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*Published in:*  
Emerging Markets Review

*DOI:*  
[10.1016/j.ememar.2022.100941](https://doi.org/10.1016/j.ememar.2022.100941)

*Publication date:*  
2022

*Licence:*  
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*Document Version*  
Publisher's PDF, also known as Version of record

[Link to publication in Discovery Research Portal](#)

*Citation for published version (APA):*  
Wang, Y., Zhang, Y., Kang, W., & Ahmed, A. H. (2022). Female analysts and COVID-19 corporate donation. *Emerging Markets Review*, 53, Article 100941. <https://doi.org/10.1016/j.ememar.2022.100941>

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## Female analysts and COVID-19 corporate donation

Yang Wang<sup>a,\*</sup>, Yifei Zhang<sup>b</sup>, Wei Kang<sup>c</sup>, Ahmed Hassan Ahmed<sup>a</sup>

<sup>a</sup> School of Business, University of Dundee, Dundee, Scotland, UK

<sup>b</sup> School of Accounting and Finance, Faculty of Business, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong, China

<sup>c</sup> Anglia Ruskin University, Bishop Hall Ln, Chelmsford, England, UK

### ARTICLE INFO

#### JEL classification:

G30

J16

M14

#### Keywords:

Female analysts

COVID-19

Corporate social responsibility

China, donation

### ABSTRACT

This paper examines the impact of female analysts' coverage on firm's philanthropic activities amidst the outbreak of the COVID-19 pandemic in China. Using a hand-collected dataset of corporate philanthropy, the paper provides robust evidence that firms covered by female analysts are more likely to contribute actively to the well-being of societies by increasing corporate donation. This positive relationship is more pronounced if the company is privately controlled or covered by female analysts with more working experience, or located in more infectious provinces. Overall, our findings call for more female analyst recruitment, yielding benefits of pressuring firms to engage in philanthropy.

### 1. Introduction

The global level of socially responsible investment has grown rapidly in recent years, reaching \$30.86 trillion in 2018 (Global Sustainable Investment Alliance, 2018). The rise reflects pressure on companies from a range of different stakeholder groups to contribute to social welfare by engaging in environmental, social and governance practices (Ahmed et al., 2019). Corporate social responsibility (CSR) involves a range of corporate activities to meet perceived stakeholder obligations and our study focuses on an increasingly important yet understudied area of CSR, that is, the decision to make charitable donation. The existing literature has long been interested in studying how firm-level governance factors such as CEO and board characteristics (Chin et al., 2013; Tang et al., 2015), institutional ownership (Neubaum and Zahra, 2006), and assurance from big auditors (Clarkson et al., 2019) affect corporate donation and other types of CSR practices. However, they neglect the fact that financial analysts may play an important role in affecting corporate philanthropy. Analysts can reduce information asymmetry between management and outside investors, thereby alleviating agency problems and enhancing internal corporate systems (Miller, 2006). External monitoring by analysts may increase a firm's CSR information exposure, thereby putting more public pressure on firms to increase CSR engagement (Jo and Harjoto, 2014). Moreover, prior literature reports gender differences in financial analysts' earnings forecasts (Green et al., 2009), risk preference (Croson and Gneezy, 2009), competence (Kumar, 2010), and their recommendation issuing process (Bosquet et al., 2014). However, very few studies explore the benefits of gender diversity in the financial analyst profession, especially from the perspective of increasing CSR practices. Subsequently, our paper aims to fill this literature gap by focusing on the impact of female analysts' coverage on firm's philanthropic activities in China during the COVID-19 pandemic.

We manually collected corporate donation made by Chinese listed firms during the pandemic outbreak. The donation amount

\* Corresponding author.

E-mail addresses: [ywang001@dundee.ac.uk](mailto:ywang001@dundee.ac.uk) (Y. Wang), [yifei.zhang@polyu.edu.hk](mailto:yifei.zhang@polyu.edu.hk) (Y. Zhang), [wei.kang@aru.ac.uk](mailto:wei.kang@aru.ac.uk) (W. Kang), [a.h.a.ahmed@dundee.ac.uk](mailto:a.h.a.ahmed@dundee.ac.uk) (A.H. Ahmed).

<https://doi.org/10.1016/j.ememar.2022.100941>

Received 19 August 2021; Received in revised form 15 June 2022; Accepted 24 June 2022

Available online 28 June 2022

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consists of cash and non-cash components such as masks, ventilators, etc., given that non-cash donation is considerably valuable during the pandemic. Using data from 512 Chinese listed firms, we find that firms covered by female financial analysts donated a more considerable amount than those not. We further find that this relationship is more pronounced for firms covered by female analysts with a longer working experience, and firms that are privately controlled as well as firms located in highly infectious regions. Beyond that, we empirically prove that firm site visit is an important channel through which female analysts affect corporate donation. Moreover, we use a two-stage least squares approach to address endogeneity concern, and our reported results are robust against a battery of alternative tests.

Our research is firstly motivated by the benefits from engaging in CSR activities. More specifically, firms can enjoy increased stock returns (Wang et al., 2011), lower cost of capital (Ahmed et al., 2019), lower risks (Jo and Harjoto, 2014), building or maintaining positive reputation, higher sales and favorable treatments by regulators and government officials (Xu et al., 2020). Furthermore, CSR activities can be regarded as a special type of investment, which helps firms establish competitive advantage over their market competitors (Wang and Zhang, 2020). Subsequently, it is important to understand the determinants affecting CSR engagement. Serving as an information medium, analyst coverage is an important mechanism to alleviate agency problems between firms and external stakeholders and improve organizational visibility (Zhang et al., 2015). Managers may value analysts' opinions highly and undertake optimal policies to meet stakeholders' interests.

This paper is also motivated by the impact of COVID-19 on firm socially responsible behaviours. On one hand, the pandemic has witnessed many enterprises being proactively engaged in socially responsible activities (Liu et al., 2020). For example, the *Global Times* (2020) reported that 14 million items of medical supplies, such as face masks, testing kits, and thermometers, have been donated worldwide from Chinese firms such as Alibaba or Fosun. In addition, tech companies with substantial operations in China, such as Apple, donated millions of dollars in medical resources in the initial stages of the coronavirus outbreak to protect their workforce (Ballesteros and Magelssen, 2021). On the other hand, some companies have chosen to pursue short-term gains by reducing or abandoning their social commitments. Due to financial constraints, these firms are more likely to use financial resources to support their own operations rather than fulfilling social responsibility (He and Harris, 2020). Given the heterogeneity of these social practices, it is necessary to understand what drives firms to be more socially responsible, especially in the face of the damaging impact posed by the pandemic, which constrains firms' resources and long-term viability.

The drivers of philanthropic activities in stable institutional settings can be different from those in disrupted conditions, as firms will be fighting for their survival by pulling together with governments and non-investing stakeholders for the restoration of economic institutions (Ballesteros and Magelssen, 2021). The extant literature suggests that firms operating in disaster areas contribute more towards disaster relief efforts (Muller and Whiteman, 2009). Therefore, our study also examines the association between female analysts and corporate donation whilst taking the COVID infection level of different regions into consideration.

This study makes two major contributions to the extant literature. First, we expand earlier research on analyst coverage and gender diversity. Most previous research on financial analysts tend to focus on their impact on firm value, earnings forecasts, earnings quality, governance practices and acquisition decisions (Hong et al., 2000; Green et al., 2009; Chen et al., 2015). This study investigates gender heterogeneity in financial analysts' profession in pressuring investee firms to engage in philanthropic practices. More specifically, we argue that female analysts are more caring, ethical, rational, and focus more on communicating and disseminating information than their male counterparts (Huang and Kisgen, 2013). Subsequently, female analysts exert more pressures on firms to engage actively in CSR activities and are expected to show more sympathy towards societal concerns such as the ones caused by the COVID-19 pandemic, and thereby encourage their investee firms to engage in philanthropic activities. Moreover, our paper is the first that examines the impact of female analysts on corporate donation whilst incorporating analysts' working experience. In this regard, our findings have practical implications in calling for increased recruitment of female analysts, especially those with greater working experience to the securities firms and other professional investment institutions.

Second, this is one of the first papers that examine the channel on how female analysts affect corporate donation. Previous research such as Zhang et al. (2015) and Cheng et al. (2016) find that greater analyst coverage is linked to enhanced analyst forecast accuracy and better CSR performance. We extend this stream of research by examining whether female analysts can use "informal channels" to incentivize managers to engage more in CSR activities. In particular, firm visits enable female analysts to capture a wide range of information not only about financial performance, but also about work safety, employee welfare, corporate contribution to society. If female analysts learn about negative information during the firm visits, they may downgrade firm ratings and even disclose such information in the analyst report. Firm managers who can anticipate such economic consequences of firm visit are more likely to improve CSR performance, in order to release positive signals to markets and avoid future financial losses. Consistent with this view, our study provides empirical evidence that female analysts utilize site visits to talk to the management team and exert ethical pressures on firms to engage in more philanthropic activities during the pandemic.

The study is organized into five sections. After this introduction, we review the pertinent literature and present hypotheses in Section two. The third section outlines the methods, and the fourth section provides results. Lastly, we conclude the paper and discuss some policy implications.

