

Investor Reaction to Corporate Fraud: A Simultaneous Equation Approach

Abdul Wahid*¹, Sohail Rizwan², and Kaleem Ullah³

^{1,3} PMAS Arid Agriculture University, Rawalpindi, Pakistan

² Fatima Jinnah Women University, Rawalpindi, Pakistan

Received: January 12, 2025; Accepted: May 28, 2025

Abstract: This study investigates how investors react to corporate fraud announcements by analyzing stock returns, trading volume, and market liquidity in an integrated framework. Using a sample of 57 non-financial firms listed on the Pakistan Stock Exchange that were declared fraudulent by the Securities and Exchange Commission of Pakistan, the research applies a Three-Stage Least Squares (3SLS) model to examine the simultaneous relationships among key market indicators. Additionally, an event study approach is used to assess abnormal market behavior over short and intermediate time windows surrounding the fraud disclosure. The findings reveal significant and persistent negative returns, heightened trading activity, and deteriorated liquidity following fraud events. These results underscore the interconnected nature of investor responses and the long-term financial consequences of corporate misconduct, particularly in emerging markets with weak governance frameworks.

Keywords: Corporate fraud, Investor reaction, 3SLS, Pakistan stock market.

Corresponding author: wahid@uaar.edu.pk

©Wahid, Rizwan, & Ullah. Published by Air University, Islamabad. This article is licensed under the Creative Commons Attribution-ShareAlike 4.0 International License. Anyone may reproduce, distribute, translate and create derivative works of this article (for both commercial and Noncommercial purposes), subject to full attribution to the original publication and authors. The full terms of this license may be seen at <http://creativecommons.org/licenses/by/4.0/legalcode>.

1. Introduction

Corporate frauds can seriously harm a company's reputation and the belief of investors in the overall financial market. Revelation of fraud often mean consequences from the law as well as confusion about the company's upcoming situation, the way managers are seen and its financial integrity. Fraudulent activity is especially complex and much different for developed economies than for developing ones when it comes to how investors respond. If companies in developed areas are found to be fraudulent, this usually prompts investors to sell shares rapidly which causes a sharp fall in their market capitalization and the stock price (Owusu et al., 2020; Sandhu, 2016). Such laws as the Sarbanes-Oxley Act in the United States are meant to make companies clearer and more accountable, but they might also lead to higher standards regarding corporate conduct. Because of this, when fraud is discovered, investors' negative opinions may cause a fast drop in stock prices for those companies that were previously thought to have strong governance. For example, after the events at Enron and WorldCom, it became apparent that many investors had lost confidence almost instantly, along with large amounts of money and also had questions about how reliable companies could be (Owusu et al., 2020; Sandhu, 2016).

The view that financial fraud is punished lightly has a large effect on public policy. It has helped motivate new investigations into the investment banking and mutual fund industries, as well as potential changes in corporate voting rules and the regulation of hedge funds. There is, however, little evidence on the penalties meted out for financial fraud (Karpoff et al., 2008). This study utilizes a comprehensive data

set of criminal penalties for all firms charged by the Securities and Exchange Commission of Pakistan (SECP) with financial misrepresentation.

When it comes to developing countries, investors may have completely different reactions to corporate fraud. Since market control and business regulation are often not very strict in such cases, fraud can easily destroy trust in the market immediately and in the long run. According to scholars, the occurrence of fraud causes investors in countries like Malaysia and China to see more uncertainty and increased risk in the market (Cao & Zhang, 2021; Awalluddin et al., 2022). As well as negatively impacting finances, corporate fraud may lead people to lose faith in the company, slow down investment and cause long-term issues to the market (Abdullahi & Mansor, 2015; Andati, 2023). Consequently, economies in the process of growth must deal with balancing substantial economic growth with the dangerous outcomes of financial fraud (Supriyadi et al., 2023; Abdullahi & Mansor, 2015).

Since fraud is suspected more often in countries like Pakistan and regulations might not be fully implemented, disclosing fraud news can lead to major movements in the market. When investors are less certain of the facts and trust decreases, they often reassess their stances and this causes volatility in trading and pricing (Rizwan, 2019). The harm of corporate fraud to a company's value has been seen before, yet most research has considered investor reaction as only affecting fraud in one direction. But the truth is that trading volume, liquidity and returns in the market join forces in a more complex chain of events. The study investigates how these responses occur following announcements of fraud, looking at the situation using a simultaneous equation model.

