



Heriot-Watt University  
Research Gateway

## Management Earnings Forecast and Technical Innovation

### Citation for published version:

Khan, MB, Ezeani, E, Saleem, H & Usman, M 2024, 'Management Earnings Forecast and Technical Innovation: The Mediating Effects of Cost of Debt', *Journal of Accounting in Emerging Economies*, vol. 14, no. 5, pp. 1103-1126. <https://doi.org/10.1108/JAEE-09-2023-0279>

### Digital Object Identifier (DOI):

[10.1108/JAEE-09-2023-0279](https://doi.org/10.1108/JAEE-09-2023-0279)

### Link:

[Link to publication record in Heriot-Watt Research Portal](#)

### Document Version:

Peer reviewed version

### Published In:

Journal of Accounting in Emerging Economies

### Publisher Rights Statement:

This author accepted manuscript is deposited under a Creative Commons Attribution Non-commercial 4.0 International (CC BY-NC) licence. This means that anyone may distribute, adapt, and build upon the work for non-commercial purposes, subject to full attribution.

### General rights

Copyright for the publications made accessible via Heriot-Watt Research Portal is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

### Take down policy

Heriot-Watt University has made every reasonable effort to ensure that the content in Heriot-Watt Research Portal complies with UK legislation. If you believe that the public display of this file breaches copyright please contact [open.access@hw.ac.uk](mailto:open.access@hw.ac.uk) providing details, and we will remove access to the work immediately and investigate your claim.

1 **Management Earnings Forecast and Technical Innovation: The Mediating Effects of Cost of**  
2 **Debt**

3 **Abstract**

4 **Purpose** - This study examines whether a firm's management earnings forecasts affect its technical  
5 innovation activities. Our study also examines whether the cost of debt plays a mediating role  
6 between the management earnings forecasts and the innovation nexus.

7 **Design/methodology/approach** We obtained data from 1032 Chinese non-financial firms listed  
8 on the Shanghai and Shenzhen stock markets from 2005 to 2022 (i.e., 18576 firm-year  
9 observations). We used various econometrics techniques, such as Heckman's (1979) two-stage  
10 selection method and two-stage least square, to examine the relationship between management  
11 earnings forecasts and the firm's technical innovation activities.

12 **Findings** - We find a positive relationship between management earnings forecasts and the firms'  
13 technical innovation. We also find that the cost of debt mediates the relationship between  
14 management earnings forecast and technical innovation. Further analysis indicates that frequent  
15 earnings forecasts provide incremental information regarding a firm's future value and cash flows,  
16 thus reducing the volatility and uncertainty in cash flow calculations. Our findings are robust to  
17 several tests.

18 **Research Implications** - Our study has implications for policymakers, practitioners, and high-  
19 level management of Chinese firms, enabling them to understand the relationship between  
20 management earnings forecasts and firms' innovation activities.

21 **Keywords:** Management Earnings Forecasts, Firm's Technical Innovation Activities, Cost of  
22 Debt, Mediation Effect, Information Asymmetry implications for policymakers, practitioners, and  
23 high-level management of Chinese firms,

## 24 **1. Introduction**

25 In recent years, intense competition has led to increased innovativeness among firms  
26 (Bena & Li, 2014; S.-S. Chen, Huang, Hwang, Wang, & Accounting, 2019). Previous studies  
27 highlight that innovation enables a firm to gain a competitive advantage by creating novel products  
28 or services desired by customers (Jia, 2019; Ren, Huang, Liu, & Yan, 2023; Van de Ven, 1986).  
29 Innovative-friendly firms are mindful of short-term outside pressure (Ederer & Manso, 2011) and  
30 try to manage market participants' expectations through management earnings forecasts (Choi,  
31 Myers, Zang, & Ziebart, 2011; H. J. Huang, Habib, Sun, Liu, & Guo, 2021).

32 Management earnings forecasts communicate comprehensive information about the firm's  
33 essential features that control the value-generating process, particularly the firm's future cash flows  
34 (Dutta & Gigler, 2002). The key motivation for disclosing firms' information is to reduce  
35 asymmetric information (Gong, Xia, Xia, & Wang, 2023; Rakow, 2010) and provide transparency  
36 in the innovative process (Brown & Martinsson, 2019; Zhong, 2018). Hence, a firm's higher  
37 commitment toward frequent forward-looking earnings forecasts reflects the managers' aptitude to  
38 close the information gap between managers and outsiders (Abdelazim, Metwally, & Aly, 2023).

39 Extant literature suggests the need for firms to communicate with market participants and  
40 maintain a transparent environment through frequent disclosure of information as it directly  
41 impacts the cost of capital and is a key source of input into innovation activities (Alhaddad,  
42 Whittington, & Gerged, 2021; Stephen P Baginski & Rakow, 2012; Cao, Myers, Tsang, & Yang,  
43 2017; Rakow, 2010). Previous studies suggest that disclosing firm-specific information will  
44 mitigate information asymmetry (R. Salem, Ezeani, & Song, 2023; R. I. A. Salem, Ezeani, Gerged,  
45 Usman, & Alqatamin, 2021) and uncertainty among investors (Darrough & Stoughton, 1990).  
46 However, the proprietary cost (Jia, 2019), litigation costs (Yamada, 2016), and the possibility of

47 eroding firms' competitive advantage imply that it is not always beneficial for managers to provide  
48 frequent earnings forecasts. This study examines whether frequent management earnings forecasts  
49 affect the firm's research and development (R&D) expenditure (i.e., technical innovation  
50 activities). It also investigates the mediating effects of the cost of debt in the relationship between  
51 management earnings forecast and technical innovation. Our study is important due to China's  
52 unique institutional environment (Komal, Ezeani, Shahzad, Usman, & Sun, 2021; Komal, Ezeani,  
53 et al., 2023) and the mandatory earnings forecast requirements, which deviate from the voluntary  
54 approach used in most developed countries.

55 We are motivated to undertake this study for the following reasons. Firstly, consistent with  
56 the signaling and agency theory, studies suggest that management earnings forecasts will mitigate  
57 information asymmetry (Dutta & Gigler, 2002; Hsieh, Song, Wang, & Wang, 2019; Preussner &  
58 Aschauer, 2022). However, the existing studies have focused on voluntary forecasts (Jog &  
59 McConomy, 2003; Waymire, 1986). Previous studies have ignored the impact of management  
60 earnings forecasts on firm innovation. Also, no study have considered the mediating effect of the  
61 cost of debt on the relationship between management earnings forecasts and firm innovation.

62 Secondly, studies show that corporate innovation is generally costly (Bouncken & Kraus,  
63 2013; Tian & Wang, 2014). However, it is well documented that management earnings forecasts  
64 influence the cost of capital (Stephen P Baginski & Rakow, 2012; Cao et al., 2017; Rakow, 2010;  
65 K. T. Wang & Zhu, 2023), thereby reducing the cost of firms exploration. Hsieh et al. (2019)  
66 proved that management earnings forecasts could help firms assess favourable bank loan contract  
67 terms. However, no study to date has examined the mediating effect of the cost of debt on the  
68 management earnings forecasts and the firm's technical innovation activities nexus.

