




# Revisiting market reactions to directors' dealings for JSE – Listed firms: An information environment perspective

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**Purpose:** Directors' dealings have the potential to provide valuable information to the market. The purpose of this study is to determine whether the market reaction to directors' dealings has any relationship with other available sources of information about the company (i.e. its 'information environment').

**Design/methodology/approach:** Market reaction to directors' dealings was measured in an event study. Thereafter, a regression analysis was performed to examine the relationship between market reaction and indicators of the firm's information environment.

**Findings/results:** Directors' dealings trigger statistically significant abnormal returns for small companies during the anticipation and event window and for medium and large companies during the post-event window. We find statistically significant relationships between the market reactions to directors' dealings and various indicators of the information environment. There is a significant relationship between market reactions and analyst following (in large- and medium-sized firms) and bid-ask spread (in small companies).

**Practical implications:** Directors' trades possess differing levels of informational value, depending on the information environment of the firm, with implications for market efficiency and corporate reporting.

**Originality/value:** The juxtaposition of research on directors' dealings and the information environment contributes to two strands of research that are often studied in isolation.

**Keywords:** director's dealings; event study; information environment; JSE; regression.

## Introduction

The market's reaction to directors' dealings can provide insights into whether participants view these trades as credible signals. The company's information environment refers to the amount of information available about a firm (Zeghal, 1984). The reaction of the market to directors' dealings can provide valuable details about the company's information environment. In turn, this detail has important implications for the informational efficiency of markets.

It is evident from the prior research that the company's information environment and the effect of directors' dealings on the stock price of a company have been studied largely in isolation from one another. For example, Dardas and Güttler (2011) examine whether directors' dealings are informative but do not consider information-specific variables in their analysis, while Baik et al. (2018) examine the relationship between managerial ability and the quality of the firm's information environment but do not consider the relationship between directors' dealings and the information environment. This study seeks to fill this research gap.

Furthermore, this study seeks to make a contextual contribution by focusing on the Johannesburg Securities Exchange (JSE). The context is notable as the JSE is situated in the emerging South African economy, which is acknowledged for its information-rich environment (Barth et al., 2017) and robust corporate governance regulations (Natesan, 2020). Prior research has focused on developed economies (e.g. Lakonishok & Lee, 2001; Ryan, 2005), while the focus on South Africa has been limited to directors' dealings to inform investment strategies (Moodley et al., 2016; Mordant & Muller, 2003; Thaver & Ward, 2011).

This study is predicated on the notion that where companies have a strong information environment (i.e. there are low levels of information asymmetry), there is minimal new information

to the market from directors' dealings. The purpose of this study is, therefore, to understand the market reaction to directors' dealings and determine whether the reaction has any relationship with the information environment. We specify two research questions, each with its own set of hypotheses and associated methodologies. Firstly, we determine whether directors' dealings trigger significant abnormal returns and trading volumes, using an event study method. Secondly, we determine whether market reaction is related to various indicators of the firms' information environment. To this end, we use a regression model with various measurement indicators of information asymmetry. Hypotheses are developed with reference to the theoretical framework and prior empirical evidence.

This study considers only legal trades, as defined in the JSE guidelines, paragraph 3.66. The guidelines state that a director may deal in securities only if they have advised the chairman (or other designated directors) in advance and have received clearance. The sample includes only these approved trades, being those disclosed via the Stock Exchange News Service (SENS) announcements (JSE, 2019).

## Literature review

### Theoretical framework

The Efficient Market Hypothesis formalised by Fama (1970) states that a financial market is efficient when prices reflect all available information. Specifically, three forms of efficiency were defined – strong, semi-strong and weak. In a market that displays strong-form efficiency, there are no information advantages to be obtained from insider trades, as all information is already reflected in the price of the share. However, these circumstances are viewed as unrealistic in practice. With regard to the JSE's efficiency, researchers have concluded that it is not strong-form efficient (Thompson & Ward, 1995) and that there is room for prediction of share prices based on informational advantages (Nyakurukwa & Seetharam, 2023).

Market efficiency is relevant to this study, as directors' dealings are publicly disclosed to the market in accordance with the JSE listing requirements. This study considers the market response to directors' dealings in the context of the information environment and evaluates the market reaction in relation to information-specific factors to determine the firm-specific contexts in which directors' trades are likely to confer significant informational advantages. Consistent with the efficiency theories discussed in Ryan (2005) and Nyakurukwa and Seetharam (2023), the present study is predicated on the notion that the richer the information environment, the lower the informational advantage to the market from directors' dealings.

In the context of incorporating information into prices, the development of the Capital Asset Pricing Model or CAPM (Lintner, 1965; Sharpe, 1964), is closely intertwined with theories of market efficiency. The CAPM is an asset pricing model that specifies the relationship between risk and return.

It follows, therefore, that the CAPM is used in an event study such as this one. Significant deviations from a CAPM-predicted return following an event can reasonably be inferred to be a result of the information content of that event.

The research surrounding directors' dealings often draws on signalling theory and information asymmetry, which suggests that directors who have access to private information about a company signal this information to the market through their trading activities (John & Lang, 1991). Directors' dealings are viewed as informative signals, and multiple studies investigate the profitability of directors' dealings as signals by calculating the abnormal returns earned by directors on their trades. Many of these studies (Moodley et al., 2016; Neill et al., 2008; Ryan, 2005) have found significant associations between directors' trades and abnormal returns on company shares, indicating the potential for informational advantages, even amid the relatively strong information environment and trading laws in South Africa (Barth et al., 2017; Ojah et al., 2020; Natesan, 2020; Thaver & Ward, 2011).

### Market reaction to the director's dealings

In the context of the JSE, Thaver and Ward (2011) examined whether the volume of shares traded could be an indicator of potential insider trading. They found that 34 out of 142 price-sensitive SENS announcements were associated with significant abnormal trading volumes prior to the release of the announcement (emphasis added). It is therefore unsurprising that the investment community shows strong interest in trading by insiders, driven by the belief that insiders possess valuable information about a company's future prospects (Moodley et al., 2016; Nanda & Barai, 2020), so much so that these trades could be used in developing trading strategies for outside investors (Mordant & Muller, 2003).

### Hypothesis development

#### Market reaction in terms of price and volume

Ryan (2005) examined the relationship between the ability of directors' dealings to trigger share price as well as trading volume activity and the richness of a firm's information environment using trading data from the London Stock Exchange. The study addressed both the price and the trading volume impact of directors' dealings because directors' dealings can potentially communicate different dimensions of the news content of such trades. Thus, trading volume preserves differences among individual investors, which are cancelled out in the averaging process that determines equilibrium prices. In the context of the JSE, Thaver and Ward (2011) consider abnormal trading volumes prior to price-sensitive information being announced by the company. Nanda and Barai (2020) consider the effect of insider transactions on the stock characteristics of return and volume. Return and volume reactions are considered distinct from each other as 'it is possible that directors' trades may generate significant trading volume movements but less

significant price changes and vice versa' (Ryan, 2005, p. 334). It is evident from prior research that insider trades have the potential to be associated with abnormal returns and/or abnormal trading volumes. Hypotheses for this study, therefore, involve both price and volume reactions:

**H1:** Directors' dealings will trigger statistically significant abnormal returns (*H1.1*) and abnormal trading volumes (*H1.2*) in JSE-listed companies.

