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Does stardom affect the informativeness of a CEO's insider trades?

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Abstract

This study examines whether the celebrity or star status of a chief executive officer (CEO) affects the informativeness of his insider trades. Using three different measures to identify star CEOs in a sample of S&P 1500 firms, we find that trades of non-star CEOs predict future abnormal returns and earnings innovations and that trades of star CEOs do not. The predictive power of non-star CEO trades is mostly attributable to opportunistic trades, not routine trades. We also find evidence suggesting that the abnormal returns associated with non-star CEO insider trades are due to the lower visibility and consequently less scrutiny of non-star CEOs compared with star CEOs.

KEYWORDS
chief executive officer, insider trading, opportunistic trade, routine trade, star

JEL CLASSIFICATION
G14, G23, G29

1 | INTRODUCTION

Does the celebrity or star status of a chief executive officer (CEO) matter for the informational content and predictive power of his trades? The informational role of insider trading is not without debate. Cohen, Malloy, and Pomorski (2012) find that trades by non-senior insiders [insiders other than CEOs or chief financial officers (CFOs)] can predict future firm events better than trades by senior insiders. Wang, Shin, and Francis (2012) show that CFOs earn higher abnormal returns following their purchases of company shares than CEOs. Knewtson and Nofsinger (2014) find that because CEOs face more scrutiny than CFOs, CEOs limit their trading aggressiveness and their trades are less informative than trades of CFOs. Meanwhile, Ozkan and Trzeciakiewicz (2014) show that CEOs tend to purchase their own company shares more than CFOs do and that CEO purchases are more informative than those of CFOs. In this study, we focus only on CEOs and investigate whether the celebrity or star status of a CEO reveals the information content in his trading.

The public at large considers prominent CEOs in the United States to be celebrities or stars. They enjoy higher compensation (Murphy, 1999) and attract more public attention (Malmendier & Tate, 2009) compared with low-profile

CEOs. Print and electronic media dedicate multiple issues to star CEOs, their success stories, and even their lifestyles. While existing literature attempts to identify whether star CEOs create more value for their firms and consequently for investors, no study has determined whether star CEOs offer superior information in trades that can be exploited by investors to create value for themselves. We attempt to do so by first arguing the opposite. Specifically, we first argue that the trades of non-star CEOs are likely to have informational content, and then examine whether the empirical evidence supports this argument.

Insider trading by a CEO may reflect his private information or his liquidity needs, or both. Therefore, not all CEO trades are necessarily informed. Cohen et al. (2012) classify insider trades into two types: routine trades and opportunistic trades. Routine trades are usually motivated by liquidity needs (when insiders sell shares to finance consumption) or excess liquidity (when insiders receive a bonus and use it to buy shares), and opportunistic trades contain useful private information. We predict that trades by star CEOs (CEOs receiving more public attention) are mostly routine trades and therefore their trades are not likely to be informative, in contrast to trades by non-star CEOs (CEOs receiving less public attention). Star or celebrity CEOs frequently appear in the media, are involved in more social activities, and attract more attention from investors. Although both star and non-star CEOs possess useful private information about their firms, star CEOs are less likely to exploit that information in their trades due to the greater scrutiny they attract from the media and regulatory bodies. As a result, trades of star CEOs are less likely to be informative and to have the power to predict future returns.

Non-star CEOs receive less coverage in the media, attract less attention from investors, and are under less scrutiny by the regulatory bodies. Therefore, their trades are more likely to be opportunistic and to possess the power to predict returns. In addition, non-star CEOs usually do not receive a star premium in the form of extraordinary bonuses or additional stock options. They thus are less likely to purchase shares of their firms in a routine fashion.

Our investigation starts with the compilation of a sample of CEOs of S&P 1500 (including S&P 500, S&P MidCap 400, and S&P SmallCap 600) companies for the period 2004–2011. We classify these CEOs into two groups: stars and non-stars. We use three different measures to identify star CEOs: an award-based measure, a web-based measure, and a media-based measure. These measures identify star CEOs based on their award-winning, their Google search volume index (SVI), and the quantity of media coverage they receive in sources included in the Factiva database.

We employ panel regressions of future abnormal returns on indicators of star and non-star CEO trades. We find that star buys and star sells are not good predictors of future abnormal returns and that non-star buys and non-star sells are strong predictors of future abnormal returns. These findings support the argument that non-star CEO trades possess useful information about firms' future prospects. We also classify trades of both star and non-star CEOs as either opportunistic or routine. Consistent with Cohen et al. (2012), most of the predictive power of non-star CEO trades arises from opportunistic trades, not routine trades. Thus, while non-star CEOs execute both opportunistic and routine trades, the opportunistic trades are the ones that possess private information.

We also examine whether non-star CEO trades have future earnings-related information about firms. We run regressions of future cumulative abnormal returns (CARs) over three- and five-day windows surrounding the first two quarterly earnings announcements that take place after an insider trade on indicators of star versus non-star CEO trades. Pre-earnings announcement trades of non-star CEOs predict CARs associated with quarterly earnings announcements and trades of star CEOs do not. Furthermore, opportunistic insider purchases of a non-star CEO contain information about the firm's future earnings and routine purchases do not.

An alternative explanation for the argument that star CEOs invite increased scrutiny is that star CEOs have inferior information about their firms because stardom distracts them from managing the firm.[1] We investigate whether the increased scrutiny or the inferior information argument explains our findings. We argue that because firms in highly regulated industries face greater scrutiny by the Securities and Exchange Commission (SEC) and other regulators, even the non-star CEOs of such firms are likely to be more cautious in their trading. Therefore, the increased scrutiny argument suggests that the trades of both non-star and star CEOs are likely to be uninformative in highly regulated

[1] We thank an anonymous reviewer for suggesting this alternative explanation.

firms and that a difference in the information content of non-star and star CEO trades is more likely in lightly regulated firms. The inferior information argument suggests that the difference in the information content of non-star and star CEO trades should not vary based on industry regulation because the superior information of non-star CEOs relative to stars CEOs should not be affected by industry regulation.

Following Knewtson and Nofsinger (2014), we classify firms as lightly and highly regulated. We then regress future CARs on indicators of monthly star and non-star CEO trades separately for each group. For lightly regulated firms, the coefficient of non-star buy (sell) is positive (negative) and significant and the coefficients of star buy and star sell are insignificant. For highly regulated firms, the coefficients of buys and sells are insignificant for both non-star and star CEOs. These findings are consistent with the increased scrutiny of star CEOs argument and not with the inferior information of star CEOs argument.

Star CEOs are better compensated than non-star CEOs and, therefore, star CEOs could have less incentive to trade based on their private information. To alleviate any concern that our empirical results are influenced by this possibility, we control for CEO compensation (both equity and cash compensation) in our regressions. The results show that our findings are not because of higher compensation of star CEOs.

As the final examination of the difference in information content of star and non-star CEO trades, we perform four additional analyses. The first analysis involves estimating abnormal performance using a calendar-time portfolio approach as in Wang et al. (2012) to alleviate the concern raised by Fama (1998) that a study of CARs may suffer from cross-sectional correlations and time series heterogeneity. The second analysis tests the argument that trades of star CEOs are not informative by examining if the insider trades of CEOs in the same firm become less informative after they achieve star status by winning an award.[2] The third analysis focuses on the trading responses of institutional investors to trades by star and non-star CEOs. The fourth analysis examines only large (S&P 500) firms.

Test results show that our main results are robust to the use of an approach in which we form calendar-time portfolios based on the type of insiders (non-star and star CEOs) and the type of trade (purchase and sale). Furthermore, a significant decline in the positive abnormal CARs is associated with insider purchases by CEOs after they receive an award. Also, institutional investors are not aware of the private information of non-star CEOs, and they provide liquidity in the marketplace for trades by non-star CEOs. Finally, firm size is not a major contributing factor in determining the return differentials among star and non-star CEOs. Overall, our empirical findings suggest that the information content of insider trades by a CEO is related to the celebrity status of the CEO and that trades of non-star CEOs reflect private information about their firms' future prospects.

Our paper sheds some light on the ongoing debate about the informativeness and predictive power of insider trades by CEOs. We provide a new framework to assign insider trades by CEOs into one of two categories: trades by star insiders and trades by non-star insiders, and we empirically show that non-star CEO trades have the power to predict returns and star CEO trades do not. To the best of our knowledge, this paper is the first to examine the impact of insiders' star or celebrity status on equity returns. In addition, it uses three different approaches for identifying star and non-star CEOs, which shows the robustness of our empirical findings.

The remainder of the paper is organized as follows. Section 2 provides a brief background, reviews the literature, and offers our hypotheses. Section 3 describes star identification methods and data. Section 4 provides empirical evidence on star and non-star CEO trades' ability to predict future returns. Section 5 investigates whether trades made by star and non-star CEOs differ in terms of the information they contain about future firm earnings. In Section 6, we investigate whether the increased scrutiny or the inferior information argument explains our findings. In Section 7, we estimate abnormal performance using calendar-time portfolios and examine if the insider trades of CEOs in the same firm become less informative after they achieve star status by winning an award. We go on to analyze the behavior of institutional investors with respect to the trades of non-star and star CEOs and test whether our results hold if we restrict our sample to only large firms (firms in the S&P 500 index). Section 8 concludes.

[2] We are grateful to Professor Norman Strong, the associate editor, for this suggestion.

2 | BACKGROUND AND HYPOTHESES

Although the practice of trading by various corporate insiders (executives, directors, and large shareholders) based on private information is well discussed in the literature, debate is ongoing about the magnitude and significance of the informational value of insider trading. Earlier studies on insider trading, including Lorie and Niederhoffer (1968), Jaffe (1974), Seyhun (1986, 1988, 1998), Rozeff and Zaman (1988), and Lakonishok and Lee (2001), examine whether aggregate insider trading can predict firm-level returns. Seyhun and Bradley (1997) find that trades of insiders, especially top executives, contain private information about not only good news, but also bad news. They conclude that these insiders sell significantly before filing for bankruptcy. In a later study, Piotroski and Roulstone (2005) argue that insiders are contrarians and possess superior information about future firm earnings. Jiang and Zaman (2010) conclude that the predictive power of insider trades arises from superior information about future cash flows, not from the contrarian beliefs of insiders.

Inci, Lu, and Seyhun (2010) and Berkman, Koch, and Westerholm (2014), among others, study short-lived insider trading behavior. Inci et al. (2010) find that insider trades, especially purchases, generate new information for market participants and lead to piggy-backing by professional investors. Berkman et al. (2014) show that guardians who want to camouflage their illegal insider trading tend to trade in their underaged children's accounts and are usually successful, especially before major corporate news announcements.