## 2. Literature review and hypotheses development

### 2.1. Financial analysts, CSR practices, and channels of analyst influence

Financial analysts substantially influence investor opinion and share price. Hence, analyst coverage and preferences can have a causal effect on firms' investment and financial policies (DeGeorge et al., 2013). Therefore, managers consider analysts' reports highly

important. Theoretically, analyst reports should include all the relevant financial and non-financial information that analysts use to support their share recommendation (Derrien and Kecskés, 2013). Recent findings suggest that financial analysts increasingly make use of non-financial information to make predictions over time. For instance, Dhaliwal et al. (2012) find that CSR disclosure is complementary to corporate financial disclosure, and financial analysts tend to utilize CSR information to predict more accurate earnings estimates and reduce forecasting errors. Subsequently, analysts' demand for CSR information is high, leading to increasing incentives for firms to fulfil their social responsibility (Jo and Harjoto, 2014). From firms' perspective, corporate disclosure of CSR can reduce information asymmetry between firms and their stakeholders. In this regard, firms can not only make business practices more transparent to analysts and investors but also better respond to societal pressures (Zhang et al., 2015).

Analysts, especially female financial analysts, are more sympathetic and consider the needs of wide-ranging stakeholders (Konrad and Kramer, 2006). In this regard, female analysts are more likely to consider CSR-related firm decisions and increase firms' CSR information exposure to different stakeholders (Hu et al., 2021). If female analysts learn negative information about firms' CSR practices, they tend to make sell recommendations, and investors would not purchase the firm stocks. Subsequently, managers are more likely to use their CSR activities to send positive signals to female analysts whilst withholding bad news (He and Tian, 2013). Therefore, firms have more incentives to engage in philanthropic activities and try to impress female analysts with their CSR practices during their firm visit to obtain favorable ratings and recommendations (Hu et al., 2020).

We argue that female analysts can use 'informal channel' to put pressure on managers to engage in more CSR practices. Such an informal channel is linked to female analysts' phone calls with managers and/or corporate site visit. More specifically, analysts examine public information released by listed firms as basic information to serve fund managers and investors for investment advice. However, such a 'formal information channel' is often less valued in the information contexts of analysts. Subsequently, private information is needed to enhance the accuracy of their forecast (Graaf, 2021). To access private information, analysts may have private conversations with management via phone calls with the CEOs or CFOs (Brown et al., 2015), or corporate site visits (Cheng et al., 2016). These 'informal communication channels' with management provide analysts with a deeper insight into a firm's operations and an opportunity to build a closer relationship with management. Evidently, analysis of survey data collected from 365 U.S. financial analysts indicates that 98.4% of financial analysts have direct contacts with the CEOs or CFOs at least once a year (Brown et al., 2015). In China, analysts tend to conduct firm site visit to learn more information on a firm's fundamentals and ask questions to managers during the site visit on the matters that concern them the most (Cheng et al., 2016). Subsequently, managers are likely to take more actions following analysts' inquiries. Such informal channels provide a venue for analysts to express their concerns and push managers to fulfil more social responsibilities such as philanthropic donation.

Corporate site visit becomes increasingly important for analysts to acquire additional information, as it enables financial analysts to observe a firm's operation and directly talk with managers and directors, ultimately reducing information asymmetry between managers and analysts (Hu et al., 2020). The effects of corporate site visits have been examined in terms of improving analysts' forecast accuracy (Cheng et al., 2016), increasing stock returns (Hong et al., 2019) and encouraging corporate environmental investment (Hu et al., 2020). Female analysts are generally more socially oriented, exhibiting more communal characteristics, such as showing greater empathy and caring for others (Wang et al., 2021a, 2021b). Subsequently, female analysts are more likely to ask questions and tend to actively express their concerns over CSR issues and exert pressure on managers to fulfil social responsibilities on the visit. According to the *Listing Rules of Shen Zhen Stock Exchange*, financial analysts' visiting records need to be publicly disclosed by listed firms. Such disclosure may trigger negative stock market reaction if it reveals potential problems on firms' CSR practices. As a result, managers have greater incentives to fulfil social responsibilities such as philanthropic donation to prevent any adverse stock market reaction from occurring (Hu et al., 2020).

## 2.2. Review of prior findings: financial analysts and firm activities

Most previous research on financial analysts and firm activities focuses on how financial analysts affect corporate financial decisions. As analysts have greater ability in revealing additional information to outsiders, investors often put large weights on analysts' reports and recommendations during their decision making. If positive information is released by analysts, firms are more likely to get greater access to external financing. Subsequently, additional capital in turn enables firms to fund more productive projects and attract greater investments (To et al., 2018). Apart from being an information intermediary, financial analysts also play a significant role in deterring corporate fraudulent activities. This is because financial analysts have expertise in accounting and finance fields and have greater understanding of complex financial statements and footnotes (Yu, 2008). As a result, firms with greater analyst coverage are less likely to manipulate earnings. Nevertheless, some studies have pointed the dark side of the analyst coverage. For instance, firms followed by greater financial analysts are subject to more pressure from managers to meet short-term financial goals, which impedes a firm's investment into innovation (He and Tian, 2013).

An increasing number of studies have examined the association between financial analysts and social activities. However, empirical findings are mixed. On the one hand, financial analysts as an external mechanism can disseminate social-related (e.g., CSR-related) information and ease information asymmetry between management and stakeholders. This in turn, encourages firms to engage in more socially responsible activities (Hinze and Sump, 2019). For instance, Zhang et al. (2015) find that firms that are followed by more analysts face greater social pressures, and consequently, behave more ethically and are more likely to engage in philanthropic activities. On the other hand, some studies argue that firms followed by greater analysts tend to be less socially responsible. Specifically, Adhikari (2016) suggests that firms with greater analyst coverage are subject to more pressure to meet short-term financial objectives. As a result, managers may cut back on discretionary spending on CSR activities.

### 2.3. Hypotheses development

#### 2.3.1. Female analysts and corporate donation

We argue that corporate donation is more pronounced in firms followed by more female analysts. Social role theory suggests that human behaviours are inherent in social roles (Eagly, 1997). Women place greater emphasis on communicating, networking, and establishing bonds via social interactions (Kimbrough et al., 2013; Wang et al., 2021a, 2021b). Additionally, females are more likely to maintain good interpersonal relationships and consider the well-being of others (Huang and Kisgen, 2013). In the event of disasters, they tend to be more caring and sympathetic. Therefore, women value social responsibilities highly relative to their male counterparts. Such differences support the notion that female analysts demand more corporate CSR disclosure and engagement, especially during COVID-19, since CSR is considered as a beneficial way for most stakeholders surviving from the crisis. Moreover, greater female analyst coverage will increase the attention that firms receive from the capital market, which reinforces the transformation of the CSR participation into value-enhancing activities, and this in turn would provide greater motivation for firms to fulfil social responsibilities, such as charitable giving (Hinze and Sump, 2019).

Compared to their male counterparts, females tend to be less overconfident and risk-taking (Barber and Odean, 2001). For instance, female analysts' earnings forecasts are generally more conservative than male analysts (Lonkani, 2019). In contrast, the overconfidence of male analysts often leads to underestimation of risks, including CSR relevant risks. As such, the overconfidence of male analysts may cause firms to withhold or delay information disclosure of adverse CSR news to investors, whereas female analysts tend to demand higher information disclosure level from firms, and use CSR-related information to reduce their forecasting errors (Ahmed et al., 2017).

Female analysts may visit firms to obtain more information by observing the operations of the business and communicating with managers, especially the information that they care the most. In this way, female analysts can exert more pressure on managers to improve CSR engagement (Yin et al., 2018). In line with this reasoning, Hu et al. (2020) find that financial analysts' and institutional investors' site visits increase corporate CSR information exposure to stakeholders. This in turn will increase ethical and social pressure on firms and motivate firms to make more philanthropic donation. Accordingly, we develop the first hypothesis as follows:

**H<sub>1</sub>** : *Female analyst coverage is positively associated with corporate donation during the COVID-19 pandemic.*

#### 2.3.2. Female analysts, working experience, and corporate donation

This study further investigates the boundary condition of analysts' working experience on the relationship between female analyst coverage and a firm's donation. Female analysts with longer working records in the industry are expected to have more skills and deeper knowledge (Clement, 1999). Therefore, they are more likely to identify and bring attention to firm policies that do not serve shareholders' best interests (Bradley et al., 2017). In addition, experienced female analyst coverage can have the effects of reducing managers' incentives to engage in self-serving behaviours, providing an impetus for directors to enhance their CSR performance such as an increased corporate donation. Moreover, high-quality female analysts are influential, and their ratings significantly impact the market (Boivie et al., 2016). Therefore, managers perceive more pressure of meeting or beating the expectations of these experienced female analysts. This leads to the following hypothesis:

**H<sub>2</sub>** : *The positive relationship between female analyst coverage and corporate donation is stronger for firms with greater experienced female analysts.*

#### 2.3.3. Female analysts, ownership structure, and corporate donation

This section examines whether the role of female analyst coverage in corporate donation is conditional on firm ownership. Prior empirical findings are mixed with regards to the impact of state ownership on firm donation. On the one hand, SOEs have substantial political connections with government officials (Marquis and Qian, 2014). Subsequently, for SOEs, besides shareholder wealth maximization, they also have socio-political responsibilities such as maintaining social stability, and they are expected to act as a role model for their private counterparts (Xia et al., 2009). In this sense, SOEs may have incentives to engage in CSR practices such as philanthropic donation (Kuo et al., 2012). On the other hand, some studies suggest that SOEs may cause damages to society and market (Yu, 2014). For instance, SOEs could abuse their market power, taking advantage of monopoly pricing and setting high product or service prices. In addition, compared to private firms, SOEs enjoy greater government financial support such as they often have preferential access to bank loans and equity funding (Guo et al., 2009; Cull et al., 2015). SOEs also enjoy more favorable policies on market access, tax treatment, land use rights, and technological development funds (Hua et al., 2006; Yang et al., 2014). Accordingly, the incentives of using philanthropic donation to build a socially responsible image to attract potential investors or impress stakeholders are low for SOEs.

