*Original Research Article*

Public Emergencies, Corporate Cash Holdings, and Analysts’ Forecast Bias

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ABSTRACT

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| Cash management is crucial for businesses during significant public emergencies. The cash holdings in a company serves as an important indicator for analysts' earnings forecasts and can influence the degree of the forecast bias. This paper uses a sample of A-share listed companies in China's Shanghai and Shenzhen stock exchanges from 2018 to 2022, employing a Difference-in-Differences (DID) approach to examine the changes in the impact of cash holdings on analysts' forecast bias before and after the pandemic. The results indicate that after the pandemic, higher cash holdings are associated with lower accuracy in analysts' earnings forecasts, with forecasts becoming more optimistic. Further analysis reveals that in companies with higher financing constraints, fewer agency problems, and greater disagreement among analysts, there is a tendency for analysts to overstate the preventive value of cash holdings, leading to overly optimistic forecasts for companies with high cash levels, which ultimately reduces the accuracy of these forecasts. |

*Keywords: public emergencies; COVID-19 pandemic; Cash holdings; Analysts' earnings forecasts*

1. INTRODUCTION

In the capital market, securities analysts play a critical role as information intermediaries, providing investment advice to investors and improving market pricing efficiency by analyzing company information and ​forecasting profitability. Corporate cash holdings are one of the key indicators analysts use to predict a company’s future operating performance, enabling them to assess its financial health, risk management capabilities, and growth potential more comprehensively. Analysts’ interpretation of the impact of cash holdings can affect the accuracy of their earnings forecasts, thereby affecting investors’ valuation of corporate value and the pricing efficiency of capital markets.

Corporate cash holdings serve as a critical mechanism for mitigating economic volatility and market risks. Grounded in the preventive motive, substantial cash reserves fulfill dual functions as liquidity buffers against operational disruptions and enablers of growth option capture. During the COVID-19 pandemic period, the preventive value of cash holdings became particularly salient given widespread operational risk exposure. For analysts, while cash buffers may reduce forecast bias through diminished operational uncertainty, cognitive biases stemming from overemphasis on preventive motives may conversely induce optimism bias in earnings forecasts.

This study empirically investigates the effect of corporate cash holdings on analysts' earnings forecast bias, incorporating heterogeneity analysis based on COVID-19 pandemic-induced exogenous shocks. Utilizing a sample of Chinese A-share listed firms spanning 2018-2022, three core research questions are addressed: (1) How do corporate cash holdings influence analysts' forecast bias and sentiment under pandemic shocks? (2) Whether the preventive motive of cash holdings enhances forecast accuracy by mitigating operational risk, or conversely deteriorates reliability due to halo effects? (3) How does this relationship vary across firm characteristics? The findings advance understanding of information intermediation mechanisms during crises, with implications for improving analysts' rational forecast behavior in emerging markets.

The potential contributions of this study lie in the following aspects. First, it extends the literature on determinants of analysts' earnings forecasts by addressing a critical gap in existing research. Prior studies predominantly focus on how corporate disclosure quality shapes analysts' forecasts, yet largely overlook the mediating role of exogenous environmental disruptions. Situated within the COVID-19 pandemic context, this paper systematically examines how corporate cash holdings influence analysts' forecast bias under major exogenous shocks, thereby pioneering empirical insights into external contingency effects on forecasting behavior.Second, this research provides new evidence on the impact of corporate cash holdings on analysts' earnings forecasting behavior. Prior research on analyst earnings forecasts has not addressed the impact of corporate cash holdings on analyst earnings forecast bias. This paper examines how corporate cash holdings influence analyst earnings forecast accuracy under major emergency shocks through dual mechanisms of uncertainty reduction and halo effects. This paper cuts through the major unexpected event shocks and discusses the impact of the corporate cash holdings on the level of analysts' earnings forecasts under the unexpected event shocks from the perspectives of both uncertainty reduction and halo effect.