69 Finally, China provides a unique context for examining the relationship between  
70 management earnings forecasts and firm innovation. The country has the largest economy among  
71 the world's emerging markets, and its capital market is rapidly improving. Also, the Chinese  
72 government's growing efforts to increase investment probabilities (Ren et al., 2023) have led to  
73 firms' innovative efforts. Previous studies overwhelmingly document voluntary disclosure's  
74 relevance in reducing information asymmetry (Al-Bassam, Ntim, Opong, & Downs, 2018; Md  
75 Zaini, Samkin, Sharma, & Davey, 2018; Ntim, Opong, Danbolt, & Thomas, 2012; R. Salem et al.,  
76 2023; R. I. A. Salem et al., 2021; Tan, Komal, Ezeani, Usman, & Salem, 2022). However, China  
77 has a mandatory approach to management earnings forecasts (Xiaobei Huang, Li, Tse, & Tucker,  
78 2018; Y. Wang, Chen, & Wang, 2015) and a unique institutional environment with type two  
79 agency conflict (Komal, Bilal, et al., 2023; Komal et al., 2021; Tan et al., 2022). The mandatory  
80 approach to earnings forecasts and the unique business environment makes it interesting to  
81 examine the relationship between management earnings forecasts and corporate innovation in  
82 China.

83 Therefore, using a sample of 1,032 non-financial firms listed on the Shanghai and  
84 Shenzhen stock markets from 2005 to 2022, this study examines whether a firm's management  
85 earnings forecasts affect its technical innovation activities. Our study also examines whether the  
86 cost of debt plays a mediating role between the management earnings forecasts and the innovation  
87 nexus. We find a positive relationship between frequent management earnings forecasts and a  
88 firm's technical innovation activities, suggesting that frequent earnings forecasts enable firms to  
89 invest in potential R&D projects. We show that management earnings forecasts improve  
90 innovation by decreasing information asymmetry. Also, we find that the cost of debt mediates the  
91 relationship between management earnings forecasts and technical innovation.

92           Our study contributes to previous literature in the following ways: firstly, previous studies  
93 focused on the impact of voluntary management forecasts on various organisation outcomes  
94 (Gramlich & Sørensen, 2004; Jog & McConomy, 2003; Kim, Shroff, Vyas, & Wittenberg-  
95 Moerman, 2018), we contribute to this area of study by focusing on management earnings forecasts  
96 in China, which is mainly mandatory. Secondly, we contribute to the literature by documenting  
97 novel evidence on the mediating role of the cost of debt in the relationship between management  
98 earnings forecast and technical innovation. Thirdly, the signaling theory suggests the impact of  
99 disclosure in mitigating the information gap between insiders and firm outsiders (Spence, 1978).  
100 Consistent with the signaling theory, we demonstrate that the frequency of management earnings  
101 forecasts positively impacts corporate innovation.

102           The remaining study is arranged as follows. Section 2 includes the Institutional  
103 background, Section 3 covers the literature review and hypothesis development, Section 4  
104 describes the data sample, measurement of variables, experimental research design, and empirical  
105 analysis, and Section 5 presents the empirical result of this study. Lastly, section 6 reveals the  
106 study's conclusions, limitations, and future directions.

## 107 **2. Institutional background**

108           In most Western countries, firms are expected to voluntarily provide earnings forecasts  
109 (Gramlich & Sørensen, 2004; Jog & McConomy, 2003). Studies suggest that a voluntary approach  
110 to earnings forecasts may result in bias and not fully reflect management information (McConomy,  
111 1998; McNichols, 1989).

112           As an emerging economy, China has not adopted the voluntary disclosure of earnings forecasts  
113 prevalent in the West. Before 1998, it was not common for Chinese firms to forecast their earnings

114 before the required report date. However, Chinese regulators introduced mandatory earnings  
115 forecasts in 2001 to reduce the information gap. According to the China Securities Regulation  
116 Commission (CSRC), if a listed firm's financial efficiency and deviation reach a specific threshold,  
117 they must publicly disclose their earnings forecasts (Xiaobei Huang et al., 2018). Publicly listed  
118 firms in China must issue earnings forecasts for the fiscal year if the manager anticipates their  
119 earnings will increase or reduce by at least 50% in the prior year. As all the Chinese firms end their  
120 fiscal year on 31<sup>st</sup> December, the forecasts must be issued by 31st January. An additional layer of  
121 mandatory earnings forecast was added in 2004 and required firms to disclose the anticipated profit  
122 of the current year following a loss in the previous year.

123 From 1998 to 2006, management earnings forecast requirements passed through several significant  
124 modifications and revisions, which suggest the vital influence in China. Also, the stock exchange  
125 supported the mandatory approach to earnings forecasts advocated by the CSRC by providing  
126 forms that enhance forecast release standardization. It also mandates an update on the earnings  
127 forecast previously issued by firms if there are changes in circumstances. For instance, the stock  
128 exchange demands another update if the new estimate shows a significant difference (more than  
129 50%) from the previous year's estimate. Also, firms are likely to be publicly denounced for  
130 inaccurate earnings forecasts. In certain circumstances, the firm may be required to restore the trust  
131 of investors by offering an apology through the national newspaper.

132 Previous studies in Chinese context highlight the benefits of the mandatory approach to earnings  
133 forecast used in China (Xiaobei Huang et al., 2018; Y. Wang et al., 2015). For instance, Xiaobei  
134 Huang et al. (2018) argue that mandatory forecasts' information content is superior to voluntary  
135 earnings forecasts. They also suggest that mandating firms to forecast earnings will increase the  
136 chances of future voluntary earnings forecasts since firms are accustomed to providing valuable

137 information. Similarly, Y. Wang et al. (2015) argue that forced earnings forecast increases the  
138 likelihood of more timely information that mitigates asymmetric information in the capital market.  
139 Dai, Parwada, and Zhang (2015) report that Chinese firms provide miscellaneous information  
140 through management earnings forecasts, which help to decrease the information risk between  
141 managers and market participants. Thus, market participants consider them an essential document  
142 for the securities market in the country.

143 Prior studies have shown that a rigorous approach to management earnings forecasts encourages  
144 managers to meet investor expectations regarding firms' performance, mitigate mispricing, and  
145 reduce short-term behaviour (Choi et al., 2011; Kasznik & Lev, 1995). Mandatory earnings  
146 forecasts also provide an incremental measure to the investor to assess how the managers enhance  
147 the monitoring mechanism (Bens & Monahan, 2004; O. Z. LI & Zhuang, 2012). Hence, examining  
148 the association between management earnings forecast and technical innovation in Chinese firms  
149 would be interesting.