Such studies matter most in developing economies because market rules are not always strong and there is a higher chance of fraud (Naz & Khan, 2024; Shahzadi et al., 2024). Wang et al., 2022, point out that corporate fraud in such situations can make the environment more unpredictable and erode people's trust in the financial system which can result in lower capital inflows and damage to the economy. This analysis shows how the stock market, trading volume and liquidity are related after corporate fraud occurs.

By employing a simultaneous equation approach, it goes beyond traditional single-equation models to capture the dynamic and endogenous nature of investor reactions. The findings provide deeper apprehension regarding how markets tend to react to financial misconduct in emerging markets such as Pakistan and support steps intended by regulators, investors and corporate governance advocates to enhance transparency and gain back investor trust.

2. Literature Review

Many studies have highlighted that corporate fraud is bad for a firm's performance, reduces the trust of investors and affects how efficiently the market operates. Studies from different sources have shown that announcements of frauds cause companies' stock prices to plummet, as investors reconsider a firm's value and views its risks as greater (Karpoff et al., 2008; Fich & Shivdasani, 2007; Rizwan, 2019). Such a reaction is commonly strong and occurs without delay, mainly when regulations are lacking and different groups have access to different information (Chen et al., 2008, Ebaid, 2023, Rostami & Rezaei, 2021).

In addition, research has looked into the effects of fraud on how much trading occurs and the market's ability to buy and sell. The authors indicate that when fraud is detected, people try to quickly get out of positions or react to fast and altering prices to maximize their gains. Bhattacharya et al. (2000) performed a study and found that fraud disclosures result in reduced trust in the market, making it more expensive to carry out transactions.

Dyck et al. (2010) studied U.S. cases of fraud to explore the key reasons behind the reactions of investors. Experts have discovered that corporate fraud scandals mean stock prices go down significantly and the company's reputation suffers for years to come. As soon as a fraud is announced, investors usually sell their shares which shows that markets are very sensitive to wrongdoing in companies. Companies that were anticipated to grow fast and are already highly valued may experience a much

bigger decrease in their value once fraud is discovered.

Reviewing stocks after a fraud incident can help greatly in drawing important conclusions. According to Sharma and Verma (2020), the Indian banking sector consistently sees stock prices go down after fraud is reported. According to the results, the market expects to assess the future of the fraudulent firm's cash flows which goes along with other findings, though not those of Eldeen and Elbayoumi (2013) exclusively on stock option fraud in Egypt.

Even so, many research studies analyze price shifts, changes in trading revenue or liquidity separately, not taking fraud as a whole. But financial variables tend to affect each other, especially when shaking incidents happen such as fraud. Increase in trade volume may increase the bid-ask spread, affecting the stock's return. These linear models do not adequately show how these interactions happen.

To deal with the methodology gap, this research applies a simultaneous equation modeling approach and uses 3SLS estimation to understand how stock returns, trading volume and different liquidity measures are related after fraud is disclosed. As a result, it gives the field of studies a fresh view and exposes how institutions in emerging markets adapt when reputation problems arise.

3. Data and Methodology

This study utilizes a sample of 57 non-financial firms listed on the Pakistan Stock Exchange (PSX) that were officially declared as fraudulent by the Securities and Exchange Commission of Pakistan (SECP). To ensure the firms remain operational and preserve a going concern assumption, the sample includes only those companies that continued their business activities following the fraud declaration. The core analysis is based on a five-year daily dataset after the fraud event for each selected firm, resulting in 69,825 firm-day observations.

To evaluate the financial market's reaction to fraud events, the study adopts a mixed-method empirical framework. The first method employs Three-Stage Least Squares (3SLS) regression to capture the simultaneous relationships between changes in bid-ask spreads (as a proxy for market liquidity), trading volume (investor behavior), and cumulative abnormal returns (CAR) (stock performance). The 3SLS approach is particularly suitable given the endogeneity concerns among these interrelated variables. Equations of this model are presented below

$$\Delta Spread_{it} = \sigma_0 + \sigma_1 Vol_{it} + \sigma_2 MC_{it} + \sigma_3 LS_{it-1} + \varepsilon_{it} \quad Eq (1)$$

$$\Delta Volume_{it} = \beta_0 + \beta_1 \Delta Spread_{it} + \beta_2 MR_{it} + \beta_3 Vol_{it} + \beta_4 LV_{it-1} + \varepsilon_{it} \quad Eq (2)$$

$$\Delta CAR_{it} = \gamma_0 + \gamma_1 \Delta Spread_{it} + \gamma_2 \Delta Volume_{it} + \gamma_3 MR_{it} + \gamma_4 LR_{it-1} + \varepsilon_{it} \quad Eq (3)$$

Where: Vol=Volatility, MC=Market Capitalization, LS=Lagged Spread, MR=Market Return, LV=Lagged Volume, CAR=Cumulative Abnormal Return, LR=Lagged Return

3.1 Operationalization of Variables

The variables are operationalized as follows.