2. Research hypothesis

One of the responsibilities of analysts is to provide investors with accurate information about the earnings of listed companies. Analysts play a critical role as information intermediaries in the capital market by collecting, analyzing and disseminating forecast information. There are numerous factors affecting the quality of analysts' forecasts, which can be mainly divided into two factors: firm characteristics and analysts’ characteristics. Firm characteristics include corporate information transparency (Waymair,1986; Ni et al.,2023), earnings characteristics (Coen,2005; Kross et al.,1990), financial statement comparability (De Franco et al.,2011; Caban Garcia et al.,2020). Analysts’ characteristics include analysts experience, professional background, cognitive biases, conflicts of interest and so on.

Corporate cash holdings can affect the quality of analysts' earnings forecasts in terms of both the preventive effect and the halo effect.

On the one hand, the preventive effect reduces operational uncertainty for enterprises and improves analyst forecast quality.

Based on the preventive motive theory, Cho and Kim (2019) found that firms increase cash holdings to maintain liquidity buffers against future financing cost uncertainties. For instance, during financial crises, companies facing credit issues and financing difficulties significantly reduce dividend payouts to accumulate cash reserves. Firms with stronger external financing constraints are more inclined to retain cash for future investment activities. Cheng et al. (2021) demonstrated that firms with higher pre-crisis cash reserves outperformed others during financial crises, as low cash holdings expose firms to elevated liquidity risks, higher transaction costs, and lower profitability due to insufficient internal funds. Higher cash reserves help mitigate operational uncertainties and facilitate timely investment opportunities for greater profitability. Xiao et al. (2020) revealed that during the COVID-19 pandemic, corporate cash holdings exhibited a significantly positive correlation with cumulative abnormal returns in event windows, indicating market recognition of the preventive value of cash holdings.

When forecasting corporate earnings, analysts incorporate cash flow information. Absent cognitive biases, elevated cash holdings during major emergencies can enhance analysts' forecast accuracy by alleviating external financing constraints, reducing operational uncertainties, and dampening earnings volatility risks. This enables more precise assessments of corporate profitability and growth prospects, thereby improving forecast quality and reducing forecast bias.On the other hand, the halo effect exacerbates analysts' cognitive bias and reduces the quality of analysts' forecasts.

On the other hand, the halo effect exacerbates analysts’ cognitive biases, thereby impairing the accuracy of their forecasts.

The halo effect refers to the tendency of individuals to holistically evaluate an object based on a single perceived characteristic, whereby one dominant feature disproportionately influences the assessment of other attributes. During the pandemic, when analysts conduct forecasts based on corporate cash holdings levels, the influence of the halo effect may manifest in two dimensions:First, it amplifies the perceived significance of cash holdings. Analysts may disproportionately focus on a firm's cash reserve levels during pandemic conditions, extrapolating this single indicator to assess overall financial health. This cognitive bias could lead to neglect of market environment complexities(e.g., debt levels and competitive positioning)that crucially affect corporate resilience. Second, it distorts evaluations of complementary performance dimensions. Firms with substantial cash reserves may receive unwarranted positive assessments of unrelated operational aspects. Both cognitive distortions may result in systematic overestimation of corporate risk resilience and future performance in analyst forecasts, generating excessive optimism that amplifies forecast bias.

Based on this, two hypotheses are proposed in this paper:

**H1a:** Firms with higher cash holdings exhibit smaller analysts’ earnings forecast bias during major emergencies.

**H1b:** Firms with higher cash holdings exhibit greater analysts’ earnings forecast bias with significant optimistic bias during major emergencies.

1. Study design

**3.1 Sample Selection and Data Sources**

This study uses China's Shanghai and Shenzhen A-share listed companies from 2018 to 2022, with primary data sourced from the China Stock Market & Accounting Research (CSMAR) database. Following standard practice in empirical finance research, rigorous data scrubbing procedures are implemented to mitigate anomalous observations: (1)Sector Filtering: Exclude financial firms due to their distinct regulatory frameworks and financial reporting practices.(2)Financial Distress Exclusion: Remove companies under special treatment (ST, \*ST) or particular transfer (PT) status.(3)Missing Data Elimination: Drop observations with incomplete records for critical variables.To address outlier contamination, all continuous variables are winsorized at the 1st and 99th percentiles. These procedures yield a final unbalanced panel dataset comprising 5,399 firm-year observations.