### Role of the information environment

Information asymmetry arises when different market participants possess different levels of information about a company (Akerlof, 1970). Zeghal (1984) explains that the information environment refers to the amount of information available about a firm (the amount of information refers to all information that is relevant to determining security prices at any given time). The information environment plays a crucial role in shaping the stock market's reaction to events such as directors' dealings by influencing the flow and quality of information available to investors (Piotroski & Wong, 2012). In other words, the information environment influences the level of information asymmetry, which influences the stock market's reaction to events.

### Analyst following

Analyst following is widely recognised in financial literature as an indicator of the information environment of a firm. Analysts are generally seen as responsible for the collection and production of information, as evidenced by Brennan and Hughes (1991) and Bhushan (1989), who equate analyst following with the economy-wide amount of information gathering in their models of stock splits and disclosure, respectively. By disclosing information to the public through their reports, analysts can reduce the information asymmetry between insiders and outside investors. Additionally, the monitoring of firms by analysts encourages the acquisition of information by outsiders, which further improves the information environment (Dang et al., 2021). Leece and White (2017) find that analysts tend to herd towards stocks with more opaque information environments and greater information asymmetry. Collectively, these studies show the appropriateness of analyst following as an indicator of the information environment of the firm. Therefore, this study hypothesises as follows:

**H2:** The share price (*H2.1*) and trading volume (*H2.2*) reaction to directors' dealings have a significant relationship with the number of analysts following the company.

### Bid-ask spread

The bid-ask spread is used as a measure of information asymmetry, as empirical studies show a positive relationship between the bid-ask spread and the measures of information asymmetry. A wider bid-ask spread reflects greater information asymmetry among market participants, while a narrower spread reflects less informational imbalance (Chung et al., 1995). Therefore, this study hypothesises as follows:

**H3:** The share price (*H3.1*) and trading volume (*H3.2*) reaction to directors' dealings has a significant relationship with the bid-ask spread of the company.

### Size

Firm size is recognised as an indicator of the information environment because of its relationship with information asymmetry and the availability of firm-specific disclosures. Zeghal (1984) investigates the effect of firm size on the informational content of the financial statements. Their findings highlight firm size as an indicator of the amount of information available about a firm, given the inverse relationship between firm size and the informational content of their financial statements. Ryan (2005) includes size as a measurement approximation for the quality of the information environment. Zadeh and Eskandari (2012) found companies' risk-disclosure levels to be positively related to the company size. This evidence confirms the suitability of size as an indicator of the company's information environment. Therefore, this study hypothesises as follows:

**H4:** The share price (*H4.1*) and trading volume (*H4.2*) reaction to directors' dealings has a significant relationship with the size of the company.

## Methodology

This study uses an event study methodology (Ball & Brown, 1968) to evaluate the relationship between the stock price and trading volume reaction to directors' dealings and the company's information environment. The cumulative average abnormal returns (CAAR) and the cumulative average abnormal volume (CAAV) were calculated to measure the stock price and trading volume reaction to the directors' dealings. Thereafter, a regression analysis was performed by using the CAAR and the CAAV as the dependent variables and the indicators for the information environment as independent variables to determine whether a significant relationship exists.

### Population and sample

The population for this research has been defined as all on-market directors' dealings for companies on the JSE, as reported in the SENS announcements between 01 January 2022 and 31 December 2023. The recommendation of Ryan (2005), a two-calendar-year period is used to ensure that sufficient historical data can be collected for the estimation period, given the differing financial year ends. The period begins on 01 January 2022, as 2022 is the first year in which the South African economy displayed pre-pandemic levels of operating with minimal business and economic disruption as a result of the COVID-19 pandemic. According to Statistics South Africa (2022), the South African economy took almost two years to recover from the worst of the COVID-19 pandemic and in the first quarter of 2022, the South African gross domestic product rebounded to its pre-pandemic levels. Additionally, the 2-year period minimised the risk of having two directors' trades that had different relationships

with each of the indicators of the information environment caused by the trades occurring at different phases of the economic cycle. This approach helps ensure that the observed relationships of the market reaction to the directors' dealings and their relationship with the information environment are not confounded by changes in the economic cycle.

The sample for this study includes directors' dealings from 90 companies, comprising 30 small companies, 30 medium companies, and 30 large companies on the JSE. This size categorisation is important despite the use of 'size' as an indicator of the information environment. By having sub-samples of size, we reduced the possibility of the effects of trades in large companies masking the effects of trades in smaller companies.

The JSE's Large Cap (J205), Mid Cap (J201) and Small Cap Index (J202) classifications were followed to create the sub-samples of size. These classifications are derived by the JSE according to a ranking system based on-market capitalisation (JSE, 2025). Each company's classification is included in the EquityRT database. For the purposes of this research, the classification data were drawn directly from EquityRT. The 90 companies were selected from the pool of companies that reported the on-market directors' dealings. Within each size category (small, medium and large), 30 companies were selected based on the presence of directors' dealings during the event window.

After adjusting for confounding events, the data collection indicates 247 SENS announcements relating to dealings from large companies, 173 announcements from medium companies and 162 announcements from small companies.

## Event study

An event study method was used to assess the market reaction to directors' dealings, following the guidance in MacKinlay (1997) and applications thereof in similar event studies (Nanda & Barai, 2020; Nkongho & Makina, 2020).

The abnormal return was calculated as Equation 1:

$$AR_{i,t} = R_{i,t} - ER_{i,t} \quad [\text{Eqn 1}]$$

- where  $AR_{i,t}$  is equal to the abnormal return of stock  $i$  on day  $t$
- $R_{i,t}$  is equal to the actual return of stock  $i$  on day  $t$
- $ER_{i,t}$  is equal to the expected return for firm  $i$  on day  $t$

The actual return for day  $t$  was expressed as a percentage and computed as Equation 2:

$$\frac{R_{i,t} - R_{i,t-1}}{R_{i,t}} \quad [\text{Eqn 2}]$$

MacKinlay (1997) suggests two models that can be used to calculate the expected return: the mean return model and the market model. As in Ryan (2005), the present

study uses the market return model. A market model was chosen, as it incorporates the entire market's performance and avoids the situation in which abnormal returns are conflated with general market movements. Specifically, the CAPM, developed by Sharpe (1964) and Lintner (1965), was used to estimate expected returns ( $ER_{i,t}$ ) as Equation 3:

$$ER_{i,t} = R_f + \beta_i (R_{m,t} - R_f) \quad [\text{Eqn 3}]$$

where:

- $R_{m,t}$  is the return on the JSE All Share Index in period  $t$
- $R_f$  is the risk-free rate in period  $t$ , based on the return of the 10-year South African government bond
- $\beta_i$  is the beta coefficient for each specific firm  $i$

The abnormal volume ( $AV_{i,t}$ ) was calculated as Equation 4:

$$AV_{i,t} = RV_{i,t} - EV_{i,t} \quad [\text{Eqn 4}]$$

where  $RV_{i,t}$  is equal to the actual trading volume of firm  $i$  on day  $t$  and  $EV_{i,t}$  is equal to the expected trading volume of firm  $i$  on day  $t$ .

