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EFFECTS OF BAD NEWS ON STOCK RETURNS AND ANALYSTS' RECOMMENDATIONS: THE INFLUENCE OF EXECUTIVE GENDER

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ABSTRACT

Although women are more conservative and more ethical than men, the proportion of female executives is still lower than that of men. Both Chief Executive Officers (CEOs) and Chief Financial Officers (CFOs) have strong influences in making corporate financial decisions. However, most of the literature focuses only on CEOs and ignores CFOs. Therefore, when bad news happens, it is possible that a female CEO/CFO can better alleviate the negative impact. We thus employ 4,405 firm-year observations over the period of 1996–2018, of which 680 are unique companies listed on the S&P1500 index, to examine how CEO and CFO gender influences stock returns and analyst recommendations. Our ordinary least squares and logistic regression results show that investors are pessimistic about companies led by female CEOs/CFOs, especially female CEOs. That is, when something bad happens, stock returns and analyst recommendations are worse for firms with female CEOs. Overall, this study is first to use stock returns to observe market reactions to firms with female CEOs/CFOs. In other words, the corporate remains unfriendly toward women, even those who are qualified as CEOs/CFOs.

Keywords: CEO, CFO, Gender, Stock Returns, Analyst recommendations

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INTRODUCTION

In the past 20 years, numerous studies regarding the influence of the Chief Executive Officer (CEO) on a company have been published, while only a few studies have focused on Chief Financial Officer (CFO) in the era before the Sarbanes-Oxley Act (SOX), which came due to some high-profile corporate scandals including that of Enron. The continuous outbreak of such negative news reduced investors' confidence in the capital market. After the Enron scandal, the U.S. Securities and Exchange Commission (SEC) and other countries demanded better accuracy and reliability of company financial statements. At the same time, people began to pay attention to the disclosure quality of the companies as well. As both company information disclosure and the preparation of financial reports are mainly the work of the CFO, the importance of the CFO in a company increased after the implementation of SOX.

Moreover, although the proportion of female executives is increasing, because the gender stereotype in business still exists, the proportion of female executives is lower than that of men. Women, as described by Doan and Iskandar-Datta (2020), Khan and Vieito (2013), and Schopohl et al. (2021), are generally considered to be less confident, more anxious, less willing to take risks, and with a conservative character; on the contrary, men are considered optimistic, confident, and adventurous. These statements infer that women are not competent for female executive positions. However, the research of Doan and Iskandar-Datta (2020) also showed that compared with men, women are generally regarded as moral, and sound minded. Thus, it is possible that they are less likely to manipulate financial statements and are better able to win the trust of investors. In addition, due to women's lack of confidence, female executives may stop money-losing projects ahead of time to protect investors' trust; so, when bad news happens, negative impacts on the company may be alleviated.

That is, the influence of women's personalities can produce a positive benefit to the company. Therefore, when the genders of the CEO and CFO are different, their decision-making criteria may also be different. Brooks et al. (2019) found that women are more risk averse than men in terms of gambling habits and portfolio risk status. However, most people only remember the negative impact of female executives on the company and do not take the work content into consideration. The results of such bias became the motivation of this study to explore market reactions to female CEOs and CFOs. In addition, in the past, males dominated as company leaders, and there was an implicit male bias in the literature on top management decision-making. As a result, there were many literatures comparing men and women in business leadership (Khan & Vieito, 2013; Ho et

al., 2015; Barua et al., 2010; Gupta et al., 2020). Most of the research topics only focused on CEOs or CFOs and explored the different management behaviors and styles derived from different personality traits. In contrast, this study extends the previous literature on gender to observe the effects of different CEO and CFO gender characteristics on market response to companies' news announcement. We perform regression analysis on a sample of 680 companies listed on the S&P 1500 index.

The findings of the present study are consistent with those of Adams and Ferreira (2009) in that they both suggest that firms with female representation experience a less favourable stock market response. However, the present study focuses on the effect of gender on CEO and CFO positions, while Adams and Ferreira (2009) examine the effect of gender on board representation. Furthermore, the present study finds that the effect is stronger for female CEOs than for female CFOs, which is not examined in the study of Adams and Ferreira (2009). Our finding is also consistent with a study by Datta et al. (2022), which found that the gender of the CFO does not have a significant impact on the firm's financial performance or market response.

Overall, this research contributes to understanding the status of women in the workplace. In the past, due to gender discrimination, women often had great difficulties in being promoted. This phenomenon often resulted from the traditional concept that women should help men at home, causing women to be considered as bringing more negative than positive benefits to a company. Although the gradual rise of women's rights can be found today with the passage of time, this does not mean that people's impressions of women's status have improved. Although the proportion of women in the workplace has increased, stereotypes and gender discrimination still exist, and investors remain pessimistic about companies led by females because of their personality traits. This study indicates that if the CEO or CFO are female, regardless of a company announcing good news or bad news, the stock returns will be worse than those for companies with a male CEO or CFO.

LITERATURE REVIEW

Theoretical Background

In today's highly competitive era, top managers (mostly CEOs and CFOs) have an increasing influence on listed companies. They are often the makers and executors of company decisions. Therefore, their relevant characteristics and preferences will also have a particular influence on the company. A number of studies have investigated the personality traits of top managers, including age, educational

background, and salary incentives. Because the proportion of female executives is relatively small, some scholars in the financial and psychological circles have independently discussed female executives' influence.

According to previous literature, female executives often face excessive challenges related to censorship, performance pressure, and gender stereotypes (Eagly & Carli, 2012). Auster (1993) even extended the effect caused by the diversity of explicit and implicit gender prejudice. These phenomena have caused the number of female executives to be extremely small, especially female CEOs in large U.S. companies (Fierman, 1990). In the face of different male and female personality traits, the gender of CEOs and CFOs may have different impacts on a company.

These arguments are built on Kanter's (1977) theory of token status. That is, the presence of women in top management draws attention and is perceived by the public differently from men. The biased and less favourable stereotypes of women are inconsistent with a leadership role. For example, people tend to envision men as having the appropriate attributes for leadership success, while women are perceived as being less qualified for senior management positions.

Traits of CEOs or CFOs

People have different expectations of their personality traits because CEOs and CFOs have different job scopes. Lafley (2009) mentioned that CEOs have a unique responsibility for the company's performance and results, and that they need to consider the company's goals and external stakeholders of competition at the same time. Robbins (2012) also mentioned that although CEOs need to endure all the operating conditions of the company, their main responsibility is to manage the corporate strategy and establish a good corporate culture. Meanwhile, Gow et al. (2016) measured CEO personality traits and found that openness is positively correlated with R&D intensity and negatively correlated with net leverage, while responsibility is negatively related to growth. Besides, CEOs should take appropriate risks during the growth stage of a company. On the contrary, when the company is mature, they should have a higher sense of responsibility.

Heffes (2007) pointed out that one of the most difficult parts of CFO work is to communicate with the board of directors. After the SOX of 2002, the responsibilities of the CFO have been increasingly scrutinised by the board of directors and audit committee. How to encourage the board of directors and audit committee to accept professional financial information effectively and reasonably is a big problem faced by the CFO. In addition, Ham et al. (2017) showed the importance of the CFO in financial reporting accuracy by studying

the relationship between narcissism and conservatism, and found that in addition to professional financial knowledge, good and persuasive communication skills are also important for a successful CFO. As financial reports need to be accurate, CFOs should be more conservative than CEOs and should not be overconfident. As mentioned in the research of Akinwumi et al. (2020), the narcissistic traits of CFOs may aggravate corporate debt crises.

Traits of Female CEOs or CFOs

Stereotypes about women suggest they lack self-confidence, are gentle, conservative, and unwilling to take too much risk, and are more ethical and compassionate. As described in previous studies, female executives are less confident in making acquisitions and debt issuance decisions than men (Huang & Kisgen, 2013). Compared with male CFOs, female CFOs undertake more ethical decisions (Doan & Iskandar-Datta, 2020). In terms of risk levels, the number of companies led by female CEOs is less than the number of companies led by men, indicating that female executives are relatively risk-averse (Khan & Vieito, 2013). Meanwhile, top female managers tend to have lower leverage and less volatility in returns (Faccio et al., 2016; Schopohl et al., 2021). Ho et al. (2015) further found that a CEO's gender is positively correlated with the company's accounting conservatism, especially when facing high litigation and acquisition risks, which is consistent with the traditional view of the past.

When female executives exhibit feminine traits such as indecision and sympathy, the public tends to regard them as being incompetent and lacking aggressive leadership; however, when they exhibit a masculine personality and project strength and confidence, they are often perceived as being bossy (Oakley, 2000).

Hypothesis Development

Compared with the literature on CFOs, there is more relevant literature on CEOs. Not only do prior studies have researched on different personality traits derived from gender, but they also explore the impact of female CEOs on a company, including the company's litigation risks, corporate governance and performance.

