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Opportunistic Insider Trading During the COVID-19 Pandemic

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Correspondence: Bijoy Chandra Das (bijoychandra.das@bcu.ac.uk)**Received:** 6 June 2024 | **Revised:** 26 November 2024 | **Accepted:** 25 March 2025**Keywords:** COVID-19 | future returns | opportunistic insiders | opportunistic trades routine insiders | routine trades

ABSTRACT

This paper examines whether opportunistic or routine insiders in US markets engage in informed trading and earn higher short-term returns during the COVID-19 pandemic. Our findings indicate that trades by opportunistic insiders are indeed informative, yielding higher returns compared to those of routine insiders during the pandemic. Interestingly, we also observe that opportunistic directors earn higher returns than CEOs. Additionally, opportunistic insiders trading in the Nasdaq market achieve higher returns compared to those in the NYSE, and opportunistic insiders in the financial sector outperform those in the non-financial sector. Our results remain robust across various model specifications, alternative measures and considerations for endogeneity. Overall, our findings suggest that opportunistic insiders possess a significant informational advantage, enabling them to engage in informed trading during the pandemic.

1 | Introduction

'Amit Dagar, a Pfizer Inc. employee, received material non-public information about the success of the trial of Paxlovid (COVID-19 antiviral treatment) and traded to generate illicit profits, which amounted to one-day investment returns of 2,458 percent'—The Securities and Exchange Commission (SEC).

The SEC's statement indicates that material inside information allows insiders to engage in informed trading and thereby generate substantial investment returns because they had prior access to sensitive information about company matters or government emergency announcements. Given this context, our study investigates whether opportunistic insiders utilised non-public material information to achieve higher returns from non-routine trading during the COVID-19 pandemic. Prior research has examined insider trading and abnormal profits in the context of firm-level events (e.g., Arif et al. 2022), financial crises (e.g., Gangopadhyay

et al. 2019; Cziraki 2018) and the COVID-19 pandemic. However, following Cohen et al. (2012), the abnormal profits that opportunistic insiders achieved from non-routine trading during the COVID-19 pandemic have not been covered. Our study eliminates this gap by investigating whether opportunistic insiders were involved in informed trading during the pandemic.

Opportunistic insiders are non-routine traders who do not participate in seasonal trading over the years. We predict that opportunistic insiders have access to private information, and this information influences their informational advantage, as reflected in the probability of informed trading—opportunism. Information advantage may arise from the uncertainty (El Ghouli et al. 2022; Durnev 2010). Similarly, the COVID-19 pandemic can increase the information advantage (e.g., X. Li 2020; Nagar et al. 2019) and increase the possibility of opportunistic trading (Pierce 2023; Arif et al. 2022; Chen et al. 2022; Zou et al. 2022; Li et al. 2021; Chowdhury et al. 2018; Del Brio et al. 2002; Kyle 1985). Therefore, we expect that opportunistic insiders had prior access to material information regarding the declaration of a national

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emergency about the COVID-19 pandemic on 13 March 2020, and its impact on the US stock markets (e.g., El Ghouli et al. 2022). Their opportunistic (informed) trading during the pandemic may have generated abnormal profits.

Alternatively, routine insiders trade to fulfil their liquidity needs or for diversification reasons (Cohen et al. 2012). Specifically, routine insiders buy shares after their firms give them bonuses during the same month each year. They also receive discounts on trading their firm's stock, which indicates that routine insiders are not trading on information (e.g., Drummond David of Alphabet Inc). However, non-routine insiders trade opportunistically to generate higher returns (Cohen et al. 2012). Therefore, opportunistic insiders could participate in informed trading during the pandemic. In this paper, by considering the importance of information advantage, we investigate whether non-routine insiders traded opportunistically to generate higher returns through a particular form of opportunism-informed trading during the COVID-19 pandemic. The uniqueness of this paper is that it focuses on opportunistic and routine insider trades during an exogenous event like a pandemic.

The COVID-19 pandemic created significant uncertainty in global financial markets and impacted regulatory oversight. The initial outbreak led to a sharp decline in stock market values, with a notable rise in volatility. The CBOE volatility index (VIX), a key measure of market uncertainty, increased dramatically during the early months of the pandemic, reflecting investors' fears and uncertainties about economic prospects and the impact of lockdown measures on global trade and commerce.

The pandemic caused extreme fluctuations in financial markets, with the S&P 500 experiencing one of its most volatile periods in history. This environment of unpredictability made markets more susceptible to manipulative practices like insider trading. The surge in volatility was driven by investor fears over economic shutdowns, changing policies and the uncertain future of businesses during COVID-19. Given the presence of critical information about the pandemic's impact on specific sectors and companies, the temptation to engage in insider trading increased. The SEC issued warnings against using material non-public information related to COVID-19 and ramped up surveillance where possible, but insider trading cases linked to pandemic-related knowledge were still reported (Baker et al. 2020; M. L. Levin 2020). The US Securities and Exchange Commission (SEC) and other regulatory bodies faced logistical challenges during the pandemic. Lockdowns and remote work complicated routine enforcement actions, and investigations had to adapt to new constraints. This reduction in capacity meant fewer resources were dedicated to uncovering and prosecuting financial crime. Reports and experts suggested that enforcement delays and the shifting focus towards market stability created opportunities for corporate insiders to exploit confidential information. The SEC's actions included filing lawsuits against companies and individuals who made misleading pandemic-related claims or who took advantage of sensitive information about the crisis to make profitable trades (Baker et al. 2020). Regulatory bodies were stretched thin, and the economic chaos made markets vulnerable to unethical behaviour.

According to game theory¹, which we use as our theoretical lens, opportunistic insiders show opportunistic behaviour (see Fenik et al. 2020; Qin et al. 2019) by seeking greater returns from abnormal trading. Their better access to private information provides an information advantage, and they use asymmetric information opportunistically. Therefore, we seek to discover whether opportunistic insiders generate higher returns. This study examines the research question, 'How does opportunism behaviour influence opportunistic insiders' involvement in informed trading during the pandemic?'

To test our conjecture, we consider the predictive ability of insider trades for holding period returns (1 and 3 months) performance in baseline regression with multi-way fixed effects and different econometric models (difference-in-difference specification) to check whether non-routine insiders traded opportunistically compared to routine insiders during the pandemic. To promote the robustness of our analysis, we employ different considerations, such as event studies (cumulative abnormal returns [CAR]), to measure the short-term benefits, measuring the performance of opportunistic and routine trades by comparing the directors and CEOs, NYSE and Nasdaq market insiders, and financial and non-financial sector insiders. We also consider the instrumental variable approach (2SLS) to mitigate the endogeneity concern and support the baseline regression results.

With regard to our results, first, we find that the predictive ability of insider trades during the COVID-19 pandemic was more significant, and opportunistic insiders generated greater returns during the same period. Second, our findings from baseline regressions and a difference-in-difference specification suggest that opportunistic insiders generated higher returns than routine insiders during the pandemic. Third, we find that directors generated greater returns than CEOs, opportunistic insiders of the Nasdaq market generated greater returns than did opportunistic and routine insiders of the NYSE market, and opportunistic insiders of the financial sector generated greater returns than did opportunistic insiders of non-financial sectors. Finally, the robustness tests support our baseline results, and the instrumental variable approach helps mitigate the endogeneity concerns caused by measurement errors.

Overall, our findings suggest that opportunistic insiders generated greater returns than routine insiders during the pandemic and support our hypotheses. The findings are consistent with the corporate finance literature, agreeing with those of Ali and Hirshleifer (2017), Cohen et al. (2012), Jeng et al. (2003), Lakonishok and Lee () and Aboody and Lev (2000). Opportunistic insider trades are based on private information, and holding returns are higher.

Our research makes important contributions to the corporate finance literature. First, we contribute to the insider trading literature (e.g., Cohen et al. 2012) by focusing on opportunistic insiders during the pandemic. Second, we focus on opportunistic trades and holding period returns, which helps check the robustness of our primary contribution. Finally, we provide a unique contribution: that directors generate greater returns than CEOs, opportunistic insiders of the Nasdaq market generate greater

returns than opportunistic and routine insiders of the NYSE market, and opportunistic insiders of the financial sector generate greater returns than opportunistic insiders of non-financial sectors. To strengthen our contributions, we consider the insider trades of all US firms using all open market stock purchases and sales reported to the SEC between October 2019 and July 2020, inclusive, surrounding the date of declaration of a national emergency during COVID-19 rather than the confirmed first case or health emergency in the United States for our tests on informed insider trades. Thus, this consideration is not subject to the need to check the legal issues of insider trades. Notably, no other major event (for example, an election) occurred during the pandemic. Therefore, pandemic time is free from exogenous events. Our study has a significant implication for investors and capital market regulators with regard to monitoring opportunistic trades.

The rest of the paper is organised as follows. In Section 2, we explain the relevant literature and build hypotheses. In Section 3, we describe the data and method. In Section 4, we lay out the summary statistics and the main findings. Concluding remarks appear in the final section.

2 | Background and Hypothesis Development

Insiders², such as officers and directors, often legally trade their firm's shares and earn risk-adjusted abnormal returns (e.g., Arif et al. 2022; Jagolinzer et al. 2011; Lakonishok and Lee). Insiders trade on private information³, which adjusts the share prices to reflect the news (Carlton and Fischel 1983). Similarly, economic policy uncertainty (EPU) increases the information advantage and insider trading (X. Li 2020). EPU can increase due to various events, such as presidential elections, the trade war, and the COVID-19 pandemic⁴. Economic uncertainty worsens the information environment in the financial market (Nagar et al. 2019), and non-public information is valuable when the financial market has a deficiency in the information environment (Aboody and Lev 2000). During the uncertainty period, the material information gap between insiders and outsiders is higher, and insiders can make greater profits from informed trading.