Although most studies on insider trading show that purchases, not sales, by insiders possess superior information, Scott and Xu (2004) find that information-driven sales have the power to predict future returns and liquidity-driven sales are uninformative. In a more recent paper, Cohen et al. (2012) use a novel approach of segregating insider trades into two groups: routine and opportunistic. According to Cohen et al., opportunistic (routine) insider trades do (do not) have the power to predict future returns on a stock. They also conjecture that most opportunistic traders are local and non-seniors, i.e., not the CEO, CFO, or chairman of the board.

While the CEO is the most important executive in a corporation, the informational role of CEO insider trading relative to that of other executives in the firm is not without debate. Cohen et al. (2012) find that trades by non-senior insiders predict future firm events better than trades by senior insiders. Wang et al. (2012) report that purchases of company shares by CFOs reveal more information than those by CEOs. Knewtson and Nofsinger (2014) show that the information content of CFO insider trading is stronger than that of CEO insider trading because CEOs are less willing to exploit their informational advantage. Meanwhile, Ozkan and Trzeciakiewicz (2014), who examine insider trades in a sample of UK firms, show that CEOs are stronger purchasers than CFOs and that purchases by CEOs are more informative than those by CFOs.

Our focus is only on CEOs, and we investigate whether the celebrity or star status of a CEO reveals the information content in his insider trading. A star or celebrity CEO tends to attract more attention from the public and from investors, appears frequently in the media, and is involved in more social activities. Although a reasonable assumption is that star CEOs possess useful private information about their firms, they are less likely to exploit this information than non-star CEOs, given that star CEOs are watched more closely by the media and are under greater scrutiny by regulatory bodies. As a result, insider trades by star CEOs are more likely to be routine trades than opportunistic trades. Overall, we expect that trades by star CEOs are uninformative and do not possess the ability to predict returns.

A non-star CEO is likely to be an executive of a local corporation, does not attract much public attention, is less prone to be discussed in the press and media, and is likely to be under less scrutiny by the SEC and other regulatory bodies. As a result, insider trades by non-star CEOs are more likely to be opportunistic trades than routine trades. Therefore, we propose that trades by non-star or non-celebrity CEOs are likely to be informative and possess significant predictive ability for future returns.

H1a: Insider trades of star or celebrity CEOs do not possess the ability to predict future firm returns.

H1b: Insider trades of non-star or non-celebrity CEOs possess the ability to predict future firm returns.

According to Ke, Huddart, and Petroni (2003) and Piotroski and Roulstone (2005), insider trading in a firm reveals information about the firm's future earnings prospects. If CEOs exploit information about future firm earnings, their *ex-ante* stock trades should reflect future earnings surprises, which are not already evident in the stock price. Similar to Wang et al. (2012), we characterize these earnings surprises as earnings innovations. Non-star CEO trades are likely to be mostly opportunistic trades, and purchases (sales) by non-star CEOs should predict positive (negative) earnings innovations. A similar pattern should not be expected for star CEO trades, which are likely to be mostly routine and uninformative.

H2a: Insider trades of star CEOs do not contain information about future earnings innovations.

H2b: Insider trades of non-star CEOs contain information about future earnings innovations.

3 | DATA

In this section, we describe methods of identifying star and non-star CEOs, sources of data used for the identification, and sources of firm-related data.

3.1 | Identification of star CEOs

Our sample consists of CEOs of firms in the S&P 1500 index for the period 2004–2011. The S&P 1500 index includes S&P 500, S&P MidCap 400, and S&P SmallCap 600 companies and covers approximately 90% of the US market capitalization. We use three measures to identify those sample CEOs who are stars or celebrities and those who are non-stars or non-celebrities: an award-based measure, a web-based measure, and a media-based measure.[3] The award-based measure identifies star and non-star CEOs by the winning of high-profile awards; the web-based measure, by the search frequencies of CEOs in Google; and the media-based measure, by the quantity of media coverage CEOs receive in sources included in the Factiva database.

3.1.1 | Award-based measure

For our award-based measure, which follows Malmendier and Tate (2009) and Koh (2011), star or celebrity CEOs are those who have won prestigious contests organized by highly regarded international business publications. Various publications have conferred awards on CEOs during our sample period, including *Bloomberg Businessweek*, *Chief Executive*, *Forbes*, and *Morning Star*. In addition, *Harvard Business Review* published an article containing the ranking of CEOs of large public companies who have performed best over their entire time in office. Details of the sources used to identify award-winning CEOs are given in Appendix A.

After determining the award winners, deemed star CEOs, we follow Malmendier and Tate (2009) and Kubick and Lockhart (2017) to construct a nearest-neighbor matching sample of non-star CEOs. In the first of this two-step procedure, we estimate a logit regression to identify observable firm and CEO characteristics that predict CEO awards. The firm characteristics are size, book-to-market ratio, and past returns, and the CEO characteristics are age, gender, and tenure. We control for year and industry effects. We include observations from each month in which a sample award is given. The results of this logit regression, in Table 1, show that CEOs of larger firms, firms with low book-to-market ratios, and firms with past higher returns are more likely to win awards. In addition, females and older CEOs with more experience are more likely to win awards. In the second step, we use the predicted values from the logit regression to construct a nearest-neighbor matched sample for the award winners. For each award month, we identify the non-winning CEOs with propensity scores closest to those of each winner. We call these CEOs, who did not receive any award but have characteristics closest to those of winners, non-stars.

[3] Our measures are consistent with the measures of stardom used in Western economies. For the Chinese market, in which the state plays a dominant role in firm-level decisions, Conyon, He, and Zhou (2015) use political connections of CEOs to identify star CEOs.

TABLE 1 Determinants of award winners

Determinant	Odds ratio
Firm size	2.718***
	(0.155)
Book-to-market ratio	0.948**
	(0.021)
Returns_1_3	1.375
	(0.695)
Returns_4_6	1.218
	(0.616)
Returns_7_12	2.560***
	(0.517)
CEO female	2.155**
	(0.740)
CEO age	1.062***
	(0.013)
CEO tenure	1.099***
	(0.024)
Industry and year dummies	Yes
Pseudo R^2	0.240
Observations	45,930

Notes: This table presents estimates of a logit regression to identify observable firm and chief executive officer (CEO) characteristics that predict CEO awards. *Firm size* is measured as the log of market capitalization (share price times the number of shares outstanding) at the end of the month prior to the award month. *Book-to-market ratio* is book equity over market capitalization and is measured at the end of the last fiscal year prior to the award month. *CEO female* is a binary variable that assumes a value of one for female CEOs. *CEO age* and *CEO tenure* are the logs of the CEO age and CEO tenure, respectively, in number of years, as measured in the award month. *Returns_x_y* are the total compound returns from the y^{th} to the x^{th} month prior to the award month. Industry and year fixed effects are included in the regressions. Coefficients are displayed as odds ratios. Standard errors are below the coefficient estimates in parentheses. Statistical significance at the 1% and 5% level is indicated by ***, and **, respectively.

3.1.2 | Web-based measure

For the web-based measure, we use search frequency in Google to identify a star or celebrity CEO. Da, Engelberg, and Gao (2011) proposed the Google search volume index as a measure of investor attention. Drake, Roulstone, and Thornock (2012) use Google searches to examine investors' demand for information during earnings announcements, and Ding and Hou (2015) use such a measure to capture retail investor attention. The idea behind using SVI in our study is that a celebrity or star attracts more attention from the public, which is reflected in their Google search volume.

We use Google SVI for our star classification for three reasons. First, as Da et al. (2011) point out, it is a direct measure of public attention. Because stardom or celebrity has a clear association with public attention, Google SVI can be considered a fair and unbiased proxy of star classification. Second, the number of Internet users has been increasing in recent years and Google is now the prominent search engine. Third, Google SVI has become such a popular mode of public attention that it receives weekly news coverage from major TV channels.[4]

Since January 2004, the weekly SVI of search terms became public via Google Trends.[5] It shows how many searches have been made for a term relative to the total number of searches for that term over time. We use the SVI of a CEO's name along with his company's name to measure CEO celebrity or stardom. Searching the CEO name without the

[4] NBC broadcasts a discussion on "Hot Google Searches" during the week in its regular morning show *NBC Today*.

[5] Google Trends is available online at http://www.google.com/trends.

company name might generate an inaccurate result as it may include searches of other persons with the same name. We download weekly SVI for the CEOs in our sample and then estimate the average monthly SVI over the sample period. After compiling the average SVI for all the CEOs in our sample for the sample period, we sort the CEOs into quintiles based on the average SVI. CEOs in the top quintile (greatest SVI) are defined as stars or celebrities, and CEOs in the bottom quintile (least SVI) are considered non-stars or non-celebrities.

3.1.3 | Media-based measure

Existing literature suggests a strong positive association between media or press coverage and celebrity status. Bonner, Hugon, and Walther (2007) use media coverage as a proxy for analysts' celebrity to examine investor reaction to celebrity financial analysts. Using a similar methodology, we measure the total media coverage of a CEO by the number of appearances of the CEO's name along with the company name in all media sources included in the Factiva database. For each CEO of a firm, we record the number of articles related to the firm in Factiva during 2004–2011 that refer to the CEO of the firm at least once.[6] Any duplicate article about a CEO is excluded from the classification. We also exclude any discontinued sources. We then sort all the CEOs based on the quantity of media coverage they receive. CEOs in the top quintile, i.e., the ones receiving the most media coverage, are defined as stars or celebrities, and CEOs in the bottom quintile, i.e., the ones receiving the least media coverage, are considered non-stars.

Some studies use the number of CEO press citations to measure CEO reputation (see, for example, Milbourn, 2003). One caveat of identifying reputation using this method is that press might be biased toward reporting negative events about CEOs. Our study is free from this potential bias as we examine stardom, not reputation. Stardom is associated with both positive and negative news about a CEO.

3.2 | Insider trading and other data

We obtain insider trading data from Thomson Reuters Insiders Data Files. The data are contained in Form 4, which company insiders file with the SEC when there is a material change in their stockholdings. The data include transactions by officers and directors, including the CEO, CFO, and chairman of the board, and other large shareholders. We restrict the analysis to CEO open market transactions of equity shares. Transactions related to derivatives are excluded because of the different nature of the derivatives market and the purpose of those transactions. We also omit duplicate transactions reported by insiders and transactions without prices.

The sample period starts in 2004, when Google began reporting search volume index about specific items publicly through Google Trends, and ends in 2011. Our sample covers CEOs of S&P 1500 companies. We obtain stock returns data from the Center for Research in Security Prices, firm sizes and book-to-market ratios from Compustat, CEO characteristics and executive compensation from ExecuComp, Fama–French factors from Professor Kenneth R. French's website, institutional holdings from Thomson Financial, and earnings announcement dates from Thomson Reuters' Institutional Brokers' Estimate System (I/B/E/S).[7]

3.3 | Summary statistics and correlations

Table 2 reports summary statistics of star classification measures and insider trading during the sample period. In Panel A, CEOs classified as stars based on awards have received an average of 1.91 awards during the sample period, CEOs classified as stars based on Google SVI have an average SVI of 12.17, and CEOs classified as stars based on media coverage are mentioned in an average of about 3,515 articles about the CEO and his firm. CEOs classified as non-stars based on Google SVI have an average SVI of 0.77, and CEOs classified as non-stars based on media coverage are mentioned in an average of about 42 articles.