Previous studies such as Boubakri et al. (2008) find that SOEs exhibit poor financial performance than non-SOEs. Managers of SOEs often attribute such poor performance to the policy burdens imposed by the central or local governments. In turn, the government will further bail out the financially constrained SOEs through subsidies (Lin et al., 2020). Consequently, SOEs have less pressure to behave in socially acceptable ways and may not actively engage in donation, despite the COVID-19 pandemic calling for greater support from enterprises to societies or communities.

In contrast, private firms obtain less financial support from the government and have a greater dependence on external funding from the capital market. Private firms, therefore, are more sensitive to the discipline of outside investors through the stock market. This is especially the case in the context of the pandemic, as firms face increasing financial pressure. The socially responsible donation is considered as an ethical investment to improve corporate image and generate long-term sustainable profit (DesJardine, 2015). As a result, managers in private firms have incentives to donate to fulfil their social responsibilities and obtain favorable recommendations



from female analysts. Not meeting such social expectations could be considered a managerial failure in private firms, leading to lower analyst stock ratings and loss of investor confidence (Clement and Tse, 2003). Accordingly, we develop our hypothesis as follows:

**H<sub>3</sub>** : *The positive association between female analyst coverage and corporate donation is stronger for private firms.*

#### 2.3.4. Female analysts, corporate donation, and regional impact of COVID-19

The provincial impact of COVID-19 could be another institutional factor accounting for the variation in corporate philanthropic giving. The literature on philanthropy suggests companies' philanthropic behaviours vary across nations (Jose and Lee, 2007) and regions (Muller and Whiteman, 2009). The institutional context in which organizations are embedded differs in pressures originating from the social structures or social media (Marquis et al., 2007). Evidently, Depoux et al. (2020) find that social media panic is created among the public during the pandemic and it 'travels' faster than the virus. In this sense, we argue that firms in highly infectious provinces face higher societal pressure than those in less infectious provinces.

The spread of the COVID-19 pandemic was different across regions. Some provinces such as Guangdong, Henan, Hubei, and Hunan reported greater number of confirmed cases. These provinces, given the higher population density, larger scale, and greater residential mobility, became the worst-hit areas, and suffered significant losses (Huang et al., 2020). With the severe pandemic, the demand for sanitary and medical care products increased significantly. Consequently, these provinces have attracted greater attention whilst receiving more support from the central government and the public. In addition, restriction measures, e.g., social-distancing and lockdown, to manage pandemics are severer than those provinces with lower infectious rates, which in turn have a greater impact on people's lives. Therefore, firms have greater incentives to donate more in the highly affected areas.

Furthermore, China has a heavy emphasis on relationships or informal channels, particularly of the government's connections to access various resources. CSR has become an integral part of business strategy in China arguing it is a means by which the company seeks to extract benefits, particularly from the government (Gu et al., 2013). In this institutional context, CSR awareness has been improved significantly among companies, particularly in these highly infectious provinces. As such, we expect firms in these highly contagious provinces are more proactive in philanthropic giving. Accordingly, our hypothesis is developed as follows:

**H<sub>4</sub>** : *The positive association between female analyst coverage and corporate donation is stronger in the province with more reported COVID-19 cases.*

### 3. Data, variables, and methodology

#### 3.1. Data and variables

Our data relating to corporate donation is manually collected from the China Association for Public Companies (CAPCO) website.<sup>1</sup> Sell-side analyst information,<sup>2</sup> corporate governance, and financial data are collected from the China Stock Market and Accounting Research (CSMAR) and China Center for Economic Research (CCER) Databases. After removing missing values from all independent and control variables, the donation cases for examinations are 512 in the baseline regression specifications.

Our donation data ranges from January 27th, 2020 to April 30th, 2020, and we believe that this is a proper range to choose from for the following two reasons. First, January 27th, 2020, was selected to be the initial date as the China Association for Public Companies initiated a campaign named 'Fight against COVID-19 pandemic, actions are needed from listed firms!' on that date,<sup>3</sup> calling for greater support and philanthropic activities from listed firms to fulfil their social responsibilities in response to the pandemic. In addition, the most updated corporate donation information disclosed by CAPCO ended on April 30th, 2020, which marks the end of this campaign. One possible explanation is that mainland China has largely brought the pandemic under control by April 30th, 2020. For instance, based on official data released by the Chinese Center for Disease Control and Prevention, China reported 12 cases on April 30th, 2020, and a total of 59 confirmed cases over that week (China CDC, 2021). Second, according to the official information released by the State Council, China entered a new stage of fighting against the pandemic – 'ongoing prevention and control' since April 30th, 2020. This stage indicates that the wave of the COVID-19 has been largely under control. There are only sporadic cases reported each day, and nationwide COVID-19 control is conducted on an ongoing basis. People's work has been resumed and schools have reopened (State Council Information Office, 2020).<sup>4</sup> Subsequently, it would be inappropriate to include corporate donation after this date, as the

<sup>1</sup> Established in February, 2012, China Association for Public Companies (CAPCO) is a self-disciplinary and non-profit organization, which operates under the supervision of the China Securities Regulatory Commission. The CAPCO shares updated regulatory requirements, organizes entrepreneurship forum, and disseminates timely corporate information such as earnings and donation to the public on their website. As the most updated donation information disclosed by CAPCO ended on April 30th, 2020, our sample period is between January 27th, 2020 and April 30th, 2020.

<sup>2</sup> Financial analysts are always referred to sell-side financial analysts. The sell-side financial analysts often work for brokerage firms. They follow a series of firms to provide regular research reports for the firms' brokers and clients. Sell-side financial analysts need to visit firms and speak to firm stakeholders in order to produce more accurate analyst forecast on corporate earnings, and make recommendations that will result in purchasing or selling or firm shares (Cheng et al., 2006). In contrast, buy-side financial analysts often work for asset management firms. Buy-side financial analysts tend to conduct fundamental research and make internal forecast exclusively to their firms' portfolio managers (Jung et al., 2018). However, as these internal forecasts and recommendations are not publicly disclosed, our research only focuses on sell-side analyst information.

<sup>3</sup> The detailed information on this campaign can be found in the CAPCO's official website: <https://www.capco.org.cn>

<sup>4</sup> More information can be found in the 'White paper: Fighting COVID-19: China in action' published by the China's State Council (2020) at: [http://t.m.china.com.cn/convert/c\\_xC28nFn8.html](http://t.m.china.com.cn/convert/c_xC28nFn8.html)

purpose of donation may not be directly related to fighting against the pandemic.

The corporate donation amount is the dependent variable, which is measured as the natural logarithm of a firm's donation amount during the CAPCO's campaign following China's COVID-19 outbreak. Total donation amounts include cash and non-cash donation. The non-cash donation includes personal protective equipment and other medical supplies, and we estimate the market value of these non-cash donation by using the unit market price obtained from the Aicagou platform.<sup>5</sup> Following Black and Khanna (2007), all variables are winsorized at their 5% and 95% quantiles.

According to previous studies such as Chen et al. (2016), analyst coverage can be proxied as the number of analysts following the firm. Analysts following a firm means that financial analysts study a listed firm, produce analyst reports and make recommendations on purchasing or selling firm shares. Subsequently, we define 'Female' as the number of female analysts to the total number of analysts following a firm. The variable 'experience' is included to examine hypothesis 2. Following Li et al. (2020), analysts' working experience is measured as the number of quarters from an analyst's first appearance in the CSMAR database to the end of the year 2019. In this research, we first calculate analysts' working experience and then define 'experience' as a dummy variable that equals one if an analyst's working experience is above the sample median and zero otherwise. To examine hypothesis 3, the variable 'Private' is introduced as a dummy variable which equals one if the ultimate controller of a firm is the private owner and zero otherwise. Lastly, to examine hypothesis 4, the variable 'High-infection' is introduced. To build this variable, the number of confirmed COVID-19 cases across different provinces in mainland China (until 30th April 2020) is summarized. Then, 'High-infection' is defined as a dummy variable that equals one if the total number of reported COVID-19 cases in a province is above the sample median and zero otherwise.