Dadanlar and Abebe (2020) researched high-profile female CEOs, past work experience and general susceptibility to various misbehaviours. They used logistic regression and found that the number of discrimination lawsuits reduces when a female CEO leads the company, especially for female CEO-led firms with favourable diversity ratings. Dah et al. (2020) studied the impact of gender on corporate governance control and confirmed that the appointment of a female

CEO is usually related to the company's advantages. In other words, company directed by female CEOs have less risk of failure and are less volatile, even when experiencing financial distress. As a result, when bad news happens, investors are more confident in women than men.

According to Kanter's (1977) theory of token status, as the number of women represented in senior management positions increases, women at these levels face less performance pressures. That is, Elsaid (2014) explored the impact of the CEO's gender, function and educational background on corporate performance and bankruptcy rates; the results showed that when the CEO changes from female to male, the company's performance will increase and the bankruptcy rate will decrease. Therefore, this study puts forth the following hypothesis:

H1: When a company's CEO is female, the stock return will be stagnant, and when a company's CEO is male, the stock return will grow.

Luo et al. (2020) showed that companies led by female CFOs are significantly less likely to engage in accounting fraud, but the negative relationship is nonexistent in state-owned enterprises. Schopohl et al. (2021) investigated the extent of the influence of female CFOs on a company's leverage and found that female CFOs can effectively reduce the company's board of directors' leverage, especially when the CEO/CFO's ability is insufficient. Doan and Iskandar-Datta (2020) mentioned that when a company's CFO is a female, to solve the impact of free cash flow agency costs, excessive cash holdings will be returned to the shareholders. Simultaneously, they further found that compared with male CEOs/CFOs, female CEOs/CFOs make more ethical decisions. One of the possible reasons could be that female CEOs/CFOs receive a great deal of attention due to the stereotypes of women, which is in line with Kanter's (1977) theory of token status. Therefore, we test the following hypothesis in the present study:

H2: Female CFOs will reassure investors, and the stock return will better than in companies with male CFOs.

The Impact of Bad News

The personality traits of executives affect their corporate governance and decision-making; however, the work contents of CEOs and CFOs are different. As a result, CEOs and CFOs with different genders will have different reactions to good news and bad news. When the company faces a bad situation, the financial conservatism of female CFOs can effectively reduce the risk of the company. In contrast, female CEOs may not be competent for leadership because they cannot bring higher

profits to the company due to their conservative character. However, some studies have found that female CEOs are more conservative and will not cause more risks for companies in trouble.

Past research has explored other factors that investors might consider to be bad news from a company, such as its sustainable development goals. Forecasts of a company's sustainable development goals can provide a useful source of information for investors, and they are positively correlated with the stock price information (Ng & Rezaee, 2020), which means that the stock price will fall when the analyst recommendations are negative. Past literature has also mentioned that it is difficult for individual investors to get information about the stock market. This condition may cause information asymmetry and produce abnormal stock returns (Brown et al., 2009).

RESEARCH DESIGN

Sample Selection

The final sample includes 4,405 firm-year observations consisting of merged, firm-level data from Compustat, ExecuComp, the Institutional Broker' Estimate System (I/B/E/S), and the Centre for Research in Security Prices (CRSP) databases between 1996 and 2018, after excluding missing values. This study excludes public utilities and financial firms from the sample, as these firms operate under different regulations and have different financial-reporting characteristics. This study obtains financial statement data from the Compustat files, obtains stock return data from the CRSP files, obtains analyst recommendation score data from the I/B/E/S files, and obtains gender data related to CEOs and CFOs from the ExecuComp files. All continuous variables are winsorised at their 5th and 95th percentiles.

The Definition of Bad News

The section first defines a company's bad news and its measure index and then introduces the regression model. Under the leadership of CEOs and CFOs of different genders, the market reaction to good news and bad news might vary. Good news can make investors have positive expectations for the future operation of the company, resulting in an increased abnormal stock return. On the contrary, when there is major bad news, there will be a setback. Baumeister et al. (2001) showed that bad events have more influence than good events. Obviously, compared with

good news, the market reacts more strongly to bad news. Therefore, this study mainly observes the impact of CEOs and CFOs of different genders on companies when bad news occurs.

Earnings reports contain a wealth of information about a company (Chudek et al., 2011; Machuga et al., 2002) and affect investors' expectations of a company's future operating prospects (Kasznik & Lev, 1995). Analyst earnings forecasts represent the expectations of the market for a company's operating performance. If a company's actual earnings are lower than market expectations, investors will feel disappointed and reduce their prospects for the company. As stated by Li (2020), investor sentiment is correlated with stock prices. As a result, this study defines bad news as negative earnings surprises of the company; that is, situations where the actual earnings per share (EPS) is less than the analysts' earnings forecast.

Investors usually regard a company's earnings in the previous year as an important reference benchmark (Lonie et al., 1996; Aharony & Swary, 1980). Therefore, if the company earnings in the current year are lower than last year, it is usually considered bad news. Angelovska (2017) documented that earnings announcements can assess the wealth and profitability of a company and indicate possible dividends. It is assumed that such information will be important for investors and is reflected in the stock price. Krische (2005) also found a transitory prior-period gain or loss affects how investors apply prior-period earnings when evaluating current period earnings. Thus, this study also defines bad news as the earnings recession of the company.

In summary, bad news is defined as the company's earnings surprise and earnings recession; on the contrary, it is good news when the earnings surprise is greater than 0 and shows earnings growth. This study regards earnings surprises as both good news and bad news, because they affect investors' expectations of the company's future operating prospects (Kasznik & Lev, 1995). In addition, analysts' earnings forecasts represent the market's expectations of a company's operating performance. When the company's actual income is lower than the market expectation, investors will feel disappointed, which further affects the company's investors' prospects. In addition, investors usually regard the company's earnings in the previous year as an important reference benchmark (Lonie et al., 1996; Aharony & Swary, 1980). Therefore, if the company earnings in the current year are lower than last year, it is usually considered bad news; otherwise, it is regarded as good news.

Measuring The Impact of Bad News on The Company

This study explores executives' gender and negative impacts through two aspects of measuring the company's bad news. Consistent with the previous literature (Kinney et al., 2002; Conrad et al., 2002), this study first uses the stock price to measure the negative impact as shown in Equation (1). Kinney et al. (2002) found that dispersion differences are related to the importance of earnings surprises measured by stock returns. Conrad et al. (2002) showed that as the market's relative level rises, the stock price response to negative earnings surprise will increase.

$$AR_{it} = b_0 + b_1 Psurprise_{it} + b_2 Nsurprise_{it} + b_3 Nsurprise_{it} * FCEO_{it} + b_4 Psurprise * FCFO_{it} + b_5 Nsurprise * FCEO_{it} + b_6 Nsurprise * FCFO_{it} + \text{Controls} + \mu_{it} \quad (1)$$

To exclude the impact of market returns on stock returns, market-adjusted returns (AR) are used for measuring the time effects of bad news and good news. It is calculated on the announcement day (–1, 21) and (–21, 21). This study first deletes any absolute Ri values that are greater than 0.6 and then calculates the mean value of Ri minus Rm between announcement day–1 and announcement day+21. Finally, this study annualizes the mean value of Ri minus Rm to become the AR data. *Psurprise* and *Nsurprise* are the absolute values of the actual earnings minus the median consensus earnings forecasts. They represent the degree of good news and bad news, respectively. FCEO represents a female CEO. If the CEO in the company is female, it is 1; otherwise, it is 0. Similarly, FCFO represents a female CFO. If the CFO in the company is female, it is 1; otherwise, it is 0. Controls are the control variable that may affect stock returns. The control variables include the firm size, book-to market ratio, CEO and CFO age, CEO tenure, number of analysts following the company, CEO and CFO compensation, and free cash flow. Finally, ε represents the error term, *i* stands for the firm, and *t* represents the time.

Fama and French (1992; 1993) pointed out that company size and book-to-market ratio (BM) will affect stock returns, so these two variables are included as control variables. Also, several studies (Fu & Zhang, 2019; Weigand & Irons, 2007; Dita & Murtaqi, 2014; Décamps et al., 2011) have shown that company characteristics can affect stock returns. Thus, this study controls the variables for free cash flow (FCF) and the number of analysts following the firm (Analyst). In addition to controlling the CEO and CFO characteristics related to stock returns (Dauth et al., 2017; Elsaid, 2014; Muttakin et al., 2019; Kohlbeck & Luo, 2019), this study controls CEO age (CEOAGE) and CFO age (CFOAGE), CEO tenure

(TENURE) and CEO compensation and CFO debt-like compensation (COMP). Furthermore, to prevent errors in the AR results caused by year and industry, this study adds year dummy and industrial dummy variables.