The expected volume ( $EV_{i,t}$ ) was determined as follows:

$EV_{i,t}$  = the average volume traded over the estimation window from  $t-90$  to  $t-6$ .

The stock price and trading volume reactions to directors' dealings were measured by using the CAAR and the CAAV, respectively, over the event window.

The CAAR was calculated as Equation 5:

$$CAAR = \sum_{t=1}^T \frac{1}{N} \sum AR_{i,t} \quad [\text{Eqn 5}]$$

where  $N$  is equal to the number of observations within the sample,  $T$  is the number of days post the event date, and  $AR_{i,t}$  is the abnormal return for firm  $i$  on day  $t$ .

The CAAR were calculated for the anticipation window, the event date, and five days post the event date.

The CAAV was calculated as Equation 6:

$$CAAV = \sum_{t=1}^T \frac{1}{N} \sum AV_{i,t} \quad [\text{Eqn 6}]$$

where  $N$  equals the number of observations in the sample,  $T$  is the number of days post the event date, and  $AV_{i,t}$  is equal to the abnormal volume of firm  $i$  on day  $t$ .

The CAAV were calculated for the anticipation window, the event date, and five days post the event date.

The timeline of the entire event period consists of three periods, namely, the estimation window, the anticipation window and the post-event window, as shown in Figure 1 (not drawn to scale).

Given that this study investigates the stock price and trading volume reaction to directors' dealings, a shorter estimation window of 90 days is used, which is similar to Nanda and Barai (2020). The anticipation window begins 5 days before the event date because that is the maximum amount of time allowed between the transaction date and the announcement of the transaction (JSE, 2019).

The SENS announcement is  $t_0$  (event date) because before that, the trade is not known to the market. The short event window of 5 days is optimal for this study because it allows the focus to remain on the initial market reaction to the event without the influence of other events in subsequent trading days. Additionally, it has been empirically demonstrated by Ryngaert and Netter (1990) that a shorter event window will usually capture the significant effect of an event.

## Regression

In line with Thalassinos et al. (2012) and Nanda and Barai (2020), a regression analysis was employed to determine the relationship between the stock price and trading volume reaction to directors' dealings and the company's information environment.

The indicators for the company information environment are defined as follows: Firm size is defined as the natural log of market capitalisation and is termed 'SIZE'. The bid-ask spread is defined as the natural log of the median of the difference between daily closing bid and ask prices divided by their midpoint and is termed 'BID-ASK' (Barth et al., 2017). The number of analysts is defined as the number of analysts producing recommendations for our sample of firms and was termed 'ANA'.

The following models (Equation 7 and Equation 8) were used:

$$CAAR_{j,i,t} = \alpha_0 + \alpha_1 SIZE_{i,t} + \alpha_2 (BID - ASK)_{i,t} + \alpha_3 ANA_{i,t} + \varepsilon_1 \quad [\text{Eqn 7}]$$

$$CAAV_{j,i,t} = \beta_0 + \beta_1 SIZE_{i,t} + \beta_2 (BID - ASK)_{i,t} + \beta_3 ANA_{i,t} + \varepsilon_2 \quad [\text{Eqn 8}]$$

where CAAR and CAAV are the natural log of the CAAR and volume, respectively for event  $j$  in company  $i$  at time  $t$ . SIZE, BID-ASK and ANA are the indicators for the company information environment for company  $i$  at time  $t$ .

The chosen model was derived from the model used by Ryan (2005), which incorporated firm size, number of

analysts and absolute values of cumulative abnormal returns as dependent variables, while the price and trading volume movements driven by directors' trades served as independent variables.

## Validity and reliability

Confounding events were identified by comparing the actual returns of a firm to the index return of the industry that the firm operates in, and where the returns of the firm deviate significantly from the returns of the industry index is indicative of a possible confounding event. A significant deviation is defined as a return that is greater than three standard deviations (s.d.) from the mean index return, as 99.7% of observations lie between the mean and three s.d. (Mishra et al., 2019). Events that were identified by using the above method were checked for confounding events by investigating whether there were any SENS announcements released related to company actions that would influence the stock characteristics other than the event, such as earnings announcements, dividend declarations or corporate action announcements, such as mergers or divestitures.

The trading restrictions imposed by the JSE listing rules in paragraphs 3.63–3.74 help address the issue of confounding events by prohibiting directors' trading during closed periods (see section 2). Given that directors will be unable to trade during these periods, there is a reduced likelihood of abnormal returns and volumes being calculated, which have been influenced by the events that take place during closed periods, such as earnings announcements.

In addition, the assumptions of regression were tested. This study tests for (1) an approximately linear relationship between variables, (2) multicollinearity, (3) homoscedasticity and (4) normality (Osborne & Waters, 2002). Linearity was tested by using scatter plots of the residuals; multicollinearity was tested by using the variance inflation factor (VIF) statistic to ensure that the degree of multicollinearity was sufficiently low to perform the regressions (Shrestha, 2020). The Breusch–Pagan test for heteroscedasticity was used to confirm the absence of heteroscedasticity (Klein et al., 2016). Data were tested for normality by using the Kolmogorov–Smirnov test and the normal Q-Q plot to verify that the data followed a normal distribution (Osborne & Waters, 2002; Yazici & Yolacan, 2007).

## Ethical considerations

Ethical clearance to conduct this study was obtained from the University of the Witwatersrand Human Research Ethics Committee (Non-Medical) (No. WSOA-2024-07-22W).

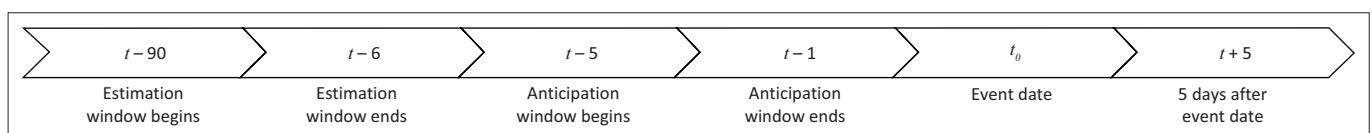


FIGURE 1: Timeline of the event study.

