors. Beyond their direct effects on misreporting, it is hypothesized that Capability may lead individuals to perceive greater opportunities, thereby increasing the likelihood of misreporting. Conversely, individuals lacking Capability may not perceive sufficient opportunities, reducing the chance of fraudulent activity. Thus, Opportunity acts as a mediating factor in this relationship.

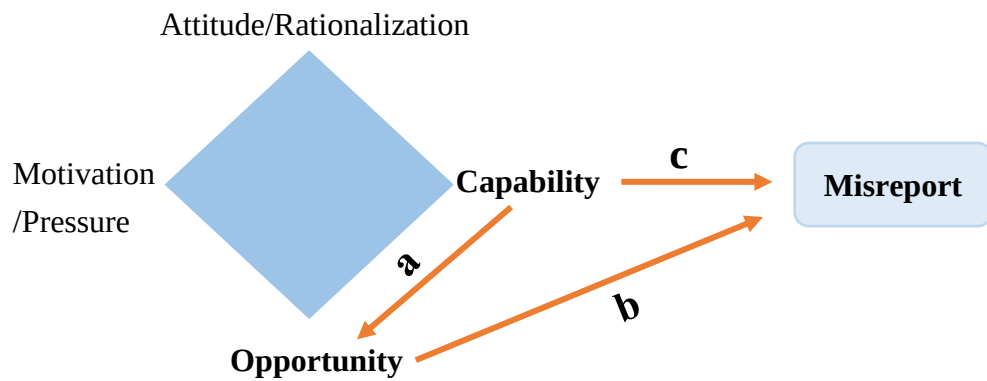


Figure 2 Associations between Capability, Opportunity, and Misreport

The potential relationship between Capability, Opportunity, and Misreporting is illustrated as above. The orange arrows in the figure refer to the influence. It is important to note that this analysis primarily focuses on the relationship between Capability, Opportunity, and Misreport. However, the other two factors, Motivation/Pressure and Attitude/Rationalization, also have impacts on misreporting behaviors separately, though these are not depicted in this figure.

Path “c” in Figure 2 indicates that Capability has a direct impact on misreporting behaviors. In contrast, paths “a” and “b” suggest that Capability first leads to an increased perception of Opportunity, which in turn causes misreporting. While Hypothesis 1 examines path “c”, Hypothesis 2 aims to confirm whether a mediating effect exists in the relationship between Capability and Opportunity.

Hypothesis 2: The association between the capability to misreport and misreport behavior will be mediated by the participants’ perceived opportunity.

2.3.3 The effect of capability and actual misreporting on participants’ attitude changes

The subsequent hypothesis is regarding the relationship between Capability and Attitude. Although participants’ attitudes toward general misreporting behaviors were assessed before the

“Capability assignment”, it is hypothesized that their ethical perceptions may shift following this assignment. To capture this dynamic, participants’ attitudes are categorized into pre-attitude and post-attitude. The pre-attitude reflects responses from the initial survey, while the post-attitude is gauged through a post-questionnaire. This post-questionnaire includes statements of “I felt that reporting higher was more acceptable if I had the special capability” and “I felt less guilt about reporting higher if I had the special capability”, with responses measured on a 7-point Likert scale. Scores exceeding the median level (i.e., a score of four) are interpreted as unethical attitudes. The post-attitude, measured using these assumptive statements, allows for the assessment of both misreporters and honest reporters.

Figure 3 illustrates the hypothesized relationship between Capability and Attitudes. The orange arrows represent the impact of capability and actual misreporting on participants’ post attitudes, while the blue arrows merely refer to the experiment process. The acquisition of assigned capability and whether the participants actually misreported, are supposed to contribute to a more tolerant attitude towards misreporting.

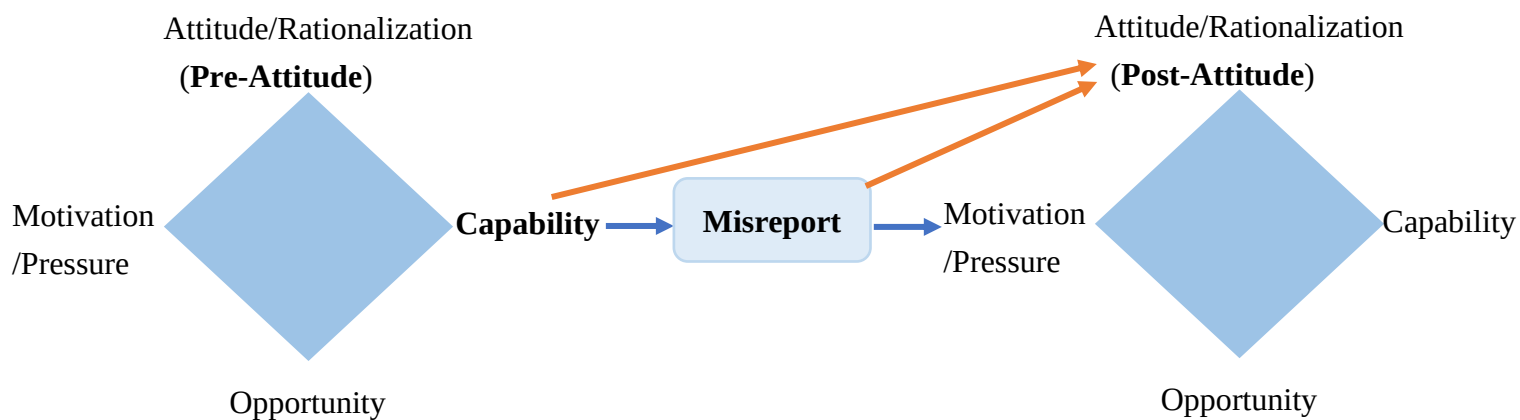


Figure 3 The effect of capability and actual misreporting on participants’ attitude changes

Initially, it is expected that misreporters will exhibit less guilt for their misreporting behaviors, aligning with the premise that ethical individuals experience guilt and discomfort when engaged in wrongdoing (Murphy, 2012; Mayhew and Murphy, 2014). Mayhew and Murphy (2014) referenced neuroscience research to indicate that feelings of guilt and discomfort can deter unethical behavior, but if these emotional impacts are minimal, individuals may act unethically.

Consequently, this study operates under the assumption that individuals who engage in misreporting experience less guilt than those who report honestly. Inversely, individuals who exhibit lower levels of guilt and discomfort are more inclined to act unethically. Thus, this study hypothesizes that participants who misreport will exhibit less guilt and more acceptance of their misreporting behaviors compared to the honest participants.

Hypothesis 3a: Misreporting individuals will feel less guilt (more tolerant attitude) about misreporting behaviors than honest individuals (All participants).

Regarding the impact of capability on participants' attitudes, it is hypothesized that misreporters with capability will exhibit more unethical attitudes than those without capability. Murphy (2012) investigated the influence of Machiavellian traits¹⁹ on participants' emotions and discovered that individuals with higher Machiavellian tendencies who misreported felt significantly less guilt compared to other misreporters. Similarly, Mayhew and Murphy (2014) examined the effect of authority (e.g., being instructed to misreport by a boss) on misreporters' feelings. They found that individuals instructed to misreport experienced less guilt and discomfort than those who misreported without such instruction. In line with these findings, this study posits that capability may diminish the guilt felt by misreporters, making their actions seem more acceptable. Consequently, misreporting participants endowed with capability are expected to experience less guilt about their misreporting behaviors compared to misreporters who lack such capability.

Hypothesis 3b: Misreporting individuals who are told to have the capability to misreport will feel less guilt (more tolerant attitude) about misreporting behaviors than misreporters who have no capability to do so (Misreporters only).

3. Research method

I conducted an experiment to investigate how people will act when they are assigned with the capability. I used oTree to create webpages that include all the procedures and recruit participants from Prolific. oTree is an open-source platform for researchers to implement online experiments (Chen et al., 2016). All participants were sourced through Prolific, a crowdsourcing service assisting researchers in recruiting participants from specific regions. I targeted individuals living in North America, given that most prior studies were conducted there. Additionally, I established English as a screening criterion to ensure participants' language proficiency and comprehension of the experiment.

¹⁹ Machiavellianism is a character trait that views and manipulates others for their self-interest, and often act opportunistically (Murphy, 2012).

I conducted the formal experiment and collected data from 202 participants in August 2023.²⁰ To avoid bias, those who had previously taken part in my pilot study were excluded. Ten participants' data were deleted. One was deleted for not reporting the number but one sentence, and one was deleted for a calculation question wrong.²¹ Two were deleted because they reported number less than the actual slider completion, and it was confirmed that they are typos by directly contacting the participants. Six were deleted because they completed 0 slider. The final sample contains 192 people.

3.1 Experiments design

In my experiment, participants are first required to read the consent form and instruction page to ensure they understand the experiment procedure. Each experiment includes two tasks. The first task is to answer the questionnaire, with a fixed payment of \$ 2.00. There are 10 questions regarding participants' attitudes towards misreporting, and 27 questions regarding their attitudes towards money. Another 9 questions are distractions.²² Participants' attitudes towards misreporting and money are considered to be control variables. This task is aiming to get data on these two measures. The details of the survey can be referred to Appendix 1.

The attitude survey towards misreporting is taken from Murphy (2012) and all the questions are scenarios about misreporting behaviors. For example, participants read the scenario "I have been tempted to overstate my credentials on college applications" and choose their level of agreement. There are seven levels of agreement, from 1 = strongly disagree to 7 = strongly agree, and four is the neutral choice. When the average score of a participant exceeds four, it indicates that this participant is favoring misreporting behaviors (Murphy, 2012).

The other attitude survey towards money is from Tang (2016), which analyzes the relationship between an individual's attitudes toward money and ethical decision-making. He used a survey to test participants' Monetary Intelligence (MI). This survey contains 27 items and is scaled to five dimensions: (1) disagree strongly, (2) disagree, (3) neutral, (4) agree, and (5) agree strongly. Because attitudes towards misreporting and money are tested in one survey, so I changed the scale to 7-point Likert scale, to stay the same with Murphy (2012)'s survey. MI scores can be calculated in three dimensions: Affective (affective love of money motive), Behavioral (the stewardship

²⁰ Before the formal experiment, I conducted a pilot study among five students majoring in business and twenty English native speakers to confirm if the experiment's contents could be smoothly understood by potential participants. The formal experiment was conducted after collecting feedbacks from the pilot study.

²¹ A calculation question was included in the survey to assess whether participants responded seriously and attentively. Responses with incorrect answers to this calculation question were deemed inattentive, and as a result, the associated data were excluded from the analysis.

²² Distracter questions were used to minimize the likelihood that participants could guess the connection between the survey and the experiment's objective, following Murphy's (2012) manipulation method.

behavior), Cognitive (cognitive meaning of money), and an overall MI score, which is the average of the three dimensions. According to Tang (2016), high love of money motive is negatively related to making ethical decisions, which implies that high love of money motive is positively related to unethical decisions. Therefore, considering the effect of money on people's decision-making, controlling people's attitudes toward money is also necessary.

After finishing this questionnaire, participants are asked to complete the second task. The second task is called the slider task, which simply requires participants to move each slider to the middle position as much as possible (Sawada, 2021). One achievement is considered to be equal to \$0.10. Participants were told that "the payment will be totally based on your report" several times, which implies that participants are permitted to report any numbers, offering them the opportunity to misreport. Participants practiced twice and did the formal slider task for 90 seconds, and then, were asked to report their performance.

After the first report, participants were measured by their real performance, and participants who achieved over a certain number of sliders²³ were told that they possessed the "capability to report a higher number". Participants who achieved less than a certain number of sliders were told that they didn't have the "capability to report a higher number".²⁴ 92 people get the special capability among 200 participants. Then, participants were asked to report their performance for the second time. This aimed to manipulate participants' capability and examine whether they would be more likely to misreport if they got the higher capability. This manipulation is modified following the manipulation showed in Mayhew and Murphy (2014), which investigated the effect of authority and asked the participants to report twice before and after the appearance of authority.

After the two tasks, participants were asked to answer a post-questionnaire with 9 questions to check if they perceived that they got enough motivation and opportunity in this experiment. Participants' perceptions about capability and the factors in the Fraud Triangle were asked too.

Details of the experiment procedures and questions in post questionnaire are provided in Appendix 2 and Appendix 3. Appendix 4 presents the screenshot of the actual slider task's page.

3.2 Variables and analyses

The effect of Capability will be assessed within the context of the Fraud Triangle. Firstly, I will verify that participants were adequately motivated and given sufficient opportunities for

²³ The certain level of slider number that endues participants with the Capability varies during the experiment. This experiment is not a real-time system, therefore to make sure that there are enough participants who can get the "special capability", I set 33 sliders as the 50% level number due to the pilot study and recruited 50 participants first. I adjusted it to 30, 28, and 26 and recruited 50 participants for each slider number level.

²⁴ The assignment of capability to participants was not random but rather based on the performance of the slider task, in order to mimic real workplace scenarios, where individuals with better performance are more likely to receive promotions.

misreporting, ensuring the experiment's settings are appropriate. Participants who believe they didn't receive enough motivation or opportunity will be excluded from the analyses. As for the Attitude, participant's attitudes towards general misreporting behaviors were evaluated through the survey in task 1 and serve as a control variable in the analysis. After the exclusion, Hypothesis 1 will be addressed using the subsequent regression function. Both the dummy variable indicating whether participants misreported and the degree of misreporting are considered to be used as dependent variables in this study.

$$\text{MIS} = \beta_0 + \beta_1 \text{TREAT} + \beta_2 \text{MIS}_1 + \beta_3 \text{NUMBER} + \beta_4 \text{ATT}_1 + \beta_5 \text{ATT}_2 + \beta_6 \text{MOTIVE} + \beta_7 \text{OPPO} + \beta_8 \text{AGE} + \beta_9 \text{SEX} + \beta_{10} \text{STATUS} + \varepsilon \quad \cdots \text{Model 1}$$

$$\text{MISRATE} = \beta_0 + \beta_1 \text{TREAT} + \beta_2 \text{MIS}_1 + \beta_3 \text{NUMBER} + \beta_4 \text{ATT}_1 + \beta_5 \text{ATT}_2 + \beta_6 \text{MOTIVE} + \beta_7 \text{OPPO} + \beta_8 \text{AGE} + \beta_9 \text{SEX} + \beta_{10} \text{STATUS} + \varepsilon \quad \cdots \text{Model 2}$$

The first dependent variable is MIS, which indicates the participants' final decisions of misreporting or not. MIS equals 1 if the participant misreported in the second report, 0 otherwise. The second dependent variable is MISRATE, which captures the magnitude of the misreporting amount, calculated as the misreported amount divided by the correct number. The misreported amount refers to the difference between the correct number and the reported number.