**3.2 Definition of Variables**

**3.2.1 Explained variables**

Referring to the study of Yutao Wang and Yanchao Wang(2012), the analysts forecast bias formula used in this paper is Ferrorit=Abs[Mean(Fepsit)-Mepsit]/Abs(Mepsit), where Mepsit is the actual EPS, Fepsit is the analysts' forecasted EPS. Mean (Fepsit) is the average of analysts' forecast EPS.

**3.2.2 Explanatory variables**

The explanatory variable in this study is pre-pandemic cash holdings (Cash). Following prior literature, we measure pre-pandemic cash holdings as "(corporate monetary funds + trading financial assets) / total assets" for the year 2018.

Since the COVID-19 pandemic shock originated in late 2019, this paper defines the period from 2020 onward (inclusive) as the post-pandemic shock period. A binary dummy variable (Post) is constructed, where Post = 1 for observations in 2020 and subsequent years, and Post = 0 for all prior years.

**3.3.3 Control variabls**

The control variables are operationalized across three dimensions with measurement protocols aligned with top-tier journal standards: (1) firm characteristics variables, including age of firm (Age), size of firm(Size), market-to-book ratio (Mbratio), financial leverage (Lev), profitability (Roa), and accrual-based earnings management (Dacc); (2) corporate governance variables, including Chairman-CEO duality (Dual), Blockholders ownership (Lholder), and board scale(Board); (3) analysts’ characteristics variables, including forecast period (Horizon), the number of analysts (Coverage), and the analysts forecast update intensity (Update).

**Table 1. Definition of variables**

|  |  |  |
| --- | --- | --- |
| **Variables Names** | **Symbols** | **Definitions** |
| Accuracy of analysts’ forecast | Ferror | Ferrorit=Abs[Mean(Fepsit)-Mepsit]/Abs(Mepsit) |
| Optimistic bias of analysts | Oferror | When the average EPS predicted by analysts is greater than the actual EPS, =Ferror, otherwise 0 |
| pessimistic bias of analysts | Pferror | When the average EPS predicted by analysts is less than the actual EPS, =Ferror, otherwise 0 |
| Level of cash holdings | Cash | The cash holdings level of the enterprise in 2018, cash holding = (cash and cash equivalents + trading financial assets) / total assets |
| COVID-19 pandemic impact | Post | After 2020, it is 1, otherwise it is 0 |
| Company size | Size |  Ln(total assets) |
| Company age | Age | Ln(Current Year - IPO Year + 1) |
| Update frequency | Update | Ln (the mean of the total number of forecasts released) |
| Forecast interval | Horizon | Ln(Fiscal Year End Date  - report date) |
| Analysts tracking quantity | Coverage |  Ln(the number of analysts following+1) |
| Accrued earnings management | Dacc | According to the modified Jones model |
| Book to market ratio | Mbratio | Total Assets / (Market Value of Equity + Book Value of Liabilities) |
| Financial leverage | Lev | Total liabilities/total assets |
| Blockholders ownership | Lholder | Percentage of shares held by largest shareholder |
| Board scale | Board | Ln (the number of board members+1) |
| Chairman-CEO duality | Dual | If the chairman and general manager serve concurrently, it is 1, otherwise it is 0 |
| Profitability | Roa | Net profit/total assets |
| Year dummy variables | Year | Year fixed effects |
| Year dummy variables | Ind | Industry fixed effects |

**3.3 Modelling**

This paper utilizes the COVID-19 pandemic outbreak in 2020 as an exogenous shock and adopts the multi-period difference-in-differences (DID) framework following Wang and Wang (2012) to examine how corporate cash holdings affect analysts' earnings forecast bias during public emergencies.