## Results

### Event study results

Table 1 presents the final sample of SENS announcements and the number of dealings after adjusting for confounding events.

A single SENS announcement can announce more than one director's dealing, which explains why the number of dealings exceeds the number of SENS announcements.

**TABLE 1:** Final sample of SENS announcements and director's dealings.

Variables	Small	Medium	Large	Total
Number of companies	30	30	30	90
Number of SENS announcements	162	173	247	582
Number of dealings	331	368	504	1202

SENS, stock exchange news service.

**TABLE 2:** Analysis of directors' dealings of small companies.

Small companies	Chief Executive Officer	Chief Financial Officer	Executive Director	Company Secretary	Non-executive Director	Independent Non-executive Director	Board Chair and/or Deputy	Overall average
Total number of transactions	101	41	63	35	53	26	12	48
Average value of transaction	R3.85	R1.37	R0.86	R0.69	R2.01	R2.77	R7.70	R2.76
Average number of shares per transaction	240 083	46 993	30 588	20 497	282 075	69 576	199 707	127 075
Number of purchases	43	14	16	11	32	15	11	21
Total value of purchases	R106.43	R11.05	R9.53	R2.44	R45.22	R9.64	R81.36	R37.95
Average value of purchases	R2.48	R0.79	R0.60	R0.22	R2.38	R0.64	R7.40	R2.07
Average number of shares purchased	276 014	18 957	11 783	15 885	541 087	32 531	189 310	155 081
Number of sales	58	27	47	24	21	11	1	27
Total value of sales	R282.6	R45.28	R44.52	R21.66	R35.35	R62.31	R11.09	R71.83
Average value of sales	R4.87	R1.68	R0.95	R0.91	R1.68	R5.66	R11.09	R3.98
Average number of shares sold	213 443	61 530	36 989	22 611	47 731	120 091	199 707	100 301

**TABLE 3:** Analysis of directors' dealings of medium companies.

Medium-sized companies	Chief Executive Officer	Chief Financial Officer	Executive Director	Company Secretary	Non-executive Director	Independent Non-executive Director	Board Chair and/or Deputy	Overall average
Total number of transactions	97	68	100	37	32	28	6	53
Average value of transaction	R3.52	R1.79	R2.02	R0.90	R4.04	R2.22	R5.16	R2.81
Average number of shares per transaction	59 505	44 221	53 988	14 121	46 380	68 732	134 350	60 186
Number of purchases	25	19	5	0	20	20	2	13
Total value of purchases	R24.46	R8.98	R4.77	0	R96.16	R27.08	R0.54	R23.14
Average value of purchases	R0.98	R0.47	R0.95	0	R4.81	R1.35	R0.27	R1.25
Average number of shares purchased	27 973	38 044	19 278	0	33 933	84 191	4925	29 764
Number of sales	72	49	95	37	12	8	4	40
Total value of sales	R317.20	R112.71	R197.74	R32.20	R33.11	R35.05	R30.43	R108.35
Average value of sales	R4.41	R2.30	R2.08	R0.90	R2.76	R4.38	R7.61	R3.35
Average number of shares sold	70 453	46 616	55 815	14 121	67 126	30 084	199 062	69 040

**TABLE 4:** Analysis of directors' dealings in large companies.

Large companies	Chief Executive Officer	Chief Financial Officer	Executive Director	Company Secretary	Non-executive Director	Independent Non-executive Director	Board Chair and/or Deputy	Overall average
Total number of transactions	109	87	201	37	26	27	17	72
Average value of transaction	R22.38	R7.1	R4.55	R0.55	R49.76	R1.24	R6.01	R13.08
Average number of shares per transaction	69 517	48 717	34 372	4393	205 016	12 727	69 994	63 534
Number of purchases	17	19	22	2	10	21	13	15
Total value of purchases	R168.84	R72.21	R105.92	R1.37	R14.54	R19.55	R14.73	R56.74
Average value of purchases	R0.135	R3.80	R4.81	R0.68	R1.45	R0.93	R1.13	R1.85
Average number of shares purchased	135 175	55 896	44 161	10 853	22 906	11 570	10 376	41 563
Number of sales	92	68	179	35	16	6	4	58
Total value of sales	R2270.38	R545.71	R809.26	R18.77	R1279.16	R13.99	R87.35	R717.80
Average value of sales	R24.68	R8.03	R4.52	R0.54	R79.95	R2.32	R21.84	R20.27
Average number of shares sold	57 385	46 711	33 169	4 022	318 834	16 775	263 750	105 807

### Descriptive statistics

Table 2, Table 3 and Table 4 highlight a breakdown of all the directors' trades recorded in the SENS announcements that were collected. There were 582 SENS announcements in the sample for this study, which recorded 1202 directors' dealings. In the tables, all transaction values are provided in terms of millions of rand.

In general, the data indicate that the value and size of transactions are positively related to company size. This relationship is shown in the overall average value of transactions in large companies, R13.08 million, being significantly higher than the average value in small and medium companies of R2.76m and R2.81m, respectively. This outcome could be attributed to larger companies having a higher share price and greater liquidity of stocks compared to those of small and medium companies, meaning that each

transaction in a large company would have a higher total value, contributing to the higher average.

The remuneration policies of companies which provide share-based incentives to directors further encourage more frequent transactions by directors. As executive directors, including the Chief Executive Officer (CEO) and Chief Financial Officer (CFO), are involved in the daily operations, their remuneration packages often include share-based incentives to encourage better performance by directors, which benefits the stock price as well as their remuneration packages (Baker et al., 1988). These incentives are common in JSE-listed companies and motivate directors to engage in transactions to maximise personal gains, adjust risk exposure or convert them to cash for liquidity purposes, such as to settle taxes related to the receipt of these stock awards. The increased participation in share-based remuneration schemes and the related transactions may explain why executive directors, including the CEO and CFO, have more frequent transactions than non-executive directors do.

More specifically, the chairman of small and medium companies has the least number of transactions, with 12 and 6 transactions, respectively, yet they show the highest average transaction value. A similar result is present in large companies in which the chairman has the fourth-highest average transaction value despite having the least number of transactions (17). This behaviour is possibly explained by the role and influence of the chairman's position. As a high-ranking director, the chairman typically prioritises longer-term strategic gains over more frequent market activity, resulting in less frequent and higher-value trades (Del Brio et al., 2018). Additionally, the reason for trades by the chairman is often the rebalancing of their investment portfolio, which generally occurs annually. The rebalancing of an investment portfolio typically requires less frequent but larger trades to maintain an intended asset allocation, reduce transaction costs and enhance long-term returns, which explains the less frequent but higher-value transactions by the chairman (Brennan et al., 1997).