Regarding the independent variable, TREAT represents the treatment in the experiment, equal to 1 if the participants were told that they get the capability. The other nine variables serve as control variables here. MIS₁ is a dummy variable that equals 1 if the participant misreports in the first report, 0 otherwise. How participants act in the first report are considered to be connected with their behaviors in the second report, therefore the first reporting behaviors are used as a control variable. NUMBER equals the actual slider completion that the participants achieved in the slider task. This study sets NUMBER as a control variable following the consideration by Mayhew and Murphy (2014), which asserted that individuals are less likely to misreport if they can originally earn more money based on their task performance.

Three factors in the Fraud Triangle, namely the participants' attitudes towards misreporting behaviors (ATT₁), participants' perception of motivation (MOTIVE), and perceived opportunity (OPPO), are also treated as control variables. ATT₁ refers to the participants' attitudes towards misreporting behaviors, measured by the mean value of the corresponding responses in the survey, ranging from 1 to 7. MOTIVE refers to the motivation perceived by the participants, assessed using the average value of responses to three statements: "I was motivated enough to perform well", "I was motivated by money" and "I was motivated by outperforming others", ranging from 1 to 7. OPPO refers to the misreporting opportunity perceived by the participants, tested through

the statement of “I was given the opportunity to report more in this experiment and be paid that amount, regardless of how many sliders I actually finished. (as the statement like “The payment will be totally based on your report””, ranging from 1 to 7.

Besides, participants’ attitudes towards money (ATT_2) and their demographic information are used as control variables, too. ATT_2 refers to the participants’ attitudes towards money, assessed by the mean value of the corresponding responses in the survey, ranging from 1 to 7. AGE equals to participants’ age. SEX equals 1 if participants are male, and 0 otherwise. STATUS refers to participants’ working status, equals 1 if participants are employed, 0 otherwise.

Hypothesis 2 focuses on the relationship between Capability and opportunity. Capability is often considered to be related to Opportunity, and it is not clear whether Capability will affect the misreporting behaviors independently, or influence the perceived opportunity and then lead to misreporting behaviors. Besides the direct impact on misreporting, the relationship between Capability and misreporting behaviors is considered to be mediated by opportunity as well in this study. People with higher capability may think they have higher opportunities, therefore leads to misreporting behaviors. In Hypothesis 2, Opportunity is supposed to serve as a mediator between capability and misreporting behaviors.

The analysis of Hypothesis 2 follows Baron and Kenny’s (1986) three-step process.

Step 1: Regress mediator on the independent variable to confirm the effect of capability on opportunity.

$$OPPO = \beta_0 + \beta_1 TREAT + \varepsilon$$

Step 2: Regress the dependent variable on the independent variable.

$$MIS = \beta_0 + \beta_1 TREAT + \varepsilon$$

Step 3: Regress the dependent variable on the independent variable and mediator.

$$MIS = \beta_0 + \beta_1 TREAT + \beta_2 OPPO + \varepsilon$$

MIS is the dependent variable that equals 1 if the participant misreports in the second report, 0 otherwise. $TREAT$ is the independent variable in this experiment, equal to 1 if the participants were told that they get the capability. $OPPO$ reflects the participant’s perception of the magnitude of the opportunity, ranging from 1 to 7.

Hypothesis 3 focuses on the relationship between Capability and Attitude. H3a supposes that among all participants, misreporting individuals will feel less guilt about misreporting behaviors than honest individuals, tested by the following function.

$$ATT_3 = \beta_0 + \beta_1 MIS + \varepsilon$$

H3b supposes that among the misreporters, misreporting individuals who are told to have the capability to misreport will feel less guilt about misreporting behaviors than misreporters who have no capability to do so. This hypothesis was tested only in misreporters group.

There are three steps to investigate H3b. In step A, I conducted t-tests of differences in post-attitudes towards misreporting between misreporters and honest reporters. In step B and step C, I conducted two regressions by the following two models.

Step B: Linear regression of guilt (misreporters only)

$$\text{LESSGUILT} = \beta_0 + \beta_1 \text{TREAT} + \varepsilon$$

Step C: Linear regression of acceptance (misreporters only)

$$\text{ACCEPT} = \beta_0 + \beta_1 \text{TREAT} + \varepsilon$$

Regarding the variables used here, *TREAT* is the treatment in the experiment, equal to 1 if the participants were told that they get the capability. *LESSGUILT* refers to the extent to which the participants feel less guilt when they have capability, ranging from 1 to 7. *ACCEPT* is the extent to participant's acceptance of misreporting behaviors when they have capability, ranging from 1 to 7. *ATT₃* is calculated as the average of *LESSGUILT* and *ACCEPT*, represents the overall attitudes towards misreporting based on the context of capability, ranging from 1 to 7.²⁵

4. Results

4.1 Manipulation checks

The first aim of this research is to examine whether Capability can affect people's misreporting behaviors besides the Fraud Triangle. Therefore, checking if the experiment setting gave the participants enough motivation and perceived opportunity is necessary. I prepared nine statements in the post-questionnaire and four of them are related to motivation and perceived opportunity. Participants have to answer with a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Response excesses 4 are considered that participants agree with the statements. The result of this test is shown in Table 2. There are 3 statements related to motivation. The first statement is "I was motivated enough to perform well", with a mean point equal to 6.125 (standard deviation of 1.046), significantly higher than the midpoint of 4 ($p=0.0000$). The second statement and the third statement are "I was motivated by money" and "I was motivated by outperforming others", investigating where the motivation comes from. The mean points of "motivated by money" and "motivated by outperformance" are 5.375 (standard deviation of 1.652) and 4.775 (standard deviation of 1.866) respectively, both significantly higher than the midpoint of 4 ($p=0.0000$). Therefore, it can be verified that participants got sufficient motivation in this experiment.

The statement regarding opportunity is "I was given the opportunity to report more in this experiment and be paid that amount, regardless of how many sliders I actually finished (as the

²⁵ Appendix 5 provides the definitions of all variables used in this study, including those used in additional tests.

statement like “The payment will be totally based on your report.”). The mean response for this statement is 6.105 (standard deviation of 1.419), significantly higher than the midpoint of 4 as well ($p= 0.0000$), suggesting that participants felt they were provided with an opportunity in this experiment. This confirms the appropriateness of the experiment's setting.

Table 2 T-tests of Motivation and Opportunity

	Statements	Obs.	Mean	Std. dev.	t-statistic	p (one-tailed)
Motivation	I was motivated enough to perform well.	192	6.135	1.040	28.459	0.000
	I was motivated by money.	192	5.422	1.623	12.143	0.000
	I was motivated by outperforming others.	192	4.750	1.887	5.508	0.000
Opportunity	I was given the opportunity to report more in this experiment and be paid that amount, regardless of how many sliders I actually finished. (as the statement like “The payment will be totally based on your report.”)	192	6.172	1.352	22.253	0.000

4.2 Descriptive statistics

Table 3 contains the descriptive statistics of all the variables.

Table 3 Descriptive statistics

Variable	Obs.	Mean	Std. dev.	Min	Max
MIS	192	0.354	0.480	0	1.000
MISRATE	192	3.005	36.920	0	511.821
TREAT	192	0.474	0.501	0	1
MIS ₁	192	0.198	0.399	0	1
NUMBER	192	28.406	9.747	3	48
MOTIVE	192	5.436	1.133	1	7

OPPO	192	6.172	1.352	1	7
ATT ₁	192	2.965	1.142	1	7
ATT ₂	192	5.079	0.838	2.481	6.963
ATT ₃	192	3.896	1.985	1	7
LESSGUILT	192	3.734	2.124	1	7
ACCEPT	192	4.057	2.115	1	7
AGE	192	40.203	12.775	19	76
SEX	192	0.526	0.501	0	1
STATUS	192	0.729	0.446	0	1

MIS refers to misreporting behaviors in the second report, which equals 1 if the participant misreported. 68 participants finally chose to misreport in the experiment. The numbers of actual slider completions range from 3 to 48, with a mean value of around 28. The upper limit of the MISRATE should be 1 because the participants are told that they can report no higher than two times of the real completion number. However, it shows that multiple participants reported higher than two times and the max value is over 511. Therefore, following the setting of the experiment, the MISRATE that excess 1 will be revised as 1, which is in line with the actual payment, too.²⁶

TREAT equals 1 if the participants get capability, 0 otherwise. 91 participants were told they get the special capability to report higher. As for the control variables, the number of participants who misreported in the first report is 38. The mean value of MOTIVE, which is assessed based on response to three statements, is 5.436 (standard deviation of 1.133). The average point of participant attitudes towards misreporting is 2.965 (standard deviation of 1.142), significantly lower than the midpoint of 4 ($p = 0.0000$), indicating that most of the participants are ethical. The average response of attitudes towards money is 5.079 (standard deviation of 0.838), significantly higher than the midpoint of 4 ($p = 0.0000$), suggesting that generally participants are fond of money.

ATT₃, LESSGUILT, and ACCEPT were tested as the post-attitudes in the experiment. The mean values of these three variables are close to 4. The average age of the participants is nearly 40, and about half of them are male, which suggests the sex ratio is balanced. As for STATUS, 140 out of 192 participants are employed as full time or part time workers.

Table 4 displays the reporting behaviors of both the treatment and control groups. It shows that in the second report, participants in the treatment group exhibited a slightly higher misreporting rate (36.26%) compared to the control group (34.65%).

²⁶ I reached out to participants who reported figures more than twice their actual completion numbers. I informed them that, in accordance with the conditions emphasized during the experiment, I could only offer them rewards equivalent to twice their actual score.

Table 4 Reporting behaviors

	<u>1st Report</u>		<u>2nd Report</u>	
	Misreporters	Honest reporters	Misreporters	Honest reporters
TREAT = 0	20	81	35	66
% who misreport (report honestly)	19.80%	80.20%	34.65%	65.35%
TREAT = 1	18	73	33	58
% who misreport (report honestly)	19.78%	80.22%	36.26%	63.74%

4.3 Results of Hypotheses tests

Table 5 shows the results of Hypothesis 1.²⁷

Table 5 Tests of Hypothesis 1

Variables	Predicted relation	Model 1 (Logit)	Model 2 (OLS)
TREAT	+	0.708 (1.27)	0.131* (1.66)
MIS ₁	+	2.711*** (5.49)	0.371*** (5.63)
NUMBER	-	-0.0408 (-1.31)	-0.00826* (-1.84)
ATT ₁	+	-0.0276 (-0.15)	-0.0141 (-0.54)
ATT ₂	+	-0.629** (-2.27)	-0.0392 (-1.04)
MOTIVE	+	0.363* (1.90)	0.0366 (1.39)

²⁷ The correlation matrix of variables in Hypothesis 1 is shown in Appendix 6.

OPPO	+	0.102 (0.67)	0.0194 (1.00)
AGE	?	0.0175 (1.04)	0.00379 (1.57)
SEX	?	0.481 (1.30)	0.0606 (1.17)
STATUS	?	0.360 (0.84)	0.103* (1.69)
_cons		-0.951 (-0.51)	0.00753 (0.03)
N		192	192
Chi-squared/ F-statistic		50.56	5.28
P > chi2/F		0.0000	0.0000
Pseudo R2/ R2		0.2026	0.2257

t statistics in parentheses

* p<0.1, ** p<0.05, *** p<0.01

Participants with capability were supposed to be more likely to misreport in the experiment, The result of Hypothesis 1 shows the positive relation of Capability and misreporting behavior, aligning with the hypothesis. However, the relation is only significant at 10% level when take the misreporting rate as the dependent variable, which reduce the robustness of the impact.

As for the control variables, MIS₁ exhibits strong and positive relationship with misreporting behaviors, which indicating that participants who misreported in the first report were more likely to misreport in the second time, which confirm the consistency of participants' individual behaviors. Participants who completed more sliders in the sliders task are less likely to misreport in the experiment, which is consistent with expectation, too, proving that getting higher rewards based on the actual performance can lower the possibility to misreport. However, this relation is merely significant in Model 2.

The attitudes towards money (ATT₂) and participants' motivation (MOTIVE) are significantly related to misreporting behaviors in Model 1. The relation between ATT₂ and MIS is negative, indicating that participants who are fond of money are less likely to report higher score. This result is counterintuitive. The possible reason can be that not all the questions in the survey are suitable for testing the association between the attitudes towards money and misreporting. There are statements such as “10. I find smarter and better ways of making money” and “11. I look for

new and legal ways to make money”, which the higher the score is, the less motivated were the participants because they may think misreporting for more rewards is not good and legal. Therefore, an additional test is needed by using appropriate statements in the survey to measure participants’ attitudes towards money.

MOTIVE is positively associated with misreporting, which is under expectation. STATUS is positively related to misreporting and is significant in Model 2. This suggests that participants who have a job are more prone to misreport.

Based on the correlation matrix for the variables in Hypothesis 1 (refer to Appendix 6), there may be concern regarding multicollinearity between TREAT and NUMBER, due to a coefficient of 0.75. To address this, a Variance Inflation Factor (VIF) test was conducted. The results, as detailed below, suggest that multicollinearity is not a significant issue. The highest VIF values were 3.03 for NUMBER and 2.48 for TREAT, both well below the widely accepted threshold of 10, which indicates that multicollinearity is not a significant threat in this study.