  (1)

In the model (1), Ferrorit represents the analyst's earnings forecast bias for firm i in year t. The key independent variable Cash measures the firm's cash reserve ratio in 2018, while Post is a time indicator that equals 1 for fiscal years 2020–2022 and 0 otherwise. The coefficient on the interaction term Cash × Post identifies the marginal effect of cash holdings on forecast bias under emergency shocks.

On the basis of model (1), this paper subdivided Ferror into optimistic bias of analysts' forecasts (Oferror) and pessimistic bias of analysts' forecasts (Pferror), and constructed model (2) and model (3) respectively to examine the effect of the firm's cash holding level on the analysts' forecast bias after being hit by a significant contingency, as follows:

  (2)

  (3)

In these two models, Oferrorit represents analysts' optimistic earnings forecasts for firm i in year t, and Pferrorit represents analysts' pessimistic earnings forecasts for firm i in year t. The rest of the variables are the same as defined in the previous model (1).

1. Empirical results

**4.1 Descriptive Statistics**

The descriptive statistics for the core variables under investigation are presented in Table 2. In particular, the mean of analysts' earnings forecast accuracy (Ferror) is 0.73, with a minimum value of 0, a maximum value of 10.72 and a standard deviation of 1.56, which indicates that there is a large variation in earnings forecast accuracy among different analysts to some extent. The mean of the dummy variable Post is 0.593, indicating that 59.3% of the observations in the sample are after the COVID-19 pandemic. The mean of the corporate cash holdings variable “Cash” is 0.17, indicating that corporate cash holdings as a percentage of total assets at the end of 2018 before the COVID-19 Pandemic was 17%, with a minimum of 2% and a maximum of 53%, suggesting that there was relatively large difference between different firms in terms of cash holdings prior to the emergency.

**Table 2. Descriptive statistics**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variables** | **Observations** | **mean** | **standard deviation** | **minimum** | **maximum** |
| Ferror | 5399 | 0.73 | 1.56 | 0.00 | 10.72 |
| Oferror | 5399 | 0.70 | 1.57 | 0.00 | 10.72 |
| Pferror | 5399 | 0.03 | 0.07 | 0.00 | 0.39 |
| Post | 5399 | 0.59 | 0.49 | 0.00 | 1.00 |
| Cash | 5399 | 0.17 | 0.11 | 0.02 | 0.53 |
| Update | 5399 | 0.83 | 0.46 | 0.00 | 1.91 |
| Horizon | 5399 | 4.80 | 0.85 | 1.61 | 5.87 |
| Coverage | 5399 | 2.29 | 0.85 | 1.10 | 4.01 |
| Dacc | 5399 | 0.02 | 0.07 | -0.18 | 0.27 |
| Board | 5399 | 2.26 | 0.18 | 1.79 | 2.77 |
| Lholder | 5399 | 35.43 | 15.06 | 9.27 | 75.05 |
| Mhold | 5399 | 0.12 | 0.19 | 0.00 | 0.68 |
| Size | 5399 | 23.10 | 1.33 | 20.72 | 26.92 |
| Mbratio | 5399 | 0.66 | 0.27 | 0.12 | 1.23 |
| Lev | 5399 | 0.45 | 0.18 | 0.09 | 0.85 |
| Roa | 5399 | 0.06 | 0.05 | -0.10 | 0.22 |
| Age | 5399 | 2.34 | 0.74 | 0.69 | 3.33 |

**4.2 Main Regression Results**

Table 3 reports the impact of corporate cash holdings on analysts' earnings forecast bias under pandemic shocks. As shown in Table 3, column (1) controls for industry and year fixed effects, while column (2) incorporates additional control variables. The results reveal a statistically significant negative coefficient on Cash and a positive coefficient on the interaction term Cash×Post. This suggests that while higher cash holdings generally reduce analysts' forecast bias, the pandemic shock amplifies forecast bias for firms with elevated cash reserves.