Earnings usually contain variable information, and they are an important information source for analysts to judge a company's future performance. Because investors have limited access to information, analyst research reports are investors' main source of information (Jennings, 1987), and that investors believe analyst forecast revisions to be informative. Analysts are more likely to adjust a company's stock recommendations or earnings forecasts when earnings are announced (Yezegel, 2015). Yezegel (2015) stated that analysts revise their stock recommendations after earnings announcements because of the greater demand from investors and when the relative supply of information available on earnings announcements is higher. Therefore, this study uses the analyst recommendation score to measure the impact of bad news in Equation (2) by applying the similar method as regression Equation (1).

$$\begin{aligned}\Delta REC_{it} = {} & b_0 + b_1 Psurprise_{it} + b_2 Nsurprise_{it} + \\ & b_3 Psurprise * FCEO_{it} + b_4 Psurprise * FCFO_{it} + \\ & b_5 Nsurprise * FCEO_{it} + b_6 Nsurprise * FCFO_{it} + \\ & \text{Controls} + \mu_{it}\end{aligned} \tag{2}$$

The recommendation score is the analyst's evaluation of a company. Analysts use five suggestions in their evaluations, including *strong buy*, *buy*, *hold*, *underperform* and *sell*. This study digitizes the suggestions into five grades, from 5 (strong buy) to 1 (sell). ΔREC is the analyst recommendation score, which is the change between the mean REC before and after 7 days, 14 days and 30 days of news announcement. The control variables include the firm size, board size, independence of the board, book-to market ratio, company age, duality, the company leverage, company bankruptcy, return on equity and price-earnings ratio.

Following prior studies (Vanstraelen et al., 2003; Qasem et al., 2020; Byard & Weintrop, 2006; Thaker & Mohamad, 2019; Badru et al., 2017; Jegadeesh et al., 2004; Clarke et al., 2006; Moshirian et al., 2009), this study controls several variables that may affect the analyst recommendation score. The control variables include the book to market ratio (BM), company size (SIZE), board size (BSIZE), board independence (BINDP), company age (CAGE), company bankruptcy as measured by the Z-score (AltmanZ), and duality (DUAL). DUAL indicates the situation where one person serves as both CEO and chairman in a particular company. Company characteristics are controlled as well, including the price-earnings ratio (PE), company leverage (LEVGE) and return on equity (ROE).

Analyst Recommendation

Analysts are people who work in companies or investment banks. They provide information about the operation of a company and decide whether its stock is worth investing money. Analyst recommendation scores are often aggregated into a single score on a scale of 1 to 5. A score of 1 means buy or strong buy, 2 means outperform, 3 means hold, 4 means underperform and 5 means sell. However, as recommendation scores can remain unchanged for a relatively long time, they become obsolete and less informative as time goes on (Jegadeesh et al., 2004; Jegadeesh & Kim, 2006). Therefore, this study speculates that the recommendation score of Equation (2) may not effectively reflect the impact of CEO and CFO gender on the company, so the recommendation score is changed to the number of revision recommendation score as a new evaluation index in Equation (3).

$$\begin{aligned} Revision_{it} = {} & b_0 + b_1 Psurprise_{it} + b_2 Nsurprise_{it} + \\ & b_3 Psurprise * FCEO_{it} + b_4 Psurprise * FCFO_{it} + \\ & b_5 Nsurprise * FCEO_{it} + b_6 Nsurprise * FCFO_{it} + \\ & \text{Controls} + \mu_{it} \end{aligned} \tag{3}$$

Revision is the dummy variable of the recommendation score revision between announcement day–7 and day+7, day–14, and day+14, day+30 and day+30 from the news announcement, as well. This study divides the revision into the upward adjustments and downward adjustments of the analyst recommendation score. If more than one analyst revises the recommendation score within the above time period, the dummy variable is 1; otherwise, it is 0. The control variables are the same as those in Equation (2).

The CEO and CFO have a significant impact on a company's decision-making. When a company is in a tight place due to the negative impact of its operating prospects, the CEO and CFO are usually responsible for explaining and apologising to investors. Because the credibility of corporate accounting information is a key factor in the capital market (Pevzner et al., 2015), their responsibility for providing accurate accounting information and financial reporting is gradually increasing. The CFO evaluates financial risks and gains, while the CEO evaluates business risks and gains.

The CFO's primary responsibility is to ensure the financial success of the company, while the CEO's primary responsibility is to ensure the overall success of the company. It is obvious that the CEO and CFO are closely related to the operation of the company and have related work content, which can result a mutual influence on both parties. Therefore, this study extends Equations (1)

and (2) to further consider the gender of the CEO and CFO at the same time in Equations (4) and (5), respectively.

$$AR_{it} = b_0 + b_1 Psurprise_{it} + b_2 Psurprise * FCEOCFO_{it} + b_3 Psurprise * CEOFCFO_{it} + b_4 Psurprise * FCFOFCFO_{it} + b_5 Nsurprise_{it} + b_6 Nsurprise * FCEOCFO_{it} + b_7 Nsurprise * CEOFCFO_{it} + b_8 Nsurprise * FCEOFCFO_{it} + \text{Controls} + \mu_{it} \quad (4)$$

$$\Delta REC_{it} = b_0 + b_1 Psurprise_{it} + b_2 Psurprise * FCEOCFO_{it} + b_3 Psurprise * CEOFCFO_{it} + b_4 Psurprise * FCFOFCFO_{it} + b_5 Nsurprise_{it} + b_6 Nsurprise * FCEOCFO_{it} + b_7 Nsurprise * CEOFCFO_{it} + b_8 Nsurprise * FCEOFCFO_{it} + \text{Controls} + \mu_{it} \quad (5)$$

FCEOCFO is the dummy variable with a value of one if the CEO of the company is female and the CFO is male, and zero otherwise. CEOFCFO is another dummy variable for the comparison of gender. If the CEO of the company is male and the CFO is female, it is 1; otherwise, it is 0. Similarly, when the dummy variable FCEOFCFO is 1, it represents that both the CEO and the CFO in the company are female; otherwise, it is 0. The control variables are the same as those used in Equations (1) and (2), respectively. The definitions and measurements of the variables are summarised in the Appendix.

EMPIRICAL RESULTS

Descriptive Statistics and Correlations

Table 1 presents the summary statistics for the variables used in our empirical analysis. The sample period for our data is 1996–2018. The AR is divided into two variables between announcement day–1 and day+21 (AR121), announcement day–21 and day+21 (AR2121). Their mean values are 0.0070 and 0.0081, respectively. The median values are 0.0019 and 0.0049, while the standard deviations are 0.1103 and 0.0751, respectively. The recommendation score (REC) is divided into three different time periods: one week before and after announcement day; two weeks and one month, as well. The mean of the difference between one week before and one week after the announcement is –0.0082, and the values before and

after two weeks and one month are –0.0067 and –0.0066, respectively. All median values are 0. This result shows that the original overall analyst recommendation score will be lower than the level after the earnings announcement.

Table 1
Descriptive statistics (N = 4,405)

Variable	Mean	Minimum	Median	Maximum	Std. Dev.
AR121	0.0070	–0.6350	0.0019	1.2728	0.1103
AR2121	0.0081	–0.4098	0.0049	0.7759	0.0751
DIFREC7	–0.0082	–1.5	0	1	0.0982
DIFREC14	–0.0067	–1.5	0	1	0.1125
DIFREC30	–0.0066	–1.5	0	1	0.1374
Revision	0.1310	0	0	1	0.3374
Psurprise	0.0033	0	0.0005	0.8190	0.0217
Nsurprise	0.0043	0	0	2.2745	0.0507
FCEO	0.0390	0	0	1	0.1937
FCFO	0.1108	0	0	1	0.3139
SIZE (logMV)	7.5986	2.8550	7.4207	13.1831	1.5592
BM	0.5092	0.0010	0.4093	18.0440	0.5157
CEO_Age	56.0681	32	56	82	6.9881
CFO_Age	49.6050	30	50	72	6.2562
TENURE	8.8339	1	7	46	7.0361
Analyst	13.6005	2	11	53	8.8790
COMP	54.9621	2.3810	55.1724	100.	28.5081
FCF	0.1194	–1.1909	0.1121	1.1284	0.1131
BINDP	0.7805	0.1429	0.800	1	0.1172
BSIZE	8.7026	2	9	18	2.0133
CAGE	26.6173	3	21	68	16.2116
Dual	0.5267	0	1	1	0.4993
LEVGE	0.4857	0.0398	0.4897	0.9998	0.2041
ROE	0.1626	–40.1534	0.1206	96.7500	2.0214
AltmanZ	4.7661	–55.4504	3.6737	82.9505	4.7737
PE	18.0965	–2228.00	18.5593	3865.00	113.8894

Notes: Table 1 is the summary statistics contained the main variables and control variables from 1996 to 2018. All samples are annual data, and the statistical indicators in this table are mean, std dev, min, and max, with a total of 4,405.