### 150 **3. Theoretical framework**

151

152 Studies suggest that firms managers and outsiders are at risk of information gaps due to  
153 the complexity of innovative projects (March, 1991; Tian & Wang, 2014), making it difficult for  
154 stakeholders to assess the benefits of innovation (Petkova, 2006; Zhong, 2018). Previous studies  
155 suggest corporate transparency mitigates asymmetric information (Brown & Martinsson, 2019;  
156 Elghuweel, Ntim, Opong, & Avison, 2017; D. Huang, Liu, Chan, & Chen, 2023). D. Huang et al.  
157 (2023) argue that the mandatory and frequent disclosure of value-relevant firm-specific  
158 information is the most effective way to reduce asymmetric information associated with  
159 innovation.



160 Management earnings forecasts enable firms to open up credible communication channels  
161 with market participants and maintain a good information environment, enabling firms to mitigate  
162 asymmetric information (Preussner & Aschauer, 2022). In line with the signalling theory (Spence,  
163 1973), the credibility of disclosure and its relevance in reducing asymmetric information may be  
164 influenced by the frequency of the signal sent (Ajinkya & Gift, 1984; Gonedes, Dopuch, &  
165 Penman, 1976; Maslar, Serfling, & Shaikh, 2021). Extant literature suggests numerous benefits of  
166 management earnings forecasts. For instance, Stephen P Baginski and Rakow (2012) and Cao et  
167 al. (2017) suggest that management earnings forecasts will likely reduce the cost of financing  
168 innovation projects, thereby boosting firms' technical innovation activities. Verrecchia (2001)  
169 argues that minimising the information gap between firms and investors will increase liquidity and  
170 enable firms to reduce the cost of external finance.

171 The literature highlights the consequences and costs of public disclosure of firm-specific  
172 information (Berger & Hann, 2007; Leuz & Verrecchia, 2000; Yamada, 2016). Leuz and  
173 Verrecchia (2000) highlight the proprietary cost of disclosing firms-specific information.  
174 (Darrough & Stoughton, 1990) emphasize the importance of considering competition costs relating  
175 to disclosure. Firms may erode their competitive edge by publicly disclosing the estimation of  
176 future income relating to innovation efforts (Berger & Hann, 2007; Leuz & Verrecchia, 2000;  
177 Yamada, 2016). Providing valuable firm-specific information may facilitate competitors' exit or  
178 entry decisions (Jia, 2019). This view implies that managers of innovative firms should conduct a  
179 cost-benefit analysis before disclosing firm-specific information.

180 From the agency theory perspective, studies suggest that improving firms' information  
181 environment through frequent management earnings forecasts helps resolve agency conflicts. In  
182 line with the agency theory of free cash flow (Jensen, 1986), the improved information

183 environment resulting from frequent forecasts will enhance board monitoring. Therefore, the  
184 possibility of board monitoring may increase self-interested managers' reluctance to provide  
185 frequent earnings forecasts.

## 186 **4. Empirical Literature Review and Hypothesis**

### 187 **4.1 Management Earnings Forecasts and the Firm's Technical Innovation**

188 The relationship between technical innovation and management earnings forecasts is still  
189 unclear. On the one hand, previous studies suggest that proprietary and competition costs may  
190 deter a firm from disclosing firm-specific information (D. Huang et al., 2023; Jia, 2019; Zhong,  
191 2018). In this case, the public disclosure of the estimation of future income relating to innovation  
192 efforts may reduce a firm's competitive advantage by facilitating competitors' exit or entry  
193 decisions. Constant provision of management earnings forecasts is likely to increase the risk of  
194 imitation and unwarranted competition (D. Huang et al., 2023). Y. Wang et al. (2015) and  
195 (Yamada, 2016) suggest that earnings management forecast is associated with litigation risks. In  
196 China, the regulator also closely monitors the format and content of the management forecasts  
197 (Xiaobei Huang et al., 2018). Therefore, managers of innovative firms may show conservatism  
198 towards providing earnings estimates, especially when the content of such disclosure matters to  
199 the regulators. Ali, Klasa, and Yeung (2014) document an inverse relationship between proprietary  
200 costs and voluntary disclosure.

201 On the other hand, due to the capital-intensive nature of technical innovation (D. Huang et  
202 al., 2023) and the need to fund innovative projects over a longer period, managers are likely to  
203 report frequent earnings estimates to reduce the cost of innovation. Also, since firms engaging in  
204 technical innovation have a higher knowledge and information gap with their stakeholders (Zhong,

205 2018), frequent management forecasts may be relevant to keep the investors on board and reduce  
206 the information gap. D. Huang et al. (2023) suggest that outsiders are likely to benefit from the  
207 credibility of the mandatory management earnings forecast. It is also the case that each milestone  
208 in the innovative process represents 'a small win' for the firm. Penman (1980) argues that firms  
209 with 'good news' are more likely to disclose private firm-level information. Therefore, we expect  
210 that firms with technical innovation will increase their management earnings forecasts and propose  
211 the following hypothesis.

212 H1: Management earnings forecasts have a positive effect on technical innovation activities

#### 213 **4.2 Management Earnings Forecasts, the Firm's Technical Innovation and the Cost of debt**

214 Prior studies have examined the increasing effects of disclosure practices on a firm's cost  
215 of capital (Cao et al., 2017; Rakow, 2010). For instance, using overall corporate disclosure  
216 measures, Lang and Lundholm (1996) showed that a higher level of disclosure was related to a  
217 more significant analyst following enhanced market expectation accuracy and lower information  
218 asymmetry. Their results suggested that high-quality disclosure led to a lower cost of capital.  
219 Similarly, using a disclosure level self-constructed measure, Botosan (1997) found a negative  
220 relationship between disclosure level and the firm's cost of capital. Stephen P. Baginski and Hinson  
221 (2016) documented that the increase in management earnings forecast frequency, followed by  
222 forecast initiation, was related to a decrease in the firm's cost of equity capital. Since the  
223 management earnings forecasts provide a projection of the firm's future cash flow to repay its debt  
224 obligations, they can assist creditors by communicating essential forward-looking details of a firm  
225 that help reduce the cost of debt. The lower cost of debt could help firms manage their expected  
226 free cash flows and increase investment in potential R&D innovation projects. Thus, we conjecture  
227 an inverse relationship between the management earnings forecast and the cost of debt.

228 In line with the agency theory, frequent management earnings forecasts will improve the  
229 corporate governance of innovative firms. Consistent with the agency theory of free cash flow,  
230 previous studies find that a good corporate governance environment will increase the monitoring  
231 effect of debt (Elghuweel et al., 2017; Ezeani, Kwabi, et al., 2023; Ezeani et al., 2022; Morellec,  
232 Nikolov, & Schürhoff, 2012). Also, Since innovative projects are capital-intensive and funded over  
233 an extensive period, Hall and Lerner (2010) suggest that using debt for R&D projects may be  
234 costly. They suggest lenders may be unwilling to finance firms with quality R&D projects due to  
235 the information asymmetry problem. In contrast, Nanda and Nicholas (2014) showed that debt is  
236 a vital financing choice for a firm's innovation activities. We suggest that self-interested managers  
237 may refrain from frequent management earnings forecasts to evade the monitoring effect of debt  
238 and formulate the following hypothesis.