This study further decomposes forecast bias into optimistic and pessimistic biases. Column (3) presents estimates for optimistic bias, where the interaction term Cash×Post exhibits a coefficient of 0.851, indicating stronger optimistic forecasting attitudes toward high-cash firms during emergencies. Column (4) shows insignificant results for pessimistic bias.

These findings demonstrate that under major emergency shocks, firms with higher cash holdings experience greater earnings forecast bias and more pronounced analyst optimism. The results align with the halo effect mechanism: analysts overweight the preventive value of cash reserves while neglecting negative operational signals, thereby reducing forecast accuracy. The empirical evidence supports Hypothesis H1b.

**Table 3. Bias between company cash holding level and analysts’ forecast under the impact of pandemic**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable names** | **(1)** | **(2)** | **（3）** | **（4）** |
| **Ferror** | **Ferror** | **Oferror** | **Pferror** |
| Cash×Post | 1.064\*\*\* | 0.836\*\* | 0.851\*\* | -0.014 |
|  | (2.88) | (2.35) | (2.36) | (-0.92) |
| Cash | -1.818\*\*\* | -1.069\*\*\* | -1.096\*\*\* | 0.011 |
|  | (-6.28) | (-3.93) | (-4.01) | (0.90) |
| Control variables | No | Yes | Yes | Yes |
| \_cons | 0.927\*\*\* | 0.663 | 0.592 | 0.068\*\* |
|  | (19.28) | (1.19) | (1.06) | (2.57) |
| Industry FE | Yes | Yes | Yes | Yes |
| Year FE | Yes | Yes | Yes | Yes |
| N | 5399 | 5399 | 5399 | 5399 |
| adj. *R*2 | 0.021 | 0.070 | 0.068 | 0.040 |
| t statistics in parentheses\* p<0.1, \*\* p<0.05, \*\*\* p<0.01. Same below |

**4.3 Robustness Tests**

**4.3.1 Propensity score matching**

Although the DID method can effectively mitigate the endogeneity problem, the potential problem of sample selection bias may still interfere with the accuracy of the estimation results. To mitigate the sample selection bias problem, this paper uses the propensitymatch score method (PSM) to conduct the test: firms are divided into two groups based on their median cash holdings in 2018, i.e., high cash holding level is the treatment group and low cash holding level is the control group, and are matched using the 1:1 neighborhood matching method, and, after passing the balance test, the matched samples are subjected to the difference-in-differences (DID) estimation. The results are shown in column (2) of Table 4, and the coefficient of the interaction term Cash × Post is 1.229, which is significant at the 5% level, and the empirical results are consistent with the above empirical results.

**4.3.2 Substitution of explanatory variables**

In order to ensure the reliability and accuracy of the model estimation results, this paper replaces the firm's cash holding level measurement method by using the ratio of cash and cash equivalents to total assets (Ozkan, 2004; Lian Yujun et al., 2008) as the measurement of the firm's cash holding level. The results are shown in columns (3) and (4) of Table 4, and the regression coefficients of the interaction term Cash × Post are 0.940 and 0.981 respectively, which are significantly positive at the 5% level, consistent with the above empirical results.

**4.3.3 Substitution of explained variables**

In order to control the possible impact of key variable measurement bias on the research results and maintain the reliability and accuracy of the model estimation results, this paper replaces the measure of analyst earnings forecast accuracy test above by adopting the median instead of the mean of all the analysts' last EPS forecasts of the current year to compute the analysts' earnings Forecast accuracy Ferrorit=Abs[Medium(Fepsit)-Mepsit]/Abs(Mepsit) with reference to Chu Jian et al.'s (2019) measure of analysts' forecast accuracy. The results are shown in columns (5) and (6) of Table 4, and the regression coefficients of the interaction term Cash × Post are 0.789 and 0.804, which are positive and statistically significant at the 5% level, consistent with the above empirical results.