Uncertainty creates shocks and rumours in the stock markets, and investors alter their investment decisions due to changing government policies. Investors may opportunistically trade their shares, as a key earnings indicator (Verrecchia 2001), to overcome potential losses stemming from uncertainty. Insiders make greater profits from purchasing shares during an asymmetric information environment in the stock market. In contributing to recent studies on policy uncertainty by Yung and Root (2019), Phan et al. (2019), Nguyen and Phan (2017) and Gulen and Ion (2016), this paper uniquely considers the COVID-19 pandemic⁵ as a source of economic uncertainty. Insiders may have traded on private information about the declaration of the COVID-19 crisis as a national emergency in the United States. Therefore, there existed the possibility of opportunistically trading shares of one's own firm to earn greater returns during the pandemic.

Importantly, information advantage may cause non-routine insiders to behave opportunistically (e.g., Jagolinzer et al. 2020; Ali and Hirshleifer 2017; Cohen et al. 2012). Insiders' oppor-

tunistic behaviour can increase due to exogenous shocks, such as the financial crisis (e.g., Jagolinzer et al. 2020; Cziraki 2018) or the COVID-19 pandemic. Non-routine insiders could opportunistically trade during the pandemic because routine insiders were more distracted at that time⁶ (e.g., Cohen et al. 2012; Ali and Hirshleifer 2017). For example, the CEO of Silicon Valley Bank (SVB) opportunistically sold \$3.60 million in shares on 27 February 2023, just days before disclosing a significant loss that triggered the bank's collapse.

Non-routine traders may have had prior access to the declaration of the COVID-19 crisis as a national emergency and its effect on US stock markets. Non-routine insiders may have received reliable information about the stock price movement. This reliable information may have made it opportunistic for them to engage in informed trading before the stock price moved. This opportunistic approach may have helped them earn more returns than routine insiders. Similarly, non-routine insiders traded opportunistically on private information and generated higher returns (Jagolinzer et al. 2020; Cziraki 2018; Gangopadhyay et al. 2019; Van Geyt et al. 2013).

As mentioned earlier, opportunistic insiders do not participate in regular trading. Therefore, opportunistic insiders may generate higher profits from informed trading. Ali and Hirshleifer (2017) and Cohen et al. (2012) find that non-routine insiders have an information advantage, and they trade opportunistically to generate greater returns. During the financial crisis, opportunistic insiders generated higher returns through their abnormal trading (Jagolinzer et al. 2020). Similarly, opportunistic insiders may participate in informed trading based on prior material information regarding the upcoming declaration of the COVID-19 crisis as a national emergency in the United States. Following Cohen et al. (2012) and Ali and Hirshleifer (2017), we examine whether opportunistic insiders of US firms engaged in informed trading during the pandemic.

The US stock markets are efficient, and an efficient market is 'A market in which prices always fully reflect all available information'. However, according to game theory, opportunistic insiders in US markets show opportunistic behaviour (see Fenik et al. 2020; Qin et al. 2019) by seeking greater returns from abnormal trading because they have prior better access to private information, and they use asymmetric information opportunistically. Building these arguments, I formulate the following testable hypotheses:

H1. *Other things remain same, opportunistic insider buys and future returns are positively associated during the COVID-19 crisis.*

H2. *Other things remain same, opportunistic insider sells and future returns are negatively associated during the COVID-19 crisis.*

3 | Data and Methodology

3.1 | Data and Measurement

The data of this paper come from several sources. We collected the primary data on insider trades from the Thomson/Refinitiv

(Table 1 from insiders data) database. This database contains detailed information on insiders' trades in their firm's equity. Consistent with prior studies (e.g., Jagolinzer et al. 2020; Cohen et al. 2012), we consider the open market purchases and sales of common equity and exclude option exercises, option grants, and gifts. We require the number of shares transacted, the share prices and the transaction date of each trade. We consider all the individuals of all publicly traded firms, including financial institutions. Following Jagolinzer et al. (2020), our analysis aggregates the daily insider trades of 4078 US firms to the insider-monthly level. The insiders include officers with decision-making authority over the firm's operations, all board members, and beneficial owners of more than 10% of the firm's shares. Information about each insider transaction and the insider's relationship with the firm was electronically reported and filed on SEC Form 4 within two business days.

The COVID-19 crisis in the United States is generally thought to have started with the declaration of a national emergency on 13 March 2020. Consequently, for our tests on informed insider trades, we consider the date of declaration of a national emergency rather than the confirmed first case or health emergency in the United States. Notably, we restrict attention to insider trades between October 2019 and July 2020, inclusive. This range provides a symmetric 5-month window both before and after the declaration of the COVID-19 crisis. We refer to the 5-month period from October 2019 to February 2020 as the 'pre-COVID crisis' period and the 5-month period from March 2020 to July 2020 as the 'COVID-19 crisis' period. Following Jagolinzer et al. (2020), we winsorize the continuous variables at the 1st and 99th percentiles to address outliers⁷ and exclude all missing values. After the inclusion of all data, the final sample for our cross-sectional tests consists of trades by 16,036 insiders at 4078 firms from October 2019 to July 2020, for a total of 36,629 insider-months.

3.2 | Variable Definition

We focus on the definition of variables in this section. We include one dependent, two independent, three control and two instrumental variables in the dataset.

In summary, we consider FR_{t+1} as a dependent variable, *Opportunistic Insider Buy (Sell)* and *Routine Insider Buy (Sell)* as independent variables, and *SIZE*, *BM* and PR_{t-1} as control variables to run the regressions to find the solution to the research question(s). The purchase (sell) ratio is used as an instrumental variable to mitigate the endogeneity concerns.

3.3 | Methodology

We first use the event study to examine the stock performance during the COVID-19 crisis around the national emergency announcement on 13 March 2020 (Day 0). We calculate the CAR for stock i on Day t from the event study by WRDS using the market-adjusted model as a risk model to compute the CAR.

$$CAR_{t_1,t_2} = \alpha + \delta_1 \text{Opportunistic Insider Buy (Sell)}_t + \delta_2 \text{Routine Insider Buy(Sell)}_t + \vartheta \text{Controls}_t + \varepsilon_{t+1} \quad (1)$$

where CAR_{t_1,t_2} is CAR for firm i over days (t_1, t_2) , *Opportunistic Insider Buy (Sell)* is the indicator variable equal to 1 if the shares bought (sold) amount by opportunistic insider i in firm j and month t , *Routine Insider Buy (Sell)* is an indicator variable equal to 1 if the shares bought (sold) amount by routine insider i in firm j and month t (insider trades are aggregated to the insider-month level), and *Controls* is a vector of control variables that includes firm size (*SIZE*), book-to-market ratio (*BM*), and the past month returns (PR_{t-1}). In this specification, δ_1 represents the future returns (FR) of the opportunistic insider buys (sells) and routine insider buys (sells) after controlling for *SIZE*, *BM* and PR_{t-1} .

Following the prior research (e.g., Jagolinzer et al. 2020; Cohen et al. 2012), we next estimate the cross-section regression form to assess the insiders' behaviour opportunistically during the COVID-19 crisis:

$$FR_{t+1} = \alpha + \delta_1 \text{Opportunistic Insider Buy (Sell)}_t + \delta_2 \text{Routine Insider Buy (Sell)}_t + \vartheta \text{Controls}_t + \varepsilon_{t+1} \quad (2)$$

where FR_{t+s} is FR for the next month ($s = 1$), *Opportunistic Insider Buy (Sell)* is the indicator variable equal to 1 if the shares bought (sold) amount by opportunistic insider i in firm j and month t , *Routine Insider Buy (Sell)* is an indicator variable equal to 1 if the shares bought (sold) amount by routine insider i in firm j and month t (insider trades are aggregated to the insider-month level), and *Controls* is a vector of control variables that includes firm size (*SIZE*), book-to-market ratio (*BM*) and the past month returns (PR_{t-1}). All variables are defined in Table 1. In this specification, δ_1 and δ_2 represent the FR of the opportunistic insider buys (sells) and routine insider buys (sells) after controlling for *SIZE*, *BM* and PR_{t-1} .

To examine whether the opportunistic insiders generate higher FR than routine insiders during the COVID-19 crisis compared to the pre-COVID period, we consider the 2 months before and 3 months after the announcement of the national emergency. We include the indicator variables for pre-COVID and COVID-19 and interact these variables with *Opportunistic Insider Buy (Sell)*:

$$FR_{t_1,t_2} = \alpha + \delta_1 \text{Opportunistic Insider Buy (Sell)}_t * \text{COVID-19}_t + \beta_1 \text{Opportunistic}_t + \beta_2 \text{COVID-19}_t + \vartheta \text{Controls}_t + \varepsilon_{t+1} \quad (3)$$

where FR_{t_1,t_2} is FR for firm i over days (t_1, t_2) , *Opportunistic* is an indicator variable equal to 1 if the shares bought (sold) amount by opportunistic insider i in firm j and month t , *Routine Insider Buy (Sell)* is an indicator variable equal to 1 if the shares bought (sold) amount by routine insider i in firm j and month t (insider trades are aggregated to the insider-month level), and *Controls* is a vector of control variables that includes firm size (*SIZE*), book-to-market ratio (*BM*), and the past month returns (PR_{t-1}). In this specification, δ_2 represents the difference in FR between opportunistic and routine insiders after controlling for *SIZE*, *BM* and PR_{t-1} . δ_2 measures the incremental informativeness of insider trades by comparing the pre- and COVID-19 periods.