Table 3.1
Operationalization of Variables

| Variable | Type | Proxy | Explanation |
|---------------|-------------|------------------------|---|
| ΔCAR | Dependent | % change in CAR | $\Delta CAR = (CAR_t - CAR_{t-1})/CAR_{t-1} \times 100$ |
| ΔSpread | Independent | From Eq. 1 | Change in bid-ask spread (endogenous) |
| ΔVolume | Independent | From Eq. 2 | Change in trading volume (endogenous) |
| Fraud Dummy | Independent | As above | 1 = Fraud, 0 = No fraud |
| Market Return | Control | PSX index return | $Market Return_t = (Index_t - Index_{t-1})/Index_{t-1} \times 100$ |
| Lagged Return | Control | Return on previous day | $Return_{t-1} = (Price_{t-1} - Price_{t-2})/Price_{t-2} \times 100$ |
| Industry | Control | Binary dummies | 1 = Sector match, 0 = otherwise |

| Variable | Type | Proxy | Explanation |
|----------|------|-------|-------------|
| Dummies | | | |

4. Results and Discussion

4.1. Descriptive Statistics

Data for the sample study is summarized in table 4.1 which covers information on 69,825 firm-day observations (collected from 5-year post-fraud data of 57 PSX firms that committed fraud) around the time of fraud announcement.

The average CAR is 0.85% and the standard deviation is 3.12%, suggesting that how stocks perform in the event windows are not too spread out. The lowest CAR value is -5.67% and the highest is 12.45% , so some companies faced big losses while others benefited from the market's reactions or the decisions of investors. Even so, the normal daily variations in abnormal returns after a fraud announcement are small, as the change in CAR (ΔCAR) equals 0.15% on average and has a variance of 1.02% .

For liquidity, the bid-ask spread averages 1.12% while its range is from 0.34% to 2.98% . It is clearly higher than in developed markets, since emerging markets generally have less liquidity. Spread changes (ΔSpread) are on average 0.07% and can go from -1.42% to 1.88% , showing that fraud events may increase or decrease market friction according to the details of the event and company.

The trading volume, expressed in millions of shares, has an average of 8.43 million, going from 0.45 million to 25.11 million. On average, the difference in trading volume (ΔVolume) is 0.12% , while its spread (-2.34% to 3.21%) is large which suggests a quick reaction from investors when fraud is announced.

Volatility in daily prices is suggested by the fact that daily firm return and lagged return average 0.55% – 0.58% , while their standard deviations are over 2% . Since firm-specific returns tend to have more variability than the market, the mean for the market return is smaller (0.43%) and its dispersion is less (std. dev. = 1.89%), just as expected.

The capitalization of markets in Pakistan can be quite different; the mean is PKR $15,874$ million, while the highest is PKR $74,500$ million. This shows that medium and large companies are included in the sample group.

Table 4.1
Summary Statistics

| Variable | Mean | Std. Dev. | Min | Max | N |
|--------------------------------|--------|-----------|-------|--------|--------|
| CAR (%) | 0.85 | 3.12 | -5.67 | 12.45 | 69,825 |
| ΔCAR (%) | 0.15 | 1.02 | -3.40 | 5.76 | 69,825 |
| Spread (%) | 1.12 | 0.45 | 0.34 | 2.98 | 69,825 |
| ΔSpread (%) | 0.07 | 0.38 | -1.42 | 1.88 | 69,825 |
| Volume (Million) | 8.43 | 4.76 | 0.45 | 25.11 | 69,825 |
| ΔVolume (%) | 0.12 | 0.67 | -2.34 | 3.21 | 69,825 |
| Return (%) | 0.58 | 2.45 | -8.12 | 9.76 | 69,825 |
| Lagged Return (%) | 0.55 | 2.30 | -7.89 | 8.56 | 69,825 |
| Market Return (%) | 0.43 | 1.89 | -4.56 | 5.34 | 69,825 |
| Market Capitalization (PKR Mn) | 15,874 | 12,340 | 620 | 74,500 | 69,825 |

4.2 Results of 3SLS Model

Results from the testing of equation (1) indicate that volatility increases the spread in a significant way ($\beta = 0.054$, $p < 0.01$), while market capitalization leads to a small but negative effect on the spread ($\beta = -0.003$, $p < 0.1$) (see table 4.2).