[6] Factiva Search Builder has recently included social media, as well as blogs and boards, as additional sources.

[7] Fama–French factors are available at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

TABLE 2 Summary statistics

Panel A: Star and non-star classification measures for the sample period			
	Star classification measure		
Classification	**Award**	**Web**	**Media**
Star			
Mean	1.91	12.17	3514.60
Standard deviation	1.19	28.54	7053.39
Non-star			
Mean	0	0.77	42.03
Standard deviation	0	2.01	32.42

Panel B: Average monthly number of insider trades by CEOs				
	Star classification measure			
CEO insider trades	**Award**	**Web**	**Media**	**None**
Purchase				
All				0.58
Star	0.93	0.74	0.64	
Non-star	0.69	0.58	0.50	
Sale				
All				17.32
Star	32.22	41.35	42.07	
Non-star	14.38	11.34	10.39	

Notes: This table presents summary statistics of different star and non-star classification measures and insider trading by chief executive officers (CEOs). Panel A reports summary statistics of different star and non-star classification measures for the entire sample period, and Panel B reports those of monthly CEO insider trades. The award-based measure for classifying CEOs into stars and non-stars is determined by the high-profile awards received by CEOs; the web-based measure, their Google search volume index (SVI); and the media-based measure, the quantity of media coverage received by CEOs in sources included in the Factiva database. The total number of observations is 29,286 (9,762 purchases and 19,524 sales).

Panel B of Table 2 reports the average monthly number of trades executed by star and non-star CEOs. For the full sample of all CEOs, the average number of sales transactions per month (17.32) is much larger than that of purchases (0.58). The difference between star and non-star purchases is not striking. For example, according to the media-based classification, star CEOs execute 0.64 purchases per month and non-star CEOs have 0.50 purchases per month. The difference in the number of sales is substantial. For example, for the media-based classification, star CEOs execute four times more sales per month (42.07 trades) than non-star CEOs (10.39).

To explore whether each of the three measures captures the stardom of CEOs, we calculate correlations between the measures. Panel A of Table 3 reports the results. The top diagonal of the matrix presents Pearson correlations, and the bottom diagonal presents Spearman rank correlations. Both sets of correlation coefficients suggest that the three star classification measures are significantly positively correlated with each other.

Panels B–D of Table 3 present the Pearson and Spearman correlations of the three star classification measures with insider transactions. For all the measures, a negative (positive) relationship exists between celebrity or stardom and the average monthly number of shares purchased (sold). Prior literature finds that insider purchases contain more private information than insider sales. Thus, our correlation results suggest that trades of star insiders are less likely to contain useful private information. We further examine this issue by considering the correlations of star classification measures with opportunistic trades. Unlike routine trades, opportunistic trades are those purchases and sales that contain useful private information. We find negative and statistically significant Pearson and Spearman correlations

TABLE 3 Correlations among star CEO measures and star CEO measures with insider trades

Panel A: Correlations between star classification measures			
Measure	**Award**	**Web**	**Media**
Award	1.000	0.341***	0.641***
Web	0.782***	1.000	0.411***
Media	0.690***	0.830***	1.000

Panel B: Correlations of award-based star classification measure and insider trades				
Variable	***Star***	***Buy***	***Sell***	***Opportunistic trade***
Star	1.000	−0.095***	0.193***	−0.131***
Buy	−0.104***	1.000	–	–
Sell	0.100***	–	1.000	–
Opportunistic trade	−0.178***	–	–	1.000

Panel C: Correlations of web-based star classification measure and insider trades				
Variable	***Star***	***Buy***	***Sell***	***Opportunistic trade***
Star	1.000	−0.091***	0.099***	−0.138***
Buy	−0.140***	1.000	–	–
Sell	0.096***	–	1.000	–
Opportunistic trade	−0.082***	–	–	1.000

Panel D: Correlations of media-based star classification measure and insider trades				
Variable	***Star***	***Buy***	***Sell***	***Opportunistic trade***
Star	1.000	−0.099***	0.158***	−0.126***
Buy	−0.099***	1.000	–	–
Sell	0.088***	–	1.000	–
Opportunistic trade	−0.152***	–	–	1.000

Notes: This table reports the Pearson and Spearman correlations between different star chief executive officer (CEO) measures and of star CEO measures with types of insider trades. Pearson correlations are above the diagonal, and Spearman correlations are below the diagonal. Panel A reports the correlation matrix between various star classification measures, and Panels B through D present the correlation matrix between different star classification measures and types of transactions. The award-based measure for classifying CEOs into stars and non-stars is determined by the high-profile awards received by CEOs; the web-based measure, their Google search volume index (SVI); and the media-based measure, the quantity of media coverage received by CEOs in sources included in the Factiva database. *Buy* (*Sell*) is an indicator variable that equals one if a trade by a CEO is a purchase (sale). *Opportunistic trade* is a trade that is not executed in the same calendar month in two or more consecutive years. The total number of observations is 29,286, (9,762 purchases and 19,524 sales). Statistical significance at the 1% level is indicated by ***.

between the star classification measures and opportunistic trades. This result also indicates that the star CEO trades are less likely to contain useful private information.

4 | INFORMATIONAL ROLES OF STAR AND NON-STAR CEO INSIDERS

If CEOs exploit superior information in their trading, they should earn abnormal stock returns. This section provides empirical evidence on the power of star and non-star CEO trades to predict future abnormal stock returns. We first present evidence based on all trades and then on opportunistic and routine trades.

4.1 | All trades

In examining star versus non-star CEO trades to determine whether they predict future abnormal stock returns, we use a multivariate setup involving panel regressions of six-month-forward cumulative abnormal returns on indicator variables for monthly star and non-star CEO trades.[8] *CAR* is the cumulative six-month abnormal return generated using the Fama–French three-factor model.[9] Panels A, B, and C of Table 4 summarize regression results for award-based, web-based, and media-based star classification, respectively. To control for the momentum effect in the stock market, we include past cumulative six-month return as a control variable (*Past six-month return*). In addition, because informed trades are likely to be executed in small and mid-size trades, that is, in a higher frequency, we control for the number of monthly purchases and the number of monthly sells. Following Cohen et al. (2012), we use month fixed effects in all the regressions and compute standard errors clustered at the firm level.

In Models (1)–(4) of Panels A–C, we run separate regressions for purchases and sales by star and non-star CEOs. In Models (5)–(6), we include both types of transactions by star and non-star CEOs in the same regression, with Model (6) also including controls for the number of transactions. To alleviate any potential concern that our empirical results are influenced by the possibility that star CEOs receive more compensation and therefore have less desire to trade based on private information, we control for CEO compensation [natural log of equity compensation (*EC*) and natural log of cash compensation (*CC*)] in Model (6). *EC* is defined as the value of option awards plus the value of stock grants, and *CC* is defined as the amount of cash compensation.

Panel A, which uses the award-based classification, shows that purchases and sales by star CEOs are not good predictors of future abnormal returns and that purchases and sales by non-star CEOs are strong predictors of future abnormal returns. For example, in Model (5), which includes all explanatory variables in the same regression, the coefficient on purchases by non-star CEOs indicates that those purchases are followed by an abnormal positive return of 6.4% (standard error = 0.012) over the next six months. The coefficient on sales by non-star CEOs in Model (5) indicates that those sales are followed by an abnormal loss of 5.2% (standard error = 0.012) over the next six months. Star buys and sells are not good predictors of future abnormal returns, as neither coefficient is statistically significant. Model (6), in which we add controls for the frequency of trading, shows that non-star trades predict future firm abnormal returns and star trades do not.

Panels B and C have findings similar to those in Panel A, with non-star trades showing a pattern of significant positive (negative) abnormal returns following non-star buys (sells) and star trades not showing such a pattern. In sum, these findings suggest that trades by non-star CEOs are informative and trades of star CEOs are not informative, providing support to H1a and H1b.

4.2 | Opportunistic trades

Here and in Subsections 4.3 and 4.4, we examine the trading behavior of star and non-star CEOs based on the nature of their trades. An insider may trade either to exploit information or for the purpose of liquidity. Cohen et al. (2012) propose that if an insider trade is consistent with a seasonal pattern of trades by that insider, then that trade is routine and does not possess private information. If no such pattern exists for an insider trade, then that trade is most likely motivated by private information and is therefore an opportunistic trade. We follow a similar methodology to categorize CEO trades into two groups: opportunistic and routine. If a CEO trade is not executed in the same calendar month in two or more consecutive years, we classify it as an opportunistic trade.[10] Corporations usually offer bonuses and

[8] This method is similar to Cohen et al. (2012) except that they use future one-month return instead of six-month returns. We use six-month abnormal returns because it matches the duration in the short-swing rule (Section 16-b) of the Securities Exchange Act of 1934, which penalizes insiders for profits earned on transactions that are executed fewer than 180 days subsequent to previous trades.

[9] A description of the variables included in Table 4 and other tables can be found in Appendix B.

[10] We classify trades but not CEOs as routine or opportunistic because the same CEO might execute both routine and opportunistic trades at different times and in different situations.