**Table 4. Robustness test**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** |
| **Variable names** | **Ferror****(Before PSM)** | **Ferror****(After PSM)** | **Ferror****(Replace explanatory variables)** | **Oferror****(Replace explanatory variables)** | **Ferror****(Replace explained variables)** | **Oferror****(Replace explained variables)** |
| Cash×Post | 0.836\*\* | 1.229\*\* | 0.940\*\* | 0.981\*\* | 0.789\*\* | 0.804\*\* |
|  | (2.35) | (2.34) | (2.49) | (2.57) | (2.27) | (2.29) |
| Cash | -1.069\*\*\* | -1.171\*\*\* | -1.207\*\*\* | -1.238\*\*\* | -1.090\*\*\* | -1.123\*\*\* |
|  | (-3.93) | (-3.00) | (-4.20) | (-4.28) | (-4.18) | (-4.28) |
| Control variables | Yes | Yes | Yes | Yes | Yes | Yes |
| \_cons | 0.663 | 1.530\*\* | 0.714 | 0.641 | 0.660 | 0.601 |
|  | (1.19) | (2.11) | (1.28) | (1.14) | (1.20) | (1.08) |
| Industry Fe  | Yes | Yes | Yes | Yes | Yes | Yes |
| Year Fe | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 5399 | 2747 | 5399 | 5399 | 5399 | 5399 |
| adj. *R*2 | 0.070 | 0.066 | 0.070 | 0.068 | 0.073 | 0.072 |

1. Further analyses

**5.1 Heterogeneity Analysis Based on Financing Constraints**

This paper categorizes financing constraints based on ownership types (state-owned vs. non-state-owned) and examines how such constraints affect analysts' forecast bias.

The COVID-19 pandemic heightened external financing difficulties, incentivizing firms with ample cash reserves to rely on internal financing through the preventive motive of cash holdings to mitigate operational risks. In China, state-owned enterprises (SOEs) benefit from implicit government guarantees (Zhang Detao, 2022), granting them superior access to bank loans and stronger risk-bearing capacity. In contrast, non-SOEs face severe financing constraints characterized by high costs and limited credit lines (Zhang J et al., 2013), coupled with weaker risk-bearing capacity. Consequently, the preventive motive of cash holdings is more pronounced for non-SOEs. When analysts forecast earnings during the pandemic, cash-rich non-SOEs should theoretically exhibit lower uncertainty premiums, leading to smaller forecast bias if analysts are unbiased. However, a halo effect may emerge: analysts overemphasize the preventive value of cash holdings while neglecting other risk factors, resulting in systematically optimistic forecasts.

In this paper, subsample regression analyses are conducted for state-owned (SOE=1) and non-state-owned (SOE=0) firms with forecast bias (Ferror) and forecast optimism bias (Oferror) as the dependent variables respectively. The results in Table 5 show that the coefficients of the Cash×Post interaction term in columns (2) and (4) are 1.085 and 1.117, both positive and statistically significant at the 5% level. This indicates that, under major contingency shocks, higher cash holdings in non-state-owned firms are associated with greater bias and optimism in analysts' earnings forecasts compared to state-owned firms. This suggests that analysts' overemphasis on the preventive role of cash holdings distorts their assessments of other risk dimensions, leading to overly optimistic forecasts."

**Table 5. Heterogeneity analysis based on property rights**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **(1)** | **(2)** | **(3)** | **(4)** |
| **Variable Names** | **Ferror****(SOE=1)** | **Ferror****(SOE=0)** | **Oferror****(SOE=1)** | **Oferror****(SOE=0)** |
| Cash×Post | 0.440 | 1.085\*\* | 0.431 | 1.117\*\* |
|  | (0.90) | (2.18) | (0.87) | (2.23) |
| Cash | -0.556 | -1.106\*\*\* | -0.583 | -1.136\*\*\* |
|  | (-1.48) | (-2.91) | (-1.54) | (-2.97) |
| Control Variables | Yes | Yes | Yes | Yes |
| \_cons | 0.143 | -0.085 | 0.024 | -0.121 |
|  | (0.16) | (-0.11) | (0.03) | (-0.15) |
| Industry Fe | Yes | Yes | Yes | Yes |
| Year Fe | Yes | Yes | Yes | Yes |
| N | 1901 | 3498 | 1901 | 3498 |
| adj. *R*2 | 0.049 | 0.079 | 0.046 | 0.079 |

**5.2 Heterogeneity Analysis Based on the Agency Problem**

This paper proxies for agency problem severity using managerial ownership levels and examines their impact on analysts' forecasts.