TABLE 1 | Definitions of dependent, independent and control variables.

Variable	Abbreviation	Definition and construction	Data source
Opportunistic insider buy (sell)	Opportunistic insider trades	Following Cohen et al. (2012), we use a dummy taking value 1 if the transaction type is opportunistic insider buy (sell) defined by historical transactions, 0 otherwise. This variable is considered an independent variable as the primary measure.	Thomson/Refinitiv (WRDS) database
Routine insider buy (sell)	Routine insider trades	Following Cohen et al. (2012), we use a dummy taking value 1 if the transaction type is routine insider buy (sell) defined by historical transactions, 0 otherwise. This variable is considered an independent variable as the primary measure.	Thomson/Refinitiv (WRDS) database
One-month future returns (FR_{t+1})	One-month buy and hold returns	Future returns of firms on a monthly basis. Jagolinzer et al. (2020), Harvison (2019), Akin et al. (2019) and Cohen et al. (2012) find that the return is associated with the profitability from insider trading during the last financial crisis and others.	CRSP (WRDS)
SIZE	Market capitalization	Following Jagolinzer et al. (2020), Harvison (2019), Akin et al. (2019) and Cohen et al. (2012), we consider the SIZE as a control variable to control the effect on future returns. Here, SIZE is the natural log of market value at the end of quarter t .	Compustat—Capital IQ (WRDS)
BM	Book-to-market	The book-to-market ratio at the end of quarter t where book value is from the prior quarter-end. Following Jagolinzer et al. (2020), Harvison (2019), Akin et al. (2019), Cziraki (2018) and Cohen et al. (2012), we consider the book-to-market value as a control variable to control the effect of market value on future returns.	Compustat—Capital IQ (WRDS)
Past month returns (PR_{t-1})	Buy and hold returns	Holding period returns of firms on a monthly basis. Jagolinzer et al. (2020), Harvison (2019), Akin et al. (2019) and Cohen et al. (2012) find that the return is associated with the profitability from insider trading during the last financial crisis and others.	CRSP (WRDS)
Purchase (sell) ratio	Routine and opportunistic insider buys (sells) ratio	The number of shares purchased (sold) by insider i in the firm j and month t , scaled by the total share volume (number of shares purchased plus the number of shares sold) of insider i in firm j and month t (e.g., Jagolinzer et al. 2020; Piotroski and Roulstone 2005; Lakonishok and Lee).	Thomson/Refinitiv (WRDS) database

TABLE 2 | Summary statistics.

Panel A. Firm-level characteristics					
Variable	Mean	Std. Dev.	Max	p25	Median
<i>FR</i>	0.083	0.208	4.848	−0.001	0.048
Routine insider buy	0.027	0.162	1.000	0	0
Routine insider sell	0.09	0.286	1.000	0	0
Opportunistic insider buy	0.303	0.459	1.000	0	0
Opportunistic insider sell	0.463	0.499	1.000	0	0
<i>SIZE</i>	5.436	2.707	11.530	3.308	5.532
<i>BM</i>	0.529	2.301	7.894	0.123	0.479
<i>PR</i>	0.001	0.243	5.170	−0.097	−0.005

Panel B. Trade-level characteristics				
Variable	COVID-19		Pre-COVID	
	Routine	Opportunistic	Routine	Opportunistic
Buy (\$ millions)	178.455	4529.967	82.857	3374.915
Sell (\$ millions)	3339.463	17,128.72	4590.132	16,808.33
Total (\$ millions)	3517.918	21,658.69	4672.989	20,183.25
Number of firms	3276		3133	
Number of insiders	10,088		9868	

Note: This table presents the overview of the sample as summary statistics. Panel A presents descriptive statistics for firm-level characteristics. Panel B presents descriptive statistics for trade-level characteristics. FR_{i,t_1,t_2} is the 1-month future returns (buy-and-hold) for firm i over days (t_1, t_2) , routine insider Buy $_i$ (Sell $_i$) is an indicator variable equal to 1 if the shares bought (sold) amount by routine insider i in firm j and month t (insider trades are aggregated to the insider-month level) and opportunistic insider Buy $_i$ (Sell $_i$) is an indicator variable equal to 1 if the shares bought (sold) amount by opportunistic insider i in firm j and month t . *SIZE* is a natural log of market value at the end of quarter t . *BM* is the book-to-market ratio at the end of quarter t . *PR $_i$* is the return in month $t-1$. Unique companies (unique insiders) are the number of unique companies (insiders) in the respective sample. Purchases (sales) are the total dollar value of insider purchases (sales) in the respective sample.

We also consider the instrumental variable 2SLS accounting for the endogeneity concerns associated with the use of opportunistic insider buy (sell), and routine insider buy (sell). We use the purchase (sell) ratio as an instrument in the IV-2SLS approach to reduce instrument proliferation (e.g., Roodman 2009). We consider the variety of methods for testing the robustness of the baseline results.

The paper's empirical analysis is organised as follows: In Section 4.1, we lay out the summary statistics and bivariate correlations; in Section 4.2, we focus on event studies; in Section 4.3, we emphasise the empirical results; in Section 4.4, we present the robustness tests; in Section 4.5, we test the opportunistic insiders by using different classifications of insiders; and in Section 4.5, we specify the heterogeneity in the econometric models.

4 | Findings

4.1 | Descriptive Statistics and Bivariate Correlations

Table 2 presents the overview of the sample as summary statistics. The table provides the data for the routine and opportunistic insiders (traders) featured in the analysis. Routine trades occur

for several reasons. Following Cohen et al. (2012), routine insider sells are often driven by liquidity or diversification, which signals that the insider is not trading on information (e.g., Cook Timothy). Routine insider buys could occur after the receipt of a bonus from the firm, as bonuses are generally paid in the same month of each year, and insiders often get discounts on their firm's stock. Insider buying in the same calendar month of each year is common and often uninformative.

For an insider to be defined as opportunistic or routine, we require them to have made at least one trade in each of the three preceding years. Notably, insiders are defined as routine traders who place a trade in the same calendar month for at least three consecutive years.⁸ Insiders are defined as opportunistic traders for whom an obvious pattern cannot be detected with regard to the past timing of their trades. Thus, we define all insiders as either routine or opportunistic traders at the beginning of each calendar year based on the historical records of trades and then examine how insiders trade from that point onwards. Based on all subsequent trades, we classify each insider as either routine or opportunistic and place them into one of two buckets: routine trades (i.e., all trades made by routine insiders) and opportunistic trades (i.e., all trades made by opportunistic insiders). In the Internet Appendix (Internet Table A1), we describe these approaches in more depth.

Importantly, this simple algorithm to identify routine (opportunistic) buys or sells by insiders is clearly a noise proxy for actual routine (opportunistic) trading; our strategy will not perfectly and correctly classify each insider trade. However, the essence of our approach is that, on average, trades made for information reasons are less likely to be regular in their timing, and trades made for liquidity and diversification reasons are more likely to be regular in their timing. Consequently, we use different approaches to test opportunistic and routine insiders' transactions and find similar results.

Generally, more opportunity is created for insider trading when enforcement against insider trading declines in the market (e.g., that decline came just before the COVID-19 pandemic hit). Consequently, the decline in enforcement may increase the opportunity for insiders. However, the SEC warned that the pandemic had created more insider trading opportunities. We experiment with a variety of alternative measures (including the Internet Appendix: high- and low-levered firms) for opportunistic and routine insiders surrounding the likely COVID-19 crisis and test whether opportunistic insiders earned more returns than routine insiders.

Panel A of Table 2 presents the firm-level characteristics, such as 1-month FR, routine insider buy (sell), opportunistic insider buy (sell), *SIZE*, *BM* and past-month returns (*PR*). It shows that the mean FR (1-month FR) of firms in the sample is approximately 0.083, the mean of routine insider buy (sell) is 0.027 (0.09), the mean of opportunistic insider buy (sell) is 0.303 (0.463), the mean of *SIZE* is 5.436, *BM* is about 0.529 and the mean of the past month's returns (*PM*) is 0.01. Panel A also shows that the median of *FR* is 0.048.

Panel B presents the trade-level characteristics, such as buy (sell) and the number of unique firms and insiders, by partitioning the routine and opportunistic trades. It reports that the opportunistic buy (sell) was \$4529.967 million (\$17,128.72 million) during the COVID-19 crisis period. The routine buy (sell) was \$178.455 million (\$3339.463 million) during the COVID-19 crisis period. We find that the opportunistic buy (sell) was higher than the routine buy (sell) during the COVID crisis. Alternatively, the opportunistic buy (sell) was \$3374.915 million (\$16,808.33 million) during the pre-COVID crisis period. These statistics suggest that the opportunistic buy (sell) during the COVID-19 crisis period was larger than the amount in the pre-COVID crisis period. However, the routine buy (sell) was \$82.857 (\$4590.132) million during the pre-COVID crisis period. Notably, 10,088 (9868) insiders among 3276 (3133) firms traded during the COVID-19 (pre-COVID) crisis period.

Table 3 presents the Pearson correlation matrix for all the trades during the COVID-19 crisis period. Following Rahman et al. (2021), we use the Pearson correlation matrix for all the variables because it deals with the strength and direction of association between two variables. From the above table, we find a positive correlation (0.068) between 1-month FR and opportunistic insider buys. This correlation value is statistically significant at the 10% level. We also find a negative correlation between 1-month FR and opportunistic insider sell. This correlation value is also statistically significant at the 10% level. Alternatively, the routine insider buy (sell) is negatively correlated with 1-month FR,

and the correlation value is lower than opportunistic trades. This reveals the greater benefits that opportunistic insiders had during the COVID-19 crisis. Notably, these findings are consistent with the previous literature (Cohen et al. 2012). However, the control variables, such as *SIZE* (−0.004), *BM* (−0.035), and past month returns (−0.076), are negatively correlated with 1-month FR.