Table 6 The VIF test of independent variables

Variable	VIF	1/VIF
NUMBER	3.03	0.329968
TREAT	2.48	0.403058
ATT ₂	1.57	0.635961
AGE	1.52	0.65932
ATT ₁	1.43	0.701125
MOTIVE	1.42	0.705621
STATUS	1.16	0.861837
MIS ₁	1.10	0.908725
OPPO	1.08	0.923451
SEX	1.07	0.930418
Mean VIF	1.59	

Hypothesis 2 was tested in three steps following Baron and Kenny’s (1986) three-step process. In the first step, I regressed Opportunity on Capability to confirm the impact of Capability on Opportunity. Second, I regressed misreporting behaviors on Capability to test the effect of capability alone. In the final step, I regressed misreporting behaviors on Capability and Opportunity at the same time, to confirm their combined effects. The results are shown in table 7.

In the first regression, there is a positive impact of Capability on Opportunity, significant at the 10% level. This suggests that participants with higher capability perceive greater opportunities in

this experiment, thereby confirming the influence of Capability on perceived opportunity. The second and third regressions show the positive effects of capability and opportunity on misreporting behaviors, aligning with the hypothesis. However, these relationships are not statistically significant. In conclusion, it can be confirmed that Capability positively influences Opportunity. This indicates that Capability does not affect misreporting behaviors in isolation. What is more, even the third regression model includes both opportunity and Capability, it shows that they do not have significant effect on misreporting behaviors, which indicates that Opportunity cannot affect misreporting decision, either. This implied that misreporting decision is a result derived from complex components, and it is hard to lead to the misreporting behaviors only with Opportunity and Capability.

Table 7 Test of Hypothesis 2

Step 1: Regress mediator on the independent variable				
$OPPO = \beta_0 + \beta_1 TREAT + \varepsilon$				
Variable	Predicted relation	Coef.	t-statistics	Significance
TREAT	+	0.342	1.76	0.080
Step 2: Regress the dependent variable on the independent variable				
$MIS = \beta_0 + \beta_1 TREAT + \varepsilon$				
Variable	Predicted relation	Coef.	z-statistics	Significance
TREAT	+	0.070	0.23	0.816
Step 3: Regress dependent variable on the independent variable and mediator				
$MIS = \beta_0 + \beta_1 TREAT + \beta_2 OPPO + \varepsilon$				
Variable	Predicted relation	Coef.	z-statistics	Significance
TREAT	+	0.021	0.07	0.945
OPPO	+	0.155	1.23	0.219
N			192	

Table 8 represents the results of Hypothesis 3a and 3b. H3a supposed that among all the participants, misreporting individuals will feel less guilt about misreporting behaviors than honest individuals. These post-attitudes were tested in the post-questionnaire. LESSGUILT was tested by the statement “I felt less guilt about reporting higher if I had the special capability.” ACCEPT was tested by the statement “I felt that reporting higher was more acceptable if I had the special

capability.” Both of the statements are assumptive, so it is adequate to use these two statements to assess participants’ attitudes towards misreporting behaviors in this experiment.

The result of H3a shows that misreporting participants felt less guilt and were more accepting of the misreporting behaviors than honest participants, which is consistent with the hypothesis. To Verify H3b, I use three steps. In the first step, I conducted T-tests to check if there are significant differences in their post-attitudes between misreporters and honest reporters. The results clarify that the differences in misreporters and honest reporters’ post-attitudes do exist and are significant at 1% level, indicating that honest reporters felt more guilt and were less accepting of the assumptive misreporting behavior, even though they did not misreport at all.

In step B and step C, I did two regressions and only took the misreporters as the research object. In step B, I regress LESSGUILT on Capability, and found that misreporters with capability felt less guilt about their misreporting behaviors. The association is significant at 1% level. In step C, I took ACCEPT as the dependent variable and test the effect of Capability on it. The result shows that misreporters with capability think misreporting behavior is more acceptable than misreporters without this capability. This result is significant at 1% level.

Table 8 Test of Hypothesis 3

H3a: Misreporting individuals will feel less guilt about misreporting behaviors than honest individuals (All participants).					
$ATT_3 = \beta_0 + \beta_1 MIS + \varepsilon$					
Variable	Predicted relation	Obs.	Coef.	t-statistics	Significance
MIS	+	192	1.801	6.66	0.000
H3b: Misreporting individuals who are told to have the capability to misreport will feel less guilt about misreporting behaviors than misreporters who have no capability to do so (Misreporters only).					
Step A: T-tests of differences in post-attitudes towards misreporting (Misreporters versus honest reporters)					
Variable	Obs.	Mean (68 misreporters)	Mean (124 honest reporters)	t-statistics	Significance
ATT_3	192	5.059	3.258	6.657	0.0000
LESSGUILT	192	4.941	3.073	6.414	0.0000
ACCEPT	192	5.176	3.444	5.889	0.0000

Step B: Linear regression of guilt (misreporters only)					
$LESSGUILT = \beta_0 + \beta_1 TREAT + \varepsilon$					
Variable	Predicted relation	Obs.	Coef.	t-statistics	Significance
TREAT	+	68	1.233	2.88	0.005
Step C: Linear regression of acceptance (misreporters only)					
$ACCEPT = \beta_0 + \beta_1 TREAT + \varepsilon$					
Variable	Predicted relation	Obs.	Coef.	t-statistics	Significance
TREAT	+	68	1.188	3.00	0.004

4.4 Additional test and robust check

4.4.1 Additional test for Hypothesis 1

Considering the surprising result in Hypothesis 1, showing that there is a negative relationship between attitudes towards money and misreporting behaviors, I conducted an additional test for Hypothesis 1. I measured participants' attitude towards money based on the responses to the statements of "I was motivated by money" in the post-questionnaire, which is another representative of the extent that how they are fond of money. Besides, because this is one statement from motivation measures, the new proxy variable for motivation was calculated as the mean value of responses to "I was motivated enough to perform well" and "I was motivated by outperforming others".

The regression models are as the following two. The results are shown in Table 9.

$$MIS = \beta_0 + \beta_1 TREAT + \beta_2 MIS_1 + \beta_3 NUMBER + \beta_4 ATT_1 + \beta_5 Money + \beta_6 MOTIVE_2 + \beta_7 OPPO + \beta_8 AGE + \beta_9 SEX + \beta_{10} STATUS + \varepsilon \quad \cdots \text{Model 3}$$

$$MISRATE = \beta_0 + \beta_1 TREAT + \beta_2 MIS_1 + \beta_3 NUMBER + \beta_4 ATT_1 + \beta_5 Money + \beta_6 MOTIVE_2 + \beta_7 OPPO + \beta_8 AGE + \beta_9 SEX + \beta_{10} STATUS + \varepsilon \quad \cdots \text{Model 4}$$

Money serves as the second proxy variable for to what extent the participants are fond of money, measured by the average value of responses to "I was motivated by money", ranging from 1 to 7. MOTIVE₂ is the second proxy variable of the motivation perceived by the participants, assessed using the average value of responses to two statements: "I was motivated enough to perform well", and "I was motivated by outperforming others", ranging from 1 to 7.

Table 9 Additional tests of Hypothesis 1

Variables	Predicted relation	Model 3 (Logit)	Model 4 (OLS)
TREAT	+	0.673 (1.19)	0.120 (1.55)
MIS ₁	+	2.359*** (4.88)	0.330*** (5.00)
NUMBER	-	-0.0269 (-0.87)	-0.00698 (-1.59)
ATT ₁	+	0.0997 (-0.54)	-0.0153 (-0.61)
MONEY	+	0.396*** (2.87)	0.0476*** (2.78)
MOTIVE ₂	+	-0.206 (-1.28)	-0.0252 (-1.14)
OPPO	+	0.0420 (0.29)	0.0140 (0.73)
AGE	?	0.0225 (1.33)	0.00438* (1.83)
SEX	?	0.506 (1.36)	0.0568 (1.11)
STATUS	?	0.0994 (0.23)	0.0799 (1.34)
_cons		-2.973* (-1.71)	-0.105 (-0.45)
N		192	192
Chi-squared/ F-statistic		53.37	6.00
P > chi2/F		0.0000	0.0000
Pseudo R2/ R2		0.2138	0.2488

t statistics in parentheses

* p<0.1, ** p<0.05, *** p<0.01

In Table 9, the data reveals that with the newly introduced proxy variable for participants' monetary motivation, there is a significant positive correlation between misreporting behavior and MONEY. This suggests that participants driven by financial incentives are more inclined to misreport. Additionally, MIS_1 maintains a consistent positive association with misreporting across both Model 3 and Model 4. Furthermore, AGE demonstrates a positive and significant relationship with misreporting in Model 4, suggesting a greater propensity for misreporting among older participants.

4.4.2 Additional test for Hypothesis 2

Besides the test for Hypothesis 2, I did another test to verify the relationship of capability and perceived opportunity. I used two statements in the post-questionnaire to inquire how the participants perceived about the opportunity and capability, ranging from 1 (strongly disagree) to 7 (strongly agree). The first statement is "I felt that the announcement of capability gave me a greater opportunity to report more, even though I knew I could always report more", asking whether the participants' perception of opportunity became greater when they were aware of capability, abbreviated as PERCEPT. The second statement is "I realized that my opportunity to report more did not actually become higher (it remained unchanged), as I had been given the opportunity to report more all the time", inquiring whether the participants understood that the actual opportunity didn't change during the experiment, abbreviated as REALIZE.

I did two T-tests for this robust check and the results are shown in table 10 and table 11. Table 10 tests whether the mean values of PERCEPT and REALIZE are significantly different from 4, which represents the median level of agreement with the statements. The results clearly show that, regardless of whether considering all participants or just those in the treatment group, there is a perception of higher opportunities after becoming aware of the existence and function of capability. As for the results in Table 11, they indicate that the treatment group significantly perceived higher opportunities compared to the control group. This is consistent with the regression result in Hypothesis 2, suggesting that Capability leads to a higher perceived opportunity. Regarding the difference in the realization of opportunity, there appears to be no significant difference between the control and treatment groups. This suggests that both groups realized that the actual opportunity for misreporting did not change during the experiment.

Table 10 T-tests of perceptions and realizations of opportunity

	Statements	All participants					Treatment group				
		Obs.	Mean	Std. dev.	t-statistic	p (one- tailed)	Obs.	Mean	Std. dev.	t-statistic	p (one- tailed)
PERCEPT	I felt that the announcement of capability gave me a greater opportunity to report more, even though I knew I could always report more.	182	4.945	1.780	7.163	0.0000	87	5.184	1.709	6.463	0.0000
REALIZE	I realized that my opportunity to report more did not actually become higher (it remained unchanged), as I had been given the opportunity to report more all the time.	182	4.962	1.454	8.921	0.0000	87	4.966	1.426	6.315	0.0000

Table 11 T-tests of differences in post-perceptions and realizations of opportunity (Treatment group versus control group)

	Statements	Predicted relation	Obs.	Mean (Control group)	Mean (Treat group)	t-statistic	Significance
<i>PERCEPT</i>	I felt that the announcement of capability gave me a greater opportunity to report more, even though I knew I could always report more.	+	182	4.726	5.184	1.742	0.0416
<i>REALIZE</i>	I realized that my opportunity to report more did not actually become higher (it remained unchanged), as I had been given the opportunity to report more all the time.	?	182	4.958	4.966	0.035	0.486

5. Discussion and limitation

In conclusion, this study presents consistent findings regarding the impact of capability on fraudulent decision-making. The relationship between Capability and misreporting behaviors are positive, but only significant in the model that using misreporting rate as the dependent variable, indicating that the existence of capability can lead to higher misreporting rate. The number of participants' slider completion, show the negative association with misreporting, which is in line with the expectation, too. What is surprising is the result for attitudes towards money, which shows a negative relation with misreporting, indicating that people with a greater fondness for money, are less likely to commit fraud. For the surprising result, an additional test was done based on the responses to the post-questionnaire, which can also indicate the extent they love money. The results in the additional results are under the expectation.

The experiment also shed light on the role of capability in relation to other factors of the Fraud Triangle. It was observed that the introduction of capability led to a reduction in guilt among those who misreported, hinting at moral disengagement due to the assigned capability. Generally, participants perceived an increase in their opportunities to misreport when the statement of capability was present, with this perception being stronger among those endowed with capability. However, they also acknowledged that their actual opportunities to misreport remained unchanged, highlighting a disparity between perception and rationality.

The theoretical contribution of this study, as indicated in the title, lies in examining the role and potential of Capability as a novel fraud factor extending beyond the traditional Fraud Triangle. While the influence of Capability on misreporting behaviors remains somewhat not robust, its effects on Opportunity and Attitude have been more clearly demonstrated. From a practical standpoint, incorporating Capability into the fraud risk assessment could be beneficial. This approach considers that positional capability might significantly affect potential fraudsters' perceived opportunities and potentially lead them to more unethical attitudes. Therefore, people with this kind of traits and capability should be monitored more closely.

There are several limitations in this study. Primarily, the "Capability" in this experiment resembles "power" or "positional advantage" in a corporate setting, rather than the other four dimensions mentioned in Wolfe and Hermanson (2004), such as individual intelligence, confidence, authority, or telling lie, which are considered as one kind of capability. Furthermore, the influence of participants' attitudes towards money on their decision-making was surprising and it may because of the unappropriated measure. In future research, employing a more refined money measurement is required to clarify these complexities and deepen our understanding of the dynamics of fraudulent decision-making.