Cash holdings entail both preventive and agency conflict implications. While corporate cash reserves may incentivize managerial pursuit of private benefits at the expense of shareholder value maximization which is manifested through heightened risks of perquisite consumption or over-investment, managerial ownership serves as a governance mechanism to align principal-agent interests. Specifically, elevated managerial ownership reduces agency costs by curbing opportunistic behaviors and fostering long-term value creation (Jensen & Meckling, 1976; Jensen, 1986). Consequently, higher managerial ownership attenuates the agency costs associated with cash holdings. Under pandemic shocks, when agency conflicts are mitigated by substantial managerial ownership, cash holdings predominantly signal preventive motives. In such cases, rational analysts would interpret abundant cash reserves as reducing earnings uncertainty, thereby minimizing forecast bias. However, in the presence of halo effect, analysts may overweight the preventive value of cash while neglecting other risk factors. This behavioral distortion amplifies optimism bias and degrades forecast accuracy, as evidenced by systematically upward-biased earnings forecasts for high-ownership firms with elevated cash levels.

In this paper, subsample regression analyses are conducted according to firms with high management shareholding (Mhold=1) and low management shareholding (Mhold=0) using forecast accuracy (Ferror) and forecast optimism bias (Oferror) as explanatory variables respectively. The results are shown in Table 6. The regression coefficients of the interaction term Cash×Post in columns (1) and (3) are 1.234 and 1.261 respectively, both of which are positive and statistically significant at the 5% level. This indicates that under the impact of major emergencies, the higher the cash holdings in firms with high management shareholding compared to firms with low management shareholding, the higher the analysts' earnings forecast bias and the more optimistic the forecasting attitude due to the halo effect.

**Table 6. Heterogeneity analysis based on management shareholding ratio**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variable names** | **(1)** | **(2)** | **(3)** | **(4)** |
| **Ferror****(Mhold=1)** | **Ferror****(Mhold=0)** | **Oferror****(Mhold=1)** | **Oferror****(Mhold=0)** |
| Cash×Post | 1.234\*\* | 0.375 | 1.261\*\* | 0.375 |
|  | (2.09) | (0.87) | (2.12) | (0.86) |
| Cash | -0.956\*\* | -0.910\*\*\* | -0.979\*\* | -0.934\*\*\* |
|  | (-2.03) | (-2.93) | (-2.07) | (-2.98) |
| \_cons | -0.816 | 1.893\*\* | -0.875 | 1.766\*\* |
|  | (-0.82) | (2.48) | (-0.87) | (2.30) |
| Control Variables | Yes | Yes | Yes | Yes |
| Industry Fe | Yes | Yes | Yes | Yes |
| Year Fe | Yes | Yes | Yes | Yes |
| N | 2699 | 2699 | 2699 | 2699 |
| adj. *R*2 | 0.084 | 0.063 | 0.084 | 0.060 |

**5.3 Heterogeneity Analysis Based on the Degree of Uncertainty**

This paper measures uncertainty through analyst forecast dispersion (Fdisp). The sample is split into high- and low-uncertainty groups at the median Fdisp to examine the differential impact of uncertainty on analysts' forecast bias and optimism.