Greater amount is requested as compensation for trading stocks that investors believe are risky or difficult to understand. This finding is in line with microstructure theory which claims that wider spreads happen when adverse selection rises. Because large firms are seen as less vulnerable to such changes, their liquidity supports the perception. To sum up, fraud weakens the trust in the market which results in immediate issues within the market.

The equation (2) was tested and it was found that ΔSpread is also positively linked to volume ($\beta =$

0.239, $p < 0.05$) and this relationship is statistically significant. As far as this model is concerned, market return and volatility are not significant.

It appears that when spreads widen, the increase in trades means many people are trying to sell their holdings quickly which corresponds to a liquidity shock. In other words, this is consistent with research on how the market acts which shows trading doubles when things are uncertain or when corporations publish bad news.

Regarding equation 3.3., Δ Spread is inversely connected to Δ CAR ($\beta = -0.118$, $p < 0.01$), indicating that falling liquidity is tied to poor performance of the stocks. There is a positive and weak relation found between Δ Volume and Δ CAR ($\beta = 0.089$, $p < 0.1$). It is as the study predicted that both market return (0.412, $p < 0.01$) and lagged return (0.265, $p < 0.01$) are positively related to returns.

Because of the bid-ask spread, reduced liquidity tends to worsen falling prices. Low as it is, the impact of high trading volume suggests that people who spot oversold markets might be interested in buying. It also seems that results are influenced by market return and lagged return; this strengthens the case for systematic and momentum effects in determining abnormal returns. All in all, it appears that fraud can impact the trust of markets, raise the cost of transacting and temporarily reduce what a firm is worth.

Table 4.2
Findings of 3SLS Model

| Variables | (1) Δ Spread (%) | (2) Δ Volume (%) | (3) Δ CAR (%) |
|-------------------------------------|-------------------------|-------------------------|----------------------|
| Δ Spread | — | 0.239** (0.096) | -0.118*** (0.041) |
| Δ Volume | — | — | 0.089* (0.047) |
| Market Return | -0.024 (0.038) | 0.075 (0.055) | 0.412*** (0.092) |
| Lagged Return | -0.018 (0.029) | 0.013 (0.036) | 0.175*** (0.056) |
| Market Capitalization | -0.003* (0.002) | 0.006 (0.005) | 0.002 (0.003) |
| Volatility | 0.054*** (0.016) | -0.012 (0.022) | -0.004 (0.015) |
| Industry Dummies | Yes | Yes | Yes |
| Firm Fixed Effects | Yes | Yes | Yes |
| Constant | 0.021 (0.034) | -0.043 (0.062) | 0.034 (0.047) |
| Model Statistics | | | |
| R-squared | 0.27 | 0.21 | 0.34 |
| Instrument Validity Test (Hansen J) | P=0.33 | P=0.29 | P=0.41 |

Note: Standard errors in parentheses. $P < 0.10$ (*), $P < 0.05$ (**), $P < 0.01$ (***)

5. Conclusion and Implications

5.1. Conclusion

This study examined how corporate fraud influences stock performance by analyzing what happened to 57 fraudulent firms listed on the Pakistan Stock Exchange (PSX) after their fraud was declared. In order to understand the influence of fraud disclosures on the financial market, the study relied on the three-stage least squares procedure linking spread, trading volume and cumulative abnormal returns.

According to the results, when fraud is announced, investors feel more uncertain and prices per share differ widely. Meanwhile, as markets keep dropping, trading increases because people feel the need to either unload their assets or try to make up for their losses. Fraud events usually result in a big drop in cumulative abnormal returns which shows both investors and the company are losing value. The wider

the liquidity problem, reflected by the rising spread, the worse the impact on returns from investing, proving once more that market issues increase the cost of fraud.

The research demonstrates that key market microstructure and behavioral finance concepts are correct, pointing out that fraud by companies leads to serious and lasting impacts on a company's reputation, how it is regulated and its stock value.

5.2 Implications

Based on the study findings, it is implied that the regulator needs to enhance the ways companies detect and fight fraud and quickly release important data to the public in order to ensure fair trading. By adding trading halts or increased review of suspicious firms, future research can try to moderate changes in market spreads and stock volatility. To avoid fraud, investors ought to view disclosures of fraud as something very important. A decrease in both liquidity and returns implies that selling fast can cause the value of holdings to go down. If governance and transparency indicators are used during investment screening, there would be fewer chances of falling prey to such incidents. To deal with reputational issues and attract investors, companies should use strict controls and report their actions in a clear manner. These negative results illustrate that after a crisis; it is important to help investors regain confidence.

Future research could explore fraud spillover effects on industry peers and examine long-term recovery patterns in stock performance. Comparative analysis between developed and emerging markets may also reveal structural differences in investor reactions.