As shown in Table 1, both the positive surprise (Psurprise) and negative surprise (Nsurprise) are the absolute values of the company's actual EPS minus the earnings forecast consensus and indicate the degree of good news and bad news. The average values are 0.0033 and 0.0043, while the median values are 0.0005 and 0.00, respectively. In addition, the mean value of female CEO (FCEO) is 0.0390 and there are 172 female CEOs in whole sample. However, the mean value of female CFO (FCFO) is 0.1108 and there are 488 female CFOs in total sample. The result is similar with that of Li and Zeng (2019), who found that the average number of female CFOs appointed by enterprises is more than that of the average number of CEOs.

Table 2 estimates the significance of the difference between female executives and male executives. Panel A compares the *t*-test and nonparametric statistics for the market-AR in different time periods. We can see that both the average and median difference between CEO and CFO gender are not extremely significant in AR121. However, CEOs have higher significance than CFOs, which means the difference of CEO gender probably has a higher impact than the difference of CFO gender. Compared with AR121, when the study extends the time period to AR2121, the difference of CFO gender suggests higher impact than the difference of CEO.

Panel B compares the *t*-test and nonparametric statistics for the recommendation score (REC) in different time periods. Only the difference between female CEO and male CEO has a significant value. The median difference of the Z-score is –1.7814 and the mean difference of the *t*-value is 1.70, indicating the gender of the CEO may impact the company. The result of the recommendation score (REC) in the *t*-test and in the nonparametric statistics are similar with the result for the market-AR.

Table 2
Descriptive statistics sample test

		Panel A				Panel B					
Variable	N	AR121		AR212		DIFREC7		DIFREC14		DIFREC30	
		Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
FCEO = 0	4233	0.0076	0.0021	0.0084	0.0051	–0.0077	0	–0.0060	0	–0.00602	0
FCEO = 1	172	–0.0074	–0.0058	0.0006	–0.0019	–0.0210	0	–0.0213	0	–0.0197	0
Diff		0.0150*	0.0079*	0.0077	0.0121*	0.0130*	0**	0.0152*	0	0.0137	0
		(1.75)	(–1.5933)	(1.32)	(–1.5437)	(1.70)	(–1.7814)	(1.74)	(–1.1749)	(1.28)	(–0.1832)
FCFO = 0	3917	0.0075	0.0018	0.0080	0.0049	–0.00832	0	–0.0070	0	–0.00694	0
FCFO = 1	488	0.0034	0.0055	0.0083	0.0050	–0.00739	0	–0.0037	0	–0.00348	0
Diff		0.0041	–0.0037	-0.0003	0.0099**	–0.00093	0	–0.0033	0	–0.00345	0
		(0.78)	(–0.1114)	(-0.07)	(0.0283)	(–0.20)	(–0.4086)	(–0.61)	(–0.0802)	(–0.52)	(0.0169)

Notes: Table 2 shows the result of *t*-test and nonparametric statistics. In this study, if the CEO is female, it is 1, otherwise it is 0. Similarly, if the CFO is female, it is 1, otherwise it is 0. ***, ** and * denote statistical significance at the 1%, 5% and 10%, respectively. The () in Mean is the *t*-value and in Median is *Z*-score.

Table 3
Pearson correlation matrix

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Psurprise	1.00																			
2. Nsurprise	–0.01	1.00																		
3. FCEO	0.03	0.04	1.00																	
4. FCFO	0.01	0.01	0.03	1.00																
5. ROE	–0.04	-0.02	0.04	–0.00	1.00															
6. BM	0.26	0.20	–0.01	–0.00	–0.05	1.00														
7. LEVGE	0.04	0.05	0.02	–0.05	0.05	–0.04	1.00													
8. AltmanZ	–0.08	–0.06	–0.00	0.04	0.02	–0.22	–0.57	1.00												
9. CAGE	–0.04	–0.03	0.02	0.00	0.06	–0.04	0.19	–0.11	1.00											
10. Analyst	–0.05	–0.05	0.04	0.07	0.03	–0.09	0.18	–0.05	0.11	1.00										
11. TENURE	–0.02	–0.01	–0.07	0.01	–0.01	–0.02	–0.16	0.10	–0.04	–0.07	1.00									
12. PE	–0.02	–0.02	–0.00	-0.01	0.01	–0.06	–0.03	0.07	0.01	0.05	0.01	1.00								
13. BSIZE	–0.01	–0.02	0.04	0.06	0.03	–0.06	0.34	–0.16	0.39	0.34	–0.14	0.01	1.00							
14. Dual	–0.01	–0.02	–0.08	0.02	0.03	–0.06	0.04	–0.01	0.13	0.06	0.36	0.02	0.05	1.00						
15. COMP	–0.02	0.01	0.02	0.04	0.01	0.00	0.09	–0.05	0.13	0.12	–0.01	0.02	0.14	0.14	1.00					
16. CEOAGE	–0.04	–0.03	–0.05	0.04	0.02	–0.02	0.03	–0.01	0.18	0.00	0.43	–0.02	0.08	0.08	0.23	1.00				
17. CFOAGE	–0.03	–0.03	–0.04	–0.03	0.02	–0.04	–0.17	–0.01	0.18	–0.01	0.09	0.00	0.12	0.12	0.05	0.18	1.00			
18. FCF	–0.08	–0.08	0.00	0.05	0.08	–0.22	–0.17	0.40	–0.08	0.09	0.04	0.04	–0.02	-0.02	0.06	–0.01	–0.05	1.00		
19. BINDP	0.01	0.01	0.07	–0.04	0.02	–0.03	0.15	–0.11	0.22	0.10	–0.15	–0.01	0.16	0.16	–0.03	–0.02	0.04	–0.09	1.00	
20. SIZE	–0.13	–0.12	0.03	0.09	0.07	–0.34	0.26	0.01	0.36	0.71	–0.09	0.07	0.53	0.53	0.13	0.09	0.12	0.18	0.17	1.00

Table 3 presents the Pearson correlation matrix for all variables used in this study. Most of the correlation coefficients are generally smaller than the absolute value of 0.4. However, company size (SIZE) has a high positive correlation with some variables, including the number of analysts (Analyst), board size (BSIZE) and people serving as both CEO and board chairman (Dual). The correlation between SIZE and Analyst is 0.71, which is bigger than the correlation (0.53) with BSIZE. The correlation between SIZE and people serving as both CEO and board chairman (Dual) is same as the correlation with BSIZE. To avoid the influence of these highly correlated variables on the results, this study calculates the variance of inflation to exclude the collinearity problem.

Primary Result

Table 4 tracks the stock price of the company on the day before and the day after the earnings announcement. Some variables have high correlation coefficients that may cause collinearity; however, the whole variance inflation value (VIF) in two different time-periods is smaller than 10. As a result, this study can exclude the influence of collinearity on the results.

Table 4
Regression results: Stock return

Variables	AR121		AR121		AR2121		AR2121	
	CEO	VIF	CFO	VIF	CEO	VIF	CFO	VIF
Intercept	0.0120 (0.36)	0	0.0161 (0.48)	0	0.0185 (0.82)	0	0.0122 (0.54)	0
Psurprise	0.2994*** (3.39)	1.4178	0.2183** (2.27)	1.6791	0.0112 (0.19)	1.4178	–0.0480 (–0.73)	1.6791
Nsurprise	0.0103 (0.23)	2.0119	–0.1206*** (-3.54)	1.1641	0.0206 (0.68)	2.0119	–0.0475** (–2.05)	1.1641
Psurprise* FCEO	–0.3643** (–2.03)	1.3334			–0.3068** (–2.51)	1.3334		
Nsurprise* FCEO	–0.2625*** (–4.07)	1.9303			–0.1292*** (–2.94)	1.9303		
Psurprise* FCFO			–0.0168 (–0.11)	1.5808			–0.0347 (–0.33)	1.5808
Nsurprise* FCFO			0.0671 (0.57)	1.1345			0.0870 (1.08)	1.1345
FCEO	–0.0126 (–1.48)	1.0709			-0.0020 (–0.34)	1.0709		
FCFO			–0.0044 (–0.81)	1.1025			0.0023 (0.64)	1.1025

(*Continued on next page*)

Table 4 (*Continued*)