A series of control variables are also included in our model. First, shareholder activism is controlled, which is measured as the number of shareholder meetings annually. Active shareholders can file proposals or resolutions during the shareholder meetings and pressure a firm to respond to CSR issues (Sjöström, 2008). Thus, greater shareholder activism encourages firms to take part in socially responsible activities such as donation (Uysal, 2014). Following Liu et al. (2018), board related variables are controlled, including CEO duality (defined as a dummy variable that equals one if the CEO also serves the position of chairman and zero otherwise) and board size (defined as the number of directors on the board). Giannarakis (2014) reports that a larger board size can foster the wider exchange of ethical ideas such as CSR, whereas CEO duality reduces checks and balances and makes CEOs less accountable to stakeholders. Additionally, CEO political connection is controlled. This is a dummy variable that equals one if the CEO of a firm is currently or had previously served in government or military, or the National People's Congress or the Chinese People's Political Consultative Conference and zero otherwise. According to Muttakin et al. (2018), firms with politically connected CEOs tend to focus on maximizing financial benefits, rather than allocating resources to socially responsible activities. In fact, politically connected CEOs may take advantage of their political connections to escape from regulatory actions that might come from stakeholder pressure. The proportion of female corporate leaders is also controlled. Firms with a higher proportion of female corporate leaders tend to contribute more to philanthropic activities as they are more likely to concern for others when making decisions (Williams, 2003). Furthermore, institutional ownership is controlled, which is defined as the proportion of shares held by the institutional shareholders. Oh et al. (2017) suggest that monitoring by institutional investors results in firms making decisions in line with shareholders' long-term interests. Subsequently, firms with greater institutional investments are more likely to exert pressure on firms to engage in socially responsible activities.

A few financial performance variables are also included. Liang and Renneboog (2017) find that firm charitable donation is positively related to different measures of firm value and profitability. In other words, firms with better financial records are more likely to make greater amounts of charitable donation. Consequently, we control Tobin's Q (the ratio of market value of equity to total assets), return on assets (the ratio of net profits to total assets) and net profit margin (the ratio of net profits to total revenue). Stock returns are also included. According to Muller and Kräussl (2011) and Wang et al. (2011), firms that engaged in socially responsible activities would witness an increase in their stock returns. We also control a few variables relating to firm characteristics, including firm age, firm size, and firm leverage. Firm age is controlled, as older firms are more established and have more stable cash flows, therefore can afford them to engage in philanthropic activities (Withisuphakorn and Jiraporn, 2016). We control firm size as larger firms are more visible to the public, thus, they have stronger motivation to donate more to improve their image (Wang et al., 2015). Firm leverage is measured as a company's total liabilities to total assets. Prior research findings are mixed in terms of the relationship between leverage and donation. On the one hand, corporate donation is limited by the resources available. Firms with more debts are subject to greater pressure to pay off their debts, which in turn reduces available financial resources that can be used in philanthropic activities (Zhang et al., 2010). On the other hand, highly leveraged firms are more likely to engage in philanthropic activities in order to appease creditors (Kuzey et al., 2021). Table 1 presents a summary of key variables with definitions.

### 3.2. Research method

The following regression model is used to examine the impact of female analysts on a firm's donation amounts:

$$\ln(\text{Donation}_i) = \beta_0 + \beta_1 \text{Female}_{i,t-1} + \mathbf{X}_{i,t-1} + \alpha_i + \theta_i + \varepsilon_i \quad (1)$$

where  $\ln(\text{Donation}_i)$  is the natural logarithm of the total donation made by firm  $i$  following the COVID-19 outbreak, i.e., the time

<sup>5</sup> Aicagou is the largest online business-to-business platform in China established by Baidu. We use the Aicagou platform to estimate the market value of donated goods (e.g., non-cash donation) from listed firms.

**Table 1**  
Variable definitions.

Variable Type	Variable name	Definition
Dependent variable	Donation	Natural logarithm of a listed firm's donation during the CAPCO's philanthropy campaign following the outbreak of COVID-19
Main variables	Female	Number of female analysts divided by the total number of analysts in the team
	Experience	It is equal to one if an analyst's working experience is above the sample median and zero otherwise. Working experience is the number of quarters between an analyst's first appearance in the CSMAR database and the end of the year 2019
Control variables	Private	A dummy variable equals to one if the ultimate controller of a listed firm is the private owner and zero otherwise
	High infection	A dummy variable equals one if the number of reported COVID-19 cases in a province is above the sample median and zero otherwise.
	Activism	The number of shareholder meetings held by a firm
	Duality	A dummy variable equals one if a CEO also serves as the chairman and zero otherwise
	Board size	The number of members of the board of directors
	Political connection	A dummy variable which equals one if the CEO of a firm served in government or military, or the CEO is a current or previous member of the National People's Congress or the Chinese People's Political Consultative Conference and 0 otherwise.
	Female leader	The proportion of female members to all members in the top corporate leadership team. These corporate leaders include senior management, board of directors, and supervisors.
	Institution	The proportion of shares held by institutional shareholders.
	Margin	The ratio of net profits to total income
	Stock returns	Annual firm stock returns (with cash dividend reinvested)
	Tobin Q	The ratio of the market value of common equity divided by the book value of total assets
Return on assets (ROA)	The ratio of net profits to total assets	
Firm age	The number of years since the establishment of a firm	
Firm size	Natural logarithm of a company's total assets	
Leverage	The ratio of total liabilities to the company's total assets	

between January 27th and April 30th, 2020. The main independent variable,  $Female_{i,t-1}$ , is the female analysts' ratio of firm  $i$  in the year 2019.  $X_{i,t-1}$  is a vector of firm  $i$ 's one-year lagged control variables, which could be associated with total corporate donation. Specifically, we incorporate corporate governance-related characteristics, including shareholder activism, CEO duality, board size, CEO political connection, female leader and institutional ownership. In terms of firm features, we control for firm age, firm size, and firm leverage. The financial control variables include net profit margin, stock returns, Tobin Q and return on assets (ROA). The detailed discussion on each control variable is included in Section 3.1. To isolate the female analysts' impacts from potential unobserved time-invariant industry characteristics, we add industry ( $\alpha_i$ ) fixed effects to mitigate that concern. In addition, we also include province-level fixed effects ( $\theta_i$ ) in all the models to control for the unobserved time-invariant factors in different regions. Our robust standard errors are clustered at the sector level to account for serial autocorrelations. The coefficient of interest,  $\beta_1$  captures the effect of female analysts' coverage on firms' donation amounts.

In order to test Hypothesis 2, we re-estimate Eq. (1) by dividing the whole sample into subsamples based on 'low and high working experience'. To test Hypothesis 3, we separate the whole sample into private firms and SOEs. Likewise, to test Hypothesis 4, we dichotomize the whole sample into subsamples based on firms residing in high-infection and low infection areas by the median values of provincial infection.

## 4. Results

### 4.1. Descriptive statistics

Table 2 Panel A presents the overall descriptive statistics. It reports that the average amount of corporate donation is 9.75 million Yuan (around 1.46 million USD) during the pandemic. The female analyst's mean value is 0.275, implying that 27.5% of female analysts are engaging in producing listed firms' analyst reports in 2019. In addition, these analysts have 3.03 years (12.12 quarters) of experience as financial analysts, which is similar to Li et al. (2020)'s findings. On average, 65.3% of observations are private firms, and 81.2% of sample firms are located in high infection provinces. The mean values of shareholder activism and board size are 3.29 and 8.87, respectively. This indicates that shareholders hold about 3.29 meetings annually, and firms have around 8.87 board of directors on average.

Panel B presents the number of confirmed COVID-19 cases by provinces till 30th April 2020. Except for Hubei, where it used to be the epicenter of the coronavirus pandemic, provinces such as Guangdong, Zhejiang, Henan, and Hunan have a higher number of confirmed COVID-19 cases. Moreover, the variables were tested for multicollinearity, and the mean VIF of all variables is 1.39, indicating no multicollinearity issues.

### 4.2. Regression results

The results of the baseline model Eq. (1) are presented in Column 1 of Table 3. It is reported that the female analyst coverage is



**Table 2**  
Descriptive statistics.

Panel A Summary statistics					
Variables	N	Mean	SD	Minimum	Maximum
Donation (Ten thousand RMB)	512	975.612	1.712	20	1500
Donation (Natural logarithm)	512	6.883	1.767	3.044	7.313
Female	512	0.275	0.292	0.000	1.000
Experience	512	12.119	7.664	1.540	55.360
Private	512	0.653	0.472	0.000	1.000
High infection	512	0.812	0.392	0.000	1.000
Activism	512	3.287	1.675	1.000	7.000
Duality	512	0.272	0.447	0.000	1.000
Board size	512	8.867	1.728	6.000	12.000
Political connection	512	0.230	0.422	0.000	1.000
Female leader	512	0.185	0.119	0.000	0.614
Institution	512	0.467	0.246	0.126	0.757
Margin	512	0.112	0.115	-0.312	0.342
Stock returns	512	0.313	0.342	-0.195	1.025
Tobin Q	512	1.633	0.799	0.903	3.928
ROA	512	0.047	0.043	-0.101	0.127
Firm age	512	21.015	5.289	11.986	30.340
Firm size	512	23.243	1.493	20.544	25.588
Leverage	512	0.489	0.206	0.132	0.844

  

Panel B The number of infected cases by provinces (to 30th April, 2020).			
Provinces	Accumulated infections	Provinces	Accumulated infections
Anhui	991	Jiangsu	653
Beijing	593	Jiangxi	937
Chongqing	579	Jilin	111
Fujian	356	Liaoning	146
Gansu	139	Ningxia	75
Guangdong	1,588	Qinghai	18
Guangxi	254	Shaanxi	306
Guizhou	147	Shandong	787
Hainan	168	Shanghai	652
Hebei	328	Shanxi	163
Heilongjiang	944	Sichuan	561
Henan	1,276	Tianjin	190
Hubei	68,128	Tibet	1
Hunan	1,019	Xinjiang	76
Inner Mongolia	201	Yunnan	185
		Zhejiang	1,268

positively related to corporate donation. In particular, a one percentage point increase in female analyst coverage would increase a firm's donation by 1.8%, after controlling for the industry and the province fixed effects. The results validate our Hypothesis 1 and imply that female analysts are more caring and sympathetic, putting additional pressure to the firms to engage in socially responsible activities during the pandemic, and therefore, firms tend to give more donation (Jo and Harjoto, 2014; Chun and Shin, 2018).