239 H2: Cost of debt has a mediating impact between management earnings forecasts and firm's  
240 technical innovation activities.

241 **Insert Figure 1 here**

242

## 243 **5. Data and Research Design**

### 244 **5.1 Data**

245 We collected listed firm's management earnings forecasts data from Wind database, while  
246 the related financial indicators data and corporate governance indicators data from China Stock  
247 Market & Accounting Research Database (CSMAR) database over the period 2005-2022. Our  
248 study sample includes different industry sectors based on the China classification of national  
249 economy industries-GB/T4754-2002. **Our initial sample consists of 1,223 firms (22,008 firm-year**

250 observations) obtained from the China Stock Market & Accounting Research Database (CSMAR)  
251 and Wind database between 2005-2022. Following the prior research (Zhong 2018; Jiang, Habib,  
252 and Gong 2015; Pittman and Fortin 2004; Jia, 2019; Qin and Zhang 2019), we removed 191 firms  
253 from regulated industries and those with missing data or incomplete information. We exclude the  
254 financial services, real estate, and insurance-related industries. We also excluded 38 firms for  
255 which we cannot obtain management earnings forecasts from the Wind/CSMAR database. We  
256 remove 39 firms which have insufficient information to construct the cost of debt proxy. We  
257 exclude 42 firms with insufficient information to construct innovation activities variables. Finally,  
258 we remove 71 firms that lack sufficient data to compute the control variables. Our final sample is  
259 1032 firms (18,576 firm-year observation). Panel A of Table I shows the sample selection process,  
260 while Panel B of Table I explains the deletion of insufficient data from the selected sample size.

261 All the management earnings forecasts data are firm-yearly and all the R&D activities, cost  
262 of debt, and other proxies are taken from annual report of the company. For the technical  
263 innovation activities data, we removed implementation observations that have been discontinued.  
264 Therefore, we eliminated financial firms' observations and observations of firms that have been  
265 treated differently and other inaccurate observations (Ezeani, Salem, Usman, & Kwabi, 2023;  
266 Komal et al., 2021). For the earnings forecasts and other variables data; this study filtered the  
267 sample using the following conditions to attain the final selection set: (1) Special treated and newly  
268 listed firms were removed from the dataset. (2) Missing value observations and abnormal data  
269 were dropped from the dataset. (3) Real estate, financial, and insurance firms were removed from  
270 the study dataset. (4) To control any impact of outliers, entire perpetual variables were winsorized  
271 at 01 percent to 99th percent. 5) Focused on A-share firms because the effect of realized cost of  
272 debt of these firms is more significant in the capital market settings, and the A-share financial

273 information environment is different from that of the Band H-share firm<sup>1</sup>. Additionally, we  
274 exclude ambiguous observations, financial firms' observations and special treated firms'  
275 observations.

276 Our dependent variable is the firms' technical innovation activities (TIA), demonstrating  
277 the firm's innovation intensity. Prior studies used different proxies to estimate the firm's innovation  
278 (Griliches, 2007; Hall, Mairesse, & Mohnen, 2010). Knott and Vieregger (2019) assessed three  
279 typical innovation proxies in recent times. They contended that the research quotient is the only  
280 proxy that fulfils the condition for the R&D productivity construct in Romer's Theory (Romer,  
281 1990). However, the main focus of our study is on the innovation intent; thus, we follow Zhong  
282 (2018) and measure innovation as the firms' R&D spending scaled by the entire operating revenue  
283 during the year.

284 In this study, we used management earnings forecasts (MEFs) as the independent variable  
285 of primary interest. MEFs are commonly provided through a variety of channels, including media  
286 releases, analyst interviews, and telephone conferences (F. Li, 2010) and their information is  
287 effectively communicated to end users (Chen, Huang, Hwang, & Wang, 2019). Following Jiang,  
288 Habib, and Gong (2015), this study estimated management earnings forecasts as the firm's earnings  
289 forecast quantity during a financial year. The MEFs were used to test the study hypotheses that  
290 capture the firms' precise information on future incomes relating to accounting basics used to hold  
291 the firm's value-generating practices, particularly the firm's free cash flow.

292 Our study used one mediating variable, namely the Cost of Debt (COD), to investigate the  
293 firm's COD effect on the association between management earnings forecasts and TIA (see Figure  
294 I). Following previous studies, including Pittman and Fortin (2004), this study estimated COD as

---

<sup>1</sup>Chen et al. (2007) document that A-shares are traded in Yuan (Renimbi) and owned by individual and legal persons of the China, whereas B- and H-shares are exchange in foreign money and offered to foreign nations including Hong Kong, Macau, and Taiwan citizens only.

295 the interest cost of a firm divided by total debt (non-current obligations due during one year, short-  
296 and long-run debts, bond payables, and accounts payable) of the firm "i" and year "t." Our study  
297 expects that the firms' MEFs and COD are negatively associated.

298 Following previous studies (Jia, 2019; Qin and Zhang, 2019 (Owusu, Kwabi, Ezeani, &  
299 Owusu-Mensah, 2022)), the present study used control variables that might confound the  
300 relationship among MEFs, TIA, and the COD. The control variables included bank loan access  
301 (ABL), leverage (LEV), firm size (FS), firm's age (FA), profitability (ROA), state-owned  
302 enterprise (SOE), cash flow from operations (CFO), the book value to market (BTM), big four  
303 auditors (B4A), growth opportunity (GRO), Tobin's Q (TQ), loss in net income (LOSS), industry  
304 and year effects. Also, following previous studies (Kwabi, Owusu, Ezeani, & Boateng, 2024;  
305 Obenpong Kwabi, Owusu-Manu, Boateng, Ezeani, & Du, 2022) politically connected firm (PCF).

306 The ABL was calculated as equivalent to "1" when firms access bank loans and "0" for  
307 others. The LEV was calculated as the debt of the firms relating to the sum of debt in a year scaled  
308 by assets in total (Usman et al., 2023). The FS is determined as the natural logarithm of assets in  
309 total (Usman, Ezeani, Salem, & Song, 2022). Extant literature documents that FA is an essential  
310 variable influencing innovation activity. The FA was estimated as the years between the firm's  
311 annual financial reports and initial public offerings.