Variables	AR121		AR121		AR2121		AR2121	
	CEO	VIF	CFO	VIF	CEO	VIF	CFO	VIF
SIZE	0.0041** (2.28)	3.1142	0.0035** (1.96)	3.0855	0.0047*** (3.82)	3.1142	0.0041*** (3.32)	3.0855
BM	0.0112*** (2.92)	1.5283	0.0101*** (2.65)	1.5209	0.0019 (0.72)	1.5283	0.0011 (0.43)	1.5209
CEOAGE	–0.0002 (–0.75)	1.4130			–0.0003 (–1.51)	1.4130		
CFOAGE			–0.0002 (–0.56)	1.1787			-0.0001 (–0.12)	1.1787
TEN	0.0003 (1.31)	1.3675			0.0004** (2.29)	1.3675		
Analyst	8.7721 (0.00)	2.6804	0.0001 (0.09)	2.6858	–0.0006*** (–3.13)	2.6804	–0.0006*** (–2.93)	2.6858
COMP	–0.0001 (–1.53)	1.0974	–0.0001 (–1.42)	1.0962	–0.0001** (–2.44)	1.0974	–0.0001** (–2.43)	1.0962
FCF	–0.0137 (–0.89)	1.1711	–0.0137 (–0.89)	1.1721	–0.0296*** (–2.83)	1.1711	–0.0292*** (–2.79)	1.1721
T test Psurprise+ Psurprise* FCEO	0.17				7.49***			
T test Nsurprise+ Nsurprise* FCEO	28.20***				11.27***			
T test Psurprise+ Psurprise* FCFO			2.55				0.93	
T test Nsurprise+ Nsurprise* FCFO			0.22				0.26	
Adj. R^2	0.0635		0.0582		0.0758		0.0719	
F-statistic	5.00***		4.70***		5.84***		5.64***	
Year fixed effect	Yes		Yes		Yes		Yes	
Industrial fixed effect	Yes		Yes		Yes		Yes	

Notes: Table 4 is the result of AR regression, and it is divided into different time period between announcement day–1 and day+21 (AR121), and announcement day–21 and day+21 (AR2121). ***, ** and * denote statistical significance at the 1%, 5% and 10%, and the () is the *t*-value.

Looking at the Table 4 in detail, both CEO and CFO in AR121 have a positively significantly association each with Psurprise of 0.29940 and 0.21833, respectively. By contrast, only CFO has a significant effect on Nsurprise. After the study extends

the time period to AR2121, CFO in AR2121 has a negative significant to Nsurprise. These values indicate the degree of the rise and fall of the stock price when the company announces good news or bad news. However, the result is not consistent with the inference of this study that the market reaction to bad news is much greater than that for good news. This study speculates that the market reaction to bad news results from having an insufficient number of samples. We then investigate the influence of CEO and CFO gender (FCEO, FCFO) on the stock price. Both female CEOs (FCEO) and female CFOs (FCFO) in AR121 and AR2121 are not significant, which means investors do not care much about CEO and CFO gender in the market.

To observe the impact of female executives on stock price, we add the interaction terms Psurprise*FCEO, Psurprise*FCFO, Nsurprise*FCEO, and Nsurprise*FCFO. We can clearly see that when the company led by a female CEO in AR121 and AR2121, there will be a significantly negative impact. No matter if the company announces good news or bad news, if the CEO is female, investors will be less optimistic about the company. Besides, according to the *t*-test result, companies led by female CEOs are not only unable to effectively slow down the decline of the stock price, but also make the decline of the stock price even greater, especially when announcing bad news. As Elsaid (2014) stated, compared with men, women show a greater lack of self-confidence and low ambition. This conjecture is similar to that of Jannati et al. (2020), who stated that analyst stock recommendations for companies led by female CEOs are lower than those led by male CEOs. On the contrary, the companies led by female CFOs, whether in AR121 or AR2121, have no significant results. In other words, female CEOs have stronger effects on the company than female CFOs. Although the preparation of financial reports is a CFO specialty, when the company suffers from fraud in its financial reports, the CEO is responsible for both legal punishment and social condemnation. Therefore, this study speculates that from the perspective of investors, the main person of the company is still the CEO, and only the gender difference of the CEO will have an effective impact on the company.

Table 5 presents the recommendation score of the company on the day before and the day after the earnings announcement. As shown in Table 4, this study calculates the VIF to detect whether the high correlation between variables has an impact on the results. All VIF in different time-periods are smaller than 10. As a result, this study can exclude the influence of collinearity on the results. This study mainly observes the results at seven days before and seven days after the earnings announcement date; however, as changes to the recommendation score cannot be reflected in a short time, the study extends the time period to 14 days and one month before and after the announcement date.

Table 5
Regression results: Recommendation score

Variables	DIFREC7				DIFREC14				DIFREC30			
	CEO	VIF	CFO	VIF	CEO	VIF	CFO	VIF	CEO	VIF	CFO	VIF
Intercept	0.0082 (0.09)	0	0.0099 (0.10)	0	0.0342 (0.34)	0	0.0365 (0.36)	0	0.1381 (1.27)	0	0.1361 (1.25)	0
Psurprise	1.0418*** (3.36)	1.1855	1.0528*** (3.40)	1.1856	1.2190*** (3.76)	1.1855	1.2288*** (3.79)	1.1856	1.2607*** (3.60)	1.1855	1.2666*** (1.47)	1.1856
Nsurprise	–0.5152 (–1.41)	1.4852	–0.5584 (–1.12)	2.7455	–0.3447 (0.90)	1.4852	-0.4179 (-0.8)	2.7455	–0.5121 (–1.24)	1.4852	–0.3928 (–0.70)	2.7455
Psurprise*FCEO	1.4409 (0.17)	1.2669			1.7336 (0.20)	1.2669			–0.3548 (–0.04)	1.2669		
Nsurprise*FCEO	12.8939 (–1.11)	1.1328			–12.9356 (–1.06)	1.1328			–10.6709 (–0.81)	1.1328		
Psurprise*FCFO			0.1517 (0.05)	1.1987			-0.0691 (-0.02)	1.1987			1.3257 (0.39)	1.1987
Nsurprise*FCFO			0.0951 (0.15)	2.4643			0.1132 (0.17)	2.4643			–0.2267 (–0.31)	2.4643
FCEO	–0.0172 (–0.65)	1.4655			–0.0128 (–0.47)	1.4655			–0.0067 (–0.22)	1.4655		
FCFO			0.0002 (0.01)	1.3382			0.0082 (0.47)	1.3382			0.0028 (0.15)	1.3382
SIZE	0.0109** (2.51)	2.4200	0.0110** (2.52)	2.4462	0.0080* (1.77)	2.4200	0.0080* (1.74)	2.4462	0.0071 (1.45)	2.4200	0.0074 (1.49)	2.4462
BSIZE	0.0027 (0.88)	2.0314	0.0027 (0.90)	2.0277	0.0031 (0.96)	2.0314	0.0030 (0.95)	2.0277	0.0040 (1.17)	2.0314	0.0040 (1.16)	2.0277
BINDP	–0.0799* (–1.73)	1.4615	–0.0823* (–1.78)	1.4558	–0.0742 (–1.53)	1.4615	-0.0746 (-1.54)	1.4558	–0.0958* (–1.83)	1.4615	–0.0964* (–1.84)	1.4558

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Table 5 (*Continued*)

Variables	DIFREC7				DIFREC14				DIFREC30			
	CEO	VIF	CFO	VIF	CEO	VIF	CFO	VIF	CEO	VIF	CFO	VIF
BM	0.0220 (1.50)	2.1612	0.0218 (1.48)	2.1883	0.0133 (0.87)	2.1612	0.0131 (0.85)	2.1883	0.0001 (–0.00)	2.1612	0.0007 (0.04)	2.1883
CAGE	0.0002 (0.56)	1.6334	0.0002 (0.51)	1.6338	0.0003 (0.89)	1.6334	0.0003 (0.85)	1.6338	0.0001 (0.34)	1.6334	0.0001 (0.30)	1.6338
Dual	–0.0031 (–0.32)	1.1621	–0.0025 (–0.25)	1.1538	–0.0090 (–0.88)	1.1621	-0.0086 (–0.85)	1.1538	–0.0044 (–0.40)	1.1621	–0.0043 (–0.39)	1.1538
LEVGE	0.0381 (1.07)	2.3986	0.0376 (1.05)	2.4214	0.03551 (0.96)	2.3986	0.0365 (0.98)	2.4214	0.0311 (0.78)	2.3986	0.0324 (0.80)	2.4214
ROE	0.0050 (1.19)	1.0803	0.0050 (1.20)	1.0803	0.0055 (1.26)	1.0803	0.0055 (1.26)	1.0803	0.0055 (1.17)	1.0803	0.0055 (1.17)	1.0803
AltmanZ	0.0027 (1.58)	2.1841	0.0028 (1.60)	2.1939	0.0023 (1.30)	2.1841	0.0024 (1.31)	2.1939	0.0025 (1.28)	2.1841	0.0026 (1.33)	2.1939
PE	0.0001 (0.99)	1.1035	0.0001 (1.03)	1.1032	0.0001 (1.24)	1.1035	0.0001 (1.28)	1.1032	0.0001 (1.49)	1.1035	0.0001 (1.52)	1.1032
Adj. R^2	0.0480		0.0463		0.0434		0.0423		0.0500		0.0496	
F-statistic	1.97***		1.94***		1.88***		1.85***		2.02***		2.01***	
Year fixed effect	Yes		Yes		Yes		Yes		Yes		Yes	
Industrial fixed effect	Yes		Yes		Yes		Yes		Yes		Yes	

Notes: Table 5 is the result of REC regression, and it is divided into announcement day–7 and day+7 (DIFREC7), announcement day-14 and day+14 (DIFREC14), announcement day–30 and day+30 (DIFREC30) as well. ***, **, * denote statistical significance at the 1%, 5% and 10%, respectively and the () is the *t*-value.