Next, we turn to discussions of the heterogeneous effects on firms' donation. Column 2 (low working experience subgroup) and Column 3 (high working experience subgroup) of Table 3, which report the results for hypothesis 2. It is observed that the positive impact of female analyst coverage on corporate donation is more pronounced for firms with more experienced female analysts. Specifically, a one percentage point increase in female analyst coverage would increase a firm's donation by 5.5% for the firms followed by the more experienced female analysts. The results imply that firms have a stronger motivation to donate more during the pandemic, if more experienced female analysts follow them. These experienced female analysts have deep knowledge on the business and industry and demand greater level of CSR engagement (Li et al., 2020).

Columns 1 and 2 of Table 4 demonstrate female analysts' impact on the COVID-19 donation amount between private firms and SOEs, respectively. We find that female analysts' impact on firm philanthropic donation is more pronounced among private firms than SOEs. Our estimation results are consistent with hypothesis 3, and the reason for this could be that private firms have fewer opportunities to obtain financial resources. Subsequently, private firms have greater incentives to obtain external resources through building a socially responsible image, thus, female analyst coverage is more influential on charitable donation for private firms (Zhang et al., 2015).

Columns 3 and 4 of Table 4 report the impact of the female analyst coverage on corporate donation between firms in low and high infection provinces, respectively. Our results are consistent with hypothesis 4, and we report a positive relationship between female analysts and corporate philanthropic giving in the provinces with a higher number of confirmed COVID-19 cases, but no significant result in lower infected provinces. As high-infected regions are more likely to receive greater attention, firms in these provinces are subject to greater societal pressure. Therefore, firms with greater female analyst coverage in these regions tend to donate more during

**Table 3**  
Main regression.

Variables	Column 1	Column 2	Column 3
	Baseline	Low work experience	High work experience
Female	0.018*** (0.003)	-0.001 (0.001)	0.055*** (0.003)
Activism	0.070 (0.042)	0.187*** (0.028)	0.06* (0.031)
Duality	0.140 (0.097)	0.109 (0.177)	0.450** (0.146)
Board size	-0.087 (0.056)	-0.089 (0.049)	-0.081 (0.087)
Political connection	0.250 (0.252)	0.728** (0.211)	-0.363** (0.147)
Female leader	1.363** (0.588)	-0.022 (1.109)	0.683 (0.542)
Institution	-0.143 (0.238)	0.885** (0.205)	-0.584* (0.296)
Margin	-0.202 (0.168)	-0.162 (0.175)	-0.160 (0.188)
Stock returns	-0.161 (0.096)	-0.001 (0.238)	-0.299** (0.107)
Tobin Q	0.660*** (0.132)	0.295 (0.258)	0.583*** (0.087)
ROA	0.906** (0.311)	0.718* (0.281)	1.288** (0.428)
Firm age	-0.019* (0.009)	-0.031 (0.014)	0.036* (0.017)
Firm size	0.522*** (0.049)	0.597*** (0.018)	0.358* (0.156)
Leverage	0.979** (0.306)	0.283 (0.652)	1.318** (0.449)
Industry FE	Yes	Yes	Yes
Province FE	Yes	Yes	Yes
Observations	512	267	245
R-squared	0.509	0.583	0.702

This table shows the main results of the impact of female analysts on firms' donation and its heterogeneous effects relating to analyst working experience. Industry fixed effect and province fixed effect are included in all specifications. Robust standard errors, clustered at the industry level, are reported in parentheses. \*, \*\*, and \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

the pandemic (Hinze and Sump, 2019).

The results of some control variables are also worth noting. For example, firm size is positively related to corporate donation, implying that larger companies tend to contribute more during the COVID-19 (Wang et al., 2015). ROA is positively associated with corporate donation in most of the regression results, which are consistent with Liang and Renneboog's (2017) findings that companies with better financial performance tend to contribute more to the socially responsible activities.

#### 4.3. Robustness tests

##### 4.3.1. Alternative measurements of dependent variables

We have conducted several additional analyses to demonstrate the robustness of the results. First, alternative measures of the dependent variables are applied. In Column 1 of Table 5, the dependent variable of firm donation amount is replaced with a dummy variable 'donation'. It equals to one if a firm makes a donation during the COVID-19 pandemic and zero otherwise. The results from the Logit model show that firms with greater female analyst coverage are more likely to donate, which is in line with our baseline results

As corporate donation includes both cash donation and non-cash donation such as emergency medical supplies, we then divide the dataset into two groups and define the following alternative dependent variables, i.e., cash donation and non-cash donation. Cash donation (non-cash donation) refers to the monetary amount of cash (goods) that a firm donates during the COVID-19 pandemic. Columns 2 and 3 of Table 5 show the regression results, and they are in line with previous empirical findings: firms with greater female analyst coverage tend to make more generous cash donation and non-cash donation.

As corporate donation is an important aspect of firms fulfilling their social responsibilities, we, therefore, change the dependent variable to the CSR score and re-run the regression model. The dependent variable 'CSR score' data is collected from the CSMAR database, which considers the corporate disclosure of social responsibility covering eleven aspects. This includes whether a firm uses the Global Reporting Initiative's sustainability reporting guidelines as a reference; whether a firm discloses its protection of shareholders' rights; creditors' rights; employees' rights; suppliers' rights; customers and consumers' rights; whether a firm disclose information relating to its sustainable development; public relationships and public welfare undertakings; construction of social responsibility systems; measures of ensuring safety production; and shortcomings of its CSR practices. Subsequently, this CSR score

**Table 4**  
Main regression.

Variables	Column 1	Column 2	Column 3	Column 4
	Private	SOEs	Low infection area	High infection area
Female	0.019*** (0.004)	0.007 (0.008)	0.004 (0.004)	0.022*** (0.004)
Activism	0.091*** (0.022)	0.009 (0.027)	0.145* (0.046)	0.066* (0.035)
Duality	0.168 (0.151)	-0.637** (0.185)	0.050 (0.289)	-0.052 (0.124)
Board size	-0.148*** (0.030)	0.087 (0.121)	-0.147** (0.029)	-0.099 (0.082)
Political connection	0.062 (0.294)	0.992*** (0.129)	0.595** (0.152)	0.215 (0.275)
Female leader	0.144 (0.613)	1.308 (1.565)	1.826* (0.614)	0.986 (0.747)
Institution	-0.185 (0.166)	1.360 (1.588)	2.438*** (0.193)	-0.312 (0.280)
Margin	-0.700*** (0.151)	0.185 (0.343)	-1.202*** (0.159)	-0.039 (0.187)
Stock returns	0.004 (0.116)	-1.611* (0.589)	-0.838** (0.232)	-0.011 (0.081)
Tobin Q	0.439** (0.175)	1.063** (0.329)	1.549*** (0.079)	0.410*** (0.118)
ROA	1.666*** (0.276)	-0.216 (0.586)	2.979*** (0.186)	0.500 (0.318)
Firm age	-0.004 (0.006)	0.102* (0.033)	-0.069** (0.019)	-0.017 (0.011)
Firm size	0.695*** (0.073)	0.566*** (0.076)	0.630*** (0.032)	0.420*** (0.053)
Leverage	-0.630 (0.595)	-0.074 (0.502)	2.198** (0.521)	0.493 (0.377)
Industry FE	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Observations	320	192	102	410
R-squared	0.496	0.646	0.794	0.464

This table shows the results of the impact of female analysts on firms' donation whilst considering corporate ownership nature and regional infection level. Industry fixed effect and province fixed effect are included in all specifications. Robust standard errors, clustered at the industry level, are reported in parentheses. \*, \*\*, and \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

ranges from 0 to 11, based on whether a firm discloses the above aspects of its CSR engagement. Column 4 of Table 5 presents the results. It is observed that companies with greater female analyst coverage are more inclined to fulfil their social responsibility during the pandemic year.

#### 4.3.2. Endogeneity

The female analyst coverage is not random, and our baseline results are subject to selection bias (He and Tian, 2013). We thus adopt a two-stage least squares (2SLS) approach to tackle the endogeneity and construct the following hybrid instrumental variable. First, we construct the firm's expected analyst coverage following Yu (2008) and He and Tian (2013), which captures the change of brokerage house size. Concretely, the following equation is applied to calculate firm *i*'s expected coverage:

$$\text{ExpCov}_{i,2019,j} = \left( \frac{Bsize_{2019,j}}{Bsize_{0,j}} \right) \times Cov_{i,0,j} \tag{2}$$

where  $\text{ExpCov}_{i,2019,j}$  is firm *i*'s the expected coverage from broker *j* in year 2019.  $\frac{Bsize_{2019,j}}{Bsize_{0,j}}$  and  $Bsize_{0,j}$  are the analysts' number employed by broker *j* in the benchmark year and the year 2019.  $Cov_{i,0,j}$  is the size of firm *i*'s coverage from broker *i* in the benchmark year. We then compute the total expected coverage of firm *i* from all brokers in 2019 as follows:

$$\text{ExpCov}_{i,2019} = \sum_{j=1}^N \text{ExpCov}_{i,2019,j} \tag{3}$$

Note that  $\text{ExpCov}_{i,2019}$  includes the expected change for all analysts, both male and female. Consequently, we need a second component to capture the change in female analysts. The candidate variable we choose is the proportion of female residents in the province, following the spirit of Jurkus et al. (2011) and Conyon and He (2017). Specifically, for each broker *j* of firm *i*, we use the

<sup>6</sup> Our choice of the benchmark year is 2018, and the results remain robust if we use the year 2017 as the alternative benchmark year.