312 The ROA is the firm's profitability, estimated as the net earnings scaled by the total firm  
313 assets. The SOE was calculated as if a non-financial firm was controlled by the state or  
314 government, with one and zero values. The BTM was determined by the equity market worth plus  
315 the sum of the asset book worthless, the equity book value, and deferred taxes (adjusted to "0"  
316 when lost) scaled by the firm's entire asset book value. The B4A equaled one if an audit report was  
317 issued in a year and zero otherwise. The PCF was equivalent to "1" if firms' officials, including

318 the manager, general manager, or real controller, had a political link with government officials  
319 linked with political consultative meetings or national people congress duties at a country level or  
320 above "0" otherwise. The CFO was measured as cash flow scaled by assets in total in a year. The  
321 GRO was sales growth estimated as the disparity with the existing year's sales plus the preceding  
322 year's sales divided by the prior sales. The TQ was calculated as the equity market worth plus the  
323 firm's obligations book worth divided by the firm's total assets. A firm's earnings are less  
324 substantial for the firm's loss, and the financial expectation of achieving or striking the goals is  
325 less vital for the said firms. Thus, following a study like Jia (2019), this study included LOSS  
326 estimated as one for the firms whose net income was negative and zeroed otherwise to report a  
327 substantial loss in the previous period. Finally, this study includes year and sector dummy variables  
328 to identify the invariable period, industry heterogeneity, and period trends. **The descriptive  
329 information of the sample selection procedure is presented in Table I.**

330 **Insert Table I here**

## 331 **5.2 Research Design**

332 **We first examined the effects of a firm's management earnings forecasts on technical  
333 innovation activities (in model 1). Secondly, we examined whether the cost of debt plays a  
334 mediating role in the relationship between management earnings forecasts and innovation (see  
335 models 2 and 3). We used fixed effects regression to test the effect of management earnings  
336 forecasts on technical innovation activities and the mediating effect of the cost of debt. We also  
337 controlled for self-selection and endogeneity problems using Heckman's (1979) two-step selection  
338 method and two-stage least square analysis. In the first step, we use a probit regression model  
339 containing instrumental variable(s) that predict the independent variable but do not directly expect  
340 the dependent variable. We computed the inverse Mills ratio in the first stage and incorporated it**



341 in the second step to avoid self-selection bias. Following Caramanis and Lennox (2008), we also  
342 used a two-stage least square technique to address the endogeneity problem. In the first stage of  
343 regression, we regress the endogenous variable on their lagged values (lagged variable used as  
344 instrumental variable). We used these variables to predict the endogenous variable in the next-  
345 stage. In the second stage, we incorporate the endogenous variable's predicted value along with  
346 the exogenous variable in the regression equation. Then, we used ordinary least squares (OLS)  
347 regression to determine the variables that are vital (coefficient) in the equation. The coefficient  
348 obtained from the second stage regression have similar results to the regression models of the  
349 study. Finally, Following Liu, Cullinan, Zhang, and Wang (2016); Gul, Zhou, and Zhu (2013), we  
350 used a robustness test i.e., regression (fixed effect) as a strategic approach in which the dependent  
351 variable proxy was replaced with an alternative proxy along with lagged variables. The industry  
352 and year fixed effects are controlled for in all the regressions.

### 353 5.1.1 Management Earnings Forecasts and Firms' Technical Innovation Activities

354 H1 states that MEFs have a positive effect on TIA. It postulates that frequent MEFs  
355 increase a firm's innovation activities to mitigate information asymmetry's innate issue in firms  
356 involved in additional innovation activities. Hence, we estimated the following basic model  
357 equation (1):

$$\begin{aligned}
358 \quad TIA_{it} = & \alpha_0 + \beta_1 MEF_{it} + \beta_2 ABL_{it} + \beta_3 LEV_{it} + \beta_4 FS_{it} + \beta_5 FA_{it} + \beta_6 ROA_{it} + \beta_7 SOE_{it} + \\
359 \quad & \beta_8 BTM_{it} + \beta_9 B4A_{it} + \beta_{10} PCF_{it} + \beta_{11} GRO_{it} + \beta_{12} CFO_{it} + \beta_{13} TQ_{it} + \beta_{14} LOSS_{it} + \text{Ind. FE} + \\
360 \quad & \text{Yr. FE} + \varepsilon_{i,t} \qquad \qquad \qquad (1)
\end{aligned}$$

361 The TIA was the dependent variable, measuring its innovation intensity, and the subscript  
362 denotes the industry and year. The independent variable, MEFs, referred to earnings forecasts'  
363 quantity for the firm in a particular year t. The remaining are the control variables described.

364 **5.1.2 Cost of Debt Mediation Effect between Management Earnings Forecasts and Firm's**  
365 **Technical Innovation Activities.**

366 Next, we investigated how the lower (higher) COD alleviated (aggravated) the issue of the  
367 cash flow of a firm because of the MEFs; in turn, the MEFs facilitate (impede) the TIA. We used  
368 path analysis to examine the presence of an indirect direction and assess the significance of the  
369 direct and indirect connection through MEFs to the TIA. The path study presents the conclusive  
370 descriptions of correlation structures, as it decomposes or breaks down a correlation between the  
371 variable of the source (causal) that is MEFs, and the outcome that is the TIA, into paths such as a  
372 simple, direct, indirect, or compound path that contains a mediating variable (COD). The  
373 decomposition suggests the occurrence and proportional significance of both direct and indirect  
374 pathways between MEFs and the TIA. This study considered that the primary path analysis was  
375 repeated, e.g., all paths' flows are in one direction and include observable variables. The path  
376 study's main output was the route coefficient connecting the path coefficient signified the  
377 correlation part decomposed to the pathway matching.

378 This study used the path coefficient ratio to estimate the mediation effect or direct  
379 pathway's significance, i.e., the mediation pathway with additional parts to the entire association  
380 between the MEFs and TIA. The importance of the direct and indirect paths increases due to the  
381 rise of the ratio, and, within the background of this research, the mediation effect between MEFs  
382 and the TIA was the path coefficient product between the MEFs and COD and the path coefficient  
383 between the COD and the TIA. To examine the COD mediation effect on the relationship between  
384 MEFs and TIA, this study used the three steps of performing the mediation effect described by  
385 Baron and Kenny (1986) are as follows;

386 The study's mediator regressed on the independent variable in the first step. Then, the  
387 dependent variable regressed on the independent variable. Lastly, the dependent variable was  
388 regressed on the mediator and independent variable. These authors explained that the independent  
389 variable was expected to exhibit statistical significance in the first two steps. The mediator variable  
390 was supposed to show statistical significance in the third step, and the independent variables were  
391 unimportant. However, Zhao, Lynch, and Chen (2010) showed that the association linking an  
392 independent and dependent variable is insignificant because it can be confusing. An indirect effect  
393 establishes the mediation effect because it is the indirect and direct impacts (along with the  
394 mediator). Thus, the indirect effect should be significant. We used the following model's equations,  
395 i.e., (2) and (3), to check the COD mediation effect.