There are positively significant associations between good news announcement and recommendation score in whole observation period; on the contrary, the announcement of bad news has a negative impact on the recommendation score, but it is not significant. We then investigate the variables FECO and FCFO. It is obvious that female CEOs (FCEO) have a negative impact on the recommendation score, while female CFOs (FCFO) have a positive impact on the recommendation score. However, both are not significant (as shown in Table 5) due to REC is the scoring result of analysis and professional analysts who might not look into gender.

Looking at Table 5 in detail, it is obvious that the news released by both female CEOs and female CFOs are positive in a short observation period. When the study extends the observation period to one month, it can be found that companies led by female CEOs have a negative, but not significant, impact on the recommendation score. This study speculates the difference in results between Tables 4 and 5 result from different people's point of view. The main measurement method in Table 4 is the stock price, and stock market investors include both professional investment institutions and retail investors. As retail investors do not have as much financial knowledge as professional investors, they will consider more non-financial factors that further affect the stock price. On the contrary, Table 5 mainly lists the results of the analysts on the company, who pay more attention to financial characteristics. Therefore, Table 5 indicates that gender is not a significant factor.

The results of the interaction terms (Psurprise*FCEO, Psurprise*FCFO, Nsurprise*FCEO and Nsurprise*FCEO) in Table 5 are not significant. However, there is a positive impact on the recommendation score when companies led by female CFOs announce good news (Psurprise*FCFO). The study of Schopohl et al. (2021) conjectured that female CFOs are more conservative than male CFOs in accounting. Therefore, female CFOs might be stricter about making financial reports than male CFOs. Under the principle of overestimating liabilities and underestimating earnings, analysts will be more optimistic about the company's prospects, and the recommendation score will also be improved if the company earnings are greater than market expectations.

Table 6 shows the results of further research after considering the low frequency of analysts' correcting the recommendation scores. This study uses logistic regression to divide the results into the upward adjustments and downward adjustments of the analyst's recommendation scores. Obviously, the results in Table 6 are not better than those in Table 5, and the results of the interaction terms are not significant. However, it can be clearly seen that the results in Table 6 are similar to those in Table 5.

Table 6
Regression results: Logistic

Variables	Upgrade 7		Downgrade 7		Upgrade 14		Downgrade 14		Upgrade 30		Downgrade 30	
	CEO	CFO	CEO	CFO	CEO	CFO	CEO	CFO	CEO	CFO	CEO	CFO
Intercept	–6.3089	–6.3548	–4.9553	–4.9493	–4.8616	–4.9112	–4.8685	–4.8586	–4.7964	–4.8303	–4.1058	–4.0989
Psurprise	1.4539	2.6603	–4.3565	–3.9596	2.3313	4.1727**	–13.7858	–12.7419	1.2961	2.5712	–0.7319	–5.2536
Nsurprise	–0.1555	–0.3382	–1.4774	–4.0919	–1.0969	–0.8568	–2.4378	–4.1200	–0.8254	–0.5495	–1.6781	–1.9332
Psurprise*FCEO	–182.40		–92.2364		–101.60		–67.4988		–113.10		–48.8874	
Nsurprise*FCEO	–545.30		–1.1441		–682.70		–0.4600		–108.70		–26.8665	
Psurprise*FCFO		–4.9190		–58.7735		–8.5315		–49.2713		–18.3013		7.2906
Nsurprise*FCFO		–2.5746		4.3276		–2.8916		2.9565		–13.9377		0.3000
FCEO	0.2479		0.4381**		0.1361		0.2232		0.2791			
FCFO		–0.1933		0.0632		–0.1474		0.0375		0.0157	0.0736	–0.1108
SIZE	0.2954***	0.3050***	0.2772***	0.2756***	0.3050***	0.3151***	0.2792***	0.2789***	0.2563***	0.2598***	0.2683***	0.2702***
BSIZE	–0.0188	–0.0167	–0.0293	–0.0301	–0.0183	–0.0168	–0.0188	–0.0193	–0.0039	–0.00391	–0.0108	–0.0112
BINDP	–0.1341	–0.1739	0.3584	0.3991	–0.1607	–0.2023	0.1975	0.2092	–0.1291	–0.1317	0.1167	0.1062
BM	0.1218	0.1258	0.0817	0.0805	0.1116	0.1165	0.1537*	0.1522*	0.0475	0.0526	0.1649*	0.1822**
CAGE	–0.0004	–0.0003	–0.0096***	–0.0094***	0.0001	0.0001	–0.0103***	–0.0102***	–0.0026	–0.0025	–0.0083***	–0.0083***
Dual	–0.0445	–0.0390	–0.0058	–0.0184	–0.0311	–0.0255	0.00578	0.0017	–0.0319	–0.0363	0.0332	0.0321

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Table 6 (*Continued*)

Variables	Upgrade 7		Downgrade 7		Upgrade 14		Downgrade 14		Upgrade 30		Downgrade 30	
	CEO	CFO	CEO	CFO	CEO	CFO	CEO	CFO	CEO	CFO	CEO	CFO
LEVGE	–0.3849	–0.4308	–0.4101	–0.4086	–0.6387**	–0.6894**	–0.1796	–0.1829	–0.0918	–0.0884	0.0350	0.0391
ROE	–0.0236	–0.0229	–0.0801	–0.0798	–0.0171	–0.0173	–0.0894*	–0.0881*	–0.0213	–0.0195	–0.0684	–0.0748
AltmanZ	–0.0017	–0.0012	–0.0251**	–0.0253**	–0.0061	–0.0056	–0.0223*	–0.0225*	0.0125	0.0131	–0.0132	–0.0129
PE	0.0004	0.0004	–0.00014	–0.0002	0.0001	0.0001	–0.0002	–0.0002	–0.0003	–0.0003	–0.0002	–0.0002
R^2	0.0377	0.0373	0.0582	0.0583	0.0459	0.0458	0.0601	0.0605	0.0566	0.0568	0.0554	0.0559
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industrial fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Table 6 is the result of logistic regression, and the result is divided into the upward adjustment and the downward adjustment of analyst recommendation score. This study takes the number of analysts who revise the recommendation score between announcement day–7 and day+7, day-14 and day+14, and, day–30 and day+30 as well. If one or more analysts revise the recommendation score in the above time period, it is 1; otherwise, it is 0. ***, ** and * denote statistical significance at the 1%, 5% and 10%, respectively.

For companies under the leadership of female CEOs, whether they release good news or bad news, the news will have a negative correlation with upward adjustments. In other words, even if a company led by a female CEO releases good news, analysts would not make upward adjustments if they are pessimistic due to the CEO's gender. This result is the same as those in Jannati et al. (2020). Besides, when the observation period changes to one month before and one month after the earnings announcement date, the companies led by female CFOs have a positive correlation with upward adjustments when releasing good news. This result is also consistent with the results shown in Table 5, indicating that if the financial statements made by female CFOs can beat market expectations, better future company's results can be expected.

Table 7 considers the gender of the CEO as well as the CFO at the same time and estimates the impact on the market-AR. The purpose of this study is to explore the impact of female CEOs and CFOs on the stock price and REC.