An analysis of the purchases and sales by directors produces several interesting insights relating to the trends of directors' dealings. It is apparent that the number of sales greatly outweighs the number of purchases, evidenced by the consistently higher average number of sales in small, medium and large companies, respectively. Given the increasing amount of equity-based remuneration received by directors, it is expected that some or all the stock received will be converted into cash, depending on the director's liquidity needs, resulting in a greater number of sale transactions.

The purchase transactions are dominated by CEOs in small companies. In contrast, large companies exhibit a different dynamic with independent non-executive directors trading more frequently than CEOs, who are only ranked fourth in terms of frequency of purchases. This shift may be attributed

to the more complex governance structures and diversified management teams in large companies.

The greater number of executive director sale transactions is explained by the size and management structure of medium and large companies. As these companies are larger, they have more individuals in directorship positions and subsequently more individuals with equity-based compensation. Consequently, the higher number of sales transactions reflects the greater number of directors present in medium and large companies.

The dominance of CEOs is not surprising given that CEOs are usually better compensated than other directors, allowing them to engage in both purchase and sale transactions of greater value and size (Wang et al., 2012).

The CAARs and CAAVs, which were calculated from the event study, were tested for a significant statistical difference.

The results in Table 5 show that sale transactions generate higher abnormal returns than purchase transactions do. The sale transactions showed positive abnormal returns across the anticipation window, event day and post-event window; however, none were statistically significant. Conversely, the purchase transactions showed statistically significant negative returns for the anticipation window and the event day, as shown in Table 6. This result suggests that the market has a significant negative reaction before and on the day of a purchase transaction. These results are partially consistent with Boubacar and Morris (2011), who present results finding significant negative CAARs following purchase transactions.

However, the results of this study show that significant negative returns are present before and on the day of the announcement of the purchase reaction. We posit that our findings are possibly a result of incentive plans, which result in directors acquiring shares (which is seen as a purchase by the market). Given that these stocks are awarded to directors

**TABLE 5:** Results of tests of significant difference between cumulative average abnormal returns of purchase and sale transactions.

Period	Purchase transactions			Sale transactions		
	Mean	SD	p-value	Mean	SD	p-value
Anticipation window	-0.0087	0.067	0.029*	0.0023	0.061	0.616
Event day	-0.0100	0.074	0.015*	0.0029	0.068	0.626
Post-event window	-0.0015	0.033	0.190	0.0011	0.037	0.656

SD, standard deviation.

\*, Denotes significance at the 5% level.

**TABLE 6:** Results of tests of significant difference between cumulative average abnormal volumes of purchase and sale transactions.

Period	Purchase transactions			Sale transactions		
	Mean	SD	p-value	Mean	SD	p-value
Anticipation window	3 020 336	25 603 193	0.622	2 676 010	13 976 412	0.016*
Event day	3 588 541	28 051 602	0.963	3 150 619	15 781 390	0.008*
Post-event window	2 056 686	10 390 384	0.034*	2 231 104	9 118 840	0.001*

SD, standard deviation.

\*, Denotes significance at the 5% level.

as part of their compensation, this 'purchase' does not provide as strong a signal compared to when a director conducts a purchase on the open market. An open market purchase is typically associated with a positive signal, as the director is risking their own money in this stock, which attracts market attention. Therefore, the negative results presented in this study may also be a result of negative information leakage or market speculation, which resulted in a negative market reaction before the event.

The results in Table 6 show that sale transactions present statistically significant abnormal volumes during the anticipation window and the event day. The significant abnormal volumes present during the anticipation window and the event day of sale transactions suggest that the market anticipated the sale transactions before their announcement. This outcome is possibly a result of the market anticipating certain sale transactions following certain events, such as the sale of shares following the vesting of shares in share incentive schemes.

In Table 7, the presence of these significant returns during the estimation and event window, respectively, suggests that the market views the announcement of directors' dealings as new, relevant information and that this information was possibly anticipated prior to the event. This effect further highlights that there are possibly higher levels of information leakage in smaller companies, which allows the market to anticipate the event in small companies.

The post-event window showed negative average abnormal returns for small and medium companies and positive average abnormal returns for large companies. The large *p*-values indicate a lack of significance, which suggests that there is no continued reaction to the director's dealings after the event date. These findings are consistent with those of Mordant and Muller (2003), who found that abnormal returns from directors' trades were caused by market factors.

In Table 8, the estimation window shows that the average abnormal volumes were positive across small, medium and

large companies, but none of these abnormal volumes were statistically significant. This finding indicates that there was no market anticipation or anticipatory trading prior to the event. Similarly, the abnormal volumes of small, medium and large companies were positive for the event day, but none were statistically significant. In their event study, Thaver and Ward (2011) found that 34 out of 142 price-sensitive announcements were preceded by significant trading volumes. However, they concluded that although trading volume could be an indicator of insider trading, it should be viewed in conjunction with other indicators. Our findings support this conclusion.

The post-event window shows statistically significant positive abnormal volumes for medium and large companies, while small companies exhibit positive abnormal volumes that are not statistically significant. This finding may be a consequence of institutional investors dominating trading in medium and large companies, as they tend to react quickly to new information, which creates spikes in trading volumes that are significant (Edelen et al., 2016).

## Regression results

In this section, the results of the regression analysis are presented by size category (small, medium and large firms). Findings regarding each indicator of the information environment are discussed for each size category.

### Analyst following

The weak negative relationship for small companies shown in Table 9, suggests that as the level of analyst following decreases, the CAAR for small companies increases. Roulstone (2003) finds that analysts increase the amount of publicly available information; therefore, small companies with a larger analyst following may not experience a significant price reaction when new information, such as directors' dealings, is revealed to the market as a result of the increased amount of information available about the company, reducing their abnormal returns. This relationship, although not statistically significant, is consistent with the findings of Branson et al. (1998).

**TABLE 7:** Results of tests of significant difference among cumulative average abnormal returns of small, medium and large companies.

Period	Small			Medium			Large		
	Mean	SD	<i>p</i> -value	Mean	SD	<i>p</i> -value	Mean	SD	<i>p</i> -value
Anticipation window	-0.090	0.0660	0.043*	-0.0008	0.067	0.808	0.0038	0.0590	0.647
Event day	-0.010	0.7130	0.037*	-0.0010	0.074	0.760	0.0045	0.0670	0.733
Post-event window	-0.002	0.0320	0.162	-0.0020	0.033	0.382	0.0040	0.0394	0.869

SD, standard deviation.

\*, Denotes significance at the 5% level.

**TABLE 8:** Results of tests of significant difference among cumulative average abnormal volumes of small, medium and large companies.

Period	Small			Medium			Large		
	Mean	SD	<i>p</i> -value	Mean	SD	<i>p</i> -value	Mean	SD	<i>p</i> -value
Anticipation window	823 826	6 380 023	0.872	5 638 541	30 099 956	0.101	2 076 513	11 819 083	0.284
Event day	1 026 782	7 322 137	0.609	6 403 502	32 747 678	0.051	2 596 788	14 012 794	0.189
Post-event window	1 029 909	4 680 871	0.093	3 155 043	12 312 574	0.002*	2 239 749	9 640 800	0.045*

SD, standard deviation.