$$396 \quad COD_{it} = \alpha_0 + \beta_1 MEF_{it} + \beta_2 ABL_{it} + \beta_3 LEV_{it} + \beta_4 FS_{it} + \beta_5 FA_{it} + \beta_6 ROA_{it} + \beta_7 SOE_{it} + \beta_8 BTM_{it} + \beta_9 B4A_{it} + \\ 397 \quad \beta_{10} PCF_{it} + \beta_{11} GRO_{it} + \beta_{12} CFO_{it} + \beta_{13} TQ_{it} + \beta_{14} LOSS_{it} + Ind. FE + Yr. FE + \varepsilon_{i,t} \quad (2)$$

$$398 \\ 399 \quad TIA_{it} = \alpha_0 + \beta_1 MEF_{it} + \beta_2 COD_{it} + \beta_3 ABL_{it} + \beta_4 LEV_{it} + \beta_5 FS_{it} + \beta_6 FA_{it} + \beta_7 ROA_{it} + \beta_8 SOE_{it} + \beta_9 BTM_{it} + \\ 400 \quad \beta_{10} B4A_{it} + \beta_{11} PCF_{it} + \beta_{12} GRO_{it} + \beta_{13} CFO_{it} + \beta_{14} TQ_{it} + \beta_{15} LOSS_{it} + Ind. FE + Yr. FE + \varepsilon_{i,t} \quad (3)$$

401 The TIA was the dependent variable, measuring the firm's innovation intensity. The MEFs  
402 were the independent variable measured as earnings forecast quantity in an "i" firm for a "t" year. A  
403 firm's COD measure was used to mediate between the study's dependent and independent  
404 variables. All the variables are labeled.

405 Considering the possible endogenous association of MEFs with the TIA, we used the Two-  
406 Steps Selection Method (TSSM) and Two-Stage Least Square (TSLS) to manage self-selection  
407 and endogeneity. TSSM is used to avoid possible self-selection bias arising from endogenous  
408 earnings forecasts. In the first step of TSSM, a Probit Regression Model (PRM) was used to foresee  
409 that firms involved in innovation intent would issue more MEFs to obtain more external debt

410 financing. When employing the continuous variable, a dummy dependent variable was required to  
411 run in the PRM. Thus, we included a dummy variable during the first step of the PRM. Also, the  
412 1st step model of TSSM must consist of the instrumental variable(s) that predict the independent  
413 variable (MEFs) but do not directly expect the dependent variable (TIA); therefore, this study  
414 included instrumental variables in the PRM<sup>2</sup>. Finally, the inverse Mills ratio (IMR) was produced  
415 following the PRM<sup>3</sup>. The IMR was incorporated into the next step to avoid self-selection bias from  
416 the empirical analysis. This study used the TSLS method to control endogeneity and recognise the  
417 instrumental variables that realise the elimination constraint related to the MEFs but not correlated  
418 with TIA. Hence, we used a lagged instrument approach in the TSLS method<sup>4</sup>. Finally, to verify  
419 the study's robustness, our results employed the alternative proxy of innovation<sup>5</sup>.

## 420 6. Empirical Findings and Discussion

### 421 6.1 Descriptive Summary

422 Table II represents the descriptive statistics of the management earnings forecasts' effects  
423 on innovation activities and the mediating effect of the cost of debt in the relationship between  
424 management earnings forecast and technical innovation. Similar to the findings of Zeng and Lin  
425 (2011), we find that on average, each firm spends about 4% of the R&D expenditure per year on

---

<sup>2</sup>Following O. Z. LI and Zhuang (2012), this study includes industry guidance as an instrumental variable obtained as the proportion of the issuing MEF of a firm in the same sector.

<sup>3</sup>The IMR is calculated by  $\phi(z)/\Phi(z)$ , whereas  $z$  present the proper index feature of PRM;  $\phi$  present the function of density; and  $\Phi$  is the regular normal distribution total density.

<sup>4</sup>Due to a few causes, the second stage estimate provided important findings (Caramanis & Lennox, 2008). Primarily, the lagged values of TIA in the first stage was strongly related to the MEFs (p-value <0.001), suggesting that lagged MEFs could act as a robust instrument. Similarly, the next stage estimates were consistent when the instrumental variables were uncorrelated to residual error.

<sup>5</sup>The patent (INNO) was used as the dependent variable to further verify the study robustness. This study followed recent studies Qin and Zhang (2019), the present study selected patent data rather than the citations of patents as the firm's innovation proxy. For various reasons, the patent citation data is unavailable in China. Hence, this study calculated innovation output measures, i.e., total patent, as the sum of the inventory, utility, and design patent. These three measures were used to compute the total patent as the natural logarithm and the inventory patents, plus the natural logarithm and utility patents, plus the natural logarithm and design patents. The intellectual property market the patents actively traded by firms to guarantee safe lending.

426 its technical innovation activities. The mean (median) value of the MEF frequency was 0.68  
427 (0.000), whereas the Chinese firms had an average COD of 7%. The control variables, for example  
428 ROA, CFO, and LEV mean (median) values were 4% (0.04), 6% (0.06), and 43% (0.43),  
429 respectively. However, the dataset also showed that 67% of the Chinese firms were SOEs,  
430 suggesting that SOEs were the principal shareholders and played an essential role in domestic  
431 firms (Khan, Kayani, Saleem, & Aysan, 2024; Zeng & Lin, 2011).

432 **Insert Table II here**

433 Pearson's correlation matrix results are shown in Table III among all study variables. The  
434 primary variable of interest, MEF, was positive and significantly correlated to TIA. The correlation  
435 between MEF and TIA was 0.246, suggesting that MEF positively affected its technical innovation  
436 activities. The relationship between the MEFs and COD was also significant and negatively  
437 correlated. The correlation between MEFs and COD was -0.1053, indicating that MEFs were  
438 useful in decreasing the firm's COD. Furthermore, in this study, many variables were significantly  
439 correlated in the expected direction; therefore, all variables captured a distributed underlying  
440 construct. Most pair-wise variables connected considerably at the one percent mark in the  
441 predicted order.

442 **Insert Table III here**

## 443 **6.2 Management earnings forecasts, technical innovation activities: mediated by the firm's** 444 **cost of debt**

445 Table IV presents the baseline regression results of the H1 and H2 tests. In Model (1), the  
446 finding shows that the coefficient of MEFs has a positive relationship with TIA. This relationship  
447 is significant in both models 1 and 3 suggesting that frequent MEFs positively affect the firm's  
448 TIA. Thus, this finding supports our first hypothesis, H1. Consistent with the signaling theory and

449 previous literature, MEFs provide valuable information about a firm's necessary records that  
450 capture the value-generating process, particularly future cash flow (Bhattacharya, Ecker, Olsson,  
451 & Schipper, 2012). Besides, these frequent MEFs are also associated with improved reporting  
452 quality and transparency and a better internal control system (Feng, Li, & McVay, 2009) that  
453 provides decision-makers a better precision about possible returns from uncertain endeavors  
454 (Bushman & Smith, 2001), which helps decision-makers to understand the future innovation  
455 prospects with fewer errors to achieve higher technical innovation success. Our results are  
456 economically significant as a unit increase in MEFs corresponds to a 1.28 increase in TIA.