The higher the level of uncertainty faced by a company in the course of operations, the more difficult it is for analysts to accurately estimate the impact of the company's current operating conditions on its future performance. All of these factors, such as intense industry competition, strategic restructuring, litigation or compliance risks, complex revenue recognition practices, or volatile cost structures, will lead to a higher level of uncertainty in the company's operations, then it will be more difficult for analysts to predict the future performance, and analyst forecast dispersion will increase.Higher analyst forecast dispersion signals both heightened firm-level uncertainty and stronger preventive motives for cash retention In the face of emergencies, for companies with higher analyst dispersion, if analysts do not have cognitive bias, high cash holdings mitigate liquidity risks, thereby reducing earnings volatility, thus improving the quality of analysts' forecasts due to the larger preventive effect of cash holdings. if there is a halo effect, high cash holdings instead prompt analysts to amplify the preventive effect of cash holdings, ignoring other factors, resulting in analysts' forecasts to be more optimistic and forecast bias to increase.

This paper uses the formula Fdispit = Sd(Fepsit)/Abs(Mepsit) to measure the degree of divergence of analysts' forecasts, where Sd(Fepsit) is the standard deviation of analysts' forecasts of earnings per share, and Abs(Mepsit) is the absolute value of the actual earnings per share, and conducts subsample regression analyses according to the degree of divergence of analysts' forecasts, i.e., high dispersion (Fdisp=1) and low dispersion (Fdisp=0). The results are shown in Table 7. The regression coefficients of the interaction term Cash×Post in columns (1) and (3) are 1.603 and 1.607 respectively, which are both positive and statistically significant at the 5% level, indicating that under major exogenous shocks, firms with higher cash holdings and elevated analyst forecast dispersion exhibit lower accuracy and more optimistic forecasts. This occurs because dispersion proxies for unresolved uncertainty. Based on halo effects, Analysts exhibit systematic optimism bias in earnings forecasts for firms with high cash holding, which leads to degraded forecast accuracy.

**Table 7. Heterogeneity analysis based on analysts’ forecast divergence**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **(1)** | **(2)** | **(3)** | **(4)** |
| **Variable names** | **Ferror****(Fdisp=1)** | **Ferror****(Fdisp=0)** | **Oferror****(Fdisp=1)** | **Oferror****(Fdisp=0)** |
| Cash×Post | 1.603\*\* | -0.033 | 1.607\*\* | -0.010 |
|  | (2.49) | (-0.19) | (2.48) | (-0.06) |
| Cash | -2.159\*\*\* | -0.110 | -2.197\*\*\* | -0.121 |
|  | (-4.37) | (-0.72) | (-4.42) | (-0.79) |
| Control Variables | Yes | Yes | Yes | Yes |
| \_cons | -0.394 | 0.322 | -0.449 | 0.225 |
|  | (-0.39) | (1.64) | (-0.44) | (1.11) |
| Industry Fe | Yes | Yes | Yes | Yes |
| Year Fe | Yes | Yes | Yes | Yes |
| N | 2699 | 2699 | 2699 | 2699 |
| adj. *R*2 | 0.055 | 0.132 | 0.053 | 0.125 |

1. Conclusions and recommendations

This paper examines Shanghai and Shenzhen A-share listed companies (2018-2022) using a difference-in-differences (DID) design to investigate how corporate cash holdings affect analyst earnings forecast bias during public emergency. Results show that analysts exhibited disproportionately optimistic forecasts for firms with pre-pandemic high cash holdings, attributable to the halo effect. This effect is particularly pronounced in firms facing greater financing constraints, less severe agency problems, and higher analyst forecast dispersion. For such firms, analysts tend to overweight the preventive motive of cash holdings, resulting in larger forecast bias.

Based on the conclusions of this paper, the following policy recommendations are put forward: firstly, enterprises should strategically optimize cash management policies to enhance the value relevance of cash holdings, and establish a graded disclosure framework with materiality thresholds to reduce the degree of information asymmetry, so that external information users can make full use of the information to make investment decisions. Secondly, when predicting the future profitability of the enterprise, analysts should adhere to fiduciary duty standards by implementing structured analytical procedures, and comprehensively refer to the enterprise's various operational data of enterprises to avoid the halo effect and make rational forecasts. Thirdly, investors should objectively apply analyst forecasts with risk-adjusted interpretation frameworks, particularly regarding conflated cash-ability perceptions when making reference to the forecasts of analysts.

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