TABLE 4 Performance of insider trades of star and non-star CEOs

Panel A: Award-based star classification						
	Model					
Variable	(1)	(2)	(3)	(4)	(5)	(6)
Star buy	0.036**				0.035	0.019
	(0.017)				(0.109)	(0.031)
Star sell		−0.017			−0.007	−0.009
		(0.087)			(0.075)	(0.015)
Non-star buy			0.064***		0.064***	0.062***
			(0.007)		(0.012)	(0.011)
Non-star sell				−0.064***	−0.052***	−0.020*
				(0.007)	(0.012)	(0.011)
Past six-month return	−0.089***	−0.089***	−0.073***	−0.072***	−0.073***	−0.125***
	(0.009)	(0.009)	(0.010)	(0.010)	(0.017)	(0.014)
Number of buys						0.002
						(0.001)
Number of sells						−0.000
						(0.000)
EC						−0.000
						(0.003)
CC						−0.003
						(0.004)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.079	0.075	0.146	0.144	0.150	0.273
F-statistic	43.52***	41.36***	78.48***	78.87***	14.42***	21.35***
Panel B: Web-based star classification						
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Star buy	0.023				0.025	0.018
	(0.017)				(0.017)	(0.023)
Star sell		0.005			−0.006	0.007
		(0.007)			(0.007)	(0.009)
Non-star buy			0.057***		0.057***	0.062***
			(0.017)		(0.017)	(0.022)
Non-star sell				−0.011***	−0.007*	−0.007*
				(0.006)	(0.004)	(0.004)
Past six-month return	−0.132***	−0.135***	−0.130***	−0.133***	−0.126***	−0.160***
	(0.026)	(0.025)	(0.025)	(0.025)	(0.026)	(0.031)
Number of buys						0.005***
						(0.001)
Number of sells						−0.000***
						(0.000)

(Continues)

TABLE 4 (Continued)

Panel B: Web-based star classification						
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
EC						–0.003
						(0.003)
CC						0.002
						(0.005)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.171	0.171	0.180	0.175	0.185	0.224
F-statistic	14.94***	14.32***	19.42***	15.28***	8.62***	8.13***

Panel C: Media-based star classification						
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Star buy	–0.051				–0.052	0.033
	(0.043)				(0.042)	(0.060)
Star sell		0.061***			0.058	0.067
		(0.016)			(0.036)	(0.040)
Non-star buy			0.041***		0.038**	0.045**
			(0.013)		(0.013)	(0.017)
Non-star sell				–0.020***	–0.016***	–0.008*
				(0.006)	(0.006)	(0.005)
Past six-month return	–0.136***	–0.135***	–0.126***	–0.130***	–0.124***	–0.158***
	(0.025)	(0.025)	(0.026)	(0.025)	(0.026)	(0.031)
Number of buys						0.005***
						(0.001)
Number of sells						–0.000
						(0.000)
EC						–0.004
						(0.003)
CC						0.003
						(0.005)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.073	0.077	0.081	0.086	0.100	0.105
F-statistic	14.78***	21.64***	19.26***	19.91***	12.60***	9.26***

Notes: This table reports results of panel regressions of future cumulative abnormal returns (CARs) on indicators of monthly star and non-star chief executive officer (CEO) trades. *CAR* is the cumulative six-month abnormal return generated from the Fama–French three-factor model. Panels A, B, and C summarize regression results for award-based, web-based, and media-based star classification, respectively. The award-based measure for classifying CEOs into stars and non-stars is determined by the high-profile awards received by CEOs; the web-based measure, their Google search volume index (SVI); and the media-based measure, the quantity of media coverage received by CEOs in sources included in the Factiva database. *Star buy* (*Non-star buy*) and *Star sell* (*Non-star sell*) are indicator variables that equal one for monthly purchases and sales, respectively, by star (non-star) CEOs. *Number of buys* (*Number of sells*) is the number of monthly purchases (sales) by a CEO. *EC* is the natural log of total CEO compensation that comes from option grants and stocks, and *CC* is the natural log of total CEO compensation that comes from cash. Industry and month fixed effects are used in each regression. Standard errors (clustered at the firm level) are below the coefficient estimates in parentheses. The number of observations in each model is 29,286. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively.

stock options to their executives around the same time every year. Therefore, trades in the same months in different years are likely to be routine and uninformative.

Table 5 presents panel regressions of six-month-ahead cumulative abnormal returns on indicators for monthly opportunistic trades of star and non-star CEOs. All three panels of the table show that opportunistic buys and sells of non-star CEOs are strong predictors of future abnormal stock returns and that opportunistic trades of star CEOs do not significantly predict future abnormal stock returns. For example, in Panel A, which reports results for the award-based star classification, opportunistic buys and sells of star CEOs in Model (5) are not followed by significant abnormal future returns. The coefficients on opportunistic trades of non-star CEOs in this model indicate that opportunistic buys earn a positive abnormal return of 6.7% (standard error = 0.013) and opportunistic sells are followed by a negative return of 3.8% (standard error = 0.011) over the following six months. In the full model [Model (6)], the coefficients on non-star buys (sells) are significantly positive (negative) and the coefficients on star buys and sells are insignificant. Panels B and C, which report results for the web-based and media-based star classification, respectively, have findings similar to those in Panel A. Overall, the results in Table 5 show that when opportunistic or nonroutine trades are considered separately for stars and non-stars, such trades by stars are not informative. That is, star CEOs are less likely to place even nonroutine trades for information-based reasons.

4.3 | Routine trades

Routine insider trades in a firm are predictable, identifiable, and supposedly do not contain information about the firm's future. Following Cohen et al. (2012), we define a CEO trade as routine if it is placed in the same calendar month for at least two consecutive years. Then, we run panel regressions of future CARs on indicators for monthly routine trades of star and non-star CEOs. Regression output is summarized in Table 6.

The regression results indicate that, as expected, the coefficients of routine trades of star CEOs are insignificant. More interesting, much of the predictive power of non-star CEO trades becomes weak when the trades are routine. While the coefficients of non-star buy and sell trades in Panel A are significant when considered in isolation in Models (3) and (4), the coefficient of non-star sells becomes insignificant when we consider those trades together in Model (5) and control for other factors in Model (6). Furthermore, the coefficient of non-star buys is significant only at the 10% level in Model (5) and is insignificant in Model (6). In Panel B, all trades by non-star CEOs are insignificant, and in Panel C, only non-star buys are significant at the 5% level and non-star sells are insignificant. Thus, Table 6 shows that most of the predictive power of non-star trades arises from opportunistic trades, not from routine trades. This finding is consistent with Cohen et al. (2012), who show that routine trades in a firm are not informative about the firm's future.

4.4 | Opportunistic trade ratio

If the overall insider trading of a CEO predicts future abnormal returns, the trades placed by the CEO are likely to include more opportunistic trades than routine trades. This, along with our argument that the overall insider trades of non-star CEOs are informative, suggests that non-star CEOs are likely to place more opportunistic trades than routine trades. To test this argument, we compute the opportunistic trade ratio (OTR) of non-star CEOs as the ratio of the number of opportunistic trades to the total number of trades (sum of the number of opportunistic and routine trades) by non-star CEOs. We obtain OTRs based on both the number and dollar volume of CEO transactions. We test whether these OTRs are significantly greater than 0.5. Star CEOs should execute less opportunistic trades than routine trades. Therefore, we compute OTRs of star CEOs and test whether these OTRs are significantly less than 0.5.

Table 7 provides the results of the above tests. For each CEO classification measure, the OTR for non-stars is greater than 0.5 and the OTR for stars is less than 0.5. This pattern holds regardless of whether OTRs are based on the number or dollar volume of CEO transactions. In addition, *t*-tests show that OTRs for non-stars (stars) are statistically significantly more (less) than 0.5. These results show that non-stars place more opportunistic trades than routine

TABLE 5 Performance of opportunistic insider trades of star and non-star CEOs

Panel A: Award-based star classification						
	Model					
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Star buy	0.037**				0.037	0.020
	(0.017)				(0.110)	(0.026)
Star sell		0.008			0.018	0.015
		(0.100)			(0.097)	(0.192)
Non-star buy			0.069***		0.067***	0.059***
			(0.008)		(0.013)	(0.012)
Non-star sell				−0.068***	−0.038***	−0.020*
				(0.008)	(0.011)	(0.012)
Past six-month return	−0.097***	−0.097***	−0.077***	−0.077***	−0.077***	−0.146***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.020)	(0.016)
Number of buys						−0.000
						(0.002)
Number of sells						0.000
						(0.000)
EC						0.000
						(0.003)
CC						−0.010*
						(0.006)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.099	0.094	0.178	0.180	0.187	0.361
F-statistic	40.20***	37.96***	74.09***	74.77***	12.53***	21.58***
Panel B: Web-based star classification						
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Star buy	0.021				0.022	0.012
	(0.019)				(0.019)	(0.025)
Star sell		0.002			0.003	−0.001
		(0.008)			(0.008)	(0.011)
Non-star buy			0.069***		0.068***	0.081***
			(0.019)		(0.019)	(0.024)
Non-star sell				−0.013***	−0.009*	−0.012
				(0.006)	(0.005)	(0.007)
Past six-month return	−0.132***	−0.135***	−0.128***	−0.133***	−0.124***	−0.158***
	(0.029)	(0.029)	(0.029)	(0.029)	(0.029)	(0.036)
Number of buys						0.004**
						(0.002)
Number of sells						−0.000
						(0.000)

(Continues)

TABLE 5 (Continued)

Panel B: Web-based star classification						
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
EC						−0.003
						(0.003)
CC						0.003
						(0.005)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.190	0.190	0.203	0.197	0.210	0.216
F-statistic	11.34***	10.75***	17.43***	12.00***	7.61***	5.76***

Panel C: Media-based star classification						
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Star buy	−0.056				−0.055	0.055
	(0.046)				(0.050)	(0.067)
Star sell		0.026			0.022	0.012
		(0.021)			(0.021)	(0.029)
Non-star buy			0.037***		0.032**	0.039**
			(0.014)		(0.014)	(0.019)
Non-star sell				−0.019***	−0.016**	−0.012*
				(0.007)	(0.007)	(0.007)
Past six-month return	−0.136***	−0.135***	−0.126***	−0.130***	−0.123***	−0.150***
	(0.029)	(0.029)	(0.029)	(0.029)	(0.029)	(0.036)
Number of buys						0.004**
						(0.002)
Number of sells						−0.000
						(0.000)
EC						−0.003
						(0.003)
CC						0.003
						(0.005)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.081	0.079	0.085	0.088	0.092	0.098
F-statistic	11.45***	11.47***	14.36***	14.69***	7.51***	5.03***

Notes: This table reports results of panel regressions of future cumulative abnormal returns (CARs) on indicators of monthly opportunistic insider trades of star and non-star chief executive officers (CEOs). Opportunistic trades are defined as trades that are not executed in the same calendar month in two or more consecutive years. *CAR* is the cumulative six-month abnormal return generated from the Fama–French three-factor model. Panels A, B, and C summarize regression results for award-based, web-based, and media-based star classification, respectively. The award-based measure for classifying CEOs into stars and non-stars is determined by the high-profile awards received by CEOs; the web-based measure, their Google search volume index (SVI); and the media-based measure, the quantity of media coverage received by CEOs in sources included in the Factiva database. *Star buy* (*Non-star buy*) and *Star sell* (*Non-star sell*) are indicator variables that equal one for monthly purchases and sales, respectively, by star (non-star) CEOs. *Number of buys* (*Number of sells*) is the number of monthly purchases (sales) by a CEO. *EC* is the natural log of total CEO compensation that comes from option grants and stocks, and *CC* is the natural log of total CEO compensation that comes from cash. Industry and month fixed effects are used in each regression. Standard errors (clustered at the firm level) are below the coefficient estimates in parentheses. The number of observations in each model is 12,450. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively.