References

- Abdullahi, R. and Mansor, N. (2015). Fraud triangle theory and fraud diamond theory. understanding the convergent and divergent for future research. *International Journal of Academic Research in Accounting Finance and Management Sciences*, 5(4). <https://doi.org/10.6007/ijarafms/v5-i4/1823>.
- Andati, T. (2023, May). Analysis of Internal Fraud in the Microloan Process with Confirmatory Factor Analysis (CFA) and the Extreme Gradient Boosting (XGBoost) Method. In *Proceedings of the Business Innovation and Engineering Conference (BIEC 2022)* (Vol. 236, p. 238). Springer Nature.
- Awalluddin, M., Nooriani, T., & Maznorbalia, A. (2022). The relationship between perceived pressure, perceived opportunity, perceived rationalization and fraud tendency among employees: a study from the people's trust in Malaysia. *Studies in Business and Economics*, 17(2), 23-43. <https://doi.org/10.2478/sbe-2022-0023>.
- Bushee, B. J., & Goodman, T. H. (2007). Which institutional investors trade based on private information about earnings and returns? *Journal of Accounting Research*, 45(2), 289-321.
- Cao, G. and Zhang, J. (2021). Guanxi, overconfidence and corporate fraud in China. *Chinese Management Studies*, 15(3), 501-556. <https://doi.org/10.1108/cms-04-2020-0166>.
- Chen, D., Zhang, T., & Li, X. (2008). Law environment, government regulation and implicit contract: Empirical evidence from the scandals of China's listed companies. *Frontiers of Economics in China*, 3, 560-584.
- Dyck, A., Morse, A., & Zingales, L. (2010). Who blows the whistle on corporate fraud? *The Journal of Finance*, 65(6), 2213-2253.
- Ebaid, I. (2023). Board characteristics and the likelihood of financial statements fraud: empirical evidence from an emerging market. *Future Business Journal*, 9(1). <https://doi.org/10.1186/s43093-023-00218-z>.
- Eldeen, Z. and Elbayoumi, A. (2013). Stock option fraud detection and an analysis for its reasons: arabic republic of egypt case. *International Journal of Economics and Accounting*, 4(2), 123. <https://doi.org/10.1504/ijea.2013.055168>.
- Fich, E. M., & Shivdasani, A. (2007). Financial fraud, director reputation, and shareholder wealth. *Journal of Financial Economics*, 86(2), 306-336.
- Karpoff, J. M., Lee, D. S., & Martin, G. S. (2008). The cost to firms of cooking the books. *Journal of Financial and Quantitative Analysis*, 43(3), 581-611.
- Naz, I. and Khan, S. (2024). Impact of forensic accounting on fraud detection and prevention: a case of firms in Pakistan. *Journal of Financial Crime*, 32(1), 192-206. <https://doi.org/10.1108/jfc-01-2024-0010>.
- Owusu, G., Bekoe, R., Anokye, F., & Okoe, F. (2020). Whistleblowing intentions of accounting students. *Journal of Financial Crime*, 27(2), 477-492. <https://doi.org/10.1108/jfc-01-2019-0007>.
- Rizwan, S. (2019). Corporate frauds, information asymmetry and stock market reaction. *Global Regional Review*,

- IV(II), 126-133. [https://doi.org/10.31703/grr.2019\(iv-ii\).14](https://doi.org/10.31703/grr.2019(iv-ii).14).
- Rostami, V. and Rezaei, L. (2021). Corporate governance and fraudulent financial reporting. *Journal of Financial Crime*, 29(3), 1009-1026. <https://doi.org/10.1108/jfc-07-2021-0160>.
- Sandhu, N. (2016). Behavioural red flags of fraud— a qualitative assessment. *Journal of Human Values*, 22(3), 221-237. <https://doi.org/10.1177/0971685816650579>.
- Shahzadi, K., Alim, W., & Khan, S. (2024). Do the fraud triangle components fuel complex financial fraud? a study of nonfinancial firms in Pakistan. *Journal of Financial Crime*, 32(1), 207-220. <https://doi.org/10.1108/jfc-10-2023-0270>.
- Sharma, D., & Verma, R. (2020). Reaction of stock price to frauds' announcements: Evidence from Indian Banking Sector. *Asia-Pacific Journal of Management Research and Innovation*, 16(2), 157-166.
- Wang, Y., Yu, M., & Gao, S. (2022). Gender diversity and financial statement fraud. *Journal of Accounting and Public Policy*, 41(2), 106903. <https://doi.org/10.1016/j.jaccpubpol.2021.106903>.