Following Berry et al. (1985), we find no multicollinearity problem in the regression because the bivariate correlations do not exceed 0.80 between two independent variables. In addition, we find that the variance inflation factor (VIF) values are too low (approximately 1) and do not exceed the critical value of 10. This indicates that multicollinearity does not seem to be a problem in the regressions.

4.2 | Event Study

We first use the event study methodology to examine insider trading performance around the announcement (Day 0) of the national emergency due to the COVID-19 pandemic. We consider *CAR* as a dependent variable and regress it to routine and opportunistic insider buy (sell) along with the control variables. Table 4 reports *CAR* for two different windows (before and after the COVID-19 crisis), that is, 31 (0, +30) and 31 (−30, −1) days, for routine and opportunistic insider transactions.

Table 4 reports results from estimating Equation (1). We partition this table into two windows, that is, (0, +30) and (−30, −1). Column 1 of *CAR* (0, 30) presents the cross-sectional regression (between-group analysis) for routine and opportunistic insider buys. We find that both coefficients on routine (0.008) and opportunistic (0.033) insider buy are positive. Notably, the coefficient for opportunistic insider buy is higher than that of routine insider buy, which is economically and statistically significant (0.01) after control variables are used. Column 2 of *CAR* (0, 30) presents the cross-sectional regression (within-firm analysis) for routine and opportunistic insider buys. We find that both coefficients on routine (0.022) and opportunistic (0.030) insider buy are positive. Importantly, the coefficient for opportunistic insider buy is higher than that of routine insider buy, which is economically and statistically significant (0.01) after control variables are used and with a fixed effect. Columns 1 and 2 indicate that both insiders (routine and opportunistic) earned positive abnormal returns (buy-and-hold) from their buys during the COVID-19 crisis.

In addition, column 3 of *CAR* (0, 30) presents the cross-sectional regression (between-group analysis) for routine and opportunistic insider sells. We find that both coefficients on routine (−0.029) and opportunistic (−0.039) insider sell are negative, which is economically and statistically significant (0.01) after control variables are used. This indicates that insider sells were a better decision than holding the shares. However, the coefficient for opportunistic insider sells is larger than that of routine insider sells, which means that opportunistic insiders benefitted more than routine insiders. Column 4 of *CAR* (0, 30) presents the cross-sectional regression (within-firm analysis) for routine and opportunistic insider sells. We find that both coefficients on routine (−0.035) and opportunistic (−0.044) insider sell are negative, which is economically and statistically significant (0.01)

TABLE 3 | Matrix of correlations.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) <i>FR</i>	1.000							
(2) Routine insider buy	-0.007 (0.424)	1.000						
(3) Routine insider sell	-0.029* (0.001)	-0.052* (0.000)	1.000					
(4) Opportunistic insider buy	0.068* (0.000)	-0.110* (0.000)	-0.207* (0.000)	1.000				
(5) Opportunistic insider sell	-0.066* (0.000)	-0.155* (0.000)	-0.291* (0.000)	-0.612* (0.000)	1.000			
(6) <i>SIZE</i>	-0.004 (0.743)	0.009 (0.424)	-0.021 (0.076)	0.004 (0.736)	0.030 (0.010)	1.000		
(7) <i>BM</i>	-0.035* (0.004)	-0.035* (0.003)	0.095* (0.000)	-0.044* (0.000)	-0.003 (0.792)	0.167* (0.000)	1.000	
(8) <i>PR</i>	-0.076* (0.000)	-0.018 (0.036)	0.010 (0.243)	-0.059* (0.000)	0.060* (0.000)	-0.010 (0.408)	0.022 (0.075)	1.000

Note: This table presents the Pearson correlation matrix. FR_{i,t_1,t_2} is the 1-month future returns (buy-and-hold) for firm i over days (t_1, t_2) , routine insider Buy $_t$ (Sell $_t$) is an indicator variable equal to 1 if the shares bought (sold) amount by routine insider i in firm j and month t (insider trades are aggregated to the insider-month level) and opportunistic insider Buy $_t$ (Sell $_t$) is an indicator variable equal to 1 if the shares bought (sold) amount by opportunistic insider i in firm j and month t . *SIZE* is a natural log of market value at the end of quarter t . *BM* is the book-to-market ratio at the end of quarter t . PR_t is the return in month $t-1$. t -Statistics (two-tailed p values) based on standard errors appear in parentheses (brackets).

***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels (two-tailed), respectively.

TABLE 4 | Performance of opportunistic versus routine insiders: Cumulative abnormal returns.

Variables	Dependent variable: CAR (0, 30) and (-30, -1)							
	(1) CAR (0, 30): Buy	(2) CAR (0, 30): Buy	(3) CAR (0, 30): Sell	(4) CAR (0, 30): Sell	(1) CAR (-30, -1): Buy	(2) CAR (-30, -1): Buy	(3) CAR (-30, -1): Sell	(4) CAR (-30, -1): Sell
Routine insider buy	0.008 (0.011)	0.022 (0.016)			-0.055*** (0.012)	-0.051*** (0.016)		
Opportunistic insider buy	0.033*** (0.004)	0.030*** (0.006)			-0.027*** (0.004)	-0.043*** (0.006)		
Routine insider sell			-0.029*** (0.008)	-0.035*** (0.010)			-0.051*** (0.009)	0.010 (0.012)
Opportunistic insider sell			-0.039*** (0.004)	-0.044*** (0.005)			0.031*** (0.005)	0.057*** (0.006)
Observations	15,178	13,662	15,178	13,662	14,713	7568	14,713	7568
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Date fixed effects	No	Yes	No	Yes	No	Yes	No	Yes

Note: This table presents results from cross-sectional regressions of the cumulative abnormal returns (CAR) before and during the COVID-19 crisis. CAR (0, 30) indicates the first 30 days of CAR of insiders (opportunistic and routine) during the COVID-19 crisis, and CAR (-30, -1) indicates the first 30 days of CAR of insiders (opportunistic and routine) after starting the COVID-19 crisis. CAR_{i,t_1,t_2} is the CAR for firm i over days (t_1, t_2) , routine insider Buy $_t$ (Sell $_t$) is an indicator variable equal to 1 if the shares bought (sold) amount by routine insider i in firm j and month t (insider trades are aggregated to the insider-month level) and opportunistic insider Buy $_t$ (Sell $_t$) is an indicator variable equal to 1 if the shares bought (sold) amount by opportunistic insider i in firm j and month t . *SIZE* is a natural log of market value at the end of quarter t . *BM* is the book-to-market ratio at the end of quarter t . PR_t is the return in month $t-1$. t -Statistics (two-tailed p values) based on robust standard errors appear in parentheses (brackets).

***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels (two-tailed), respectively.

TABLE 5 | Performance of opportunistic versus routine insiders: Baseline regressions.

One-month future returns								
Dependent variable: $FR_{i,t+1}$								
Variables	(1) COVID-19: Buy	(2) Pre-COVID: Buy	(3) COVID-19: Buy	(4) Pre-COVID: Buy	(5) COVID-19: Sell	(6) Pre-COVID: Sell	(7) COVID-19: Sell	(8) Pre-COVID: Sell
Routine insider buy	0.014 (0.015)	-0.038** (0.018)	0.009 (0.027)	-0.036** (0.016)				
Opportunistic insider buy	0.044*** (0.005)	-0.002 (0.007)	0.014* (0.008)	-0.007 (0.009)				
Routine insider sell					-0.053*** (0.009)	0.012 (0.010)	-0.013 (0.010)	-0.000 (0.012)
Opportunistic insider sell					-0.056*** (0.005)	0.002 (0.007)	-0.017* (0.009)	0.001 (0.009)
<i>SIZE</i>	-0.000 (0.001)	0.003*** (0.001)	0.001 (0.001)	0.002 (0.001)	-0.000 (0.001)	0.003*** (0.001)	0.007 (0.021)	0.020 (0.017)
<i>BM</i>	-0.003** (0.001)	-0.005*** (0.001)	-0.003 (0.002)	-0.002 (0.002)	-0.003** (0.001)	-0.005*** (0.001)	0.012 (0.008)	-0.005 (0.005)
<i>PR</i>	-0.053*** (0.009)	0.034** (0.016)	-0.007 (0.012)	0.012 (0.021)	-0.051*** (0.009)	0.033** (0.016)	-0.013 (0.018)	0.028 (0.026)
Observations (insiders-month)	6144	6319	6144	6319	6144	6319	6144	6319
Month fixed effects	No	No	Yes	Yes	No	No	Yes	Yes
Firm fixed effects	No	No	Yes	Yes	No	No	Yes	Yes

Note: This table presents results from estimating Equation (2). $FR_{i,t+1}$ is the 1-month future returns (buy-and-hold) for firm i over days (t_1, t_2) , routine insider Buy_t ($Sell_t$) is an indicator variable equal to 1 if the shares bought (sold) amount by routine insider i in firm j and month t (insider trades are aggregated to the insider-month level) and opportunistic insider Buy_t ($Sell_t$) is an indicator variable equal to 1 if the shares bought (sold) amount by opportunistic insider i in firm j and month t . *SIZE* is a natural log of market value at the end of quarter t . *BM* is the book-to-market ratio at the end of quarter t . PR_t is the return in month $t - 1$. t -Statistics (two-tailed p values) based on robust standard errors clustered by firm appear in parentheses (brackets).