TABLE 6 Performance of routine insider trades of star and non-star CEOs

Panel A: Award-based star classification						
	Model					
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Star buy	−0.039				−0.031	−0.080
	(0.065)				(0.067)	(0.071)
Star sell		−0.085			−0.034	−0.035
		(0.177)			(0.027)	(0.026)
Non-star buy			0.046***		0.045*	0.009
			(0.019)		(0.026)	(0.027)
Non-star sell				−0.044**	−0.024	−0.009
				(0.019)	(0.110)	(0.021)
Past six-month return	−0.064***	−0.064***	−0.057***	−0.057***	−0.057**	−0.070***
	(0.021)	(0.020)	(0.021)	(0.020)	(0.028)	(0.025)
Number of buys						0.013***
						(0.003)
Number of sells						−0.000
						(0.000)
EC						−0.000
						(0.006)
CC						0.012
						(0.009)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.037	0.037	0.059	0.058	0.060	0.141
F-statistic	9.49***	4.86***	7.72***	7.58***	3.54***	4.58***
Panel B: Web-based star classification						
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Star buy	0.036				0.038	0.047
	(0.042)				(0.042)	(0.049)
Star sell		0.011			0.012	0.020
		(0.013)			(0.013)	(0.016)
Non-star buy			−0.006		−0.003	−0.021
			(0.045)		(0.045)	(0.055)
Non-star sell				−0.005	−0.002	0.002
				(0.014)	(0.014)	(0.017)
Past six-month return	−0.129**	−0.135**	−0.135**	−0.133**	−0.129**	−0.177***
	(0.053)	(0.053)	(0.053)	(0.053)	(0.053)	(0.061)
Number of buys						0.013**
						(0.003)
Number of sells						−0.000
						(0.000)

(Continues)

TABLE 6 (Continued)

Panel B: Web-based star classification						
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
EC						−0.003
						(0.005)
CC						0.002
						(0.009)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.117	0.116	0.116	0.117	0.117	0.119
F-statistic	3.63***	3.65***	3.28***	3.34***	3.63***	3.93***

Panel C: Media-based star classification						
Variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Star buy	−0.020				−0.016	−0.044
	(0.113)				(0.112)	(0.131)
Star sell		0.103			0.101	0.111
		(0.064)			(0.064)	(0.067)
Non-star buy			0.072**		0.074**	0.095**
			(0.034)		(0.034)	(0.046)
Non-star sell				−0.023*	−0.014	0.002
				(0.012)	(0.012)	(0.014)
Past six-month return	−0.134***	−0.139***	−0.128***	−0.130***	−0.129**	−0.185***
	(0.053)	(0.052)	(0.053)	(0.053)	(0.052)	(0.060)
Number of buys						0.012***
						(0.003)
Number of sells						−0.000
						(0.000)
EC						−0.003
						(0.005)
CC						0.004
						(0.009)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.055	0.122	0.061	0.091	0.139	0.150
F-statistic	3.28***	12.82***	5.56***	5.09***	6.45***	6.05***

Notes: This table reports results of panel regressions of future cumulative abnormal returns (CARs) on indicators of monthly routine insider trades of star and non-star chief executive officers (CEOs). Routine insider trades are defined as trades that are executed in the same calendar month in at least two consecutive years. *CAR* is the cumulative six-month abnormal return generated from the Fama–French three-factor model. Panels A, B, and C summarize regression results for award-based, web-based, and media-based star classification, respectively. The award-based measure for classifying CEOs into stars and non-stars is determined by the high-profile awards received by CEOs; the web-based measure, their Google search volume index (SVI); and the media-based measure, the quantity of media coverage received by CEOs in sources included in the Factiva database. *Star buy* (*Non-star buy*) and *Star sell* (*Non-star sell*) are indicator variables that equal one for monthly purchases and sales, respectively, by star (non-star) CEOs. *Number of buys* (*Number of sells*) is the number of monthly purchases (sales) by a CEO. *EC* is the natural log of total CEO compensation that comes from option grants and stocks, and *CC* is the natural log of total CEO compensation that comes from cash. Industry and month fixed effects are used in each regression. The number of observations in each model is 16,836. Standard errors (clustered at the firm level) are below the coefficient estimates in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively.

TABLE 7 Opportunistic trade ratios of star and non-star CEOS

	Award-based measure		Web-based measure		Media-based measure	
CEO	*OTR #*	*OTR $*	*OTR #*	*OTR $*	*OTR #*	*OTR $*
Star	0.478***	0.488	0.448**	0.452**	0.325***	0.327***
(t-statistic: $OTR < 0.5$)	(−2.40)	(−1.16)	(−2.20)	(−2.19)	(−2.77)	(−2.86)
Non-star	0.553***	0.545***	0.554**	0.553*	0.651***	0.652***
(t-statistic: $OTR > 0.5$)	(2.78)	(2.96)	(2.16)	(1.96)	(5.18)	(5.19)

Notes: This table reports average opportunistic trade ratios (OTRs) of monthly insider trades of star and non-star chief executive officers (CEOs). Opportunistic trades are defined as trades that are not executed in the same calendar month in two or more consecutive years. *OTR #* (*OTR $*) is the ratio of the number (dollar volume) of opportunistic trades to the total number (dollar volume) of trades. The award-based measure for classifying CEOs into stars and non-stars is determined by the high-profile awards received by CEOs; the web-based measure, their Google search volume index (SVI); and the media-based measure, the quantity of media coverage received by CEOs in sources included in the Factiva database. The number of observations for all trades is 13,509. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively.

trades and that the opposite is true for stars.[11] These findings provide further support to the findings in Subsections 4.2 and 4.3.

5 | STAR AND NON-STAR CEO TRADES AND EARNINGS INNOVATIONS

This paper's findings so far are consistent with the notion that non-star CEOs trade on private information and star CEOs do not. One of the types of private information that insiders may use in their trading is corporate earnings. Piotroski and Roulstone (2005) conjecture that insider trades possess information about a firm's future earnings prospects. In this section, we examine whether trades made by star and non-star CEOs differ in terms of the information trades contain about future firm earnings.

According to Wang et al. (2012), if insiders use private information about future earnings in their trades, these trades should be associated with future earnings innovations, that is, changes in earnings that have not been expected by the market. We argue that non-star CEOs are likely to incorporate information about future earnings in their trades and that star CEOs are not likely to do so. Therefore, an association between trades and future earnings innovations should exist for non-star CEOs but not for star CEOs. Accordingly, we propose that insider purchases by non-star CEOs should be associated with positive earnings innovations and insider sales by non-star CEOs should be associated with negative earnings innovations.

To test our argument, we measure earnings innovations using short-term CARs around earnings announcements as in Wang et al. (2012). We use short-term CARs because CARs computed over a long period may contain information unrelated to earnings announcements.[12] Following Wang et al., we consider three- and five-day windows surrounding the first two quarterly earnings announcements that take place after an insider trade. Figure 1 provides the timeline reflecting this analysis.

Table 8 reports results of panel regressions of three-day and five-day CARs around quarterly earnings announcements. In the three-day (five-day) window, CARs generated from the Fama–French three-factor model are cumulated over the day (two days) before the earnings announcement, the day of the announcement, and the day (two days) after the announcement. The inclusion of a day or two before the earnings announcement helps take into account any information leakage prior to the announcement.

[11] In untabulated test results, we confirm that non-star CEOs engage in more opportunistic trades relative to routine trades than star CEOs by testing that the difference in OTRs of non-stars and stars is positive and statistically significant.

[12] We thank an anonymous reviewer for suggesting that we examine short windows around the earnings announcements.

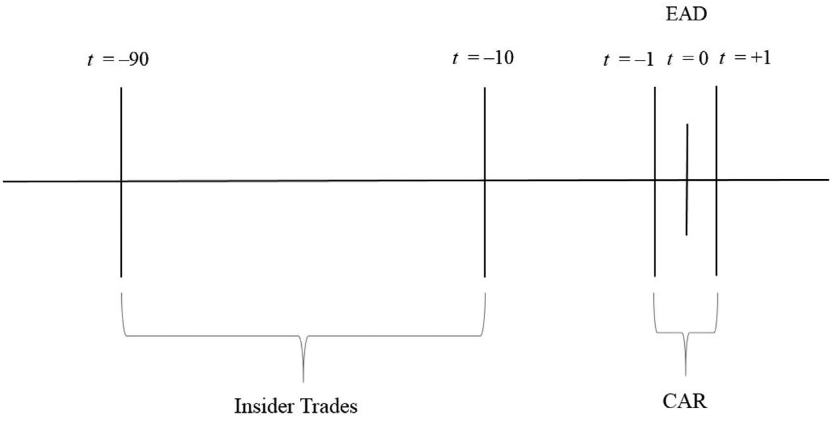

FIGURE 1 Timeline for earnings innovation analysis
Notes: The figure plots the timeline for earnings innovation analysis for cumulative abnormal returns (CARs) over a 3-day window ($t = -1$ to $t = +1$) surrounding the earnings announcement day (EAD). A similar timeline is used for a 5-day event window ($t = -2$ to $t = +2$)

The results in Table 8 show that, for five-day CARs, the coefficients on purchases by non-star CEOs are positive and statistically significant at the 1% level for all three measures of CEO classification. For three-day CARs, the coefficients on purchases by non-star CEOs are positive and statistically significant at the 1% level for two classification measures and at the 5% level for the third measure. None of the coefficients on purchases by star CEOs is statistically significant for five-day CARs. One of those coefficients is not statistically significant and two of them are barely significant at the 10% level for three-day CARs. Regarding stock sells, sales by non-star CEOs are associated with negative and statistically significant CARs for all the three CEO classification measures and both the three-day and five-day windows around earnings announcements. For sales by star CEOs, none of the coefficients is statistically significant.

Overall, the results in Table 8 are consistent with the argument that pre-earnings announcement trades of non-star CEOs are likely to predict CARs associated with quarterly earnings announcements and trades of star CEOs are not.

6 | STAR AND NON-STAR CEO TRADES AND INDUSTRY REGULATION

We have suggested that our findings are consistent with the argument that the greater visibility of star CEOs results in more scrutiny, which discourages them from trading based on private information. An alternative explanation for our findings is that star CEOs have inferior information about their firms because their stardom distracts them from managing the firm. In this section, we investigate whether the increased scrutiny or the inferior information argument explains our findings. We do so by examining whether our results vary based on regulation of the industry of a CEO's firm.