Table 7
Regression results: Further analysis from stock return

Variables	AR121	AR2121
Intercept	0.0192 (0.54)	0.0206 (0.86)
Psurprise	0.3789*** (3.21)	0.0707 (0.88)
Nsurprise	0.0207 (0.43)	0.0169 (0.52)
Psurprise*FCEOCFO	–0.4448** (–2.27)	–0.3626*** (–2.71)
Psurprise*CEOFCFO	–0.1773 (–1.03)	–0.1385 (–1.18)
Psurprise*FCEOFCFO	–4.6633 (–0.54)	–0.9877 (–0.17)
Nsurprise*FCEOCFO	–0.2730*** (–4.07)	–0.1259*** (–2.76)
Nsurprise*CEOFCFO	–0.06194 (–0.51)	0.0249 (0.30)
Nsurprise*FCEOFCFO	–56.8854 (–0.56)	–23.7994 (–0.35)
FCEOCFO	–0.0125 (–1.34)	–0.0001 (–0.02)
CEOFCFO	–0.0035 (–0.63)	0.0035 (0.93)
FCEOCFO	–0.0139 (–0.60)	–0.0101 (–0.64)
SIZE	0.0045** (2.45)	0.0048*** (3.87)
BM	0.0115*** (2.99)	0.0018 (0.69)
CEOAGE	–0.0002 (–0.64)	–0.0003 (–1.48)
CFOAGE	–0.0002 (–0.72)	–0.0001 (–0.20)
TEN	0.0004 (1.32)	0.0004** (2.30)
Analyst365	–0.0001 (–0.11)	–0.0006*** (–3.17)
COMP	–0.0001 (–1.50)	–0.0001** (–2.44)

(*Continued on next page*)

Table 7 (*Continued*)

Variables	AR121	AR2121
FCF	–0.0132 (–0.85)	–0.0298*** (–2.84)
Adj. R^2	0.0626	0.0749
F-statistic	4.60***	5.36***
Year fixed effect	Yes	Yes
Industrial fixed effect	Yes	Yes

Notes: ***, **, * denote statistical significance at the 1%, 5% and 10%, respectively and the ( ) is the *t*-value

Looking at Table 7 in detail, the interaction terms further support our results. If the CEO is female and the CFO is male, whether the company releases good news or bad (Psurprise*FCEOCFO, Nsurprise*FCEOCFO) will have a significant negative result in the AR, which is consistent with the results shown in Table 4. In other words, investors will be pessimistic about companies led by female CEOs. Simultaneously, there is a negative, but not significant, effect when the CEO is male and the CFO is female (Psurprise*CEOFCFO, Nsurprise*CEOFCFO). When compared with the effect when the CEO is female and the CFO is male, the result of having a male CEO and a female CFO proves that CEOs have a stronger influence than CFOs.

Besides, compared with the Tables 5 and 6, Table 7 further observes the impact when the CEO and CFO in a company are both. Obviously, when the CEO and CFO are both female, whether the company releases good news or bad news (Psurprise*FCEOFCFO, Nsurprise*FCEOFCFO), it will have a negative impact on the market-AR.

Table 8 considers the gender of the CEO and CFO at the same time and estimates the impact on the recommendation score (REC). Since the sample which satisfy CEO and CFO are female at the same time may be less, the study takes out the variable Nsurprise*FCEOFCFO.

Table 8
Regression results: Further analysis from recommendation score

Variables	DIFREC7	DIFREC14	DIFREC30
Intercept	0.0230 (0.24)	0.0472 (0.47)	0.1454 (1.33)
Psurprise	1.0545*** (3.41)	1.2167*** (3.75)	1.2560*** (3.59)
Nsurprise	0.5697 (–1.14)	–0.4517 (–0.87)	–0.4179 (–0.74)
Psurprise*FCEOCFO	–5.6487 (0.27)	–9.7567 (–0.44)	–22.9119 (–0.96)
Psurprise*CEOFCFO	–7.7715 (–1.22)	–7.1198 (–1.06)	–3.4813 (–0.48)
Psurprise*FCEOFCFO	–14.0142 (–0.24)	8.6439 (0.14)	10.8026 (0.16)
Nsurprise*FCEOCFO	–96.5172*** (–2.90)	–96.9802*** (–2.78)	–90.7642** (–2.41)
Nsurprise*CEOFCFO	0.11021 (0.17)	0.09378 (0.14)	–0.24728 (–0.34)
FCEOCFO	0.0117 (0.38)	0.0215 (0.66)	0.0314 (0.89)
CEOFCFO	0.0130 (0.71)	0.0203 (1.06)	0.0119 (0.58)
FCEOFCFO	–0.0202 (–0.37)	–0.0265 (–0.46)	–0.0204 (0.33)
SIZE	0.0112** (2.48)	0.0071 (1.55)	0.0067 (1.35)
BSIZE	0.0023 (0.75)	0.0030 (0.94)	0.0039 (1.13)
BINDP	–0.0789 (–1.70)	–0.0734 (–1.51)	–0.0946* (–1.80)
BM	0.01018 (0.73)	0.0124 (0.80)	0.0003 (0.02)
CAGE	0.0002 (0.56)	0.0004 (0.97)	0.0001 (0.37)
Dual	–0.0042 (–0.43)	–0.0100 (–0.98)	–0.0054 (–0.49)
LEVGE	0.0252 (0.70)	0.0360 (0.96)	0.0309 (0.77)
ROE	0.0054 (1.31)	0.0056 (1.28)	0.0055 (1.17)
AltmanZ	0.0031* (1.81)	0.0021 (1.17)	0.0024 (1.21)
PE	0.0001 (0.87)	0.0001 (1.14)	0.0001 (1.42)
Adj. R^2	0.0512	0.0456	0.0506
F-statistic	1.97***	1.86***	1.96***
Year fixed effect	Yes	Yes	
Industrial fixed effect	Yes	Yes	

Notes: ***, ** and * denote statistical significance at the 1%, 5% and 10%, respectively, and the ( ) is the *t*-value

The interaction variable Nsurprise*FCEOCFO is has a significant negative effect on the recommendation score (REC) in three different time periods. This result is same as that shown in Table 6, which shows that analysts are not optimistic about companies led by female CEOs. Also, most of the other variables in Table 8 are similar with the results shown in Table 6; however, they are not significant. This study speculates that most of the results in Table 8 are not significant because of the insufficient sample size. When the total number of samples is small, if the study subdivides each sample into groups, the number of samples in each group will be smaller and unable to effectively reflect the results.

In summary, the results indicate that the market is less optimistic about companies led by women, especially those with female CEOs. This study speculates this may be due to the fact that feminisation is not suitable for the job of CEO. In addition, there are similar results related to the gender differences between CEOs and CFOs, but the results related to female CFOs are not significant. It may also indicate that in the view of investors, the main person in charge of the company is the CEO; therefore, the gender of the CFO may not have a strong impact on the company.

Robustness Test

The results shown in Tables 4 to 8 indicate that a company's earnings information is less favourable for female CEOs or CFOs, particularly in the stock market rather than in research reports by financial analysts. Datta et al. (2022) found that the gender of the CFO does not have a significant impact on a firm's financial performance or market response. Therefore, this study conducts sensitivity tests on the stock market. Specifically, the Carhart (1997) four-factor model is used to estimate abnormal returns.

This study follows Carhart's (1997) method to estimate abnormal returns by controlling for market risk, size, market-to-book ratios and momentum factors. The coefficients for these factors are estimated using daily data from three years prior to the event date. To obtain the abnormal return, we calculate the fitted value as the normal return for each observation, and then subtract the normal return from the raw return.

The regression results from Table 4 are re-estimated using the four-factor model and presented in Table 9. The results in Table 9 show that even with different estimates of excess returns, the regression coefficients for CEOs, Psurprise*FCEO and Nsurprise*FCEO, are significantly negative, consistent with the results from Table 4. This indicates that a company's earnings information is generally less favourable for female CEOs; i.e., when a company's actual earnings exceed expectations, the stock market's positive reaction is smaller, but when a company's actual earnings fall below expectations, the stock market's negative reaction is stronger. There is less difference in companies with female CFOs, indicating that gender differences are more strongly associated with the CEO position than with the CFO position, which is consistent with the results from Table 4.

Table 9
Regression results: Four-factor model

Variables	AR121				AR2121			
	CEO		CFO		CEO		CFO	
	Estimate	VIF	Estimate	VIF	Estimate	VIF	Estimate	VIF
Intercept	–0.0055 (–0.18)	0.0000	0.0012 (0.04)	0.0000	0.0120 (0.58)	0.0000	0.0094 (0.45)	0.0000
Psurprise	0.3536 *** (3.85)	1.4532	0.2723 *** (2.69)	1.7508	0.0351 (0.56)	1.4532	–0.0275 (–0.4)	1.7508
Nsurprise	0.0057 (0.13)	2.0147	–0.1220 *** (–3.6)	1.1649	0.0168 (0.55)	2.0147	–0.0495 ** (–2.14)	1.1649
Psurprise*FCEO	–0.4183 ** (–2.32)	1.3618	-	-	–0.3321 *** (–2.69)	1.3618	-	-
Nsurprise*FCEO	–0.2545 *** (–3.97)	1.9327	-	-	–0.1245 *** (–2.84)	1.9327	-	-
Psurprise*FCFO	-	-	–0.0648 (–0.41)	1.6419	-	-	–0.0537 (–0.5)	1.6419
Nsurprise*FCFO	-	-	0.0719 (0.61)	1.1350	-	-	0.0895 (1.12)	1.1350
FCEO	–0.0102 (–1.2)	1.0713	-	-	–0.0005	1.0713	-	-
FCFO	-	-	–0.0036 (–0.67)	1.1036	-	-	0.0027 (0.73)	1.1036
Controls variables	Yes		Yes		Yes		Yes	

(*Continued on next page*)

Table 9 (*Continued*)

Variables	AR121				AR2121			
	CEO		CFO		CEO		CFO	
	Estimate	VIF	Estimate	VIF	Estimate	VIF	Estimate	VIF
T-test Psurprise + Psurprise*FCEO	0.17				7.57 ***			
T-test Nsurprise + Nsurprise*FCEO	27.71 ***				11.10 ***			
T-test Psurprise + Psurprise*FCFO	-		2.73*		-		0.89	
T-test Nsurprise + Nsurprise*FCFO	-		0.19		-		0.27	
Adj. R^2	0.0605		0.0554		0.0735		0.0698	
F-statistic	4.90***		4.60 ***		5.80 ***		5.61 ***	
Year fixed effect	Yes		Yes		Yes		Yes	
Industrial fixed effect	Yes		Yes		Yes		Yes	

Notes: Table 9 is the sensitivity test of AR regression, and it is divided into different time period between announcement day–1 and day+21 (AR121), and announcement day–21 and day+21 (AR2121). ***, ** and * denote statistical significance at the 1%, 5% and 10%, respectively, and the ( ) is the *t*-value.