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Appendix

Appendix 1: Survey

Survey 1 Attitude towards misreporting

Circle your level of agreement with each of the following scenarios, using the following scale:

1	2	3	4	5	6	7				
Strongly disagree	Somewhat disagree	Slightly disagree	No opinion	Slightly agree	Somewhat agree	Strongly agree				
Statements				Strongly disagree			Strongly agree			
1. I have been tempted to overstate my credentials on college applications.				1	2	3	4	5	6	7
2. It is late Friday afternoon at work and I have plans for the evening. At the last minute, my boss asks me to carefully read a document and provide him with comments before the end of the day. I would consider reading it briefly, but telling him I read it carefully, so I can leave work on time.				1	2	3	4	5	6	7
3. I am a member of a group that works with underprivileged children. Though I don't participate in this effort, I might say that I work with underprivileged children.				1	2	3	4	5	6	7
4. My boss at a CPA firm asks me how I performed on a recent portion of the CPA exam, which I failed. I would consider telling her I passed.				1	2	3	4	5	6	7
5. A corporate recruiter asks me how well I performed in a particular class. Though I didn't do well in the class, I am NOT likely to tell him that.				1	2	3	4	5	6	7
6. I am being interviewed to appear on a game show, and am asked whether I completed college. Even though I didn't, due to unfortunate circumstances, I might say I did.				1	2	3	4	5	6	7

7. My CPA firm has been sued by an audit client, and I have to testify in court because I worked on the audit. Though I know I didn't complete all the required audit procedures, I would be tempted to testify that I DID but failed to document them.	1	2	3	4	5	6	7
8. My company is competing for a prized client, who asks me about our quality ratings vs. our competitors. I am likely to tell the client that my company is consistently rated higher even if I know we're not.	1	2	3	4	5	6	7
9. A classmate asks me how I did in a class he is considering taking. I would be tempted to tell him I did well even if I didn't.	1	2	3	4	5	6	7
10. I would consider overstating my GPA to enhance my chances of being accepted into a prestigious organization on campus.	1	2	3	4	5	6	7

Reference: Murphy (2012)

Survey 2 Attitude towards money (Money Intelligence)

Circle your level of agreement with each of the following statements, using the following scale:

1	2	3	4	5	6	7
Strongly disagree	Somewhat disagree	Slightly disagree	No opinion	Slightly agree	Somewhat agree	Strongly agree
Statements			Strongly disagree Strongly agree			
<i>I. Affective love of money motive</i>						
Rich						
1. I want to be rich.	1	2	3	4	5	6 7
2. It would be nice to be rich.	1	2	3	4	5	6 7
3. Having a lot of money (being rich) is good.	1	2	3	4	5	6 7
Motivator						
4. Money reinforces me to work harder.	1	2	3	4	5	6 7
5. I am motivated to work hard for money.	1	2	3	4	5	6 7
6. I am highly motivated by money.	1	2	3	4	5	6 7

Importance							
7. Money is valuable.	1	2	3	4	5	6	7
8. Money is important.	1	2	3	4	5	6	7
9. Money is good.	1	2	3	4	5	6	7
II. The Stewardship Behavior							
Make money							
10. I find smarter and better ways of making money.	1	2	3	4	5	6	7
11. I look for new and legal ways to make money.	1	2	3	4	5	6	7
12. I am proud of my ability to make money.	1	2	3	4	5	6	7
Budget money							
13. I budget my money very well.	1	2	3	4	5	6	7
14. I use my money very carefully.	1	2	3	4	5	6	7
15. I am proud of my ability to save money.	1	2	3	4	5	6	7
Contribute—the Matthew effect							
16. More money should be paid to people with higher quality of performance.	1	2	3	4	5	6	7
17. More money should be paid to people with more talent.	1	2	3	4	5	6	7
18. More money should be paid to people with higher merit (performance).	1	2	3	4	5	6	7
III. Cognitive meaning of money							
Respect							
19. Money makes people respect me in the community.	1	2	3	4	5	6	7
20. Money helps me gain respect.	1	2	3	4	5	6	7
21. Money allows me to express myself.	1	2	3	4	5	6	7
Achievement							
22. Money represents my achievement.	1	2	3	4	5	6	7
23. Money is a symbol of my success.	1	2	3	4	5	6	7
24. Money reflects my accomplishments.	1	2	3	4	5	6	7
Power							
25. Money is power.	1	2	3	4	5	6	7
26. Money gives one considerable power.	1	2	3	4	5	6	7

27. Money controls and manipulates your behavior, when you are paid.	1	2	3	4	5	6	7
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Reference: Tang (2016)

Appendix 2: Experiment procedures

- (1) Participants access the experiment webpages through Prolific and enter the Welcome page.
- (2) Participants click the “Next” button and enter into the Consent Form page. The Consent Form includes Purpose, Procedures, Risks/Discomforts, Benefits, Voluntary participation and right to withdraw, Confidentiality, Costs/Payments, and Contact Information. Participants who are willing to continue the experiment are guided to click the “Next” button to enter the Instruction page.” If you want to participate in this study, click the [Next] button to enter the Instruction.” The Instruction page shows the detailed procedures of the two tasks in this experiment. The first task is completing a survey about participants’ attitudes towards fraud and money. The survey also contains some distractors questions to confuse the real purpose. Questions about simple arithmetic calculations are included to make sure participants are answering the survey seriously. The survey pages consist of forty-six questions and twenty-three questions on each page, separately. Questions are presented in random order.
- (3) After finishing the survey, participants click the “Next” button and enter the second task. Before the formal task begins, the first page is to encourage participants to try their best in the formal task and tells them that better performance can be beneficial for them. This is aimed to imitate the real working condition. The new employees in a company or in society always try to perform well for future benefits.²⁸ This is the first manipulation in this experiment, informing the participants of the existence of capability in advance, but without the details. After the “Try best” page, there are several pages made for the preparation of the formal slider task. Participants see the introduction of the slider task and get two practice rounds for 30 seconds and 45 seconds, separately.²⁹ They can know how did they perform in 30 seconds and 45 seconds. Then, they go to the formal slider task which lasts for 90 seconds.
- (4) Participants complete the formal slider task and get their results. The first report page will show their performance results and ask them to report the number as “Please report the number of slider tasks you achieved. Your payment will be based on your report.” After they finished the first reporting, they go to the next page which show how their hard-work will work in this task.
- (5) The next page is called “50% Boundary”, the second manipulation. It introduces that how the

²⁸ The future’s benefits can include but not be limited to (1) monetary rewards such like bonus and higher basic salary; (2) promotion; (3) higher professional and social reputation, (4) better working condition by job-hopping.

²⁹ The practice rounds are not set for as long as the formal task, considering that participants may feel tired if they practice a lot before the formal task.

participants who are ranked as the top 50% can use their special capability in an explicit way: “There is a special capability that we would like to give the participants with TOP 50% performance! If you are in the top 50%, you own the special capability to report more than your real performance. You are definitely a good performer in our slider task if you are the TOP 50%, and maybe you can do it better in another round. However, since our task is a “once for all” deal, you do not have another chance to redo the task. Thus, we would like to offer a special capability for the top 50% of participants. You can report the amount which you think is more matched with your quality (no higher than two times the real score). However, if you are the remaining 50% participants, unfortunately, we would not offer this special capability for you. We will not reconfirm your real score to judge if the second report is reasonable or not. You will directly get the amount you report for the second time.”

- (6) Participants enter the next page and confirm their ranking. Participants report again. Their reports will be recorded. They will be told that their response will be anonymous.
- (7) Participants will be asked to answer a post-questionnaire and input their Prolific ID to get their payment. The experiment is finished.

Appendix 3: Post Questionnaire

1. I was motivated enough to perform well.
2. I was given the opportunity to report more in this experiment and be paid that amount, regardless of how many sliders I actually finished. (as the statement like "The payment will be totally based on your report.
3. I was motivated by money.
4. I was motivated by outperforming others.
5. I felt more motivated to report higher due to the announcement of capability.
6. I felt that the announcement of capability gave me a greater opportunity to report more, even though I knew I could always report more.
7. I realized that my opportunity to report more did not actually become higher (it remained unchanged), as I had been given the opportunity to report more all the time.
8. I felt that reporting higher was more acceptable if I had the special capability.
9. I felt less guilt about reporting higher if I had the special capability.

Question 1 to Question 4 aim to confirm the presence of motivation, opportunity, monetary motivation, and non-economic motivation. Question 5 to Question 9 aim to examine the impact of capability on Motivation, Opportunity, and Attitude. These questions assess participants' perceptions in response to the introduction of capability as a new factor. The goal is to determine whether capability influences participants' motivation, perceived opportunity, and attitudes towards misreporting.

Appendix 4: Screenshots of slider task

Slider Task

Please make the slider positioned at the center in the slider task.

All the sliders will be positioned at random original location, and they can be moved from far left to far right by using your mouse or touching the screen.

When you move the slider to the center, the purple dot will turn to green, which means you complete one slider task.

This is an image of how slider moves (this will not change color).

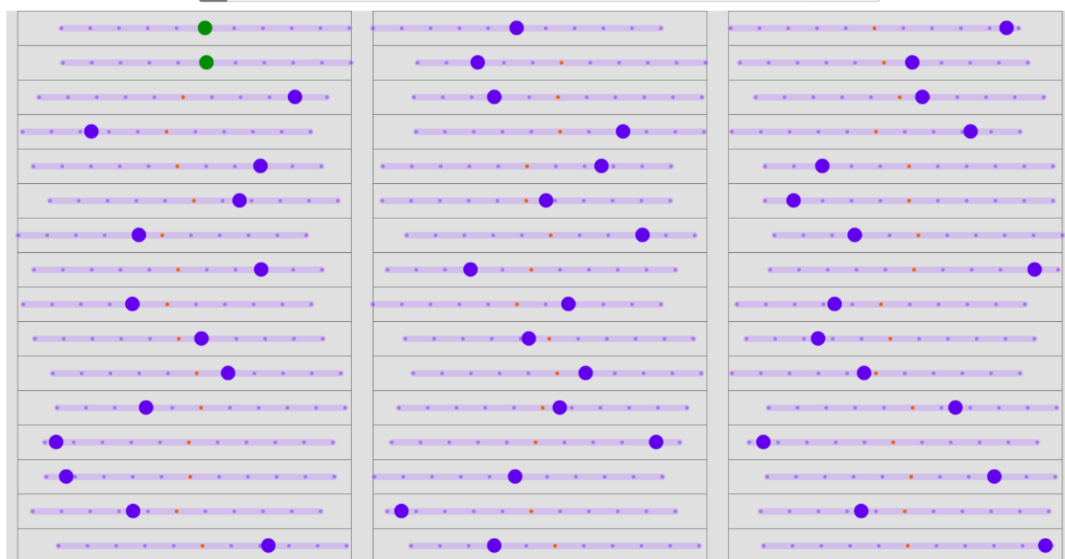


Click the Next button you will go to the practice round for twice (30 seconds and 45 seconds respectively). After the practice round you will go to the real slider task (90 seconds).

Next

Sliders task

Time left to complete this page: 1:13



Move sliders into the middle position.

Appendix 5: Variables definition

Variables	Definition
<i>MIS</i>	The dependent variable that equals 1 if the participant misreports in the second report, 0 otherwise.
MISRATE	Calculated as the misreported amount divided by the correct number, where the misreported amount refers to the difference between the correct number and the reported number.
TREAT	The treatment in the experiment, equal to 1 if the participants were told that they get the capability.
MIS ₁	A dummy variable that equals 1 if the participant misreports in the first report, 0 otherwise.
NUMBER	Equals the actual number of slider completion that the participants achieved in the slider task.
ATT ₁	Participants' attitudes towards misreporting behaviors, measured by the corresponding responses in the survey, ranging from 1 to 7.
ATT ₂	Participants' attitudes towards money, measured by the corresponding responses in the survey, ranging from 1 to 7.
MONEY	The second proxy variable for to what extent the participants are fond of money, measured by the average value of responses to "I was motivated by money", ranging from 1 to 7.
MOTIVE	The first proxy variable for the motivation perceived by the participants, assessed using the average value of responses to three statements: "I was motivated enough to perform well", "I was motivated by money" and "I was motivated by outperforming others", ranging from 1 to 7.
MOTIVE ₂	The second proxy variable for the motivation perceived by the participants, assessed using the average value of responses to two statements: "I was motivated enough to perform well" and "I was motivated by outperforming others", ranging from 1 to 7.
<i>Oppo</i>	Reflects the participant's perception of the magnitude of the opportunity, ranging from 1 to 7.
AGE	Participants' age.
SEX	Equals 1 if participants are male, and 0 otherwise.
STATUS	Refers to participants' working status, equals 1 if participants are employed, 0 otherwise.

LESSGUILT	Refers to the extent to which the participants feel less guilt when they have capability, ranging from 1 to 7.
ACCEPT	The extent to participant's acceptance of misreporting behaviors when they have capability, ranging from 1 to 7.
ATT ₃	Calculated as the average of <i>LESSGUILT</i> and <i>ACCEPT</i> , represents the overall attitudes towards misreporting based on the context of capability, ranging from 1 to 7.
PERCEPT	Reflect whether the participants' perception of opportunity became greater when they were aware of capability, measured by the statement of "I felt that the announcement of capability gave me a greater opportunity to report more, even though I knew I could always report more".
REALIZE	Reflect whether the participants understood that the actual opportunity didn't change during the experiment, measured by the statement of "I realized that my opportunity to report more did not actually become higher (it remained unchanged), as I had been given the opportunity to report more all the time".