***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels (two-tailed), respectively.

after control variables are used and with fixed effects. It also indicates that, for insiders, sales were a better decision than holding the shares. However, the coefficient for opportunistic insider sells is larger than that of routine insider sells, which means that opportunistic insiders benefitted more than routine insiders. Columns 3 and 4 indicate that both insider (routine and opportunistic) sells were negatively associated with abnormal returns (buy-and-hold) during the COVID-19 crisis.

Columns 1 and 2 of CAR $(-30, -1)$ present the cross-sectional regression (between-group and within-firm analysis) for routine and opportunistic insider buys. We find that both coefficients on routine (between-group: -0.055 and within-firm: -0.051) and opportunistic (between-group: -0.027 and within-firm: -0.043) insider buys are negative. The results indicate that insider buys were not beneficial for routine and opportunistic insiders before the COVID-19 crisis started. However, all the coefficients of buys are statistically significant (0.01). In addition, columns 3 and 4 of CAR $(-30, -1)$ present the cross-sectional regressions (between-group and within-firm analysis) for routine and opportunistic insider sells. All coefficients on routine (between-group: -0.051 and within-firm: 0.031) and opportunistic (between-group: 0.010 and within-firm: 0.057) sells do not indicate that opportunistic insider sells were informative and beneficial before the COVID-19 crisis started.

4.3 | Empirical Results

Table 5 reports the results from estimating Equation (2). It presents the baseline regression (cross-sectional) results with and without firm and month-fixed effects before and during the COVID-19 crisis. This table presents results when FR is measured at the 1-month horizon. Columns 1, 3, 5 and 7 estimate the results for the COVID-19 crisis period, while columns 2, 4, 6 and 8 estimate the results for the pre-COVID crisis period. In addition, columns 1 to 4 indicate the results for insider buys, and columns 5 to 8 indicate the results for insider sells.

Column 1 of Table 5 presents the regression results for the insider buys during the COVID-19 crisis. We find that the coefficient for opportunistic insider buy (0.044) is positive and higher than that for routine insider buy (0.014), which is economically and statistically significant (0.01) after control variables are used. This finding suggests that opportunistic insiders hold more FR from insider buys than routine insiders. Compared to the results of column 2, the opportunistic insider buys held higher FR during the COVID-19 crisis period than in the pre-COVID crisis period (opportunistic insider buy: -0.002 and routine insider buy: -0.038). Column 3 presents the regression results with fixed effects for insider buys during the COVID-19 pandemic. We find that the coefficient for opportunistic insider buy (0.014)

TABLE 6 | Performance of opportunistic versus routine insiders: Three-month holding returns.

Three-month future returns				
Dependent variable: $FR_{i,t+3}$				
Variables	(1)	(2)	(3)	(4)
	COVID-19: Buy	Pre-COVID: Buy	COVID-19: Sell	Pre-COVID: Sell
Routine insider buy	0.001 (0.014)	0.036* (0.020)		
Opportunistic insider buy	0.013*** (0.005)	−0.011 (0.008)		
Routine insider sell			0.015* (0.008)	0.028** (0.011)
Opportunistic insider sell			−0.011** (0.005)	0.007 (0.007)
<i>SIZE</i>	−0.002** (0.001)	0.003** (0.001)	−0.002* (0.001)	0.003** (0.001)
<i>BM</i>	0.001 (0.001)	0.008*** (0.002)	0.001 (0.001)	0.008*** (0.002)
<i>PR</i>	−0.020** (0.009)	−0.048*** (0.018)	−0.020** (0.009)	−0.045** (0.018)
Observations (insiders-month)	5981	6197	5981	6197

Note: This table presents results from estimating Equation (2). $FR_{i,t+2}$ is the 3-month future returns (buy-and-hold) for firm i over days (t_1, t_2) , routine insider Buy $_t$ (Sell $_t$) is an indicator variable equal to 1 if the shares bought (sold) amount by routine insider i in firm j and month t (insider trades are aggregated to the insider-month level) and opportunistic insider Buy $_t$ (Sell $_t$) is an indicator variable equal to 1 if the shares bought (sold) amount by opportunistic insider i in firm j and month t . *SIZE* is a natural log of market value at the end of quarter t . *BM* is the book-to-market ratio at the end of quarter t . *PR_t* is the return in month $t - 1$. t -Statistics (two-tailed p values) based on standard errors appear in parentheses (brackets).

***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels (two-tailed), respectively.

is positive and higher than that for routine insider buy (0.009), which is economically and statistically significant (0.10) after control variables are used and with fixed effects. This finding suggests that opportunistic insiders hold more FR from insider buys than routine insiders. Compared to the results of column 4, the opportunistic insider buys held higher FR during the COVID-19 crisis period than during the pre-COVID crisis period (opportunistic insider buy: −0.007 and routine insider buy: −0.036).

Column 5 presents the regression results for the insider sells during the COVID-19 crisis. We find that the coefficient for opportunistic insider sell (−0.056) is negative and more beneficial than that for routine insider sell (−0.053), which is economically and statistically significant (0.01) after control variables are used. This finding suggests that opportunistic insiders earn more returns when they sell their shares during a crisis. Compared to the results of column 6, opportunistic insider sells earned higher returns during the COVID-19 crisis period than during the pre-COVID crisis period (opportunistic insider sell: 0.002 and routine insider sell: 0.012). Column 7 presents the regression results with fixed effects for insider sells during the COVID-19 crisis. We find that the coefficient for opportunistic insider sell (−0.017) is negative and more beneficial than that for routine insider sell (−0.013), which is economically and statistically significant (0.10) after control variables are used and with fixed effects. This finding

suggests that opportunistic insiders earn more returns when they sell their shares during a crisis. Compared to the results of column 8, opportunistic insider sells earned higher returns during the COVID-19 crisis period than during the pre-COVID crisis period (opportunistic insider sell: 0.001 and routine insider sell: 0.000).

Overall, the above findings suggest that non-routine insiders generated higher returns by trading opportunistically during the COVID-19 crisis. These findings support the prior literature (e.g., Goergen et al. 2019; Ali and Hirshleifer 2017; He and Rui 2016; Rogers et al. 2016; Cohen et al. 2012; Tavakoli et al. 2012; Ravina and Sapienza 2010; Marin and Olivier 2008; Fidrmuc et al. 2006), which focuses mainly on opportunistic and routine insider transactions and not on the pandemic.

We next investigate whether our baseline findings achieve the same results when we use the 3-month FR instead of the 1-month FR. Similar to the baseline regressions, Table 6 reports the results from estimating Equation (2). It presents the regression (cross-sectional) results before and during the COVID-19 crisis. This table presents results when FR is measured at the 3-month horizon. Columns 1 and 3 estimate the results for the COVID-19 crisis period, and columns 2 and 4 estimate the results for the pre-COVID crisis period. In addition, columns 1 and 2 indicate the results for insider buys, and columns 3 and 4 indicate the results for insider sells.

TABLE 7 | Performance of opportunistic versus routine insiders: Difference-in-difference specifications (buy).

One-month future returns				
Dependent variable: $FR_{i,t+1}$				
Variables	Model (1)	Model (2)	Model (3)	Model (4)
Opportunistic insider Buy_COVID-19	0.039*** (0.008)	0.066*** (0.012)	0.036** (0.017)	0.062*** (0.020)
COVID-19	0.196*** (0.004)	0.191*** (0.006)	0.185*** (0.004)	0.199*** (0.013)
Opportunistic insider buy	−0.010 (0.006)	−0.021** (0.010)	−0.016 (0.012)	−0.048*** (0.015)
<i>SIZE</i>		0.001 (0.001)	0.001 (0.001)	0.071*** (0.019)
<i>BM</i>		−0.005*** (0.001)	−0.004** (0.002)	−0.018*** (0.005)
<i>PR</i>		0.009 (0.010)	0.015 (0.012)	−0.010 (0.014)
Observations (insiders-month)	16,660	7647	7647	7276
Month fixed effects	No	No	Yes	No
Firm fixed effects	No	No	No	Yes

Note: This table presents results from estimating Equation (3). $FR_{i,t2}$ is the 1-month future returns (buy-and-hold) for firm i over days (t_1, t_2) , *Opportunistic Insider Buy_Opportunistic_COVID-19_i* is an indicator variable (interaction) equal to 1 if the shares bought amount by opportunistic insiders i in firm j and month t , *COVID-19* is a dummy variable to indicate the pre- and during the COVID-19 crisis period, and *Opportunistic Insider Buy_i* is an indicator variable equal to 1 if the shares bought amount by opportunistic insider i in firm j and month t . *SIZE* is a natural log of market value at the end of quarter t . *BM* is the book-to-market ratio at the end of quarter t . PR_t is the return in month $t-1$. t -Statistics (two-tailed p values) based on robust standard errors clustered by firm appear in parentheses (brackets). ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels (two-tailed), respectively.

Column 1 of Table 6 presents the regression results for insider buys during the COVID-19 crisis. We find that the coefficient for opportunistic insider buy (0.013) is positive and higher than that for routine insider buy (0.001), which is economically and statistically significant (0.01) after control variables are used. This finding suggests that opportunistic insiders hold greater 3-month FR from insider buys than routine insiders do. Compared to the results of column 2, the opportunistic insider buys also held higher FR during the COVID-19 crisis period than during the pre-COVID crisis period (opportunistic insider buy: −0.011).