**Table 5**  
Robustness tests: alternative dependent variables.

Variables	Column 1	Column 2	Column 3	Column 4
	Donation dummy	Non-cash donation	Cash donation	CSR score
Female	1.012*** (0.001)	0.003* (0.001)	0.001* (0.001)	0.014*** (0.002)
Activism	1.087** (0.036)	0.082 (0.045)	0.011 (0.009)	-0.004 (0.041)
Duality	1.355** (0.209)	0.059 (0.372)	0.036 (0.024)	0.122* (0.058)
Board size	1.046 (0.030)	0.005 (0.043)	-0.049 (0.409)	0.001 (0.035)
Political connection	1.661*** (0.322)	1.065*** (0.198)	0.033* (0.017)	0.203 (0.129)
Female leader	0.554 (0.563)	0.019 (0.778)	0.204** (0.069)	0.304 (0.644)
Institution	1.301 (0.238)	1.111* (0.573)	0.035 (0.055)	0.589*** (0.148)
Margin	0.662*** (0.094)	0.150 (0.461)	-0.011 (0.017)	0.002 (0.174)
Stock returns	0.878 (0.116)	0.356* (0.185)	0.040 (0.028)	0.196 (0.122)
Tobin Q	1.130 (0.105)	0.634** (0.195)	0.067** (0.027)	0.288*** (0.058)
ROA	3.136*** (0.654)	0.076 (0.390)	0.118** (0.041)	-0.272 (0.379)
Firm age	1.009 (0.011)	0.010 (0.016)	0.002 (0.002)	-0.007 (0.008)
Firm size	1.546*** (0.084)	0.260 (0.197)	0.113*** (0.010)	0.808*** (0.073)
Leverage	0.681* (0.157)	1.028 (1.460)	0.168** (0.063)	1.006** (0.406)
Industry FE	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Observations	1945	228	366	512
R-squared	n.a.	0.258	0.469	0.226
Pseudo R-Squared	0.215	n.a.	n.a.	n.a.

In Column 1, the dependent variable is replaced by donation dummy. This is a dummy variable that equals one if a firm makes donation during the COVID-19 pandemic and zero otherwise. In Column 2, the dependent variable is replaced to non-cash donation. Non-cash donation refers to the monetary amount of goods that a firm donates during the COVID-19 pandemic. In Column 3, the dependent variable is replaced to cash donation. Cash donation refers to the amount of cash that a firm donates during the COVID-19 pandemic. In Column 4, the dependent variable is the CSR score. The CSR score ranges from 0 to 11, which refers to the extent of a firm's relevant social responsibility information disclosure. Fixed-effects models are applied in Columns 2–4, and a logit model is applied in Column 1. Industry fixed effect and province fixed effect are included in all specifications. Robust standard errors, clustered at the industry level, are reported in parentheses. \*, \*\*, and \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

provincial female resident percentage of  $j$  and take the following weighted sum for firm  $i$

$$\text{Female Resident}_{i,2019} = \sum_{j=1}^N \omega_j \text{Female Resident}_{j,2019} \quad (4)$$

where the weight  $\omega_j$  is the number of analyst reports issued by broker  $j$  covering firm  $i$  scaled by the total number of analyst reports for firm  $i$ .

Finally, we take the product of  $\text{ExpCov}_{i,2019}$  and  $\text{Female Resident}_{i,2019}$ , and obtain our instrumental variable  $\text{ExpFemaleCov}_{i,2019}$ . Intuitively, it denotes the expected female coverage for firm  $i$  in the year 2019.

$$\text{ExpFemaleCov}_{i,2019} = \text{ExpCov}_{i,2019} \times \text{Female Resident}_{i,2019} \quad (5)$$

The 2SLS results are reported from Columns 1–5 of Table 6 and Columns 1–2 of Table 7, and all the statistical significance of our four hypotheses remain unchanged. In Column 3, we use the  $\text{ExpCov}_{i,2019}$  as our alternative instrumental variable and find the result is still valid. These tests imply that our results are free from endogeneity.

#### 4.3.3. Legal environment, CEO gender, and level of marketization

Next, we examine the different impacts that female financial analysts have on corporate donation in the firms located in strong legal environment regions and those located in weak legal environment regions. To test this empirically, the province-level legal environment indices compiled by Wang et al. (2017) are used and our samples are then divided into firms in strong and weak legal environment provinces based on the median score of the index. The baseline regression results are re-estimated in the subsamples. As

**Table 6**  
Robustness tests: addressing endogeneity: two-stage least squares methods.

Variables	Column 1	Column 2	Column 3	Column 4	Column 5
	Baseline	Low experience	High experience	Private	SOEs
Female	0.066** (0.021)	0.166 (0.105)	0.069*** (0.010)	0.076** (0.027)	0.053 (0.041)
Activism	-0.033 (0.046)	-0.077 (0.154)	-0.024 (0.047)	-0.096 (0.059)	-0.006 (0.065)
Duality	0.286* (0.125)	0.397 (0.588)	0.541* (0.233)	0.067 (0.197)	0.168 (0.202)
Board size	0.079 (0.072)	0.416 (0.372)	0.028 (0.049)	0.129*** (0.013)	0.022 (0.192)
Political connection	0.565** (0.171)	0.489 (0.722)	0.460** (0.139)	0.785*** (0.131)	0.479* (0.199)
Female leader	1.273** (0.376)	5.246* (2.305)	0.283 (0.879)	0.096 (1.795)	1.133 (0.753)
Institution	0.383 (0.201)	2.762 (1.597)	-0.740 (0.410)	2.498 (1.260)	0.236 (0.595)
Margin	-0.011 (0.173)	0.756 (1.027)	-0.310 (0.196)	0.513 (0.365)	-0.476 (0.412)
Stock returns	-0.115 (0.152)	0.955 (0.926)	-0.358 (0.314)	-0.119 (0.367)	-0.156 (0.438)
Tobin Q	0.668** (0.182)	0.305 (0.174)	0.821*** (0.143)	1.099*** (0.157)	0.506 (0.271)
ROA	0.558 (0.282)	-0.315 (1.445)	0.992* (0.458)	-0.531 (0.925)	1.582* (0.687)
Firm age	0.008 (0.023)	-0.045 (0.088)	0.050* (0.022)	0.067* (0.028)	-0.010 (0.019)
Firm size	0.431*** (0.040)	-0.052 (0.186)	0.507*** (0.120)	0.346 (0.162)	0.631*** (0.084)
Leverage	1.498** (0.579)	7.466* (3.691)	-0.688 (1.097)	2.473 (1.326)	0.525 (1.773)
Industry FE	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes
Observations	512	267	245	320	192
R-squared	0.345	0.512	0.600	0.551	0.454

This table shows main regression results whilst addressing endogeneity concerns using a two-stage least square method. The second stage regression results are reported in this table. Industry fixed effect and province fixed effect are included in all specifications. Robust standard errors, clustered at the industry level, are reported in parentheses. \*, \*\*, and \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

shown in Columns 1–2 of [Table 8](#), it is observed that greater female financial analyst coverage positively impacts corporate donation for firms located in the strong legal environment regions, rather than the weak legal environment regions. This is because external monitoring by female financial analysts is stronger in areas with a strong legal environment. Consequently, female financial analysts can more effectively monitor firms, which puts extra pressure on firms and thereby induces an increase in their philanthropic donation during the pandemic ([Jo and Harjoto, 2014](#)).

We also examine the substitution effect between female CEOs and female financial analysts. Specifically, if a female CEO runs the firm, she would show a greater level of empathy and concern for others ([Rodríguez-Ariza et al., 2017](#)). Consequently, firms tend to donate more during the pandemic period, and the impact of female analysts in encouraging corporate donation would be diluted. Therefore, we divide samples into two subgroups, including companies run by male CEOs and those run by female CEOs. Shown in Columns 3–4 of [Table 8](#), we find that the positive and significant sign of female financial analysts only shows in the subgroup of male CEOs, indicating that female CEOs dilute the value of having greater female financial analyst coverage in increasing corporate donation.

Moreover, we consider the impact of the marketization level on corporate donation. As a result, we add another control variable of ‘marketization’ into the regression model. This variable refers to the marketization level of each province where a firm is located, and it is collected from the report published by the National Economic Research Institution (NERI). By increasing investments in philanthropic or other CSR activities, firms tend to meet the expectations from their stakeholders. In this way, firms’ operation can become more legitimized and they can attract more support from stakeholders to gain competitiveness in their located regions ([Ahn and Park, 2018](#)). The regression results are reported in Column 5 of [Table 8](#). It is observed that our main results remain unchanged after controlling this marketization factor. That is, firms with greater female analyst coverage tend to donate more during this public health crisis.