The increased scrutiny argument is that CEOs tend to limit their trading aggressiveness when they are under greater scrutiny. CEOs of firms in industries subject to greater regulation are likely to face greater scrutiny than those in lightly regulated industries. Therefore, the extent to which the industry of a firm is regulated is likely to affect whether the firm's CEO trades are based on private information. With firms in highly regulated industries under greater scrutiny by the SEC and other regulators, even the non-star CEOs of such firms are likely to be more cautious in their trading. Therefore, the increased scrutiny argument suggests that the trades of both non-star and star CEOs are likely to be uninformative in highly regulated firms, and a difference in the information content of non-star and star CEO trades is more likely in lightly regulated firms. If the inferior information argument explains our findings,

TABLE 8 Insider trades of star and non-star CEOs and earnings innovations

	Award-based measure		Web-based measure		Media-based measure	
	CAR window		CAR window		CAR window	
Variable	−1 to +1	−2 to +2	−1 to +1	−2 to +2	−1 to +1	−2 to +2
Star buy	0.027*	0.031	0.015*	0.010	0.019	0.024
	(0.015)	(0.019)	(0.008)	(0.010)	(0.020)	(0.020)
Star sell	0.008	0.010	0.009	−0.001	0.012	−0.003
	(0.005)	(0.009)	(0.009)	(0.010)	(0.007)	(0.004)
Non-star buy	0.029***	0.041***	0.072***	0.058***	0.030**	0.050***
	(0.010)	(0.009)	(0.007)	(0.008)	(0.012)	(0.012)
Non-star sell	−0.006**	−0.009**	−0.006*	−0.007**	−0.003*	−0.010**
	(0.003)	(0.004)	(0.003)	(0.003)	(0.002)	(0.004)
Past six-month return	−0.004***	−0.007***	−0.002**	−0.006***	−0.004***	−0.009***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Number of buys	−0.048***	−0.051***	−0.053***	−0.057***	−0.059***	−0.068***
	(0.009)	(0.010)	(0.008)	(0.009)	(0.008)	(0.009)
Number of sells	0.000**	−0.000	0.000	−0.000	0.000**	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
EC	−0.007***	−0.001	−0.006***	−0.000	−0.007***	−0.000
	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
CC	−0.008**	−0.011***	−0.007**	−0.010***	−0.009***	−0.010***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7,332	7,332	7,332	7,332	7,332	7,332
Adjusted R^2	0.07	0.07	0.10	0.08	0.07	0.07
F-statistic	19.20***	21.15***	29.95***	23.14***	19.31***	19.34***

Notes: This table reports panel regressions of future cumulative abnormal returns (CARs) on indicators of star and non-star chief executive officer (CEO) insider trades that occurred prior to quarterly earnings announcements. *CAR* is the cumulative abnormal return over the three-day window (−1 to +1) and the five-day window (−2 to +2) around the first two quarterly earnings announcements after an insider trade. CARs are generated using the Fama–French three-factor model. The award-based measure for classifying CEOs into stars and non-stars is determined by the high-profile awards received by CEOs; the web-based measure, their Google search volume index (SVI); and the media-based measure, the quantity of media coverage received by CEOs in sources included in the Factiva database. *Star buy* (*Non-star buy*) and *Star sell* (*Non-star sell*) are binary variables that equal one for monthly purchases and sales, respectively, by star (non-star) CEOs. *Number of buys* (*Number of sells*) is the number of monthly purchases (sales) by a CEO. *EC* is the natural log of total CEO compensation that comes from option grants and stocks. *CC* is the natural log of total CEO compensation that comes from cash. Industry and month fixed effects are used. A total of 8,590 earnings announcements have been used in the analysis. Standard errors (clustered at the firm level) are below the coefficient estimates in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively.

the difference in the information content of non-star and star CEO trades should not vary based on industry regulation because the superior information of non-star CEOs relative to stars CEOs should not be affected by industry regulation.

In their study of the informativeness of CFO trades, Knewtson and Nofsinger (2014) classify firms into two groups based on their regulation intensity: highly regulated firms and lightly regulated firms. Firms operating in financial and utility industries are considered highly regulated. Firms in other industries are classified as lightly regulated. We

TABLE 9 Industry regulation and performance of insider trades of star and non-star CEOs

	Award-based measure		Web-based measure		Media-based measure	
Variable	Highly regulated firms	Lightly regulated firms	Highly regulated firms	Lightly regulated firms	Highly regulated firms	Lightly regulated firms
Star buy	0.127	−0.073	0.070	0.053	0.157	0.066
	(0.089)	(0.056)	(0.056)	(0.043)	(0.136)	(0.049)
Star sell	−0.044	0.022	−0.033	0.001	−0.003	−0.003
	(0.034)	(0.015)	(0.023)	(0.013)	(0.025)	(0.014)
Non-star buy	0.027	0.108***	−0.024	0.126***	−0.017	0.151***
	(0.039)	(0.020)	(0.043)	(0.037)	(0.031)	(0.055)
Non-star sell	0.044	−0.027*	0.004	−0.017*	0.014	−0.008
	(0.034)	(0.015)	(0.015)	(0.009)	(0.019)	(0.014)
Past six-month return	−0.261***	−0.092***	−0.281**	−0.115**	−0.272**	−0.106**
	(0.066)	(0.034)	(0.127)	(0.048)	(0.124)	(0.049)
Number of buys	0.017***	−0.000	0.015**	0.004	0.015**	0.004
	(0.005)	(0.002)	(0.007)	(0.003)	(0.007)	(0.003)
Number of sells	0.001**	−0.000	0.001**	−0.000	0.001**	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
EC	0.012**	−0.010***	0.016***	−0.010**	0.014***	−0.009*
	(0.005)	(0.003)	(0.005)	(0.004)	(0.005)	(0.005)
CC	−0.019*	0.007	−0.018	0.007	−0.020	0.007
	(0.010)	(0.006)	(0.015)	(0.006)	(0.015)	(0.006)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,280	23,988	5,280	23,988	5,280	23,988
Adjusted R^2	0.539	0.271	0.182	0.102	0.313	0.154
F-statistic	9.97***	18.42***	1.78*	2.93*	9.80***	16.34***

Notes: This table reports results of panel regressions of future cumulative abnormal returns (CARs) on indicators of monthly star and non-star chief executive officer (CEO) trades for highly regulated and lightly regulated firms. Firms that belong to financials and utilities are classified as highly regulated firms, and other firms are classified as lightly regulated firms. *CAR* is the cumulative six-month abnormal return generated from the Fama–French three-factor model. The award-based measure for classifying CEOs into stars and non-stars is determined by the high-profile awards received by CEOs; the web-based measure, their Google search volume index (SVI); and the media-based measure, the quantity of media coverage received by CEOs in sources included in the Factiva database. *Star buy* (*Non-star buy*) and *Star sell* (*Non-star sell*) are indicator variables that equal one for monthly purchases and sales, respectively, by star (non-star) CEOs. *Number of buys* (*Number of sells*) is the number of monthly purchases (sales) by a CEO. *EC* is the natural log of total CEO compensation that comes from option grants and stocks. *CC* is the natural log of total CEO compensation that comes from cash. Industry and month fixed effects are used in each regression. Standard errors (clustered at the firm level) are below the coefficient estimates in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively.

similarly classify firms into two groups. We then regress future CARs on the indicators of monthly star and non-star CEO trades separately for each group. Regression results are reported in Table 9.

For lightly regulated firms, the coefficient of non-star buy (sell) is positive (negative) and significant and the coefficients of star buy and star sell are insignificant. For highly regulated firms, the coefficients of buys and sells are insignificant for both non-star and star CEOs. The findings hold for each star classification measure and are consistent with the increased scrutiny of star CEOs argument and not with the inferior information of star CEOs argument.

7 | ADDITIONAL TESTS

In this section, we run four additional tests to compare the predictive ability of star and non-star CEO trades. The first test examines whether our main results are robust to estimating abnormal performance using calendar-time portfolios instead of CARs, the second test focuses only on award-winning CEOs and compares the informativeness of their trades before and after they attain star status, the third test examines the link between trades of institutional investors and trades of non-star and star CEOs, and the fourth test focuses on a subsample of only large firms (S&P 500 firms).

7.1 | Calendar-time portfolio approach to measure insider returns

Fama (1998) points outs that analysis of CARs may suffer from problems of cross-sectional correlations and time series heterogeneity. We have used month fixed effects in our analyses, which should address the issues regarding time series heterogeneity. To further alleviate the concern expressed by Fama, we follow a calendar-time portfolio approach as in Wang et al. (2012).[13] We form separate calendar-time portfolios that track returns after star and non-star CEOs purchases and sells. The returns on these portfolios are regressed on risk factors.

Table 10 reports the alphas of the monthly returns on non-star and star CEO portfolios in excess of the monthly risk-free rates regressed on risk factors.[14] The risk factors are the market factor [capital asset pricing model (CAPM)], plus the size (SMB) and book-to-market (HML) factors as per Fama and French (1993), plus the momentum factor as per Carhart (1997).[15] In Panel A, the non-star and star CEO purchase (sales) portfolios contain all stocks that had at least one non-star and star CEO purchase (sales) transaction, respectively, during the previous six months. The results of the standard CAPM show that the monthly abnormal return associated with purchases by CEOs classified as non-stars based on awards is 0.163%. This abnormal return is statistically significant at the 1% level. Thus, a portfolio of non-star CEO purchases has an abnormal return of 0.163% per month. The results of the Fama and French (1993) three-factor model and the Carhart (1997) four-factor model are similar. Based on the three-factor and four-factor models, the monthly abnormal return associated with purchases by CEOs classified as non-stars is 0.121% and 0.126%, respectively. These abnormal returns are statistically significant. The abnormal returns on portfolios of star CEOs after insider purchases are not statistically significant for the CAPM, the three-factor model, or the four-factor model. Thus, portfolios of CEOs classified as non-stars based on awards earn a significantly positive abnormal return after purchases and portfolios of star CEOs do not, even after controlling for size, book-to-market, and momentum factors.

The last two columns of Panel A show the monthly abnormal returns after insider sales by CEOs classified as non-stars and stars. Based on the standard CAPM, the abnormal monthly return for non-star CEOs is −0.096%, which is statistically significant at the 1% level. The results are similar for the three-factor and four-factor models. As expected, the magnitudes of abnormal returns for non-star CEO purchases are stronger than for non-star CEO sales. In contrast to the portfolios of non-star CEOs, the abnormal returns on the portfolios of star CEOs after insider sales are not statistically significant for the CAPM, the three-factor model, or the four-factor model. These results show that, consistent with our arguments, portfolios of CEOs classified as non-stars are associated with significantly negative abnormal returns after sales and portfolios of star CEOs do not have significant abnormal returns.

In Panel B, the non-star and star CEO purchase (sales) portfolios contain all stocks that had at least one non-star and star CEO purchase (sales) transaction, respectively, during the previous 12 months. The results for the 12-month portfolios are consistent with the results reported in Panel A for the six-month portfolios. We conclude that our main findings are robust to the use of a calendar-time portfolio approach.

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[13] We are grateful to an anonymous reviewer for suggesting this analysis.