457 In Table IV, the findings of Model (2) and (3) shows that the coefficient between (MEFs  
458 and COD) and (TIA and COD) were negatively significant ( $\beta = -0.00183$  significant at 01 percent)  
459 and ( $\beta = -0.0619$  significant at 01 percent) suggesting that creditors offer lower interest rate loans  
460 to frequent and precise MEFs due to fewer information asymmetry problems. This study estimated  
461 that the overall correlation between MEFs and TIA was 0.0011 ( $p < 0.10$ ). The direct and mediated  
462 pathways decomposed this association into the section featuring the direct relationship between  
463 MEFs and TIA and the COD mediated as an indirect relationship. For both parts, the path  
464 coefficient (i.e., MEF path to COD and COD path to TIA) was statistically significant at 1%,  
465 suggesting a robust mediation effect of COD on the MEFs and TIA nexus.

466 Besides, the impact of the path coefficient between COD and TIA was negatively  
467 significant, suggesting that creditors include MEFs to lower information asymmetry and would  
468 likely charge a lower interest rate when the firms provide frequent MEFs (Hsieh et al., 2019).  
469 Sequentially, the firm's COD alleviates free cash flow problems, which are used to spur the firm's  
470 innovation activities. Overall, these findings support the H2 predictions.

471 Furthermore, the control variables result revealed that the firm's ABL, LEV, FA, PCF,  
472 GRO, CFO, TQ, and B4A were positively related to TIA. While the FS, ROA, SOE, BTM, and  
473 LOSS were negatively associated with TIA. We also found that higher innovation activities are  
474 related to a firm's LEV, which was identical to a previous study, suggesting that the credit market  
475 was reluctant to encourage innovation activities because innovative firms have an unstable and  
476 inadequate amount of inside-generated cash flows to facilitate debt (Hsu, Tian, & Xu, 2014).  
477 Furthermore, a big-size firm's growth potential shows more significant innovation activities (Tian  
478 & Wang, 2014).

479 **Insert Table IV here**

### 480 **6.3 Two-Steps Selection Method (TSSM)**

481 A key issue related to the findings from this research was the possibility of self-selection  
482 bias. Thus, we conducted TSSM to process this possible self-selection bias concern. In Table V,  
483 the 1st step employed a PRM to predict MEF decision but did not relate to TIA. We used a  
484 continuous independent variable, i.e., MEF frequency, to calculate the significance of MEFs on a  
485 firm's innovation intensity; therefore, it followed Xuerong Huang and Sun (2017) to construct a  
486 dummy variable (MEFD) to run the PRM. Our study also followed O. Z. LI and Zhuang (2012)  
487 and included instrumental variable industry guidance (ING). It was estimated as the proportion of  
488 earnings forecasts released by firms in the identical industry and selected control variables. This  
489 study produced the IMR following the self-selection PRM, adding IMR to avoid possible  
490 endogeneity in selecting MEFs. The findings of the TSSM suggested that IMR had a significant  
491 coefficient in all models, i.e., models (1, 2, and 3), which captured TIA in model 1, the dependent  
492 variable, and model 3 and the mediator variable as the dependent variable in model 2. The  
493 coefficient of ING was favorable and significant in the 1st step (i.e., presented in Table V). MEFs

494 coefficient was positive and significantly related to the TIA. In contrast, the MEFs were negative  
495 and significantly associated with the mediator variable COD, suggesting that this study's  
496 conclusion still holds after correction for self-selection bias. Therefore, the results did not have  
497 selection bias by the MEFs decision.

498 **Insert Table V here**

#### 499 **6.4 Endogeneity**

500 To address endogeneity, we used the TSLS technique to control endogeneity. We  
501 performed a TSLS instrument variable method following (Caramanis & Lennox, 2008). Our study  
502 conducted a 1st stage model that determined the observed level of TIA with the MEFs lags as an  
503 instrumental variable and all formerly employed controls as exogenous variables. The expected  
504 value through the 1st stage then replaced the MEFs in the model of the 2<sup>nd</sup> stage. The findings for  
505 the 2<sup>nd</sup> stage generated the same results, indicating that the MEFs facilitated the TIA (See Table  
506 VI).

507 **Insert Table VI here**

#### 508 **6.5 Robustness Test**

509 During our research, we extensively analyzed the study data using various sophisticated  
510 statistical techniques. In particular, our analytical framework incorporated a baseline regression  
511 (fixed effect) analysis used to control for unobserved heterogeneity and time-invariant factors. We  
512 also used Heckman's (1979) two-stage selection model to analyze any potential bias in sample  
513 selection thoroughly. Additionally, endogeneity issues were addressed using the two-stage least  
514 square approach, assuring the accuracy and consistency of our findings.



515 For robustness, this study used an alternative method for estimating the quality of  
516 innovation is to study the association between effort and efficiency. We used a strategic approach  
517 by replacing the technical innovation activities with proxy innovation patent proxy and lagged  
518 variables. Using this technique, our research can evaluate the generality and consistency of our  
519 findings beyond the particular measurement used in the initial models. We increase the study's  
520 robustness by ensuring that our conclusions are independent of any metric by examining how  
521 sensitive our conclusions are to changes in the selected dependent variable. This analytical method  
522 provides a more thorough grasp of the phenomenon being studied, strengthening the validity of  
523 our research and adding to the general dependability of the study's findings. In general, using these  
524 many statistical methods demonstrates the care with which our study design was executed since  
525 they all work together to produce a solid and well-supported analysis. Our detailed methodology  
526 strengthens the validity and reliability of the results, supporting the strength of the study's empirical  
527 findings. In this context, our study included a total patent as a substitute for invention. This  
528 research followed previous studies by Qin and Zhang (2019) and took a firm's entire patent (INNO)  
529 as the dependent variable for robustness tests. This study estimated INNO as the natural logarithm  
530 and total patents (including inventory, utility, and design). The finding shows that the coefficient  
531 of MEFs was also a positively significant relationship with INNO. This relationship is significant  
532 in both models 1 and 3 with innovation activities measured i.e., TIA ( $\beta = 0.0385$  significant at 01  
533 percent and ( $\beta = 0.0378$  significant at 01 percent). Additionally, the findings of Model (2) and (3)  
534 shows that the coefficient between (MEFs and COD) and (INNO and COD) were negatively  
535 significant ( $\beta = -0.00180$  significant at 01 percent) and ( $\beta = -0.0677$  significant at 10 percent),  
536 suggesting that creditors offer lower interest rate loans to frequent and precise MEFs due to fewer  
537 information asymmetry problems. This study estimated that the overall correlation between MEFs

538 and TIA was 0.00378 ( $p < 0.01$ ). Overall, the robust test resembled the results of the baseline  
539 analysis (see Table VII).