#### 4.3.4. The channel that female analysts affect corporate donation

We examine the channel that female analysts increase corporate donation in this section. We propose that female analysts drive corporate donation amounts through firms’ site visit. Firm site visit refers to analysts’ trip to a firm’s headquarter or its relevant factories. The Shenzhen Stock Exchange in China required the listed firms to disclose information relating to analysts or institutional



**Table 7**  
Robustness tests: addressing endogeneity: two-stage least squares methods.

Variables	Column 1	Column 2	Column 3
	Low infection area	High infection area	Alternative IV
Female	0.063 (0.087)	0.058*** (0.011)	0.096** (0.024)
Activism	-0.004 (0.106)	-0.066 (0.064)	-0.044 (0.055)
Duality	0.087 (0.239)	0.355 (0.229)	0.434** (0.152)
Board size	0.002 (0.049)	0.037 (0.062)	0.071 (0.087)
Political connection	0.463 (0.325)	0.407* (0.202)	0.440* (0.202)
Female leader	3.507 (3.126)	1.255 (0.738)	1.303* (0.611)
Institution	0.525 (0.479)	0.461 (0.349)	0.130 (0.256)
Margin	0.273 (0.283)	0.157 (0.372)	-0.063 (0.242)
Stock returns	0.810 (0.807)	0.192 (0.221)	-0.248* (0.123)
Tobin Q	0.323 (0.348)	0.481** (0.169)	0.806*** (0.178)
ROA	-0.407 (1.344)	0.199 (0.512)	0.784* (0.353)
Firm age	0.012 (0.010)	-0.012 (0.038)	0.004 (0.028)
Firm size	0.457** (0.131)	0.450*** (0.089)	0.448*** (0.052)
Leverage	0.984** (0.322)	1.293 (0.829)	1.940* (0.806)
Industry FE	Yes	Yes	Yes
Province FE	Yes	Yes	Yes
Observations	102	410	512
R-squared	0.131	0.280	0.413

This table shows main regression results whilst addressing endogeneity concerns using a two-stage least square method. The second stage regression results are reported in this table. Industry fixed effect and province fixed effect are included in all specifications. Robust standard errors, clustered at the industry level, are reported in parentheses. \*, \*\*, and \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

investors' firm visit since 2013 (Hu et al., 2021). Subsequently, we can identify whether female analysts are more concerned on CSR issues based on the questions they asked during the firm site visit. To examine this channel, we introduce a variable, 'Firm visit CSR', which is a dummy variable that equals one if CSR-related questions were asked to a firm's senior management during the corporate site visit and zero otherwise.<sup>7</sup> In addition, we construct an interaction variable between female analysts and firm visit CSR and incorporate it into the regression models, in order to capture the impact of female analysts' corporate site visit on corporate donation amounts during the COVID-19 pandemic. The results are presented in Column 1 of Table 9. It is observed that the coefficients of Female\*Firm visit CSR are positively significant at the 1% level, indicating that firm site visit is the channel that female analysts drive corporate donation amounts. In other words, as female analysts are more concerned about the ethics of fulfilling social responsibilities due to their personalities of empathy and care, they are more likely to exert pressure on managers during corporate site visits to push for more donation (Hu et al., 2020). We have also conducted an endogeneity test using the two-stage least squares method, and reported the results in Column 2 of Table 9. Our results indicate our channel test of female analyst influence is free from endogeneity issues.

#### 4.3.5. Interaction term approach

Lastly, this section examines how moderating factors affect the relationship between female analysts and corporate donation by using the interaction term approach. The following regression model will be applied to re-examine H2, H3 and H4

$$\ln(\text{Donation}_i) = \beta_0 + \beta_1 \text{Female}_{i,t-1} + \beta_2 \tau_{i,t-1} + \beta_3 (\text{Female}_{i,t-1} \times \tau_{i,t-1}) + X_{i,t-1} + \alpha_i + \theta_i + \varepsilon_i \tag{6}$$

where the main independent variable,  $\text{Female}_{i,t-1}$ , is the female analysts' ratio of firm  $i$  in the year 2019. The dummy variable,  $\tau_{i,t-1}$ , refers to analysts' working experience, the nature of firm ownership, and infection regions, depending on the context of analysis. Specifically, to re-examine H2,  $\tau_{i,t-1}$  equals to one if an analyst's working experience is above the sample median and zero otherwise.

<sup>7</sup> CSR related questions are obtained through searching the following key words e.g., 'donation', 'philanthropy', 'social responsibility', 'social value', 'sustainable', 'public welfare', 'disaster relief operation', 'social care' based on the questions that analysts asked during their corporate site visits.

**Table 8**  
Robustness tests: legal environment, CEO gender and marketization.

Variables	Column 1	Column 2	Column 3	Column 4	Column 5
	Weak legal environment	Strong legal environment	Male CEO	Female CEO	Marketization
Female	-0.008 (0.01)	0.022*** (0.002)	0.017*** (0.002)	0.041 (0.06)	0.015*** (0.002)
Activism	0.088* (0.012)	0.034 (0.030)	0.101** (0.041)	0.443 (0.105)	0.075* (0.041)
Duality	0.300* (0.044)	-0.039 (0.111)	0.100 (0.089)	0.891** (0.069)	0.108 (0.080)
Board size	0.125** (0.003)	0.041 (0.038)	0.017 (0.024)	1.045* (0.116)	0.025 (0.021)
Political connection	0.658*** (0.001)	0.110 (0.210)	0.448*** (0.109)	-0.524 (0.365)	0.429*** (0.124)
Female leader	0.125 (0.088)	0.011 (0.371)	0.255 (0.226)	7.283 (1.800)	-0.027 (0.417)
Institution	0.931* (0.117)	0.237 (0.259)	0.392 (0.318)	-0.026 (0.380)	0.388 (0.316)
Margin	0.427* (0.044)	0.106 (0.155)	0.065 (0.179)	1.808 (0.423)	0.114 (0.160)
Stock returns	0.511* (0.040)	0.065* (0.029)	-0.255 (0.200)	-2.113 (0.763)	-0.113 (0.199)
Tobin Q	0.872** (0.025)	0.542*** (0.101)	0.463** (0.177)	0.390 (0.144)	0.474** (0.158)
ROA	1.846** (0.050)	0.279 (0.274)	0.809*** (0.186)	-2.409 (0.650)	0.643*** (0.204)
Firm age	0.055** (0.004)	0.011 (0.013)	0.001 (0.012)	0.089** (0.005)	-0.005 (0.013)
Firm size	0.411*** (0.002)	0.422*** (0.049)	0.428*** (0.071)	2.224* (0.330)	0.446*** (0.075)
Leverage	1.500* (0.190)	1.096*** (0.268)	1.321*** (0.373)	6.239** (0.364)	1.214*** (0.371)
Marketization					0.102*** (0.032)
Industry FE	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	No
Observations	117	395	476	36	512
R-squared	0.703	0.584	0.466	0.915	0.465

The strong legal environment is a dummy variable that equals one if the legal environment index in a province is above the sample median and zero otherwise. Legal environment index refers to the level of the legal environment in a province where a listed firm is located and it is based on the index developed by the National Economics Research Institute (NERI). Column 3 shows the impact of female analysts on the corporate donation if the target firm has a male CEO in presence. Column 4 shows the impact of female analysts on the corporate donation if the target firm has a female CEO in presence. In Column 5, ‘Marketization’ refers to the marketization level of each province where a firm is located, and this variable is collected from the report published by the NERI. Industry fixed effect and province fixed effect are included in all specifications. Robust standard errors, clustered at the industry level, are reported in parentheses. \*, \*\*, and \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

To re-assess H3,  $\tau_{i,t-1}$  equals to one if the ultimate controller of a listed firm is the private owner and zero otherwise. To re-examine H4,  $\tau_{i,t-1}$  equals one if the number of confirmed Covid-19 cases in a province is above the sample median and zero otherwise. The coefficient of interest,  $\beta_3$ , captures the interaction effect of female analysts and their working experience, firm ownership nature, infection regions on corporate donation.  $X_{i,t-1}$  is a vector of firm  $i$ 's control variables. Industry ( $\alpha_i$ ) and province fixed effects ( $\theta_i$ ) are included in all the models.

Regarding the interaction effects, our results show positive and significant coefficients (e.g., Female\*Experience, Female\*Private, and Female\*High infection) in Columns 1–3 (Table 10). These findings further support H2, H3, and H4, which indicate that the positive impact of female analyst on corporate donation is more pronounced if the company is covered by female analysts with greater working experience, privately controlled and located in more infectious provinces.