\*, Denotes significance at the 5% level.

The large company CAAR model showed a nonsignificant, weaker positive relationship, evidenced by the coefficient of 0.143 and a  $p$ -value above 0.05. However, the relationship would be significant if considered at the 10% significance level. As large companies are subject to more information disclosure and are more efficient in reducing information asymmetry (Brent & Addo, 2012), the analyst following has a minor and less impactful effect on the abnormal returns than for small or medium companies, as shown in Table 9 and Table 10.

In contrast, the large company CAAV (Table 11) model showed a moderately strong, statistically significant relationship with ANA. While prior research by Roulstone (2003) suggests that analyst following increases market liquidity, this result suggests that ANA does not meaningfully affect the abnormal volumes traded. The coefficient of 0.309 shows a high statistical significance with a  $p$ -value < 0.001. These results confirm prior empirical evidence that the higher analyst following is typically associated with higher levels of institutional investors in larger firms (O'Brien & Bhushan, 1990). This relationship is possibly attributable to institutional investors in large companies adjusting their

portfolios as a result of directors' dealings, which may trigger large trades, resulting in abnormal volumes.

### Bid-ask spread

The small companies' CAAR model displays a statistically significant positive relationship with BID-ASK as indicated by a coefficient of 0.192 and a  $p$ -value of 0.026. Information asymmetry introduces uncertainty and risk, which market participants compensate for by demanding higher returns, resulting in wider spreads (Gregoriou et al., 2005). As information asymmetry is at its highest in smaller companies (Brent & Addo, 2012), the small company model is expected to demonstrate a stronger, statistically significant relationship.

Conversely, the large company CAAR model has a nonsignificant weak negative relationship with BID-ASK. Although not statistically significant, this is an interesting result that suggests that as information asymmetry (BID-ASK) decreases, the abnormal returns increase and vice versa. This result is possibly explained by larger firms being more efficient in reducing information asymmetry (Brent & Addo, 2012).

### Firm size

Although not statistically significant, the results of the CAAR models suggest that as firm size decreases, the abnormal returns marginally increase and vice versa. The direction of the coefficients is consistent with the findings of Bachrach and Galai (1979), Banz (1981), and Neill et al. (2008), who report a negative association between average return and the market value of stocks (size) after adjusting for CAPM-based risk (Levy, 1990).

The statistically significant ( $p$ -value < 0.001) result of the CAAV model indicates a moderately strong relationship with SIZE. This result suggests that larger medium-sized companies will have greater abnormal volumes, whereas the opposite is true for smaller medium-sized companies.

### Summary of results

Overall, it is evident from these results that there is a diverse relationship between the market reaction to directors' dealings and each of the indicators of the information environment. Small companies demonstrating a significant relationship with the bid-ask spread and stock price reaction reflect the higher levels of information asymmetry experienced by small companies. The observed significance among analyst following, stock price reaction, company size and trading volume reaction suggests that medium companies are in a transitional phase, and certain aspects of the information environment (analyst following and company size) begin to play a more influential role in mitigating information asymmetry.

The significant result observed between analyst following and trading volume reaction within large companies suggests

**TABLE 9:** Regression results – Small companies.

Variable	CAAR			CAAV		
	Standardised coefficients Beta	<i>t</i> -statistic	Sig.	Standardised coefficients Beta	<i>t</i> -statistic	Sig.
(Constant)	-	-1.239	0.217	-	7.7748	<0.001
ANA	-0.081	-1.002	0.318	-0.043	-0.5320	0.596
BID-ASK	0.192	2.253	0.026*	-0.073	-0.8590	0.392
SIZE	-0.003	-0.033	0.974	-0.124	-1.4710	0.143

Note:  $R$ -squared: CAAR = 0.039; CAAV = 0.018.

Sig., significance; ANA, analyst following; BID-ASK, bid-ask spread; CAAR, cumulative average abnormal return; CAAV, cumulative average abnormal volume.

\*, Denotes significance at the 5% level.

**TABLE 10:** Regression results – Medium-sized companies.

Variable	CAAR			CAAV		
	Standardised coefficients Beta	<i>t</i> -statistic	Sig.	Standardised coefficients Beta	<i>t</i> -statistic	Sig.
(Constant)	-	-2.375	0.019*	-	0.218	0.828
ANA	0.205	2.482	0.014*	-0.106	-1.433	0.154
BID-ASK	0.057	0.705	0.482	0.006	0.087	0.931
SIZE	0.052	0.634	0.527	0.388	5.285	<0.001*

Note:  $R$ -squared: CAAR = 0.049; CAAV = 0.143.

Sig., significance; ANA, analyst following; BID-ASK, bid-ask spread; CAAR, cumulative average abnormal return; CAAV, cumulative average abnormal volume.

\*, Denotes significance at the 5% level.

**TABLE 11:** Regression results – Large companies.

Variable	CAAR			CAAV		
	Standardised coefficients Beta	<i>t</i> -statistic	Sig.	Standardised coefficients Beta	<i>t</i> -statistic	Sig.
(Constant)	-	-2.227	0.027*	-	9.287	<0.001*
ANA	0.143	1.908	0.058	0.309	4.321	<0.001*
BID-ASK	-0.017	-0.255	0.799	0.103	1.585	0.114
SIZE	-0.051	-0.685	0.494	-0.026	-0.363	0.717

Note:  $R$ -squared: CAAR = 0.017; CAAV = 0.083.

Sig., significance; ANA, analyst following; BID-ASK, bid-ask spread; CAAR, cumulative average abnormal return; CAAV, cumulative average abnormal volume.

\*, Denotes significance at the 5% level

that greater visibility and coverage reduce information asymmetry.

## Conclusion

This study provides a comprehensive review of the stock market reaction to directors' dealings and their relationship with the information environment. The results of the event study have important implications for the efficiency of the JSE and shareholder wealth creation. The results indicate that abnormal returns and abnormal volumes of a company's stock can be triggered by directors' dealings, which highlights the impact of the information environment on investor sentiment and the market reaction.

The focus of prior studies, such as Mordant and Muller (2003) and Moodley et al. (2016), is the potential for trading strategies for outside investors. The current study's contribution lies in the focus of the study on the informational impact of directors' dealings in the context of the information environment. The results provide evidence of the informational value of directors' trades among companies on the JSE and are therefore relevant to both corporate reporting and investment management researchers.

Future research could be extended to compare the reactions and relationships determined in markets with differing levels of disclosure and regulatory environments. Additionally, economic downturn and/or market volatility, such as the global financial crisis of 2008 and more recently the COVID-19 pandemic, can alter how investors perceive activities such as directors' trades (Hoffmann et al., 2013). Future research could examine how market reactions vary during these times of crisis or uncertainty, which would provide insights into the robustness of directors' dealings as information signals under different market conditions.