[14] For the sake of space, we report the results only for the award-based measure of CEO classification. Results for the other two measures are qualitatively similar to the results for the award-based measure.

[15] We get these factors from Kenneth R. French's website (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/).

TABLE 10 Alphas of calendar-time portfolio regressions

Panel A: Six-month returns				
	Dependent variable			
	Purchase Portfolio Returns		*Sale Portfolio Returns*	
Regression model	Star CEOs	Non-star CEOs	Star CEOs	Non-star CEOs
CAPM	−0.021	0.163***	−0.036	−0.096***
	(0.045)	(0.031)	(0.102)	(0.016)
Fama–French three-factor	0.009	0.121**	0.008	−0.098***
	(0.042)	(0.055)	(0.148)	(0.026)
Carhart four-factor	0.001	0.126***	0.001	−0.098***
	(0.051)	(0.022)	(0.149)	(0.027)
Panel B: 12-month returns				
	Dependent variable			
	Purchase Portfolio Returns		*Sale Portfolio Returns*	
Regression model	Star CEOs	Non-star CEOs	Star CEOs	Non-star CEOs
CAPM	−0.029	0.252***	−0.058	−0.149***
	(0.019)	(0.067)	(0.039)	(0.050)
Fama–French three-factor	0.091	0.185***	0.036	−0.062*
	(0.064)	(0.068)	(0.029)	(0.035)
Carhart four-factor	0.055	0.112**	0.014	−0.061*
	(0.046)	(0.052)	(0.009)	(0.035)

Notes: This table reports the alphas of the monthly returns on non-star and star chief executive officer (CEO) portfolios in excess of the monthly risk-free rates. The award-based measure, which considers high-profile awards received by CEOs, is used for classifying CEOs into stars and non-stars. The non-star and star CEO purchase (sales) portfolios in Panel A include all stocks that had at least one non-star and star CEO purchase (sales) transaction, respectively, during the previous six months. The portfolios in Panel B include all stocks with at least one such transaction during the previous 12 months. The independent variables are the market factor [capital asset pricing model (CAPM)], plus the small minus big (SMB) and high minus low (HML) factors (Fama–French three factors), plus the momentum factor (Carhart four factors). The factors in regression models are obtained from Kenneth R. French's website (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/). The number of observations is 96 in Panel A and 90 in Panel B. Standard errors are below the coefficient estimates in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively.

7.2 | Trades of award-winning CEOs before and after winning an award

One way to test the argument that trades of star CEOs are less informative is to focus on a subsample of award-winning CEOs and determine whether their insider trades in the same firm become less informative after they achieve star status by winning an award. Table 11 reports results of panel regressions of future CARs of award-winning CEOs before and after they receive an award. *Post award−buy* (*Post award−sell*) is an indicator variable that assumes a value of one if the purchase (sale) is made after the CEO has received an award.

Model (1) includes purchases, Model (2) includes sales, and Model (3) includes both purchases and sales. The results show that the coefficient of *Post award−buy* is negative and statistically significant in both Models (1) and (3). Thus, a significant decline is evident in the positive abnormal CARs associated with insider purchases by CEOs after they receive an award. Similar to the weaker results reported for insider sales in this paper and in previous research, the coefficient of *Post award−sell* is not significant in Models (2) and (3). Overall, the results in Table 11 are consistent with the argument that insider buys of non-star CEOs are informative.

TABLE 11 Insider trades of award-winning CEOs before and after winning an award

Variable	Model (1)	(2)	(3)
Buy	0.038***		0.056***
	(0.013)		(0.015)
Sell		0.012	0.012
		(0.076)	(0.070)
Post award—buy	−0.032*		−0.022**
	(0.019)		(0.011)
Post award—sell		−0.016	−0.010
		(0.076)	(0.070)
Past six-month return	0.128**	0.152**	0.187**
	(0.060)	(0.061)	(0.094)
Number of buys	−0.005	−0.005	−0.005
	(0.004)	(0.004)	(0.003)
Number of sells	0.002	0.001	0.002
	(0.003)	(0.003)	(0.003)
EC	−0.011***	−0.012***	−0.011***
	(0.003)	(0.003)	(0.004)
CC	0.004	0.003	0.004
	(0.006)	(0.006)	(0.006)
Fixed effects	Yes	Yes	Yes
Adjusted R^2	0.106	0.023	0.151
F-statistic	3.25**	0.41	3.03**

Notes: This table reports results of panel regressions of future cumulative abnormal returns (CARs) of award-winning chief executive officers (CEOs) before and after they receive an award. *CAR* is the cumulative six-month abnormal return generated from the Fama–French three-factor model. *Buy* (*Sell*) is an indicator variable that equals one if a trade by a CEO is a purchase (sale). *Post award—buy* (*Post award—sell*) is an indicator variable that assumes a value of one if the purchase (sale) is made after the CEO has received an award. *Number of buys* (*Number of sells*) is the number of monthly purchases (sales) by a CEO. *EC* is the natural log of total CEO compensation that comes from option grants and stocks. *CC* is the natural log of total CEO compensation that comes from cash. Industry and month fixed effects are used in each regression. The number of observations in each model is 1,176. Standard errors (clustered at the firm level) are below the coefficient estimates in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively.

7.3 | Star and non-star CEO trades and institutional holdings

Sias and Whidbee (2010) and Cohen et al. (2012) examine whether institutional investors are aware of the superior information inherent in insider trading. These studies argue that examining changes in institutional holdings in the period in which an insider trade took place and in the subsequent period can provide some evidence related to whether institutions have some knowledge of informed insider trades and are mimicking those trades or institutions are providing liquidity to insiders by being on the other side of insider trades. A positive relationship between changes in institutional holdings and insider trades would suggest that institutions are mimicking insider trades and a negative relationship would suggest that institutional investors are providing liquidity to insiders for their trades.

We follow the above arguments to explore whether the behavior of institutional investors differs between trades of non-star and star CEOs. We run two regressions using quarterly measures, because institutional holdings data are

TABLE 12 Insider trades of star and non-star CEOs and changes in institutional holdings

	Award-based classification		Web-based classification		Media-based classification	
Variable	Current change	Future change	Current change	Future change	Current change	Future change
Star quarterly buy	−0.013	0.006	−0.015	0.008	−0.012	0.005
	(0.022)	(0.017)	(0.012)	(0.006)	(0.008)	(0.006)
Star quarterly sell	0.002	−0.005	−0.008*	−0.002	0.005	−0.009**
	(0.005)	(0.016)	(0.005)	(0.004)	(0.004)	(0.004)
Non-star quarterly buy	−0.006**	0.009	−0.008***	0.008	−0.009***	0.007
	(0.003)	(0.017)	(0.003)	(0.009)	(0.003)	(0.006)
Non-star quarterly sell	0.015**	−0.007	0.005**	−0.011*	0.005*	−0.000
	(0.007)	(0.005)	(0.002)	(0.006)	(0.003)	(0.004)
Past quarter return	0.080***	−0.033**	0.084***	−0.032***	0.083***	0.000
	(0.016)	(0.016)	(0.016)	(0.012)	(0.020)	(0.005)
# of quarterly buys	−0.000	−0.000	−0.000	−0.000	−0.000	−0.000
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
# of quarterly sells	−0.000	−0.000	0.000	−0.000	−0.000	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
EC	−0.002	−0.001	−0.001	−0.001	−0.001	−0.000
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
CC	−0.005**	−0.005**	−0.005**	−0.005***	−0.005**	−0.005***
	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,367	12,443	13,367	12,443	13,367	12,443
Adjusted R^2	0.171	0.150	0.188	0.112	0.219	0.072
F-statistic	4.96***	1.96**	13.99***	1.85*	2.87***	3.17***

Notes: This table reports panel regressions of current and future changes in institutional holdings of stocks on indicators of quarterly star and non-star chief executive officer (CEO) trades. We measure the changes in institutional holdings at a quarterly level. Current change is the percentage change in institutional shareholdings in a firm in the quarter in which the CEO of the firm makes a trade. Future change is the percentage change in institutional shareholdings in a firm in the quarter following a CEO trade. The award-based measure for classifying CEOs into stars and non-stars is determined by the high-profile awards received by CEOs; the web-based measure, their Google search volume index (SVI); and the media-based measure, the quantity of media coverage received by CEOs in sources included in the Factiva database. *Star quarterly buy* (*Non-star quarterly buy*) and *Star quarterly sell* (*Non-star quarterly sell*) are indicator variables that equal one for quarterly purchases and sales, respectively, by star (non-star) CEOs. The number of quarterly buys and sells by a CEO are included as controls. *EC* is the natural log of total CEO compensation that comes from option grants and stocks. *CC* is the natural log of total CEO compensation that comes from cash. Industry and quarter fixed effects are used in each regression. Standard errors (clustered at the firm level) are below the coefficient estimates in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively.

available on a quarterly basis. We regress the change in contemporaneous institutional holdings on indicators of star and non-star CEO trades, and we regress the change in institutional holdings in the quarter following insider trades on indicators of star and non-star CEO trades. Results are reported in Table 12.

For non-star CEOs, the results for contemporaneous regressions show that the coefficient of their purchase transactions is negative and significant and the coefficient of their sell transactions is positive and significant for each of the three star classification measures. This finding of a negative relationship between insider trades and changes in contemporaneous institutional holdings suggests that institutional investors act as liquidity providers for trades of non-star CEOs.