Appendix 6: Correlation Matrix of variables in Hypothesis 1

	MIS	MISRATE	TREAT	MIS_1	NUMBER	ATT_1	ATT_2	MONEY	MOTIVE	$MOTIVE_1$	OPPO	AGE	SEX	STATUS
MIS	1.00													
MISRATE	0.87***	1.00												
TREAT	0.02	-0.01	1.00											
MIS_1	0.45***	0.39***	0.00	1.00										
NUMBER	-0.06	-0.13*	0.75***	-0.06	1.00									
ATT_1	0.08	0.08	0.03	0.24***	-0.05	1.00								
ATT_2	0.00	0.08	-0.09	0.20***	-0.13*	0.38***	1.00							
MONEY	0.26***	0.25***	0.06	0.22***	0.09	0.16**	0.38***	1.00						
MOTIVE	0.11	0.10	0.03	0.10	0.12	0.20***	0.49***	0.73***	1.00					
$MOTIVE_2$	-0.02	-0.02	0.01	-0.01	0.10	0.17**	0.42***	0.35***	0.89***	1.00				
OPPO	0.09	0.12*	0.13	0.11	0.05	0.02	0.10	0.15**	0.12	0.06	1.00			
AGE	0.05	0.14*	-0.38***	-0.08	-0.51***	-0.22***	-0.01	-0.09	-0.06	-0.02	0.06	1.00		
SEX	0.09	0.08	-0.04	0.05	0.05	0.17**	0.07	0.14*	0.15**	0.11	-0.06	-0.11	1.00	
STATUS	0.06	0.13*	0.04	0.07	0.01	0.32***	0.24***	0.15**	0.13*	0.08	-0.08	-0.02	0.10	1.00

Chapter 4: A meta-analysis of the corporate fraud factors

Abstract: This study collected data from previous research on fraud factors, yielding combined results of significant determinants. The scope of the study encompasses literature from 1996 to 2023, and all the studies were conducted at firm-level. The chosen effect sizes include p-values, t-statistics, and z-statistics. A thorough review of 2,789 papers was conducted after setting the selecting strategy, from which a final sample of 77 studies was selected. A meta-analysis technique was employed to examine the combined effect of each fraud factor on corporate fraud.

The result based on weighted average calculation revealed that financial conditions are strongly associated with fraud decision. Corporate with better fraud conditions are less likely to commit fraud, while firms in the financial distress are more likely to engage in fraud. Besides, firms with more debt, firms with more volatile returns, firms with overvaluation, and firms experiencing M&A, are more likely to commit fraud. To link with the five factors for fraud, these variables can be considered as variables related to Motivation/Pressure. In contrast, firms with more supervision (e.g., supervision from the outside, state, or largest shareholder), are less likely to be engaged in fraud. These variables align with the Opportunity aspect of the five factors for fraud theory. Regarding external influences, firms with more analysts are less likely to commit fraud, representing the sole factor associated with Exposure in this analysis. This synthesis of existing research presents a comprehensive overview of the factors associated with fraud and contributes robust insights for future research.

Keywords: Corporate Fraud, Fraud Factors, Meta-Analysis

1. Introduction

This paper integrates the findings of 77 previous studies, summarizing their empirical data on fraud factors. It thus provides a more robust cluster of results regarding significant determinants of financial fraud. The abundance of research in the accounting fraud field offers a unique opportunity for this meta-analysis. Many studies employ similar variables but yield varying results, suggesting that the effects of certain factors on corporate fraud remain unclear.

Financial pressure is frequently cited as a key factor for fraud, as outlined by the Fraud Triangle theory, which posits that individuals are more prone to engage in fraudulent activities under unshareable financial pressure (Dorminey et al., 2010, 2012). Return on Assets (ROA) is commonly used as a measure of financial performance and can be employed to assess financial pressure within firms. In their analysis of ROA's role as an independent variable in fraud research, Lennox et al. (2013) found a consistent negative relationship between ROA and fraud across eight models in their research, all significant at a minimum of the 10% level. This suggests a robust negative association between ROA and corporate fraud. Lisic et al. (2015) reached a similar conclusion, with all ten of their regression models showing a significant negative relationship between fraud and ROA at the 1% level. However, other studies present contrasting findings. Troy et al. (2011) conducted four regressions, all indicating a positive relationship with fraud, though none were statistically significant. Hass et al. (2016) added complexity to these findings. In their study, they conducted multiple regressions and divided the sample into subgroups of SOE (i.e., State-owned enterprise) and non-SOE firms. Six out of nine regressions showed a significant positive relationship, while three indicated a negative, non-significant relationship. In robustness tests, six models showed positive correlations and three models showed negative correlations. All of these results are significant, while three results are non-significant.

These conflicting results arouse a significant research interest. To better understand the impact of fraud determinants, this study employs meta-analysis to resolve the discrepancies observed in the use of identical variables across fraud research. There is an abundance of studies examining the relationship between fraud and various factors, often using the same variables in their regression models. This can lead to confusion for new researchers in the field, as these variables show mixed results without definitive conclusions on any single fraud factor. This uncertainty extends to empirical studies on corporate fraud, particularly regarding the selection of appropriate control variables.³⁰

³⁰ After examining numerous papers with fraud as the dependent variable, I observed that many studies focus on a single unique object as the independent variable, employing multiple others as control variables. Consequently, in compliance with the criterion requiring that for inclusion in this meta-analysis, there are at least five data for one variable, the variables selected in this meta-analysis are neither exceedingly novel nor difficult to access. Researchers are trying to find more unique and

To address these challenges, this study is aiming to offer novel insights into fraud research. Papers were collected through the Web of Science Collection, followed by a screening process from the original sample. The criteria for selection included the presence of p-values, t-statistics, and z-statistics as measures of effect sizes. Ultimately, 77 papers met these criteria and were included in the final sample.

After the calculation of the combined effect of each variable, the results reveal that, based on prior research disclosing the required effect sizes (namely, p-values, t-statistics, and z-statistics), 13 variables have been identified as having a significant impact on corporate fraud in the weighted average calculation based on each research's sample size.³¹ In details, the losses in the fraud company, the number of the board meetings, the volatility of returns, M&A events, the market value, and the leverage of the firm were confirmed to be positively and significant related to fraud at least at 10%. The proportion of the outside directors, the proportion of the largest shareholder and the top 10 largest shareholders, whether the firm is a SOE, the analyst following the firm, and ROA, are demonstrated to be negatively and significantly associated with fraud. Notably, one variable (i.e., CEO's tenure) demonstrated different results between simple average and weighted average calculations, suggesting that sample size can significantly influence the direction of the association.

This meta-analysis has deepened the understanding of significant fraud factors and derived more reliable outcomes from combined effect calculations, which is particularly crucial for factors where research results have previously been inconsistent. Furthermore, the robust combined results can provide fresh perspectives for future studies. With many researchers exploring new fraud determinants, the findings of this meta-analysis could offer valuable options for control variables in their studies.

The structure of this meta-analysis is organized as follows: Section 2 provides an overview of previous research. Section 3 details the methodology employed in this meta-analysis. Section 4 presents the findings, and Section 5 concludes with a discussion of these results.

2. Overview of fraud research

In the field of fraud research, there are primarily two focus areas. The first focuses on identifying the causes of fraud, treating corporate fraud as the dependent variable, and examining various potential determinants as independent variables. This approach aims to confirm which

novel independent variables related to fraud, and therefore improve the novelty. Considering this research trend, the primary academic contribution of this study is identifying significant variables that can assist future researchers in selecting appropriate control variables for their investigations.

³¹ The term "research's sample size" in this research refers to the number of observations utilized in each model. In contrast, "Size" as used in Chapter 2 as the control variable, means the firm size, which is calculated by the logarithm of total assets.

factors significantly influence corporate fraudulent behavior. The second area of research treats fraud as the dependent variable, exploring its impact and consequences. Notably, this includes not only the influence of fraud on the firms but also includes the examination of fraud's spillover effects on society, such as increases in city crime rates, as highlighted by Holzman et al. (2020).

This study concentrates on the first area, specifically investigating the factors that lead to corporate fraudulent behaviors. To address this question, I have developed a theoretical framework consisting of five factors relevant to fraud and conducted an empirical study focused on the Chinese stock market. This research aims to understand the characteristics of fraudulent companies listed in China. However, the findings regarding the effects of Capability and Exposure remain inconclusive. Therefore, determining whether variables related to Capability or Exposure have been considered in previous studies and do they have a combined significant effect on fraud emerges as another research interest in this meta-analysis.

The most common model for the previous studies which focus on fraud are as follows:

$$\text{Fraud}_{it} = \beta_0 + \beta_1 \sum \text{Independents}_{it} + \beta_2 \sum \text{Controls}_{it} + \varepsilon_{it}$$

In this study, *Fraud_{it}* refers to fraudulent behaviors occurring in year *t*. This research specifically focuses on financial statement fraud, which means misreporting behaviors in financial statements. However, data acquisition for identifying fraudulent firms varies among researchers. A common method is using regulatory enforcement data, implying that firms penalized by regulators are considered fraudulent. This meta-analysis found that over half of the final samples rely on enforcement data. Another popular method is identifying fraud based on restatement firms. Other approaches, such as using lawsuit data, news sources, or fraud-related databases, are also employed by some researchers. This meta-analysis does not limit the data source, adhering to the general principle of collecting as many papers as possible for comprehensive analysis.

It is important to note that, although various fraud research studies categorize variables as independent or control variables, they are statistically equivalent when included in the same model. Therefore, this meta-analysis records and analyzes all data from the selected models, irrespective of their original categorization. After selecting 77 final samples, the relevant details of each study were compiled and are presented in Table 3. This table provides information on each paper's authors, publication year, journal, research country/region, period, overall sample size (firm-year), fraud sample size (firm-year), data used to identify fraud firms, and the presence of multiple samples in the study. "Multiple samples" is marked as "No" if all regressions in a study have the same number of observations, and "Yes" if different models use varying numbers of observations, regardless of the reasons. Descriptive statistics are displayed in Table 2, with Panel B showing the distribution of papers by year, Panel C detailing country distribution, and Panel D indicating journal publication. The data reveals a comparatively balanced distribution

across years, but a concentration of samples from the US and China, accounting for nearly 90% of the total. While the goal of a meta-analysis is to include as many papers as possible, therefore including unpublished conference papers is also under consideration. However, the final selection only consists of journal-published papers due to various reasons, such as accessibility issues or failure to meet selection criteria.

3. Methodology

3.1 Meta-analysis technique

Meta-analysis is a technique used as an important research tool in synthesizing findings from a broad range of studies, offering a more comprehensive understanding of diverse phenomena. It is the systematic review and quantitative synthesis of prior studies, differentiating from the qualitative reviews (Havránek et al., 2020). This methodology, can be realized as a “study of studies”, aggregates and analyzes data from multiple research papers and provide an overall combined result based the analysis (Hay et al., 2006). In the field of empirical economics, meta-analysis has become a conventional tool, with over 2000 meta-analyses conducted to date (Havránek et al., 2020).

The meta-analysis technique employed in this study is akin to that used by Hay et al. (2006), particularly in the fields of accounting and auditing. The effect sizes chosen for this analysis include the p-value, along with associated statistics such as z-statistics and t-statistics. A combined p-value for each selected variable was calculated to assess its overall impact on fraud.

3.2 Criteria for inclusion and exclusion

The criteria for including previous studies related to financial fraud in this meta-analysis were determined based on four key rules, emphasizing the principles of “data accessibility” and “research feasibility”. First, given the focus on corporate fraud, the studies included must be empirical and conducted at the firm level. Second, to ensure comprehensibility, only studies published in English were considered. Third, the selected studies are required to use regression analysis with fraud as the dependent variable. This criterion is vital as it enables the examination of the effects of various factors on fraud. A typical model used in these studies is presented below.

$$\text{Fraud}_{it} = \beta_0 + \beta_1 \sum \text{Independents}_{it} + \beta_2 \sum \text{Controls}_{it} + \varepsilon_{it}$$

Lastly, the studies must disclose the effect size so that the data collection and combined calculation can be conducted, also aligning with the “research feasibility”. In line with the methodology utilized by Hay et al., (2006), the primary effect size chosen for this analysis was the p-value, and related statistical data, including z-statistics and t-statistics, were collected accordingly. The p-values were then calculated from these statistical data and subsequently

converted into z-scores using the Stouffer combined test. It is worth noting that there are other meta-analyses utilizing correlation as the effect size (O'Boyle et al., 2012; Naville et al., 2019). However, the reason for selecting p-value as the effect size in this analysis is determined by the research objective, which is to figure out the significant determinants of financial fraud in corporations. Therefore, emphasizing the causal relationship between fraud and its influencing factors, rather than merely examining their correlational relationship, is more important in this meta-analysis. Studies for which these statistical data (i.e., p-value, z-statistics, and t-statistics) could not be obtained were excluded from the analysis.³²

3.3 Search strategy

To identify usable studies, I used the Web of Science Core Collection as the primary database. The search terms were created by the combination of three finance-related keywords: “Financial”, “Accounting”, and “Corporate” in conjunction with five fraud-related keywords, namely “Fraud”, “Misreporting”, “Misrepresentation”, “Misbehavior”, and “Wrongdoing”. This combination yielded a total of fifty search terms. The search rule was that these search terms must be included in the Topic of the studies, which includes the Title, Abstract, Author Keywords, and Keywords Plus.

In terms of the Document Types reflected in the database, the search was limited to the following: Article, Proceeding Paper, and Early Access. Document types such as Review Article, Book Chapters, Editorial Material, Note, Book Review, Book, Correction, Addition, or Letter were directly excluded from the search.

The final step to narrow down the search volume is to limit the research field following the database categorization. Within the Citation Topics Meso section, the selected criteria ultimately included “6.10 Economics”, “6.3 Management”, “6.317 Risk Assessment”, and “9.92 Statistical Methods”, from a comprehensive list of Meso level Citation Topics. Additionally, the Web of Science Categories chosen for the search included “Business Finance”, “Business”, “Economics”, and “Management”.³³

³² Besides p-value, z-statistics, and t-statistics, the other kinds of statistics data disclosed in their regression results tables are standard errors, Wald Chi-square, and odds ratio. I exclude the studies using these statistics from this analysis.

³³ Initially, I adopted a comprehensive searching strategy encompassing 14 Meso Citation Topics: 4.187 Security Systems, 4.48 Knowledge Engineering & Representation, 4.61 Artificial Intelligence & Machine Learning, 6.10 Economics, 6.11 Education & Educational Research, 6.110 Law, 6.122 Economic Theory, 6.185 Communication, 6.238 Bibliometrics, Scientometrics & Research Integrity, 6.27 Political Science, 6.3 Management, 6.317 Risk Assessment, 6.73 Social Psychology, and 9.92 Statistical Methods. However, the search results showed that a large number of papers did not align with my selection criteria. As a consequence, I reconsidered and ultimately changed my focus to the four Meso Citation Topics.