4.3.6. A difference-in-differences estimation

Finally, we consider a difference-in-differences (DID) estimation to examine whether female analysts are more likely to increase corporate donation during the COVID-19 crisis period. The advantage of using the DID model is to address the concern that the shock from COVID-19 crisis could drive our baseline results. Subsequently, we compare firm  $i$ 's corporate donation in the year 2019 and 2020 respectively. The DID model is specified as below:

$$\text{Donation}_{i,t} = \text{Female Dummy}_i + \text{Post}_t + \text{Female Dummy}_i \times \text{Post}_t + X_{i,t-1} + \alpha_i + \gamma_t + \varepsilon_{it} \tag{7}$$

where  $\text{Female Dummy}_i$  is a dummy variable that equals one if a firm was followed by at least one female analyst and zero otherwise.  $\text{Post}_t$  is a dummy variable and equals one if corporate donation is made in the year 2020 and zero if the corporate donation is made in

**Table 9**  
Robustness tests: analyst firm visit channel.

Variables	Column 1	Column 2
	Baseline	2-SLS IV
Female	0.021*** (0.002)	0.026** (0.007)
Firm visit CSR	0.008 (0.212)	0.256 (0.443)
Female*Firm visit CSR	0.010*** (0.003)	0.029** (0.011)
Activism	0.050 (0.042)	0.071 (0.071)
Duality	0.120 (0.082)	0.220 (0.113)
Board size	0.083** (0.032)	0.016 (0.021)
Political connection	0.255 (0.201)	0.670** (0.229)
Female leader	0.111 (0.400)	0.722 (0.859)
Institution	0.371 (0.260)	0.203 (0.209)
Margin	0.027 (0.127)	0.035 (0.215)
Stock returns	0.035 (0.096)	0.116 (0.145)
Tobin Q	0.611*** (0.108)	0.681* (0.290)
ROA	0.609** (0.264)	0.407 (0.368)
Firm age	-0.003 (0.010)	0.019 (0.016)
Firm size	0.478*** (0.028)	0.486*** (0.058)
Leverage	0.987*** (0.257)	0.928* (0.435)
Industry FE	Yes	Yes
Province FE	Yes	Yes
Observations	512	512
R-squared	0.605	0.388

This table shows the regression results regarding the channels of female analyst influence in Column 1, whilst addressing endogeneity concerns using a two-stage least square method in Column 2. The second stage regression results are reported in Column 2. Industry fixed effect and province fixed effect are included in all specifications. Robust standard errors, clustered at the industry level, are reported in parentheses. \*, \*\*, and \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

year 2019.  $Female\ Dummy_i \times Post_t$  is our main variable of interest, which equals one if a firm is followed by female analysts in the year 2020 and zero otherwise.  $X_{i,t-1}$  is lagged control variables.  $\gamma_t$  is the year fixed effect and  $\alpha_i$  is the province  $\times$  industry fixed effect. Other notations are similarly defined as in (1). The results are reported in the Column 1 of Table 11, and they are consistent with our baseline findings that firms following by female analysts are more likely to make greater donation. In other words, our results are not driven by any time trend. In addition, the dependent variable was replaced to firm CSR score in Column 2, and it is observed that our main findings remain unchanged.

## 5. Conclusions

Our study investigates the relationship between female financial analyst coverage and corporate philanthropic donation. Using a hand-collected dataset of Chinese listed firms' philanthropic donation during the COVID-19 pandemic, we find that female analyst coverage is positively associated with firms' donation amounts. Thus, female financial analysts' external monitoring tends to put more social pressure on listed firms and induce an increase in their donation amounts. Our study also investigates the moderating effects of analyst experience, ownership types, and geographic locations. Our results demonstrate that firms have more substantial incentives to donate more during the COVID-19 pandemic if more experienced female analysts follow them. In addition, we show that the positive relationship between female analyst coverage and firm donation is more pronounced for private firms. This is because private firms have less financial support compared to SOEs, thus they tend to donate more to improve their image and attract stakeholders' attention to obtain greater resources. Moreover, we report that the positive association between philanthropic giving and female analyst coverage is more pronounced for firms located in high-infection regions. Our findings support the view that female analysts are more

**Table 10**  
Robustness tests: an interaction variable approach.

Variables	Column 1	Column 2	Column 3
	Working experience	Private ownership	Infection area
Female	0.031*** (0.004)	0.029*** (0.008)	0.071*** (0.004)
Female*Experience	0.050*** (0.002)		
Female*Private		0.017* (0.009)	
Female*High infection			0.030*** (0.004)
Activism	0.110*** (0.029)	0.098* (0.048)	0.086* (0.041)
Duality	0.251** (0.100)	0.013 (0.100)	0.140 (0.078)
Board size	0.111* (0.057)	0.077** (0.030)	0.085 (0.055)
Political connection	0.126 (0.206)	0.257 (0.211)	0.370 (0.217)
Female leader	0.698 (0.542)	0.630 (0.388)	1.326** (0.548)
Institution	0.482*** (0.135)	0.040 (0.180)	0.453** (0.144)
Margin	0.182* (0.097)	0.143 (0.155)	0.202 (0.179)
Stock returns	0.153 (0.087)	0.240** (0.075)	0.220** (0.068)
Tobin Q	0.496*** (0.130)	0.555*** (0.147)	0.595*** (0.133)
ROA	0.731** (0.239)	0.819** (0.255)	0.852** (0.274)
Firm age	0.033** (0.014)	0.034*** (0.010)	0.038*** (0.008)
Firm size	0.716*** (0.028)	0.612*** (0.083)	0.634*** (0.061)
Leverage	0.496 (0.285)	1.282*** (0.294)	0.967*** (0.240)
Industry FE	Yes	Yes	Yes
Province FE	Yes	Yes	Yes
Observations	512	512	512
R-squared	0.574	0.431	0.426

This table re-examines the main results of H2-H4 using the interaction variable approach. Variable 'Experience' is controlled in Column 1; variable 'Private' is controlled in Column 2 and variable 'High infection' is controlled in Column 3. Industry fixed effect and province fixed effect are included in all specifications. Robust standard errors, clustered at the industry level, are reported in parentheses. \*, \*\*, and \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

ethical and show empathy towards others, thus contributing to a stream of literature in gender diversity and corporate social responsibility.

We have conducted several robustness tests and report that the findings remain consistent with the baseline regression results. In particular, the results are robust to alternative measurements of dependent variables, including a dummy variable of corporate donation, the specific cash donation amounts, non-cash donation amounts, and the CSR score. Endogeneity concerns are addressed using a two-stage least squares approach. The results confirm that our main findings remain unchanged. We also find that firm site visit is the channel that female analysts drive corporate donation amounts. In addition, it is reported that the impact of female analyst coverage on firm donation is more pronounced in companies that operate in a stronger legal environment. Moreover, we observe a substitution effect between female financial analysts and female CEOs. The presence of female CEOs dilutes the value of having greater female financial analyst coverage in increasing corporate donation. Lastly, we confirm that our results are robust to alternative model specifications, i.e., a sample-split method, an interaction-term method and a difference-in-differences method.

These findings provide insights for regulators, investors, and other stakeholders. Women are more emotional, sensitive, sympathetic, communicative, and cooperative, which make them consider the needs of a group of wide-ranging stakeholders (Konrad and Kramer, 2006). Our findings support this statement and report that greater female financial analyst coverage increases corporate social pressure on firms and increases their donation amounts. This is important as corporate philanthropic donation plays an essential role in assisting societies recover from disasters including the COVID-19 pandemic. Nevertheless, women are still under-represented in China, especially in the key positions, and their contributions to the firms often remain underestimated. Our results suggest that it is especially critical for securities firms or other professional investment institutions to recruit more female analysts to the positions, yielding extra benefits of putting more pressures on their investees to conduct more socially responsible activities. These benefits become especially

**Table 11**  
Robustness tests: a difference-in-difference approach.

Variables	Column 1	Column 2
	Donation dummy	CSR score
Female dummy	0.027* (0.015)	0.072** (0.027)
Post	0.037** (0.014)	0.159*** (0.035)
Female dummy*Post	0.075*** (0.019)	0.063*** (0.013)
Activism	0.002 (0.001)	0.003* (0.002)
Duality	0.023** (0.009)	0.035*** (0.012)
Board size	-0.001 (0.005)	0.006 (0.006)
Political connection	0.060*** (0.012)	0.053** (0.023)
Female leader	0.001 (0.001)	0.002* (0.001)
Institution	-0.142*** (0.019)	-0.067** (0.028)
Margin	-0.001* (0.001)	-0.001 (0.001)
Stock returns	0.046*** (0.016)	0.029** (0.011)
Tobin Q	0.006** (0.002)	0.003 (0.008)
ROA	0.029 (0.024)	0.054 (0.055)
Firm age	-0.001 (0.001)	-0.003** (0.001)
Firm size	0.059*** (0.004)	0.124*** (0.011)
Leverage	0.052 (0.031)	0.181*** (0.051)
Industry FE	Yes	Yes
Province FE	Yes	Yes
Observations	3496	3496
R-squared	0.127	0.140

In Table 11, variable 'Female Dummy' is dummy variable that equals to one if a firm is followed by at least one female analyst and zero otherwise. Variable 'Post' is a dummy variable that equals to one if it is in the year 2020 and equals to zero if it is in the year 2019. In Column 1, the dependent variable is donation dummy that equals one if a firm makes donation and zero otherwise. In Column 2, the dependent variable is CSR score, which ranges from 0 to 11 and is collected from CSMAR database. The CSR score reflects the extent of a firm's relevant social responsibility information disclosure. Industry fixed effect and province fixed effect are included in all specifications. Robust standard errors, clustered at the industry level, are reported in parentheses. \*, \*\*, and \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

obvious if more experienced female analysts are recruited to analyze a firm's investment opportunities. For the securities regulators, they need to be aware of the importance of gender diversity and encourage female representation by proposing and passing relevant legislation. Our paper also reports that the impacts of female financial analysts on corporate donation differ among ownership structures. Therefore, a reduction of state influence could further strengthen female analysts' monitoring effectiveness, thus inducing firms to take part more actively in these socially responsible activities in the post-pandemic world.

### Declaration of Competing Interest

The named authors declare no conflicts of interest.

### Acknowledgements

We would like to thank Miss Xin Chen for her excellent research assistance. Dr. Yifei Zhang acknowledges start-up funding support from The Hong Kong Polytechnic University [Project ID: P0036258].



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