TABLE 13 Performance of insider trades of star and non-star CEOs for a subsample of large (S&P 500) firms

	Award-based star classification			Web-based star classification			Media-based star classification		
Variable	All	Opportunistic	Routine	All	Opportunistic	Routine	All	Opportunistic	Routine
Star buy	0.040	0.064	–0.050	–0.017	–0.015	–0.013	0.027	0.045	–0.020
	(0.045)	(0.047)	(0.141)	(0.032)	(0.032)	(0.125)	(0.054)	(0.059)	(0.135)
Star sell	–0.004	0.002	–0.021	0.013	–0.003	0.025	0.023	–0.004	0.101
	(0.013)	(0.016)	(0.023)	(0.011)	(0.013)	(0.021)	(0.019)	(0.026)	(0.175)
Non-star buy	0.034*	0.051**	–0.032	0.089*	0.096**	0.066	0.027	0.028*	0.094
	(0.020)	(0.023)	(0.092)	(0.049)	(0.048)	(0.249)	(0.047)	(0.017)	(0.175)
Non-star sell	–0.033	–0.050**	0.024	–0.012	–0.017*	–0.002	–0.015	–0.014	0.022
	(0.022)	(0.022)	(0.020)	(0.014)	(0.011)	(0.030)	(0.014)	(0.016)	(0.028)
Past six-month return	–0.112**	–0.201***	–0.058	–0.106***	–0.131***	–0.056	–0.112***	–0.131***	–0.072*
	(0.055)	(0.064)	(0.106)	(0.022)	(0.026)	(0.042)	(0.022)	(0.026)	(0.042)
Number of buys	0.002	0.002	–0.001	0.004	0.005	–0.002	0.004	0.005*	–0.002
	(0.003)	(0.003)	(0.018)	(0.003)	(0.003)	(0.019)	(0.003)	(0.003)	(0.015)
Number of sells	0.000	0.000	–0.000	–0.000	0.000	–0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
EC	–0.002	0.007	–0.025**	–0.003	0.005	–0.031***	–0.006	0.005	–0.032***
	(0.005)	(0.006)	(0.011)	(0.005)	(0.006)	(0.011)	(0.005)	(0.006)	(0.011)
CC	0.006	0.001	0.013	0.003	0.001	0.009	0.004	0.000	0.011
	(0.007)	(0.006)	(0.011)	(0.005)	(0.006)	(0.010)	(0.005)	(0.010)	(0.010)
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15,295	6,474	8,821	15,295	6,474	8,821	15,295	6,474	8,821
Adjusted R^2	0.200	0.109	0.163	0.101	0.179	0.052	0.131	0.156	0.035
F-statistic	1.69*	3.26***	1.38	4.23***	4.19***	1.43	4.47***	3.73***	1.45

Notes: This table reports results of panel regressions of future cumulative abnormal returns (CARs) on indicators of monthly star and non-star chief executive officer (CEO) trades for a subsample of large firms (S&P 500 firms). *CAR* is the cumulative six-month abnormal return generated from the Fama–French three-factor model. The award-based measure for classifying CEOs is determined by the high-profile awards received by CEOs; the web-based measure, their Google search volume index (SVI); and the media-based measure, the quantity of media coverage received by CEOs in sources included in the Factiva database. *Star buy* (*Non-star buy*) and *Star sell* (*Non-star sell*) are indicator variables that equal one for monthly purchases and sales, respectively, by star (non-star) CEOs. *Number of buys* (*Number of sells*) is the number of monthly purchases (sales) by a CEO. *EC* is the natural log of total CEO compensation that comes from option grants and stocks. *CC* is the natural log of total CEO compensation that comes from cash. Industry and month fixed effects are used in each regression. Standard errors (clustered at the firm level) are below the coefficient estimates in parentheses. Statistical significance at the 1%, 5%, and 10% level is indicated by ***, **, and *, respectively.

The results for next quarter's changes in institutional holdings show that the coefficients of star and non-star buys are positive and the coefficients of star and non-star sells are negative. While the signs of these coefficients give some indication that institutions buy (sell) shares in the quarter after CEOs buy (sell) shares, these coefficients are not statistically significant. Overall, while our earlier results have shown that the trades of non-star CEOs are information-driven, the results for next quarter's changes in institutional holdings do not provide evidence that institutions are smart enough to follow only the trades of non-star CEOs.

7.4 | Subsample analysis for only S&P 500 companies

We have controlled for firm size in computing abnormal returns used in panel regressions, which helps alleviate the concern that CEOs of large companies are more likely to be a celebrity or star. We redo our tests for a subsample of only large companies by restricting the sample to those firms that belong to the S&P 500 index. Main test results are reported in Table 13. Overall, our results remain consistent, further showing that our findings are not being driven by firm size.

8 | CONCLUSIONS

In this paper, we examine whether stardom or celebrity of corporate CEOs affects the informational content and future return predictive power of their trades. We argue that because star CEOs attract greater public attention and higher scrutiny by regulatory bodies, they are less likely to trade based on their superior private information. Trades of non-star CEOs are likely to contain useful private firm-specific information and have the power to predict future returns. Moreover, the trades made by star and non-star CEOs are likely to differ in terms of the information they contain about future firm earnings.

We use three measures to identify star and non-star CEOs. First, we identify star CEOs as those CEOs who have won prestigious awards by highly regarded business publications. After identifying the award winners as star CEOs, we follow Malmendier and Tate (2009) to construct a nearest-neighbor matching sample of non-star CEOs. Second, we use search frequency in Google. In this measure, CEOs in the top (bottom) quintile of their Google search volume index (SVI) during the sample period are classified as stars (non-stars). Third, we use a media-based measure in which CEOs in the top (bottom) quintile of the quantity of media coverage they receive in sources included in the Factiva database are classified as stars (non-stars).

Test results show that star buys and star sells do not predict future abnormal returns and that non-star buys and non-star sells are strong predictors of future abnormal returns. Test results also show that trades of non-star CEOs, specifically purchases, contain information about future firm earnings and trades of star CEOs do not. Non-star CEOs engage more in opportunistic trades than routine trades, and most of the predictive power of non-star trades arises from opportunistic trades and not from routine trades. Also, trades of non-star CEOs do not have a significant ability to predict future returns if their firm operates in a highly regulated industry. Thus, consistent with the scrutiny argument, industry regulation tends to dissuade non-star CEOs from placing information-based trades.

We conduct some additional tests to augment our analysis. We show that our main results are robust to estimating abnormal performance using calendar-time portfolios instead of CARs. We also show that, for award-winning CEOs, the informativeness of their insider trades declines after they win an award. We then examine the link between trades of institutional investors and trades of non-star and star CEOs, and we find that institutional investors provide liquidity to non-star CEOs. Finally, we show that our results are not driven by firm size.

Overall, this paper adds to the literature on the identification of informational trades and traders who are truly informed. This paper has useful practical implications for investors as it shows that they should carefully interpret trades by top corporate executives before mimicking them. The paper also helps regulators, investors, and other active market participants identify which insiders and insider trades provide insights into firm value.

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DATA AVAILABILITY STATEMENT

Most of the data used in this study are from providers that require a paid subscription and do not allow sharing of data.

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APPENDIX A

Description of sources used to identify chief executive officer (CEO) awards

Source	Description
Bloomberg Businessweek	*Bloomberg Businessweek* is a weekly business magazine published by Bloomberg L.P. It is available in more than 150 countries and has a global weekly circulation of over 980,000. It was known as *Businessweek* prior to 2010. Every year, the editorial board of the magazine announces "best and worst managers of the year" and "best entrepreneur of the year." The number of yearly awards in each category varies from 0 to 25.
Chief Executive	*Chief Executive* is a business magazine that has been published every two months, since 1976, by Chief Executive Group, LLC. It has a circulation of 42,000. It has announced a "CEO of the year" award since 1987. A panel of CEOs chooses the award winner.
Forbes	*Forbes* is a biweekly American business magazine published by Forbes, Inc. In addition to various lists such as America's richest people and best employers, Forbes announces the "best performing CEOs" of the year based on the decision of its editorial board.
Time/CNN	In 2001, journalists of Time magazine and CNN jointly announced the names of the 25 most influential global executives based on their cross-border influences, leadership, and contribution to markets.
Morningstar	Morningstar, a Chicago–based investment research and management firm, introduced its "CEO of the year" award in 2000. The award winner is chosen by the equity analyst team of Morningstar, based on criteria such as stewardship, strategic thinking, and value creation.
Harvard Business Review	Since 2010, *Harvard Business Review* has compiled lists of top CEOs of large public companies worldwide based on their performance over their entire tenures. These lists, which include up to 200 CEOs, are based on criteria such as country- and industry-adjusted shareholder returns and social and governance performances.

APPENDIX B

Description of variables

Variable	Description
Firm size	Size of a firm, as measured by the log of market capitalization (share price × the number of shares outstanding) at the end of the month before the award month.
Book-to-market ratio	Ratio of book equity and market capitalization, measured at the end of the last fiscal year prior to the award month.
CEO female	Indicator variable that equals one if a chief executive officer (CEO) is female.
CEO age	Log of a CEO's age in number of years in the award month.
CEO tenure	Log of a CEO's tenure with a firm in number of years in the award month.
Return_x_y	Total compound return from the y^{th} to the x^{th} month prior to the award month.
Buy	Indicator variable that equals one if a trade by a CEO is a purchase.
Sell	Indicator variable that equals one if a trade by a CEO is a sale.
Star	Indicator variable that equals one for a CEO if the CEO is a star based on a given measure (award, web, or media).
Non-star	Indicator variable that equals one for a CEO if the CEO is not a star based on a given measure (award, web, or media).
Star buy	Indicator variable that equals one if a monthly purchase is by a star CEO.
Star sell	Indicator variable that equals one if a monthly sale is by a star CEO.
Non-star buy	Indicator variable that equals one if a monthly purchase is by a non-star CEO.

Variable	Description
Non-star sell	Indicator variable that equals one if a monthly sale is by a non-star CEO.
Past six-month return	Past cumulative six-month return.
Number of buys	Number of monthly purchases by a CEO.
Number of sells	Number of monthly sales by a CEO.
CAR	Cumulative abnormal return (CAR) generated from the Fama–French three-factor model, usually over a six-month period following an insider trade. In an earnings-related analysis, the CAR is over a three-day window or a five-day window around the first two quarterly earnings announcements that take place after an insider trade.
Routine trade	CEO trade that is routine and uninformative. A trade executed in the same calendar month in two or more consecutive years is considered a routine trade.
Opportunistic trade	CEO trade that possesses private information. A trade not executed in the same calendar month in two or more consecutive years is considered an opportunistic trade.
MarketEx	Fama–French factor for the excess return on the market, computed as the difference between the daily market return and the risk-free rate of return.
SMB	Small minus big, a Fama–French factor indicating the difference between daily returns on portfolios of small and large stocks.
HML	High minus low, a Fama–French factor indicating the difference between daily returns on portfolios of high and low book-to-market value stocks.
EC	Log of equity compensation, the value of option grants plus the value of stock grants.
CC	Log of cash compensation, the amount of cash compensation.
OTR	Opportunistic trade ratio, the ratio of the number (dollar volume) of opportunistic trades to the total number (dollar volume) of trades.
Post award—buy	Indicator variable that equals one if a purchase by a CEO is made after the CEO has received an award.
Post award—sell	Indicator variable that equals one if a sale by a CEO is made after the CEO has received an award.
Star quarterly buy	Indicator variable that equals one if a quarterly purchase is by a star CEO.
Star quarterly sell	Indicator variable that equals one if a quarterly sale is by a star CEO.
Non-star quarterly buy	Indicator variable that equals one if a quarterly purchase is by a non-star CEO.
Non-star quarterly sell	Indicator variable that equals one if a quarterly sale is by a non-star CEO.
Past quarter return	Past cumulative quarterly return.
# of quarterly buys	Number of quarterly purchases by a CEO.
# of quarterly sells	Number of quarterly sales by a CEO.
Current change	Percentage change in institutional shareholdings in a firm in the quarter in which the CEO of the firm makes a trade.
Future change	Percentage change in institutional shareholdings in a firm in the quarter following a CEO trade.