The resulting numbers of studies identified by each key term following the search strategy are shown in Table 1. The numbers in parentheses represent the papers selected during the initial search.

Table 1 search terms and combinations

	Financial	Accounting	Corporate
Fraud	846(81)	523(56)	676(104)
Misreporting	135(26)	85(15)	84(16)
Misrepresentation	47(3)	23(5)	32 (4)
Misbehavior	47(8)	30(1)	73(3)
Wrongdoing	51(4)	32(1)	105(6)

After the completion of the initial search, a total of 333 papers were retained for further selection. I did an elimination of unusable and duplicate papers and less 186 papers subsequently. I checked each paper carefully to see if it fit this meta-analysis. It was noted that not all papers disclosed the statistical data I needed (i.e., p-values, t-statistics, and z-statistics). There are a part of the studies disclosing standard errors, Wald chi-squares, and odds ratios. Besides, some studies showed numbers in their regression results tables but without explanation for these numbers. These papers were excluded from this analysis too. I followed the methodology adopted by Hay et al. (2006) and only kept papers that had a p-value or data we could use to calculate a p-value. Consequently, papers lacking disclosure of p-values, t-statistics, and z-statistics were excluded. Additionally, for the calculation of p-values, the degrees of freedom were recorded.

Table 2 shows the sample selection process and the sample distributions. As a result, 77 papers remained in this meta-analysis.

Table 2 Sample selection and sample distributions

Panel A Sample selection	Papers
Studies identified by each key term following the search strategy	2789
Studies selected in the initial review	333
<i>Less papers</i>	
Less the unusable and repetitive studies	186
Less the studies disclose the standard errors	29
Less the studies disclose the Wald Chi-square	9
Less the studies disclose the odds ratio	1

Less the studies with unclear statistics	23
Less the studies do not use the data of fraud year	6
Less the studies including interaction variables	2
Final sample	77

Panel B Sample distribution by year

Year	No. of studies	%
1996	1	1.30%
2004	1	1.30%
2008	2	2.60%
2009	1	1.30%
2010	1	1.30%
2011	5	6.49%
2012	3	3.90%
2013	6	7.79%
2014	2	2.60%
2015	2	2.60%
2016	5	6.49%
2017	5	6.49%
2018	5	6.49%
2019	5	6.49%
2020	6	7.79%
2021	7	9.09%
2022	15	19.48%
2023	5	6.49%
Total	77	100%

Panel C Sample distribution by country and setting

Country	No. of studies	%
United States	41	53.25%
China	28	36.36%
Taiwan	2	2.60%
Canada	1	1.30%
Indonesia	1	1.30%
Iran	1	1.30%
Japan	1	1.30%
Korea	1	1.30%

Malaysia	1	1.30%
Total	77	100%

Panel D Sample distribution by journal

Abbreviation	Journal	No. of studies
CAR	Contemporary Accounting Research	8
JBE	Journal of Business Ethics	7
AR	The Accounting Review	6
JFE	Journal of Financial Economics	3
JAE	Journal of Accounting and Economics	3
IRFA	International Review of Financial Analysis	2
JCF	Journal of Corporate Finance	2
ARJ	Accounting Research Journal	2
ARA	Asian Review of Accounting	2
CJAR	China Journal of Accounting Research	2
FRL	Finance Research Letters	2
JAPP	Journal of Accounting and Public Policy	2
JAR	Journal of Accounting Research	2
JAAF	Journal of Accounting, Auditing & Finance	2
JBFA	Journal of Business Finance & Accounting	2
JBR	Journal of Business Research	2
SMJ	Strategic Management Journal	2
AF	Accounting & Finance	1
ABR	Accounting and Business Research	1
AH	Accounting Horizons	1
AEBMR	Advances in Economics, Business and Management Research	1
AE	Applied Economics	1
AEL	Applied Economics Letters	1
AJPT	Auditing: a Journal of Practice & Theory	1
AEP	Australian Economic Papers	1
EM	Economic Modelling	1
EMR	Emerging Markets Review	1
FAJ	Financial Analysts Journal	1
FBRC	Frontiers of Business Research in China	1
IJA	International Journal of Accounting	1

IJAIM	International Journal of Accounting & Information Management	1
IJEM	International Journal of Emerging Markets	1
IREF	International Review of Economics and Finance	1
JBEM	Journal of Business Economics and Management	1
JMCB	Journal of Money, Credit and Banking	1
MD	Management Decision	1
PBFJ	Pacific-Basin Finance Journal	1
PSBS	Procedia - Social and Behavioral Sciences	1
RAS	Review of Accounting Studies	1
RF	Review of Finance	1
SO	Strategic Organization	1
TFSC	Technological Forecasting & Social Change	1
QREF	The Quarterly Review of Economics and Finance	1
Total		77

Table 3 Overview of separate studies included in this meta-analysis.

Authors	Year	Publication	Country/ Region	Period	Sample size (firm-year)	Fraud sample (firm-year)	Fraud firms	Multiple samples
Beasley	1996	AR	US	1982-1991	150	75	Enforcement firms	No
Uzun, Szewczyk, and Varma	2004	FAJ	US	1978-2001	266	133	Companies were alleged to have committed fraud	No
Archambeault, Dezoort, and Hermanson	2008	CAR	US	1999-2002	306	153	Restatements firms	No
Ettredge, Sun, Lee, and Anandarajan	2008	AJPT	US	1988-2002	190	95	Enforcement firms	Yes
Brazel, Jones, and Zimbelman	2009	JAR	US	1994-2000	220	110	Enforcement firms	No
Lennox and Pittman	2010	CAR	US	1981-2001	162804	1,109	Enforcement firms	No
Chi, Weng, and Liou	2011	PSBS	Taiwan	2006-2009	258	129	Restatement firms	Yes
Troy, Smith, and Domino	2011	SO	US	1992-2004	312	156	Enforcement firms	No
Firth, Rui, and Wu	2011	JCF	China	2000-2005	542	271	Restatement firms	No
Dechow, Ge, Larson, and Sloan	2011	CAR	US	1982-2005	133461	2190	Enforcement firms	Yes
Feng, Ge, Luo, and Shevlin	2011	JAE	US	1982-2005	335	116	Enforcement firms	Yes
Peterson	2012	RAS	US	1997-2005	1192	333	Restatement firms	Yes
Baber, Liang, and Zhu	2012	AH	US	1997 and 2005	1430	54	Restatement firms	Yes
Bens, Goodman, and Neamtiu	2012	AR	US	1996-2007	2293	300	Restatement firms	Yes
Markelevich and Rosner	2013	CAR	US	2000-2010	14612	286	Enforcement firms	Yes
Caskey and Hanlon	2013	CAR	US	1970-2001	47763	330	Enforcement firms	Yes

Authors	Year	Publication	Country/ Region	Period	Sample size (firm-year)	Fraud sample (firm-year)	Fraud firms	Multiple samples
Chen, Cumming, Hou, and Lee	2013	EMR	China	2001-2008	10317	405	Enforcement firms	Yes
Lobo and Zhao	2013	AR	US	2000-2009	51507	5573	Restatement firms	Yes
Lennox, Lisowsky, and Pittman.	2013	JAR	US	1981-2001	126273	797	Enforcement firms	Yes
Armstrong, Larcker, Ormazabal, and Taylor	2013	JFE	US	1992-2009	20445	929	Restatement and Enforcement firms	Yes
Hu and Yang	2014	AEL	China	2004-2011	898	449	Enforcement firms	No
Ding and Wu	2014	JBE	US	2003	622	186	Answered in the survey	No
Lisic, Silveri, Song, and Wang	2015	JBR	China	1999-2005	270	7809	Enforcement firms	Yes
Biggerstaff, Cicero, and Puckett	2015	JFE	US	1992-2009	6498	unclear	Fraud events reported in the FSR database	Yes
Nguyen, Hagendorff and Eshraghi	2016	RF	US	2000-2013	4072	244	Enforcement firms	No
Cormier, Antunes, and Magnan	2016	MD	Canada	1995-2009	32	16	Enforcement firms	No
Liu	2016	JFE	US	1988-2006	67104	3.1% of the firm-year observations	Lawsuit firms, Enforcement firms, and Restatement firms	Yes
Hass, Tarsalewska, and Zhan	2016	JBE	China	2000-2010	5236	309	Enforcement firms	Yes
Wu, Johan, and Rui	2016	JBE	China	2003-2011	11396	966	Enforcement firms	Yes
Bradley, Gokkaya, Liu, and Xie	2017	JAE	US	1997-2011	19772	336	Restatement firms	No

Authors	Year	Publication	Country/ Region	Period	Sample size (firm-year)	Fraud sample (firm-year)	Fraud firms	Multiple samples
Shi, Connelly, and Hoskisson	2017	SMJ	US	1999-2012	14729	265	Enforcement firms	Yes
Wang, Chen, Chin, and Zheng	2017	JAPP	China	2007-2012	5514	850	Enforcement firms	Yes
Yang, Jiao, and Buckland	2017	TFSC	China	1997-2007	164	82	Enforcement firms	Yes
Kurniawan and Hermawan	2017	AEBMR	Indonesi a	2009-2013	140	70	Enforcement firms	No
Azizkhani, Daghani, and Shailer	2018	IJA	Iran	2010	343	33	Audited by a private audit firm is charged with misstated financial reports and identified by the IACPA as an auditor failure.	Yes
Albrecht, Mauldin, and Newton	2018	AR	US	2004-2013	19058	Mean (0.104)	Restatement firms	Yes
Bayram and Wernicke	2018	SMJ	US	1992-2011	206	103	Enforcement firms	Yes
Christensen, Jones, and Kenchington	2018	CAR	US	1994-2008	19109	2259	Restatement firms	No
Souther	2018	JAE	US	1997-2011	6099	53	Enforcement firms	No
Liao, Chen, and Zheng	2019	AF	China	2009-2014	2742	Mean (0.101)	Enforcement firms	Yes
Jha	2019	JBE	US	1990-2009	85743	408	Enforcement firms	Yes
Curtis, Donelson, and Hopkins	2019	CAR	US	1996-2002	503	58	Restatement firms	No
Wahid	2019	JBE	US	2000-2010	38273	unclear	Restatement firms	Yes

Authors	Year	Publication	Country/ Region	Period	Sample size (firm-year)	Fraud sample (firm-year)	Fraud firms	Multiple samples
Cao, Luo, and Zhang	2020	JAPP	US	2004-2016	38840	Mean (0.0130)	Restatement firms, and Enforcement firms	Yes
Zhang, Wang, and Kong	2020	EM	US	1996-2011	232	134	Lawsuit firms	No
Li and Li	2020	FRL	China	2007-2016	12559	Mean (0.048)	Enforcement firms	Yes
Lin, Walker, and Wang	2020	IREF	Taiwan	1999-2015	182	84	Lawsuit firms	No
Ma, Pan, and Stubben	2020	AR	US	1994-2013	13318	Mean (0.02)	Enforcement firms	No
Luo, Peng, and Zhang	2020	PBFJ	China	2004-2014	14536	10303(mean: 0.12), 4233(mean: 0.09)	Enforcement firms	Yes
Allee, Baik, and Roh	2021	CAR	Korea	2006-2014	8597	225	Restatement firms, qualified audit opinions firms, Enforcement firms	Yes
Su, Feng, and Tang	2021	IRFA	China	2010-2018	11465	3005	Enforcement firms	Yes
Zeng, Yang, and Shi	2021	IJAIF	China	2010-2017	881	Mean (0.508)	Enforcement firms	Yes
Xiong, Ouyang, Tong, and Zhang	2021	JCF	China	2007-2017	19852	Mean (0.167)	Enforcement firms	Yes
Alkebsee and Habib	2021	ARA	China	2011-2015	4633	Mean (0.132)	Restatement firms	Yes
Zhao, Yang, Li and Song	2021	FBRC	China	2010-2018	24704	4107	Enforcement firms	Yes

Authors	Year	Publication	Country/ Region	Period	Sample size (firm-year)	Fraud sample (firm-year)	Fraud firms	Multiple samples
Yao, Zhao, Sensoy, Cheng, and Goodell	2021	IRFA	China	2008-2017	11119	Mean (0.123)	Enforcement firms	Yes
Sakawa and Watanabel	2022	JBE	Japan	2008-2016	30260	289	data from Tokyo Shoko Research (TSR)	Yes
Pham, Pham, and Truong	2022	JBFA	US	2000-2015	13080	Mean (0.131)	Restatement firms	No
Tang, Gu, Weng, and Ho	2022	IJEM	China	2007-2016	15490	Mean (0.10)	Enforcement firms	Yes
Xing, Zhang, Xiong, and Li	2022	CJAR	China	2010-2017	10073	Mean (0.084)	based on the CSMAR database	Yes
Liang, Gao, and Xie	2022	QREF	China	2004-2016	24019	3978	Enforcement firms	Yes
Radwan, Tian, Garefalakis, Koutoupis, and Kyriakogkonas	2022	JBEM	China	2010-2017	17239	Mean (0.129)	Enforcement firms	Yes
Mason and Williams	2022	JAAF	US	1992-2010	44596	144	Enforcement firms	Yes
Cao, Geng, Zhang and Li	2022	AEP	China	2008-2018	13170	Mean (0.265)	based on CSMAR database	Yes
Blanco, Dhole, and Gul	2022	JBFA	US	2000-2018	8996	158	Enforcement firms	Yes
Li	2022	ABR	US	1982-2005	340	170	Enforcement firms	Yes
Ren, Zhong, and Wan	2022	JBE	China	2008-2019	13068	1907	Enforcement firms	Yes
Luo and Song	2022	ARA	China	2007-2017	18635	mean (0.032)	Restatement firms	Yes
Chen, Fan, and Zhang	2022	FRL	China	1999-2018	30619	mean (0.07)	Enforcement firms	Yes
Su and Alexiou	2022	CJAR	China	2007-2017	21216	2708	Restatement firms	Yes
Hagendorff, Le, and Nguyen	2022	JMCB	US	1994-2013	58158	602	Enforcement firms	Yes
Wang and Wu	2023	AE	China	2013-2019	18639	mean (0.265)	Enforcement firms	Yes

Authors	Year	Publication	Country/ Region	Period	Sample size (firm-year)	Fraud sample (firm-year)	Fraud firms	Multiple samples
Wu, Cao, and Zhang	2023	JBR	China	2007-2021	37216	mean (0.076)	Enforcement firms	Yes
Manry, Huang and Yan	2023	ARJ	US	2009-2012	10698	82	Lawsuit firms	Yes
Choi, Li, Shenkar, and Zhang	2023	JAAF	US	1996-2011	9686	214	Lawsuit firms	Yes
Li, Li, and Zhang	2023	AR	US	1976-2018	29757	106	Enforcement firms	Yes

3.4 Variables data collection and meta-analysis techniques

In the data collection process for this study, it is important to note that some research papers included multiple regressions. In such cases, the most comprehensive regression from each study was chosen as the representative sample. This method aligns with the approach used in previous research by Hay et al. (2006), O'Boyle et al. (2012), and Naville et al. (2019), which sought to mitigate potential bias arising from repeated sample selection. It is crucial to mention that if a single study used two different samples, even with the same regression model, both results were recorded and included in our analysis. However, there were no instances of this scenario in the current meta-analysis.