Furthermore, the regression results from Table 7 are re-estimated using the four-factor excess returns in Table 10, and the estimated results remain largely the same, indicating the stock market's response to earnings information is less favourable for female CEOs.

Table 10
Regression results: Further analysis from four-factor model

Variables	AR121	AR2121
	Estimate	Estimate
Intercept	0.0006 (0.02)	0.0157 (0.7)
Psurprise	0.4958*** (3.88)	0.1271 (1.45)
Nsurprise	0.0150 (0.31)	0.0124 (0.38)
Psurprise*FCEOCFO	–0.5587** (–2.78)	–0.4190*** (–3.05)
Psurprise*CEOFCFO	–0.2871 (–1.62)	–0.1917 (–1.58)
Psurprise*FCEOFCFO	–2.7803 (–0.29)	–0.4223 (–0.07)
Nsurprise*FCEOCFO	–0.2630*** (–3.94)	–0.1198*** (–2.62)
Nsurprise*CEOFCFO	–0.0493 (–0.4)	0.0323 (0.39)
Nsurprise*FCEOFCFO	–90.4004 (–0.55)	52.3226 (0.47)
FCEOCFO	–0.0110 (–1.19)	0.0005 (0.07)
CEOFCFO	–0.0031 (–0.57)	0.0036 (0.94)
FCEOCFO	–0.0108 (–0.46)	–0.0089 (–0.55)
Controls variables	Yes	Yes
Adj. R^2	0.0599	0.0728
F-statistic	4.51***	5.32***
Year fixed effect	Yes	Yes
Industrial fixed effect	Yes	Yes

Notes: Table 10 is the sensitivity test of AR regression, and it is divided into different time period between announcement day–1 and day+21 (AR121), and announcement day–21 and day+21 (AR2121). ***, ** and * denote statistical significance at the 1%, 5% and 10%, respectively, and the ( ) is the *t*-value.

CONCLUSIONS AND RESEARCH RECOMMENDATIONS

Based on Crijns et al. (2017) and Liu and Nguyen (2020), female and male executives have different behaviours and decision-making activities due to their different personalities. In recent years, more and more women have become senior executives and company leaders. Studies have shown that women are more conservative and men are more radical. This study assumes that when women become CEO, the company will be more stable but grow slowly. On the contrary,

when the CEO is male, the company will be riskier but grow faster. When the company has a female CFO, investors will feel more trust in the company's finances and believe it will have a better stock price return. This study adds good news and bad news as factors to discuss the impact of executive gender on stock price and recommendation score. The research results show that when a company announces bad news, neither female nor male executives can mitigate the negative impact on the stock price, and that female executives bring a greater negative impact. Also, when a company releases good news, investors will continue to look down on companies led by female CEOs, and the stock price returns will be lower. Therefore, there is a significant negative relationship between CEO gender and stock price. This study mainly uses the earnings surprise as a measurement to distinguish good news from bad news. However, judgments of good news and bad news can be based on other information. Perhaps women's status in society has indeed improved, but because the results of this study are mainly based on accounting information. As a result, the probability of bad news happening is generally low. When accounting information is used to measure good news and bad news, there may be the possibility of incomplete reactions from the market.

This study explores investors' gender preference for executives from the perspective of stock price returns. Therefore, the results of this study are useful for expanding the related research on the social status of women. In addition, the gender of executives can be added as an effective variable in predicting stock prices in follow-up studies to predict stock price returns. This study shows that gender has an impact on stock price returns. This study suggests that future research extend the observation period or examine the impact of female executives on companies from perspectives other than accounting information. Also, this study mainly estimates the reaction of stock prices and recommendation scores using short-term observations. If the observation period is extended to years, the impact of female executives on the company may be different.

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APPENDIX

Variable definition

Dependent	Definition
AR	The annual market-adjusted return defined as the annual return of (Ri–Rm) between the announcement day–1 and day+21, announcement day–21 and day+21. This study first deletes the absolute vale of Ri which is greater than 0.6 and then calculates the mean value of Ri minus Rm between announcement day–1 and announcement day+21. Finally, the study annualizes the mean value of Ri minus Rm to become the AR data.
REC	The mean change of recommendation score between the announcement day–7 and day+7, announcement day–14 and day+14, announcement day-30 and day+30 as well. The recommendation score is the evaluation of analysing the company from analysts. They use five suggestions including strong buy, buy, hold, underperform, and sell to advice investors. This study digitizes the suggestions into five grades, from the best 5 to the lowest 1.
Revision	The dummy variable of the recommendation score revision between announcement day–7 and day+7, day–14, and day+14, day–30 and day+30 as well. This study divides the revision into the upward adjustment and the downward adjustment of analyst recommendation score. If there are more than one analyst revise the recommendation score between the above time period the dummy variable presents 1; otherwise, it is 0.

Independent	Definition
Psurprise	The degree of good news variable which is the absolute value of actual EPS-consensus earnings forecast.
Nsurprise	The degree of bad news variable which is the absolute value of actual EPS-consensus earnings forecast.
FCEO	The dummy variable of female CEO when the CEO gender is female then it equals 1, and 0 otherwise.
FCFO	The dummy variable of female CFO when the CFO gender is female then it equals 1, and 0 otherwise.
FCEOCFO	The dummy variable of female CEO and male CFO. When the CEO gender is female and CFO gender is male, it equals 1, and 0 otherwise.
CEOFCFO	The dummy variable of male CEO and female CFO. When the CEO gender is male and the CFO gender is female, it equals 1, and 0 otherwise.
FCEOFCFO	The dummy variable of female CEO and female CFO. When both CEO and CFO gender are female, it equals 1, and 0 otherwise.
Control variable	**Definition**
CEOAGE	The age of the female CEO in years.
CFOAGE	The age of the female CFO in years.
Analyst	The number of analysts following company before the fiscal year end 365 days.
BM	Book-to-market ratio (total book value of equity divided by the firms' market capitalisation).
BSIZE	Natural logarithm of total directors of each company.
BIND	The percentage of independent directors within each company.
AltmanZ	A variable measured by Z-score. Firms with high Z-ccore, indicating less likelihood of financial distress, are less likely to have adverse analyst coverage reactions. Z-score equals to 1.2 (Working Capital/Total Asset) +1.4 (Retained Earnings/ Total Asset) +3.3 (Earnings Before Interest And Taxes/Total Asset) +0.6 (Market Value Of Equity/Book Value Of Liabilities+1 (Sales/ Total Asset).
COMP	The percentage rank of the CEO's or (CFO's) compensation which is equals to (Salary + Bonus + Other Annual + Restricted Stock Grants + LTIP Payouts + All Other + Value of Option Grants). The rank is group by the company size, Industry, and the firm year.
SIZE	A variable measures the natural log of total market value of equity.

CAGE	The age of the company in years.
DUAL	The situation where one person serves as both CEO and chairman of the board in a particular company. When the same person holds the position of chairman and CEO, it equals 1, and 0 otherwise.
FCF	Free cash flow equals to (Operating Income Before Depreciation – Total Taxes –The Gross Interest Expenses on Short- and Long–Term Debts – Total Dividend On Preferred Shares And Ordinary Shares)/ Total Assets in Previous Year.
LEVGE	The firm's leverage is measured as the sum of long-term debt and debt in current liabilities deflated by equity's market value at the end of the fiscal year.
P.E.	The price-to-earnings ratio is the ratio for valuing a company that measures its current share price relative to its per-share earnings
ROE	Return on assets defined as income before extraordinary items scaled by total assets in year *t.*
TENURE	The number of years since the CEO is appointed to its CEO position.