The finding of statistically significant negative abnormal returns following purchase transactions contrasts with the general notion that purchases are typically associated with positive abnormal returns (Lakonishok & Lee, 2001). Future research could investigate the reasons or possible causes of the negative abnormal returns following purchase transactions.

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## Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

## CRedit authorship contribution

Ushir Moonilal: Conceptualisation, Methodology, Writing – original draft, Writing – review & editing. Avani Sebastian: Conceptualisation, Methodology, Supervision, Writing – review & editing. Nicholas Schwenke: Formal analysis, Methodology, Supervision. All authors reviewed the article, contributed to the discussion of results, approved the final version for submission and publication, and take responsibility for the integrity of its findings.

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## Data availability

The data that support the findings of this study are available from the corresponding author, Avani Sebastian, upon reasonable request.

## Disclaimer

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## References

- Akerlof, G.A. (1970). The market for "lemons": Quality uncertainty and the market mechanism. *The Quarterly Journal of Economics*, 84(3), 488–500.
- Bachrach, B., & Galai, D. (1979). The risk-return relationship and stock prices. *Journal of Financial and Quantitative Analysis*, 14(2), 421–441. <https://doi.org/10.2307/2330512>
- Baik, B., Brockman, P.A., Farber, D.B., & Lee, S. (2018). Managerial ability and the quality of firms' information environment. *Journal of Accounting, Auditing & Finance*, 33(4), 506–527. <https://doi.org/10.1177/0148558X17742820>
- Baker, G.P., Jensen, M.C., & Murphy, K.J. (1988). Compensation and incentives: Practice vs. theory. *Journal of Finance*, 43(3), 593–616. <https://doi.org/10.1111/j.1540-6261.1988.tb04593.x>
- Ball, R., & Brown, P. (1968). An empirical evaluation of accounting income numbers. *Journal of Accounting Research*, 6(2), 159–178. <https://doi.org/10.2307/2490232>
- Banz, R.W. (1981). The relationship between return and market value of common stocks. *Journal of Financial Economics*, 9(1), 3–18. [https://doi.org/10.1016/0304-405X\(81\)90018-0](https://doi.org/10.1016/0304-405X(81)90018-0)
- Barth, M.E., Cahan, S.F., Chen, L., & Venter, E.R. (2017). The economic consequences associated with integrated report quality: Capital market and real effects. *Accounting, Organizations and Society*, 62, 43–64. <https://doi.org/10.1016/j.aos.2017.08.005>
- Bhushan, R. (1989). Firm characteristics and analyst following. *Journal of Accounting and Economics*, 11(2–3), 255–274. [https://doi.org/10.1016/0165-4101\(89\)90008-6](https://doi.org/10.1016/0165-4101(89)90008-6)
- Boubacar, H., & Morris, T. (2011). Insider trading in large Canadian banks. *International Journal of Economics and Finance*, 3(6), 25. <https://doi.org/10.5539/ijef.v3n6p25>
- Branson, B.C., Guffey, D.M., & Pagach, D.P. (1998). Information conveyed in announcements of analyst coverage. *Contemporary Accounting Research*, 15(2), 119–143. <https://doi.org/10.1111/j.1911-3846.1998.tb00552.x>