Another point to emphasize is the treatment of papers utilizing interaction variables in their regression models. In cases where interaction variables were employed, the data from these regression models was not collected, irrespective of whether it was the most comprehensive model or not. Furthermore, if all regression models in a paper used interaction variables, the paper was excluded from this meta-analysis. The inclusion of interaction variables could potentially influence the relationship between fraud and its determinants, and therefore, their exclusion was deemed necessary for the integrity of the analysis.

Following the rules outlined above, typically, data from one regression model was collected from each paper. All variables were labeled based on their definitions, with those sharing the same meaning grouped together. After labeling all the variables, a research assistant and I began the categorization process. Although I had developed a theory of five fraud factors in the empirical study, for a better and broader understanding, we first divided the variables into internal and external levels. “Internal” refers to variables related to aspects within the company, while “external” refers to factors outside the company. The internal variables were further subdivided into firm-level and individual-level categories. The final step involved classifying them as either financial or non-financial. Table 4 presents these variable categories. The final categorization of variables was established based on our mutual agreement.

Table 4 Categories of independent variables used in fraud research.

Categories			
Internal	Firm-level	Financial	e.g., ROA
		Nonfinancial	e.g., Board size, SOE
	Individual-level	Financial	e.g., CEO's compensation
		Nonfinancial	e.g., the CEO's age
External	Financial		e.g., Auditing fee
	Nonfinancial		e.g., number of analysts

In applying meta-analysis techniques, I adopted a method consistent with Hay et al. (2006). This involved using the Stouffer combined test, where I first converted p-values, z-statistics, and t-statistics into z-scores for each variable.³⁴ Two calculations were then computed. The first calculation involved computing the simple average z-scores for each group and generating combined z-scores for each variable group. These combined z-scores were then transformed into combined p-values to assess the collective effect of each variable group.

The second calculation was based on a weighted average, using the sample size of each study. Different weights were assigned to various studies depending on their sample sizes. The results indicated fewer significant findings in the weighted combined results compared to the simple average-based results. Both sets of results—the simple average-based and the weighted average-based—are presented in Table 5.

It is important to note that while initially over 100 variables were collected for this meta-analysis, the minimum threshold for inclusion in the final analysis was set at five occurrences. Therefore, variables mentioned fewer than five times in previous studies were excluded from the final test. The final results included 30 variables, with the frequency of each variable's occurrence in prior studies also detailed in Table 5.

4. Results

Table 5 presents the final results of this study. A detailed discussion of the variables within each subcategory follows. The definition of the variables can be referred in Appendix. In general, out of the 30 variables analyzed, 23 showed significant results in the simple average-based results. However, in the weighted average results, the number of significant variables decreased to 13, and the level of significance was also weaker. This variation highlights the potential impact of sample size differences across studies. For instance, the sample size in Liu (2016)'s research was 67,104, whereas Cormier et al. (2016) conducted their study with only 32 samples. The final results of this meta-analysis indicate that sample size can significantly influence the outcomes.

³⁴ In the conversion process, only p-values require recalculation into z-scores. The values of z-statistics and t-statistics can be directly employed without modification. To distinguish between the original data and the converted data, the term “z-score” is used here to refer to the data that has been converted.

Table 5 Results for selected variables

categories			variable	freq	Number of significant results			Based on average z-scores				Based on weighted average z-scores				
					Pos.	Neg.	Not Sig.	comb_z	direction	comb_p	stars	comb_z	direction	comb_p	stars	
Internal	Firm-level	Financial	<i>Changes</i>													
			GROWTH-REV	20	8	0	12	4.0682	Positive	0.0000	***	1.0906	Positive	0.2755		
			<i>Bad financial condition</i>													
			LOSS2Y	6	3	0	3	5.5017	Positive	0.0000	***	2.1247	Positive	0.0336	**	
			LOSS	10	5	0	5	5.8956	Positive	0.0000	***	1.8450	Positive	0.0650	*	
			<i>Ownership</i>													
			INSTOWN	17	9	0	8	3.3515	Positive	0.0008	***	0.8202	Positive	0.4121		
			CEOOWN	17	8	0	9	-0.5471	Negative	0.5843		-0.4003	Negative	0.6889		
			TOP1	13	6	2	5	-8.0253	Negative	0.0000	***	-2.4327	Negative	0.0150	**	
			TOP10	7	4	1	2	-5.6640	Negative	0.0000	***	-2.0000	Negative	0.0455	**	
			<i>Operating</i>													
			M&A	11	6	0	5	4.1687	Positive	0.0000	***	1.9506	Positive	0.0511	*	
			<i>Size</i>													
			SIZE	50	28	4	18	5.9119	Positive	0.0000	***	1.0474	Positive	0.2949		
			SIZEM	9	5	0	4	4.6222	Positive	0.0000	***	1.6776	Positive	0.0934	*	
			<i>Financial ratio</i>													
			RETURN	8	4	1	3	-0.5666	Negative	0.5710		-0.1771	Negative	0.8594		
			VOL	8	6	1	1	4.5134	Positive	0.0000	***	2.0264	Positive	0.0427	**	

			ROA	44	22	5	17	-12.1540	Negative	0.0000	***	-1.8070	Negative	0.0708	*
			MTB	18	8	0	10	3.4880	Positive	0.0005	***	1.3340	Positive	0.1822	
			BTM	17	4	1	12	-0.9699	Negative	0.3321		-0.6433	Negative	0.5200	
			TQ	7	3	1	3	-2.0926	Negative	0.0364	**	-0.8890	Negative	0.3740	
			R&D	6	1	0	5	-0.6627	Negative	0.5075		-0.2238	Negative	0.8229	
			LEV	52	26	1	25	12.6794	Positive	0.0000	***	1.9151	Positive	0.0555	*
		Nonfinancial	Board												
			OUTSIDE	10	3	2	5	-5.6736	Negative	0.0000	***	-2.5903	Negative	0.0096	***
			IND	26	8	0	18	-3.8853	Negative	0.0001	***	-0.9548	Negative	0.3397	
			BMEETING	9	6	0	3	5.6802	Positive	0.0000	***	2.3013	Positive	0.0214	**
			BSIZE	31	7	1	23	2.3124	Positive	0.0208	**	0.2933	Positive	0.7693	
			Firm's attributes												
			FAGE	31	10	4	17	-4.3222	Negative	0.0000	***	-0.7795	Negative	0.4357	
			SOE	10	6	0	4	-4.8326	Negative	0.0000	***	-2.0594	Negative	0.0395	**
	Indiv dual	Nonfinan cial	CEOTENURE	6	1	0	5	0.0692	Positive	0.9449		-0.1126	Negative	0.9104	
			DUAL	31	9	0	22	5.9781	Positive	0.0000	***	1.1808	Positive	0.2377	
			CEOAGE	6	0	1	5	-1.5892	Negative	0.1120		-0.2898	Negative	0.7720	
External	Nonfinancial	BIGN	33	7	5	21	-5.3429	Negative	0.0000	***	-1.3377	Negative	0.1810		
		ATENURE	7	4	0	3	-0.4120	Negative	0.6803		0.7001	Positive	0.4839		
		ANANUM	17	8	3	6	-8.9496	Negative	0.0000	***	-2.2510	Negative	0.0244	**	

* p<0.1, ** p<0.05, *** p<0.01

4.1 Financial variables at firm-level

This category contains the largest number of variables, totaling 18. These variables have been further divided into subcategories. The first subcategory, “changes” includes only one variable – changes in revenue (GROWTH-REV). This variable has been used in 20 studies, eight of which demonstrated a significant and positive relationship with fraud, while the remaining 12 showed no significant results. The simple average results indicate a significant and positive relationship, but this significance disappears in the weighted results.

The next subcategory is “bad financial condition”, comprising two variables: loss in the two years prior to the fraud (LOSS2Y) and loss in the year of fraud (LOSS). Both variables generally showed either a significant positive relationship or no significant relationship with fraud in previous studies. Thus, the combined results remain positive. Both variables are significant in simple and weighted average results, though the level of significance decreases in the weighted results. LOSS2Y is significant at the 5% level and LOSS at the 10% level. This finding suggests that a poor financial condition is positively correlated with fraud, aligning with the “Motivation” factor among the five factors for fraud. This implies that companies experiencing financial distress or under the pressure of financial performance are more inclined to engage in fraudulent activities. It emphasizes the importance of financial stability in mitigating the risk of fraud, highlighting a critical area for companies to focus on in their governance and risk management strategies.

The following category is ownership. INSTOWN and CEOOWN represent the share proportions held by institutional investors and the CEO, respectively. Previous studies have shown these variables to have either a significant positive relationship or no significant relationship with fraud. The combined results reveal that while INSTOWN has a positive and significant relationship in the simple average results, it becomes non-significant in the weighted results. For CEOOWN, none of the results are significant. TOP1 and TOP10 represent the proportion of shares held by the largest and the top 10 largest shareholders, respectively. Despite mixed results in previous studies, the combined results for TOP1 indicate a negative and significant relationship. This outcome suggests that the positive results may be weaker and less significant than the negative results, leading to a combined negative and significant result. These results indicate that share concentration plays a crucial role in the occurrence of fraud. A higher concentration of shares seems to deter fraud, suggesting that concentrated ownership may lead to more robust and stronger supervision within companies. This aligns with the “Opportunity” aspect in the theoretical framework of fraud factors. Enhanced oversight reduces the opportunity for committing fraud, consequently leading to a decrease in its occurrence. This underscores the importance of corporate governance and the effective monitoring of share distribution as a preventive measure against fraudulent activities.

Mergers and Acquisitions (M&A) are categorized as variables related to operating decisions. M&A is represented as a dummy variable, assigned a value of 1 if the firms have merger or acquisition activities in the fraud year, and 0 otherwise. This variable demonstrates a positive and significant relationship with fraud in both the simple average and weighted average results. The positive correlation between M&A activities and fraud could be attributed to the companies' need to enhance their financial performance appearance during M&A processes, letting the M&A activities be viewed as a successful operational decision. Such behavior aligns with the "Motivation" aspect of fraud factors theory, suggesting that firms may engage in fraudulent activities to show a more favorable financial status during significant corporate events like mergers and acquisitions.

The next subcategory under consideration is firm size. While many studies use total assets as a proxy variable for size, several others employ market value to represent firm size. The relationships observed in prior studies are varied. Approximately half of the papers indicate a positive and significant relationship between fraud and size, whereas the other half present negative or non-significant results. The combined results also lean towards a positive correlation, with total assets showing no significant impact in the weighted results, while market value is significant at the 10% level. This suggests that firms with a higher market value are more likely to engage in fraudulent activities.

A higher market value, resulting from higher stock prices or increased outstanding stock, not only reflects a larger company size but may also convey additional information. A higher stock price often correlates with greater expectations from investors, potentially bringing pressure on the executives to sustain the price level. Furthermore, a larger volume of outstanding stock may relate to broader investor attention. From this perspective, a higher market value could indicate increased pressure on the CEO. This factor is also translated as a "Motivation" factor within the fraud framework.

The final category within financial and firm-level status is financial ratios, which are indicative of a firm's financial condition. The variable RETURN refers to stock returns over the fraud year. Although this variable is not significant in the combined results, the volatility of these returns (VOL) shows a significant and positive correlation with fraud in the final analysis. This suggests that firms involved in fraud tend to have higher volatility in their stock returns, implying that any positive returns on their stock may not be sustainable. Firms might engage in fraudulent activities to artificially enhance the sustainability or consistent growth of their stock returns or prices. This behavior aligns with the "Motivation" concept within the framework of fraud factors, indicating a strategic approach to manipulating financial outcomes.

Return on Assets (ROA) generally exhibits a negative relationship with fraud. This negative correlation is significant at the 1% level in the simple average results and at the 10% level in the

weighted average results. Interestingly, this finding is consistent with the results related to losses. The presence of losses, indicating poor financial health, is positively related to fraud, whereas a higher ROA, implying better financial performance, is negatively associated with fraud. These observations collectively suggest that firms in financial distress are more likely to engage in fraudulent behavior, while those with strong financial performance lack the incentive or rational motivation to commit fraud. This supports the “Motivation” factor within the framework of fraud factors, emphasizing the role of a firm’s financial condition in the likelihood of fraudulent behavior.

The Market-to-Book (MTB) ratio and Book-to-Market (BTM) ratio are contrasting variables, and their results are also oppositely aligned.³⁵ However, neither of them shows statistical significance. The Tobin's Q ratio (TQ) exhibits a negative relationship with fraud but is also not significant. R&D, representing the ratio of research and development expenses to total assets, indicates the extent of a firm’s R&D activities, but is similarly not significant in this analysis.