Column 3 presents the regression results for insider sells during the COVID-19 crisis. We find that the coefficient for opportunistic insider sell (−0.011) is negative and more beneficial than that for routine insider sell (0.015), which is economically and statistically significant (0.05) after the control variables are used. This finding suggests that opportunistic insiders earn more returns when they sell their shares during a crisis. Compared to the results of column 4, the opportunistic insider sells earned higher returns during the COVID-19 crisis period than during the pre-COVID crisis period (opportunistic insider sell: 0.007 and routine insider sell: 0.028).

Overall, the above findings suggest that non-routine insiders generated higher returns by trading opportunistically during the COVID-19 crisis. These results support the prior findings (e.g., baseline regression results).

Next, we focus on difference-in-difference specifications to test whether opportunistic insiders trade to generate higher returns. For the difference-in-difference specification, we consider insiders who traded 3 months before and 3 months after the start of the COVID-19 crisis period. This specification fulfils the requirement of parallel trend assumption for that time. Table 7 reports the results of estimating Equation (3). It presents the difference-in-difference specification results during the COVID-19 crisis period compared to those during the pre-COVID crisis period by opportunistic insiders (buys) compared to routine insiders (buys). This table presents the results from when FR is measured at the 1-month horizon. Column 1 estimates the results without control variables, column 2 estimates the results considering the control variables, column 3 estimates the results with month-fixed effects, and column 4 estimates the results with firm-fixed effects.

Table 7 compares 1-month FR for the opportunistic and routine insiders before and after the COVID-19 crisis started. We find the positive and statistically significant coefficient in model (1) for opportunistic insider buys during the pandemic (difference-in-differences p value < 0.01) without control variables. It leads to a statistically higher difference-in-difference (the difference in opportunistic and routine insiders' 1-month FR before the COVID-19 crisis started minus the difference in opportunistic and routine insiders' 1-month FR after the COVID-19 crisis started) of 0.039 FR for the opportunistic insiders. We also find

TABLE 8 | Performance of opportunistic versus routine insiders: Difference-in-Difference specifications (sell).

One-month future returns				
Dependent variable: $FR_{i,t+1}$				
Variables	Model (1)	Model (2)	Model (3)	Model (4)
Opportunistic Insider Sell_COVID-19	−0.039*** (0.007)	−0.057*** (0.011)	−0.024** (0.011)	−0.033** (0.016)
COVID-19	0.226*** (0.005)	0.233*** (0.008)	0.218*** (0.005)	0.230*** (0.016)
Opportunistic insider sell	0.010* (0.005)	0.002 (0.008)	−0.006 (0.007)	0.006 (0.010)
<i>SIZE</i>		0.001 (0.001)	0.001 (0.001)	0.070*** (0.018)
<i>BM</i>		−0.006*** (0.001)	−0.004*** (0.001)	−0.019*** (0.005)
<i>PR</i>		0.010 (0.010)	0.016 (0.010)	−0.009 (0.014)
Observations (insiders-month)	16,660	7647	7647	7276
Month fixed effects	No	No	Yes	No
Firm fixed effects	No	No	No	Yes

Note: This table presents results from estimating Equation (3). $FR_{i,t2}$ is the 1-month future returns (buy-and-hold) for firm i over days (t_1, t_2) , *Opportunistic Insider Sell_Opportunistic_COVID-19*, is an indicator variable (interaction) equal to 1 if the shares sold amount by opportunistic insiders i in firm j and month t , *Post* is a dummy variable to indicate the pre- and during-COVID-19 crisis period, and *Opportunistic Insider Sell_i* is an indicator variable equal to 1 if the shares sold amount by opportunistic insider i in firm j and month t . *SIZE* is a natural log of market value at the end of quarter t . *BM* is the book-to-market ratio at the end of quarter t . PR_t is the return in month $t - 1$. t -Statistics (two-tailed p values) based on robust standard errors clustered by firm appear in parentheses (brackets). ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels (two-tailed), respectively.

the positive and statistically significant coefficient in model (2) for opportunistic insider buys during the pandemic (difference-in-differences p value < 0.01) with control variables. It leads to a statistically higher difference-in-differences (the difference in opportunistic and routine insiders' 1-month FR before the COVID-19 crisis started minus the difference in opportunistic and routine insiders' 1-month FR after the COVID-19 crisis started) of 0.066 FR for the opportunistic versus routine insiders.

We also find the positive and statistically significant coefficient in model (3) for opportunistic insider buys during the pandemic (difference-in-differences p value < 0.01) with month-fixed effects. It leads to a statistically higher difference-in-differences (the difference in opportunistic and routine insiders' 1-month FR before the COVID-19 crisis started minus the difference in opportunistic and routine insiders' 1-month FR after the COVID-19 crisis started) of 0.036 FR for the opportunistic versus routine insiders. We also find the positive and statistically significant coefficient in model (4) for opportunistic insider buys during the pandemic (difference-in-differences p value < 0.01) with firm fixed effects. It leads to a statistically higher difference-in-differences (the difference in opportunistic and routine insiders' 1-month FR before the COVID-19 crisis started minus the difference in opportunistic and routine insiders' 1-month FR after the COVID-19 crisis started) of 0.062 FR for the opportunistic versus routine insiders.

All these findings suggest that opportunistic insider buys hold larger returns than routine insider buys. These results support the prior findings.

Table 8 also reports the results from estimating Equation (3). It presents the difference-in-difference specification results during the COVID-19 crisis period compared to those during the pre-COVID crisis period by opportunistic insiders (sells) compared to routine insiders (sells). This table presents the results from when FR is measured at the 1-month horizon. Column 1 estimates the results without control variables, column 2 estimates the results considering the control variables, column 3 estimates the results with month-fixed effects, and column 4 estimates the results with firm-fixed effects.

Table 8 compares 1-month FR for the opportunistic and routine insiders before and after the COVID-19 crisis started. We find the negative and statistically significant coefficient in model 1 for opportunistic insider sells during the pandemic (difference-in-differences p value < 0.01) without control variables. It leads to a statistically lower difference-in-differences (the difference in opportunistic and routine insiders' 1-month FR before the COVID-19 crisis started minus the difference in opportunistic and routine insiders' 1-month FR after the COVID-19 crisis started) of −0.039 FR for the opportunistic versus routine insiders. We also find the negative and statistically significant coefficient in model 2 for opportunistic insider sells during the

TABLE 9 | Performance of opportunistic and routine trades.

Variables	One-month future returns							
	Dependent variable: $FR_{i,t+1}$							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	COVID-19	Pre-COVID	COVID-19	Pre-COVID	COVID-19	Pre-COVID	COVID-19	Pre-COVID
Routine buy	0.025 (0.020)	-0.043* (0.023)	0.036** (0.018)	-0.011 (0.013)				
Opportunistic buy	0.042*** (0.005)	-0.004 (0.007)	0.037*** (0.011)	-0.014 (0.013)				
Routine sell					0.025** (0.011)	-0.014 (0.013)	0.004 (0.013)	-0.025 (0.016)
Opportunistic sell					-0.010** (0.005)	0.005 (0.006)	-0.016** (0.007)	0.009 (0.011)
SIZE	-0.000 (0.001)	0.003*** (0.001)	-0.040* (0.020)	0.183*** (0.026)	-0.002* (0.001)	0.003*** (0.001)	-0.024** (0.011)	0.182*** (0.013)
BM	-0.003** (0.001)	-0.005*** (0.001)	0.023** (0.009)	-0.019*** (0.004)	0.001 (0.001)	-0.005*** (0.001)	0.011* (0.006)	-0.019*** (0.005)
PR	-0.053*** (0.009)	0.035** (0.016)	-0.058*** (0.021)	0.053* (0.031)	-0.021** (0.009)	0.032** (0.016)	-0.029*** (0.011)	0.052** (0.024)
Observations	6144	6319	5779	5935	5981	6319	5612	5935
Fixed effects	No	No	Yes	Yes	No	No	Yes	Yes

Note: This table presents results from estimating Equation (2). $FR_{i,t}$ is the 1-month future returns (buy-and-hold) for firm i over days (t_1, t_2) , Routine Buy $_i$ (Sell $_i$) is an indicator variable equal to 1 if the shares bought (sold) amount by routine insider i in firm j and month t (insider trades are aggregated to the insider-month level) and Opportunistic Buy $_i$ (Sell $_i$) is an indicator variable equal to 1 if the shares bought (sold) amount by opportunistic insider i in firm j and month t . SIZE is a natural log of market value at the end of quarter t . BM is the book-to-market ratio at the end of quarter t . PR $_t$ is the return in month $t - 1$. t -Statistics (two-tailed p values) based on robust standard errors clustered by firm appear in parentheses (brackets).

***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 level (two-tail), respectively.

pandemic (difference-in-differences p value < 0.01) with control variables. It leads to a statistically lower difference-in-differences (the difference in opportunistic and routine insiders' 1-month FR before the COVID-19 crisis started minus the difference in opportunistic and routine insiders' 1-month FR after the COVID-19 crisis started) of -0.057 FR for the opportunistic versus routine insiders.

We also find the negative and statistically significant coefficient in model 3 for opportunistic insider sells during the pandemic (difference-in-differences p value < 0.05) with month-fixed effects. It leads to a statistically lower difference-in-differences (the difference in opportunistic and routine insiders' 1-month FR before the COVID-19 crisis started minus the difference in opportunistic and routine insiders' 1-month FR during the COVID-19 crisis) of -0.024 FR for the opportunistic versus routine insiders. We also find the negative and statistically significant coefficient in model 4 for opportunistic insider sells during the pandemic (difference-in-differences p value < 0.05) with firm fixed effects. It leads to a statistically lower difference-in-differences (the difference in opportunistic and routine insiders' 1-month FR during the COVID-19 crisis minus the difference in opportunistic and routine insiders' 1-month FR after the COVID-19 crisis started) of -0.033 FR for the opportunistic versus routine insiders.