- Brennan, M.J., & Hughes, P.J. (1991). Stock prices and the supply of information. *Journal of Finance*, 46(5), 1665–1691. <https://doi.org/10.1111/j.1540-6261.1991.tb04639.x>
- Brennan, M.J., Schwartz, E.S., & Lagnado, R. (1997). Strategic asset allocation. *Journal of Economic Dynamics and Control*, 21(8–9), 1377–1403. [https://doi.org/10.1016/S0165-1889\(97\)00031-6](https://doi.org/10.1016/S0165-1889(97)00031-6)
- Brent, W.H., & Addo, C.K. (2012). Minimizing information asymmetry: Does firm's characteristics matter? *Academy of Banking Studies Journal*, 11(1), 43.
- Chung, K.H., McInish, T.H., Wood, R.A., & Wyhowski, D.J. (1995). Production of information, information asymmetry, and the bid-ask spread: Empirical evidence from analysts' forecasts. *Journal of Banking & Finance*, 19(6), 1025–1046. [https://doi.org/10.1016/0378-4266\(94\)00068-E](https://doi.org/10.1016/0378-4266(94)00068-E)
- Dang, C., Foerster, S., Li, Z.F., & Tang, Z. (2021). Analyst talent, information, and insider trading. *Journal of Corporate Finance*, 67, 101803. <https://doi.org/10.1016/j.jcorpfin.2020.101803>
- Dardas, K., & Güttler, A. (2011). Are directors' dealings informative? Evidence from European stock markets. *Financial Markets and Portfolio Management*, 25, 111–148. <https://doi.org/10.1007/s11408-011-0156-z>
- del Brio, E.B., Perote, J., de Miguel, A., & Gómez, G. (2018). Insider Trading and Corporate Governance in the Banking Sector. New Lessons on the Entrenchment Effect. In B. Diaz Diaz, S Idowu, & P Molyneux (Eds.), *Corporate Governance in Banking and Investor Protection*. CSR, Sustainability, Ethics & Governance, Springer.
- Edelen, R.M., Ince, O.S., & Kadlec, G.B. (2016). Institutional investors and stock return anomalies. *Journal of Financial Economics*, 119(3), 472–488. <https://doi.org/10.1016/j.jfineco.2016.01.002>
- Fama, E.F. (1970). Efficient capital markets: A review of theory and empirical work. *The Journal of Finance*, 25(2), 383–417.
- Gregoriou, A., Ioannidis, C., & Skerratt, L. (2005). Information asymmetry and the bid-ask spread: Evidence from the UK. *Journal of Business Finance & Accounting*, 32(9–10), 1801–1826. <https://doi.org/10.1111/j.0306-686X.2005.00648.x>
- Hoffmann, A.O., Post, T., & Pennings, J.M. (2013). Individual investor perceptions and behavior during the financial crisis. *Journal of Banking & Finance*, 37(1), 60–74. <https://doi.org/10.1016/j.jbankfin.2012.08.007>
- Johannesburg Securities Exchange (JSE). (2019). *Listings requirements*. Retrieved from <https://www.jse.co.za/sites/default/files/media/documents/2019-04/JSE%20Listings%20Requirements.pdf>
- Johannesburg Securities Exchange (JSE). (2025). *Headline: Index details*. Retrieved from <https://www.jse.co.za/headlineIndexDetails>
- John, K., & Lang, L.H. (1991). Insider trading around dividend announcements: Theory and evidence. *Journal of Finance*, 46(4), 1361–1389. <https://doi.org/10.1111/j.1540-6261.1991.tb04621.x>
- Klein, A.G., Gerhard, C., Büchner, R.D., Diestel, S., & Schermelleh-Engel, K. (2016). The detection of heteroscedasticity in regression models for psychological data. *Psychological Test and Assessment Modeling*, 58(4), 567.
- Lakonishok, J., & Lee, I. (2001). Are insider trades informative? *Review of Financial Studies*, 14(1), 79–111. <https://doi.org/10.1093/rfs/14.1.79>
- Leece, R.D., & White, T.P. (2017). The effects of firms' information environment on analysts' herding behavior. *Review of Quantitative Finance and Accounting*, 48, 503–525. <https://doi.org/10.1007/s11156-016-0559-z>
- Levy, H. (1990). Small firm effect: Are there abnormal returns in the market? *Journal of Accounting, Auditing & Finance*, 5(2), 235–270. <https://doi.org/10.1177/0148558X9000500208>
- Lintner, J. (1965). The valuation of risk assets and the selection of risky investments in stock portfolios and capital budgets. *Review of Economics and Statistics*, 47(1), 13–37. <https://doi.org/10.2307/1924119>
- MacKinlay, A.C. (1997). Event studies in economics and finance. *Journal of Economic Literature*, 35(1), 13–39.
- Mishra, P., Pandey, C.M., Singh, U., Gupta, A., Sahu, C., & Keshri, A. (2019). Descriptive statistics and normality tests for statistical data. *Annals of Cardiac Anaesthesia*, 22(1), 67–72. [https://doi.org/10.4103/aca.ACA\\_157\\_18](https://doi.org/10.4103/aca.ACA_157_18)
- Moodley, N., Muller, C., & Ward, M. (2016) Director dealings as an investment strategy. *Studies in Economics and Econometrics*, 40(2), 105–123. <https://doi.org/10.1080/10800379.2016.12097300>
- Mordant, N., & Muller, C. (2003). Profitability of directors' share dealings on the JSE. *Investment Analysts Journal*, 32(57), 17–31.
- Nanda, S.K., & Barai, P. (2020). Effect of insider trading on stock characteristics. *Asian Journal of Accounting Research*, 6(2), 210–227. <https://doi.org/10.1108/AJAR-09-2020-0089>
- Natesan, P. (2020). The evolution and significance of the 'apply and explain' regime in King IV. *Journal of Global Responsibility*, 11(2), 155–160. <https://doi.org/10.1108/JGR-10-2019-0091>
- Neill, B.J., Mehdi, S., & Watts, E. (2008). Are insider trades profitable? Evidence from directors' trade on the Australian stock exchange. *Corporate Ownership and Control*, 5(3), 176–187. <https://doi.org/10.22495/cocv5i3c1p2>
- Nkongho, M.E., & Makina, D. (2020). Long-run performance of corporate spin-offs and sell-offs: Evidence from the JSE limited. *South African Journal of Economic and Management Sciences*, 23(1), 1–10. <https://doi.org/10.4102/sajems.v23i1.3683>
- Nyakurukwa, K., & Seetharam, Y. (2023). Alternatives to the efficient market hypothesis: An overview. *Journal of Capital Markets Studies*, 7(2), 111–124. <https://doi.org/10.1108/JCMS-04-2023-0014>
- O'Brien, P.C., & Bhushan, R. (1990). Analyst following and institutional ownership. *Journal of Accounting Research*, 28, 55–76. <https://doi.org/10.2307/2491247>
- Ojah, K., Muhanji, S., & Kodongo, O. (2020). Insider trading laws and price informativeness in emerging stock markets: The South African case. *Emerging Markets Review*, 43, 100690. <https://doi.org/10.1016/j.ememar.2020.100690>
- Osborne, J.W., & Waters, E. (2002). Four assumptions of multiple regression that researchers should always test. *Practical Assessment, Research & Evaluation*, 8, 2. Retrieved from <https://www.proquest.com/scholarly-journals/four-assumptions-multiple-regression-that/docview/2366834549/se-2?accountid=15083>
- Piotroski, J.D., & Wong, T. (2012). Institutions and information environment of Chinese listed firms. *Capitalizing China*, 2, 201–242. <https://doi.org/10.7208/chicago/9780226237268.003.0005>
- Roulstone, D.T. (2003). Analyst following and market liquidity. *Contemporary Accounting Research*, 20(3), 552–578. <https://doi.org/10.1506/X45Y-PMH7-PNYK-4ET1>
- Ryan, P. (2005). The market impact of directors' trades: Relationship to various measures of a firm's information environment. *British Accounting Review*, 37(3), 319–337. <https://doi.org/10.1016/j.bar.2005.03.002>
- Ryngaert, M., & Netter, J. (1990). Shareholder wealth effects of the 1986 Ohio antitakeover law revisited: Its real effects. *Journal of Law, Economics, and Organization*, 6(1), 253–262.
- Sharpe, W.F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *Journal of Finance*, 19(3), 425–442. <https://doi.org/10.1111/j.1540-6261.1964.tb02865.x>
- Shrestha, N. (2020). Detecting multicollinearity in regression analysis. *American Journal of Applied Mathematics and Statistics*, 8(2), 39–42. <https://doi.org/10.12691/ajams-8-2-1>
- Statistics South Africa. (2022). *Economic recovery from COVID-19: Not all countries are equal*. Retrieved from <https://www.statssa.gov.za/?p=15690>
- Thalassinos, E., Maditinos, D., & Paschalidis, A. (2012). Observing evidence of insider trading in the Athens Stock Exchange. *Journal of Economic Structures*, 1, 1–26. <https://doi.org/10.1186/2193-2409-1-8>
- Thaver, K., & Ward, M. (2011). Abnormal volume traded as an indication of insider trading in JSE listed companies. *Studies in Economics and Econometrics*, 35(1), 59–78.
- Thompson, A.R., & Ward, M.J.D. (1995). The Johannesburg Stock Exchange as an efficient market: A review. *Studies in Economics and Econometrics*, 19(3), 33–63. <https://doi.org/10.1080/03796205.1995.12129080>
- Wang, W., Shin, Y.-C., & Francis, B.B. (2012). Are CFOs' trades more informative than CEOs' trades? *Journal of Financial and Quantitative Analysis*, 47(4), 743–762. <https://doi.org/10.1017/S0022109012000257>
- Yazici, B., & Yolacan, S. (2007). A comparison of various tests of normality. *Journal of Statistical Computation and Simulation*, 77(2), 175–183. <https://doi.org/10.1080/10629360600678310>
- Zadeh, F.O., & Eskandari, A. (2012). Firm size as company's characteristic and level of risk disclosure: Review on theories and literatures. *International Journal of Business and Social Science*, 3(17), 9–17.
- Zeghal, D. (1984). Firm size and the informational content of financial statements. *Journal of Financial and Quantitative Analysis*, 19(3), 299–310. <https://doi.org/10.2307/2331092>