The final variable in this category is leverage, calculated as the firm’s debt relative to total assets. It demonstrates a positive and significant correlation with fraud in both the simple and weighted average results. This suggests that firms with higher debt levels are more likely to engage in fraudulent activities. Higher debt may also increase financial pressure on firms, as they need sufficient money for debt repayment, which could potentially lead to fraudulent behavior. This finding further supports the “Motivation” aspect within the framework of fraud factors, emphasizing the influence of financial stressors on the propensity for fraud.

4.2 Non-financial variables at firm-level

In the non-financial firm-level category, there are two subcategories: variables related to the board and variables related to firms’ attributes. The variables associated with the board include the percentage of outside board members (OUTSIDE), the presence of independent directors (IND), the number of board meetings (BMEETING), and the size of the board (BSIZE). Both the proportions of outside and independent directors exhibit a negative relationship with fraud. Notably, OUTSIDE demonstrates a significant relationship in both the simple average and weighted average results. This variable can be seen as indicative of external supervision, suggesting enhanced oversight. The negative correlation implies that stronger supervision may act as a deterrent method against fraudulent activities, consistent with the “Opportunity” factor in fraud theory.

In the case of BMEETING (number of board meetings) and BSIZE (size of the board), both variables demonstrate a positive relationship with fraud, with significant results at the simple

³⁵ In this study, the inclusion of both Market-to-Book (MTB) and Book-to-Market (BTM) ratios is due to their respective use in different research studies. My approach was to simply gather data and show the impact of different variables, so I did not do any calculations beyond the original data.

average level. However, only BMEETING remains significant at the weighted average level. The findings for BMEETING can be associated with the concept of “Opportunity” within the framework of fraud factors as well. This implies that firms holding more board meetings might be doing so to discuss methods of committing fraud. While this interpretation requires cautious consideration, it highlights the potential for increased board meetings to be used not just for oversight and governance, but potentially for planning fraudulent activities as well.

In terms of firms’ attributes, two variables are considered: the firm’s age (FAGE) and whether it is a state-owned enterprise (SOE), the latter represented by a dummy variable assigned a value of 1 for state-owned companies. FAGE demonstrates a negative relationship with fraud, showing significance in the simple average analysis but not in the weighted results. SOE, on the other hand, exhibits a negative and significant relationship in both simple and weighted analyses. The negative correlation with SOEs could be attributed to more robust supervision, as their largest shareholder is typically the state. This suggests that state ownership may act as a form of stringent oversight.

4.3 Non-financial variables at individual-level

In this study, no financial variables were used more than five times, hence, only non-financial variables are considered in the final analysis. This category includes three variables: the tenure of the CEO (CEOTENURE), the dual role of the CEO (DUAL), and the CEO’s age (CEOAGE). CEOTENURE displays a positive relationship in the simple average results but shifts to a negative relationship in the weighted results. This variation indicates that sample size can significantly influence the combined results, though neither is statistically significant. DUAL consistently shows a positive correlation, being significant in the simple average results but not in the weighted results. This suggests that CEOs holding dual positions may have greater opportunities for fraudulent activities. The observed relationship between CEOAGE and fraud is negative, although not statistically significant.

4.4 Non-financial variables at external level

The final category encompasses non-financial external-level variables. As with financial variables, these too have not been utilized more than five times. This category includes three variables: BIGN, representing the use of large audit firms; ATENURE, indicating the number of years a firm has been serviced by the same audit firm; and ANANUM, the number of analysts following the firm. BIGN exhibits a negative and significant relationship with fraud in the simple average calculation, though it becomes non-significant in the weighted average calculation. Nevertheless, this suggests that the presence of large audit firms may imply stronger external oversight, which potentially deters fraudulent activities.

ATENURE shows opposite but not significant results in simple and weighted calculations. ANANUM consistently presents a negative relationship with fraud, being 1% significant at the simple average level and 5% significant at the weighted average level. This indicates that firms with more external analysts are less likely to engage in fraudulent activities. This finding is more closely related to the “Exposure” aspect within the fraud factors theory. Increased analyst attention means firms are under greater inspection and are more likely to be exposed if they engage in fraud, thereby reducing their likelihood of committing such acts.

Table 6 summarizes the significant results from the weighted calculations and delineates their association with the fraud factors. It is evident that the majority of the variables are related to “Opportunity” or “Motivation”. Only one variable is considered to be related to “Exposure”, highlighting the challenges in empirical studies of incorporating variables related to “Attitude” and “Capability” into the analysis. This observation underscores the complexities in studying the full scope of fraud factors and suggests a need for research to effectively integrate these less represented dimensions into the understanding of fraudulent behavior. This finding just re-emphasizes the research significance of my second study, which is conducted as an experimental investigation.

Table 6 Results of significant variables in weighted calculation

Direction	Significance	Variables	Implication	Connection
Positive effects	5% significant	LOSS2Y	The worse the financial performance, the more fraud.	Motivation
		BMEETING	The more boarding meetings, the more fraud.	Opportunity
		VOL	The more volatility of returns, the more fraud.	Motivation
	10% significant	LOSS	The worse the financial performance, the more fraud.	Motivation
		M&A	Firms engaged in Merger and Acquisition activities are more likely to be associated with to fraud.	Motivation
		SIZEM	The higher the market value, the more fraud.	Motivation
		LEV	The more debt, the more fraud.	Motivation
	1% significant	OUTSIDE	The larger percentage of the outside directors, the less fraud.	Opportunity

5% significant	TOP1	The more concentrated shares, the less fraud.	Opportunity
	TOP10	The more concentrated shares, the less fraud.	Opportunity
	SOE	State-owned enterprises, less fraud.	Opportunity
	ANANUM	The larger the number of analysts, the less fraud.	Exposure
10% significant	ROA	The better the financial performance, the less fraud.	Motivation

5. Conclusion and discussion

This study is pioneering in employing meta-analysis to synthesize findings on the effects of fraud factors, integrating results from previous research conducted over the last three decades. After reviewing nearly 3000 papers, this study provides a comprehensive overview of the existing literature. The analysis of selected papers, which disclose effect sizes suitable for this meta-analysis, reveals that 30 variables were frequently used in previous studies.³⁶ Notably, there is a significant discrepancy between the simple average results and the weighted average results. While some variables show a significant relationship with fraud in the simple average, this significance often disappears in the weighted average. This variation can be attributed to differences in sample sizes across studies, influencing the weight and resulting outcome of each variable. Overall, the weighted results indicate that 13 variables are significantly related to fraud. According to the fraud factors theory, seven of these can be classified as “Motivation” factors, five as “Opportunity” factors, and one as an “Exposure” factor. These findings underscore the challenge of incorporating factors like “Attitude” and “Capability” in firm-level studies, suggesting the need for alternative research methods to explore these individual factors.

In conclusion, financial distress is significantly correlated with fraud, providing a substantial incentive for firms to engage in fraudulent activities. Conversely, firms with solid financial performance lack sufficient motivation to commit fraud, emphasizing that improving financial health is crucial to mitigating fraud risk. Additionally, overvaluation and debt pressure are also identified as motivators for fraud, particularly during significant corporate events like M&A. Results related to “Opportunity” consistently show that stricter supervision, such as external or state-based oversight, can deter fraud. An interesting observation is the role of the number of

³⁶ This refers to over five times.

board meetings, which may not only serve as a proxy for supervision but could also indicate board members discussing undesirable methods of resolving financial issues, with fraud being one such method. The unique variable related to “Exposure” reveals that firms under greater analyst inspection are more likely to engage in fraudulent activities.

As a significant contribution, these findings clarify the collective outcomes of current studies and reduce the ambiguity surrounding certain fraud factors, which offers better understanding for the effect of fraud factors in empirical accounting field. For future researchers, this study provides new insights and aids in the selection of suitable control variables for fraud-related research, which can enhance the reliability and robustness of the fraud research.

There are several limitations in this meta-analysis. Firstly, the potential omission of relevant studies presents a concern. Search terms such as “misstatement”, “misconduct”, “irregularity”, and “manipulation” were not included, which might have restricted the breadth of this analysis. Additionally, the inaccessibility of certain papers and the exclusion of studies that did not disclose specific effect sizes (p-value, t-statistics, and z-statistics) further limited the scope. While the fundamental rule of meta-analysis is to include as many papers as possible, encompassing both journal publications and conference papers, the latter were often challenging to access. Consequently, no conference papers were included in the final analysis. Although some of these studies might hold significant value, their absence is a notable limitation.

The second limitation relates to the “file drawer problem”, or publication bias. Journals tend to favor studies with significant results, leading to the non-publication of papers that, despite their realistic implications, may not demonstrate statistical significance. As a result, these unpublished studies, which could significantly influence the overall findings, were excluded from this meta-analysis. This issue of publication bias may introduce a bias in the results as well.

Lastly, the third limitation concerns the varied data sources used by previous research to identify fraud. Sources such as enforcement, restatement, lawsuit, and news data were all considered, despite their potential to affect the consistency and comparability of results across studies. Limiting the data sources would have further reduced the sample size; therefore, the decision to include as many studies as possible was deemed more critical for this meta-analysis. Consequently, no restrictions were imposed on the types of fraud data sources used.

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Appendix

Variables definition

Categories			Variable	Definition
Internal	Firm-level	Financial	Changes	
			GROWTH-REV	$(Revenue_t - Revenue_{t-1})/Revenue_{t-1}$
			Bad financial condition	
			LOSS2Y	A dummy variable taking the value one if the firm had recorded a loss in each of the two years prior to the fraud.
			LOSS	1 if net income is negative, 0 otherwise
			Ownership	
			INSTOWN	Percentage of the company's outstanding shares owned by institutional investors.
			CEOOWN	Percentage of shares held by CEO
			TOP1	The percentage of shares held by the largest shareholder
			TOP10	The percentage of shares held by the top 10 largest firm blockholders.
			Operating	
			M&A	1 if a merger or acquisition is in the first misstated year, otherwise 0.

			Size	
			SIZE	Logarithm of total assets
			SIZEM	Log of market value of equity
			Financial ratio	
			RETURN	Buy-and-hold returns over the year
			VOL	The volatility of log returns during the fiscal year
			ROA	Return on assets in the misstated year (restated assets for restatement companies).
			MTB	Market value of equity /Book value of equity
			BTM	Book value of equity /Market value of equity
			TQ	Tobin's Q ratio
			R&D	Ratio of research and development expenses to total assets
			LEV	Debt to total assets
		Nonfinancial	Board	
			OUTSIDE	Percentage of the board members who are non-employee directors
			IND	Percentage of outside directors who were considered to be independent.
			BMEETING	Number of meetings held by the board of directors annually
			BSIZE	Total number of directors
			Firm's attributes	

			FAGE	The number of years the firm's stock has traded on a national stock exchange
			SOE	SOE is a dummy variable assigned to 1 for state-owned enterprises, and 0 otherwise
	Individual	Nonfinancial	CEOTENURE	The number of years that the CEO has served as a director
			DUAL	A dummy variable equal to one if the CEO holds the position of board chair, and zero otherwise
			CEOAGE	The age of CEO
External		Nonfinancial	BIGN	1 for Big 5 or Big 4 or Big 10 or Big15 (China context) auditor, otherwise 0
			ATENURE	Log of the number of years that the company is audited by the same audit firm on COMPUSTAT
			ANANUM	The natural logarithm of one plus the number of analysts following the firm

Chapter 5: Conclusion of Dissertation

In this dissertation, three research methodologies were utilized to investigate the factors that induce fraudulent behaviors. Theoretically, the study developed and examined the “Five Factors Model for Fraud”, which includes Motivation, Opportunity, Rationalization, Capability, and Exposure and Punishment, at both organizational and individual levels. The empirical study on the Chinese stock market and the meta-analysis focused on the organizational level, treating fraud as a behavior of firms and discussing factors leading to firm-level fraud. The experimental study shifted to the individual level, focusing on a personal factor, Capability, which is challenging to measure in firm-level studies, thus providing evidence related to this aspect of Capability that is lacking in prior research.

Consequently, the validity and rationality of all factors in the “Five Factors Model for Fraud” have been confirmed to some extent. Particularly regarding the two newly added factors, the impact of Capability on fraudulent behaviors is proven to exist but can be limited. However, its influence on Opportunity and Attitude is clearer, suggesting that it can affect misreporting behaviors both in direct and indirect ways, which can be referred to in Chapter 3. Regarding Exposure variables, besides the proxies used in Chapter 2, the meta-analysis in Chapter 4 identified a more robust proxy for Exposure, the number of analysts following the firm, demonstrating a significant and negative relationship with corporate fraud based on its combined effect. This variable reflects the likelihood of firms’ fraudulent activities being detected by external monitoring, aligning with the concept of Exposure. As for other factors, there are also similar results presented in Chapter 2 and Chapter 4, such as the positive relation between fraud and the number of board meetings, and the negative relationship between fraud and CEO’s age or share concentration.

This dissertation contributes to fraud factors research both theoretically and practically. The “Five Factors Model for Fraud” theory offers a new foundational framework for researchers focusing on fraud studies. With a comprehensive approach to developing independent variables, future research is expected to yield more intriguing results in this field. Additionally, in line with the current trend where researchers aim to examine more distinctive and innovative independent variables, the meta-analysis results can assist these researchers in selecting appropriate control variables, leading to improved research quality. Practically, observable and accessible factors within this theoretical framework can be utilized in assessing fraud risk. Specifically, investors can benefit by concentrating on accessible factors that show a significant and positive correlation with fraud, as this may help in minimizing investment failures.

Each study's limitations have been detailed previously. To avoid repetition, they are not reiterated in this chapter. One overarching limitation of this dissertation is the incomplete examination of the "Exposure and Punishment" factor, specifically the "Punishment" element. The reason for the exclusion of "Punishment" was due partly to the relative abundance of empirical evidence regarding its deterrent effect, compared to Capability, thus diminishing its research significance. Additionally, obtaining Institutional Review Board (IRB) approval for experiments involving punishment scenarios, perceived as potentially causing mental pressure or harm, proved challenging. Therefore, an examination of "Punishment" was not conducted in this dissertation. It is anticipated that this aspect will be explored in future research with a more refined design.