All findings suggest that opportunistic insider sells are more beneficial than routine insider sells. These results support the prior findings.

4.4 | Robustness Tests

In this section, we perform a series of additional tests to evaluate the robustness of our findings. In Table 9, we then investigate whether all opportunistic and routine trades instead of routine insiders impact FR measured at the 1-month horizon. Columns 1, 3, 5 and 7 estimate the results for the COVID-19 crisis period, and columns 2, 4, 6 and 8 estimate the results for the pre-COVID crisis period. In addition, columns 1 to 4 indicate the results for insider buys, and columns 5 to 8 indicate the results for insider sells.

Column 1 of Table 9 presents the regression results for the insider trades (buy) during the COVID-19 crisis. We find that the coefficient for opportunistic buy (0.042) is positive and higher than that for routine insider buy (0.025), which is economically and statistically significant (0.01). This finding suggests that opportunistic buys hold more FR than routine insider buys. Compared to the results of column 2, opportunistic buys held higher FR during the COVID-19 crisis period than during the pre-COVID crisis period (opportunistic buys: -0.004). Column

TABLE 10 | Instrumental variables approach: Two-stage least squares (2SLS).

Dependent variable: Routine and opportunistic trades				
Variables	Model 1	Model 2	Model 3	Model 4
Routine purchase ratio	0.038** (0.020)			
Opportunistic purchase ratio		0.764*** (0.012)		
Routine sell ratio			0.098** (0.013)	
Opportunistic sell ratio				0.656*** (0.006)
Observations (insiders-month)	6144	6144	6144	6144
Control variables	Yes	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes	Yes
One-month future returns				
Dependent variable: $FR_{i,t+1}$				
Variables	Model 1	Model 2	Model 3	Model 4
Routine insider buy	0.005 (0.026)			
Opportunistic insider buy		0.013** (0.008)		
Routine insider sell			-0.011 (0.010)	
Opportunistic insider sell				-0.020*** (0.008)
Observations (insiders-month)	6144	6144	6144	6144
Control variables	Yes	Yes	Yes	Yes
Month fixed effects	Yes	Yes	Yes	Yes

Note: This table presents results from estimating Equation (2). $FR_{i,t}$ is the 1-month future returns (buy-and-hold) for firm i over days (t_1, t_2) , routine insider Buy _{i} (Sell _{i}) is an indicator variable equal to 1 if the shares bought (sold) amount by routine insider i in firm j and month t (insider trades are aggregated to the insider-month level) and opportunistic insider Buy _{i} (Sell _{i}) is an indicator variable equal to 1 if the shares bought (sold) amount by opportunistic insider i in firm j and month t . $SIZE$ is a natural log of market value at the end of quarter t . BM is the book-to-market ratio at the end of quarter t . PR_t is the return in month $t - 1$. t -Statistics (two-tailed p values) based on robust standard errors clustered by firm appear in parentheses (brackets).

***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels (two-tailed), respectively.

3 presents the regression results with fixed effects clustered by firm for insider buys during the COVID-19 crisis. We find that the coefficient for opportunistic buys (0.037) is positive and higher than that for routine buys (0.036), which is economically and statistically significant (0.01). This finding suggests that all opportunistic buys hold more FR than routine buys. Compared to the results of column 4, opportunistic buys held higher FR during the COVID-19 crisis period than during the pre-COVID crisis period (opportunistic buys: -0.014 and routine buys: -0.011).

Column 5 presents the regression results for insider sells during the COVID-19 crisis. We find that the coefficient for opportunistic sells (-0.010) is negative and more beneficial than that for all routine sells (0.025), which is economically and statistically

significant (0.05). This finding suggests that opportunistic sells earn more returns when they sell their shares during a crisis. Compared to the results of column 6, opportunistic sells earned higher returns during the COVID-19 crisis period than during the pre-COVID crisis period (opportunistic sell: 0.005). Column 7 presents the regression results with fixed effects clustered by firm for insider sells during the COVID-19 crisis. We find that the coefficient for opportunistic sells (-0.016) is negative and more beneficial than that for all routine sells (0.004), which is economically and statistically significant (0.05). This finding suggests that opportunistic sells earn more returns when they sell their shares during a crisis. Compared to the results of column 8, the opportunistic sells earned higher returns during the COVID-19 crisis period than during the pre-COVID crisis period (opportunistic sells: 0.009).

TABLE 11 | More beneficial opportunistic insiders: During COVID-19 crisis.

One-month future returns				
Dependent variable: $FR_{i,t+1}$				
Variables	(1)	(2)	(3)	(4)
	Directors: Buy	CEO: Buy	Directors: Sell	CEO: Sell
Routine insider buy	0.024 (0.021)	−0.041 (0.041)		
Opportunistic insider buy	0.046*** (0.009)	0.016 (0.013)		
Routine insider sell			−0.088*** (0.019)	−0.020 (0.019)
Opportunistic insider sell			−0.061*** (0.009)	−0.039*** (0.013)
<i>SIZE</i>	−0.003* (0.002)	−0.002 (0.002)	−0.003* (0.002)	−0.001 (0.002)
<i>BM</i>	−0.005** (0.002)	−0.001 (0.003)	−0.004** (0.002)	−0.001 (0.003)
<i>PR</i>	−0.055*** (0.018)	−0.021 (0.020)	−0.050*** (0.018)	−0.021 (0.019)
Observations (insiders-month)	2324	790	2324	790

Note: This table presents results from estimating Equation (2). $FR_{i,t+1}$ is the 1-month future returns (buy-and-hold) for firm i over days (t_1, t_2) , routine insider Buy $_t$ (Sell $_t$) is an indicator variable equal to 1 if the shares bought (sold) amount by routine insider i in firm j and month t (insider trades are aggregated to the insider-month level) and opportunistic insider Buy $_t$ (Sell $_t$) is an indicator variable equal to 1 if the shares bought (sold) amount by opportunistic insider i in firm j and month t . *SIZE* is a natural log of market value at the end of quarter t . *BM* is the book-to-market ratio at the end of quarter t . *PR_t* is the return in month $t - 1$. t -Statistics (two-tailed p values) based on robust standard errors clustered by firm appear in parentheses (brackets).

***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels (two-tailed), respectively.

Table 10 presents the instrumental variable approach estimation. The results of this table may be associated with endogeneity concerns that could influence our findings. To account for these concerns, we estimate Equation (2) by using the instrumental variable-2SLS (Baum et al. 2007). Model 1 estimates the regression (within-firm analysis) for routine insider buys with purchase ratio as an instrumental variable. Model 2 estimates the regression (within-firm analysis) for opportunistic insider buys with purchase ratio as an instrumental variable. Model 3 estimates the regression (within-firm analysis) for routine insider sells with sell ratio as an instrumental variable. Model 4 estimates the regression (within-firm analysis) for opportunistic insider sells with sell ratio as an instrumental variable.

Columns 1 and 2 of Table 10 present the regression results for insider buys during the pandemic. We find that the coefficient for opportunistic insider buys (0.013) is positive and higher than that for routine insider buys (0.005), which is economically and statistically significant (0.10). This finding suggests that opportunistic insider buys held more FR than routine insider buys during the COVID-19 crisis. Columns 3 and 4 present the regression results for insider sells during the pandemic. We find that the coefficient for opportunistic insider sells (−0.020) is negative and more beneficial than that for routine insider sells (−0.011), which is economically and statistically significant (0.01). This finding suggests that opportunistic insider sells earn more returns when they sell their shares during a crisis.

Overall, the above findings suggest that opportunistic insiders traded to generate higher returns during the COVID-19 crisis. This finding also supports our baseline regression results by mitigating endogeneity concerns through instrumental variable approaches.

4.5 | Opportunistic Insiders

In this section, we explore a variety of additional tests to find which opportunistic insiders generated greater returns during the COVID-19 crisis period. Tables 11, 12 and 13 estimate the more beneficial opportunistic insiders by considering the board position, largest stock markets, and sector classifications, respectively.

Column 1 of Table 11 presents the regression results for the director buys during the pandemic. We find that the coefficient for opportunistic director buys (0.046) is positive and higher than that for routine director buys (0.024), which is economically and statistically significant (0.01). This finding suggests that opportunistic director buys held more FR than routine director buys during the COVID-19 crisis. Column 2 presents the regression results for CEO buys during the pandemic. We find that the coefficient for opportunistic CEO buys (0.016) is positive and higher than that for routine CEO buys (−0.041). This finding suggests that opportunistic CEO buys held more FR than routine CEO buys during the COVID-19 crisis. Columns 3

TABLE 12 | Between stock markets: During COVID-19 crisis.

One-month future returns				
Dependent variable: $FR_{i,t+1}$				
Variables	(1) NYSE: Buy	(2) Nasdaq: Buy	(3) NYSE: Sell	(4) Nasdaq: Sell
Routine insider buy	0.091 (0.075)	0.009 (0.056)		
Opportunistic insider buy	0.030* (0.016)	0.042** (0.019)		
Routine insider sell			-0.015 (0.020)	-0.044 (0.028)
Opportunistic insider sell			-0.033** (0.017)	-0.044** (0.018)
<i>SIZE</i>	-0.001 (0.003)	0.003 (0.003)	-0.001 (0.003)	0.003 (0.003)
<i>BM</i>	-0.003 (0.003)	-0.010** (0.005)	-0.004 (0.003)	-0.010** (0.005)
<i>PR</i>	0.007 (0.012)	-0.025 (0.055)	0.007 (0.011)	-0.023 (0.055)
Observations (insiders-month)	1361	2106	1361	2106
Month fixed effects	Yes	Yes	Yes	Yes

Note: This table presents results from estimating Equation (2). FR_{i,t,t_2} is the 1-month future returns (buy-and-hold) for firm i over days (t_1, t_2) , routine insider Buy $_t$ (Sell $_t$) is an indicator variable equal to 1 if the shares bought (sold) amount by routine insider i in firm j and month t (insider trades are aggregated to the insider-month level) and opportunistic insider Buy $_t$ (Sell $_t$) is an indicator variable equal to 1 if the shares bought (sold) amount by opportunistic insider i in firm j and month t . *SIZE* is a natural log of market value at the end of quarter t . *BM* is the book-to-market ratio at the end of quarter t . *PR* $_t$ is the return in month $t - 1$. t -Statistics (two-tailed p values) based on robust standard errors clustered by firm appear in parentheses (brackets).

***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels (two-tailed), respectively.

and 4 of this table present the regression results for director and CEO sells during the pandemic. We find that the coefficient for opportunistic CEO sells (-0.039) is negative and more beneficial than that for routine CEO sells (-0.020), which is economically and statistically significant (0.01). This finding suggests that opportunistic CEO sells earn more returns when CEOs sell their shares during a crisis compared to director sells. Overall, the above findings suggest that, by buying and selling shares during the COVID-19 crisis, directors were more opportunistic and informative than CEOs.

Columns 1 and 2 of Table 12 present the regression results for insider buys in the two largest stock markets during the pandemic. We find that the coefficient for opportunistic insider buys (0.042) in Nasdaq is positive and higher than that for opportunistic insider buys (0.030) in the NYSE, which is economically and statistically significant (0.05). This finding suggests that opportunistic insiders of Nasdaq held more FR than opportunistic insiders of the NYSE during the COVID-19 crisis. Columns 3 and 4 of this table present the regression results for insider sells during the pandemic. We find that the coefficient for opportunistic insider sells (-0.044) in Nasdaq is negative and more beneficial than that for opportunistic insider sells (-0.033) in the NYSE, which is economically and statistically significant (0.05). This finding suggests that opportunistic insiders of Nasdaq earn more

returns than opportunistic insiders of the NYSE when they sell their shares during a crisis. Overall, the above findings suggest that, by buying and selling shares during the COVID-19 crisis, insiders of Nasdaq were more opportunistic and informative compared to insiders of the NYSE.

Notably, we find that the number of insider transactions in finance sectors is larger than that of the other entire sectors. Consequently, we divide all the sectors into two parts and test to determine which is more opportunistic. Columns 1 and 2 of Table 13 present the regression results for the insider buys in the different sectors during the pandemic. We find that the coefficient for opportunistic insider buys (0.042) from the finance sector is positive and higher than that for opportunistic insider buys (0.028) from other entire sectors, which is economically and statistically significant (0.05). This finding suggests that opportunistic insiders of the finance sector had more FR than opportunistic insiders of other entire sectors during the COVID-19 crisis. Columns 3 and 4 of this table present the regression results for insider sells during the pandemic. We find that the coefficient for opportunistic insider sells (-0.071) from the finance sector is negative and more beneficial than that for opportunistic insider sells (-0.029) from other entire sectors, which is economically and statistically significant (0.05). This finding suggests that opportunistic insiders of the finance sector

TABLE 13 | Sector classifications: During COVID-19 crisis.

Variables	One-month future returns			
	Dependent variable: $FR_{i,t+1}$			
	(1)	(2)	(3)	(4)
	Finance: Buy	Other Sectors: Buy	Finance: Sell	Other Sectors: Sell
Routine insider buy	0.001 (0.028)	0.029 (0.018)		
Opportunistic insider buy	0.042** (0.017)	0.028** (0.012)		
Routine insider sell			-0.067** (0.026)	-0.021* (0.012)
Opportunistic insider sell			-0.071** (0.028)	-0.029** (0.012)
<i>SIZE</i>	0.099* (0.052)	-0.066*** (0.019)	0.103** (0.051)	-0.066*** (0.019)
<i>BM</i>	0.081*** (0.022)	0.016** (0.008)	0.075*** (0.024)	0.016** (0.008)
<i>PR</i>	-0.026 (0.031)	-0.072*** (0.027)	-0.029 (0.031)	-0.072*** (0.027)
Observations (insiders-month)	1098	4273	1098	4273
Firm fixed effects	Yes	Yes	Yes	Yes

Note: This table presents results from estimating Equation (2). $FR_{i,t}$ is the 1-month future returns (buy-and-hold) for firm i over days (t_1, t_2) , routine insider Buy $_t$ (Sell $_t$) is an indicator variable equal to 1 if the shares bought (sold) amount by routine insider i in firm j and month t (insider trades are aggregated to the insider-month level) and opportunistic insider Buy $_t$ (Sell $_t$) is an indicator variable equal to 1 if the shares bought (sold) amount by opportunistic insider i in firm j and month t . *SIZE* is a natural log of market value at the end of quarter t . *BM* is the book-to-market ratio at the end of quarter t . *PR* $_t$ is the return in month $t - 1$. t -Statistics (two-tailed p values) based on robust standard errors clustered by firm appear in parentheses (brackets).

***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels (two-tailed), respectively.

earn more returns than opportunistic insiders of other entire sectors when they sell their shares during a crisis. Overall, the above findings suggest that insiders of the finance sector were more opportunistic and informative compared to insiders of other entire sectors during the pandemic.

4.6 | Heterogeneity

In our analysis, we use multi-level fixed effects, which are known as high-dimensional fixed effects (Correia 2016). In this paper, we absorb the firm ID (CUSIP) and transaction month with clustering firm ID (CUSIP) in multi-level fixed effects. These techniques help us control the unobserved heterogeneity specific to an individual or group and prevent causal inference due to omitted variable biases (Gormley and Matsa 2014). Specifically, we include firm and month fixed effects in the baseline regressions to account for potential heterogeneity in buys and sells across firms in a given month. We also use the difference-in-differences approach to measure the pre- and during-COVID-19 effects on opportunistic transactions, and we find results in favour of opportunistic insider buys (sells). In addition, we consider the multi-level fixed effects in the instrumental variable-2SLS method to retain consistency with other results. Notably, we find consistent results from all methods.

5 | Conclusion

In this study, we investigate whether opportunistic insiders earned higher returns than routine insiders during the COVID-19 pandemic. We follow Cohen et al. (2012) in defining opportunistic and routine insiders. Our findings suggest that opportunistic insiders had an information advantage that significantly encouraged them to engage in informed trading during the pandemic in order to generate higher returns. Opportunistic insiders may have had reliable information about the declaration of the national emergence of the pandemic in the US, and opportunistic insiders generated higher returns. Our results are robust regarding the different statistical techniques, alternative measurements, robustness checks and endogeneity concerns.

We contribute to the corporate finance literature by examining opportunistic trades (e.g., Cohen et al. 2012) and FR (1 and 3 months) during the pandemic. We also contribute to insider trading literature by classifying opportunistic traders (e.g., directors vs. CEOs, insiders from the NYSE and Nasdaq market and insiders from financial vs. non-financial sectors) to find whether opportunistic traders are more informative and beneficial during the pandemic. Importantly, we find that opportunistic insiders generate higher returns than routine insiders and support our hypotheses. Following Cohen et al. (2012), we contribute to

this literature by examining whether opportunistic behaviour influences the non-routine insiders to be involved in informed trading at all USA firms using a sample of all open market transactions during the pandemic.

Collectively, our results suggest that non-routine insiders trade opportunistically to generate higher returns during the pandemic period. These findings are significant in the current economic climate, where the government plays an active role in US stock markets. We expect the government to play more active roles in influencing firm-level outcomes to control opportunistic trades during a pandemic. Therefore, we encourage other investors and capital market regulators to monitor opportunistic trades. Further research can proceed in one direction; the insights provided in the paper can be used to focus on political connections and insider trading. We leave this issue for further research.

Endnotes

- ¹ Game theory explains that opportunism is the behaviour of seeking benefits from asymmetric information where insiders have unequal access to relevant information. As a result, insiders who 'do know' can take advantage of those who 'do not know' (see Ferrin et al. 2007).
- ² Officers, directors, and those who hold more than 10% of any class of a company's securities are insiders (US Securities and Exchange Commission; S. M. Bainbridge 1998; X. Li 2020; Maddox and Suarez 2021).
- ³ Richard Burr of North Carolina and Dianne Feinstein of California (US senators) opportunistically sold their shares after a specific secret briefing on COVID-19 updates (Daniel and Baruch 2020; Crudele 2020).
- ⁴ On 11 March 2020, the World Health Organization (WHO) announced that the COVID-19 outbreak could be characterized as a pandemic (<https://trumpwhitehouse.archives.gov/presidential-actions/proclamation-declaring-national-emergency-concerning-novel-coronavirus-disease-covid-19-outbreak/>).
- ⁵ The COVID-19 crisis in the United States is generally thought to have started with the declaration of national emergency on 13 March 2020.
- ⁶ Routine insiders may trade for a host of reasons, such as liquidity demand or diversification (e.g., they sell their shares to fulfil their liquidity needs), which indicates that the routine insider is not trading on information (e.g., Drummond David of Alphabet Inc).
- ⁷ We exclude all insider trades (aggregated by month) of \$100 million or more.
- ⁸ To identify routine or opportunistic insiders, we consider the back-windows (past) trading in the same calendar month for the past 3, 4 and 5 years of trading. We find the significant results for all windows. We present the results using a 3-year back window throughout the paper.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.