540 **Insert Table VII**

## 541 **7. Conclusion**

542 We examine the relationship between management earnings forecasts and corporate  
543 innovation. Our study also examines whether the cost of debt plays a mediating role between the  
544 management earnings forecasts and the innovation nexus. Our independent variable is corporate  
545 innovation, measured as the firms' R&D spending scaled by the entire operating revenue during  
546 the year. The key independent variable used in this study is the management earnings forecast,  
547 estimated as the firm's earnings forecast quantity during a financial year. We also examined the  
548 mediating effect of the cost of debt (COD), defined as the interest cost of a firm divided by its total  
549 debt.

550 Using data from 1032 non-financial firms listed on the Shanghai and Shenzhen stock  
551 markets from 2005 to 2022, we document a positive relationship between management earnings  
552 forecasts and the firms' technical innovation. Our findings also show that the cost of debt mediates  
553 the relationship between management earnings forecast and technical innovation. Further analysis  
554 indicates that frequent earnings forecasts provide incremental information regarding a firm's future  
555 value and cash flows, thus reducing the volatility and uncertainty in cash flow calculations.

556 Our study has implications for Chinese regulators, enabling them to promote frequent  
557 management earnings forecasts through targeted incentives. The findings of this study are also  
558 relevant to Chinese firms, allowing them to understand the relationship between management

559 earnings forecasts and firms' innovation activities. Our study will also help academics appreciate  
560 the merits of mandatory disclosure in a weak institutional environment.

561 Our study has some limitations. One key limitation of this study is that the data used is  
562 limited to Chinese firms. China has a unique disclosure environment, so our findings may not be  
563 generalizable to different capital market settings. Future research would benefit from including  
564 samples from both developed and emerging economies. This approach will help researchers to  
565 compare the relationship between mandatory and voluntary MEFs disclosure on firm innovation.

## 566 **Declaration**

## 567 **Funding**

568 No funding was received from any source.

## 569 **Availability of data and materials**

570 The datasets used and analysed during the current study are available from the corresponding  
571 author upon reasonable request.

## 572 **Competing interests**

573 The authors declare that they have no competing interests.

## 574 **References**

- 575 Abdelazim, S. I., Metwally, A. B. M., & Aly, S. A. S. (2023). Firm characteristics and forward-looking  
576 disclosure: the moderating role of gender diversity. *Journal of Accounting in Emerging Economies*,  
577 13(5), 947-973.
- 578 Ajinkya, B. B., & Gift, M. J. (1984). Corporate managers' earnings forecasts and symmetrical adjustments  
579 of market expectations. *Journal of accounting research*, 425-444.
- 580 Al-Bassam, W. M., Ntim, C. G., Opong, K. K., & Downs, Y. (2018). Corporate boards and ownership  
581 structure as antecedents of corporate governance disclosure in Saudi Arabian publicly listed  
582 corporations. *Business & Society*, 57(2), 335-377.
- 583 Alhaddad, L. M., Whittington, M., & Gerged, A. M. (2021). Abnormal real activities, meeting earnings  
584 targets and firms' future operating performance: evidence from an emerging economy. *Journal*  
585 *of Accounting in Emerging Economies*, 12(2), 213-237.
- 586 Ali, A., Klasa, S., & Yeung, E. (2014). Industry concentration and corporate disclosure policy. *Journal of*  
587 *accounting and economics*, 58(2-3), 240-264.
- 588 Baginski, S. P., & Hinson, L. A. (2016). Cost of Capital Free-Riders. *The Accounting Review*, 91(5), 1291-  
589 1313. doi:10.2308/accr-51379

590 Baginski, S. P., & Rakow, K. C. (2012). Management earnings forecast disclosure policy and the cost of  
591 equity capital. *Review of accounting studies*, 17, 279-321.

592 Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological  
593 research: conceptual, strategic, and statistical considerations. *J Pers Soc Psychol*, 51(6), 1173-  
594 1182. doi:10.1037//0022-3514.51.6.1173

595 Bena, J., & Li, K. (2014). Corporate innovations and mergers and acquisitions. *The Journal of Finance*, 69(5),  
596 1923-1960.

597 Bens, D. A., & Monahan, S. J. (2004). Disclosure Quality and the Excess Value of Diversification. *Journal of*  
598 *Accounting Research*, 42(4), 691-730. doi:<https://doi.org/10.1111/j.1475-679X.2004.00154.x>

599 Berger, P. G., & Hann, R. N. (2007). Segment profitability and the proprietary and agency costs of  
600 disclosure. *The Accounting Review*, 82(4), 869-906.

601 Bhattacharya, N., Ecker, F., Olsson, P. M., & Schipper, K. (2012). Direct and mediated associations among  
602 earnings quality, information asymmetry, and the cost of equity. *The Accounting Review*, 87(2),  
603 449-482.

604 Botosan, C. A. (1997). Disclosure Level and the Cost of Equity Capital. *The Accounting Review*, 72(3), 323-  
605 349.

606 Bouncken, R. B., & Kraus, S. (2013). Innovation in knowledge-intensive industries: The double-edged  
607 sword of coopetition. *Journal of Business Research*, 66(10), 2060-2070.  
608 doi:<https://doi.org/10.1016/j.jbusres.2013.02.032>

609 Brown, J. R., & Martinsson, G. (2019). Does transparency stifle or facilitate innovation? *Management*  
610 *Science*, 65(4), 1600-1623.

611 Bushman, R. M., & Smith, A. J. (2001). Financial accounting information and corporate governance. *Journal*  
612 *of Accounting and Economics*, 32(1), 237-333. doi:[https://doi.org/10.1016/S0165-4101\(01\)00027-1](https://doi.org/10.1016/S0165-4101(01)00027-1)

613  
614 Cao, Y., Myers, L. A., Tsang, A., & Yang, Y. G. (2017). Management forecasts and the cost of equity capital:  
615 International evidence. *Review of accounting studies*, 22, 791-838.

616 Caramanis, C., & Lennox, C. (2008). Audit effort and earnings management. *Journal of Accounting and*  
617 *Economics*, 45(1), 116-138. doi:<https://doi.org/10.1016/j.jacceco.2007.05.002>

618 Chen, Huang, C.-W., Hwang, C.-Y., & Wang, Y. (2019). Voluntary disclosure and corporate innovation  
619 *Accounting. Review of Quantitative Finance*, 1-35.

620 Chen, S.-S., Huang, C.-W., Hwang, C.-Y., Wang, Y. J. R. o. Q. F., & Accounting. (2019). Voluntary disclosure  
621 and corporate innovation. 1-35.

622 Choi, J.-H., Myers, L. A., Zang, Y., & Ziebart, D. A. (2011). Do management EPS forecasts allow returns to  
623 reflect future earnings? Implications for the continuation of management's quarterly earnings  
624 guidance. *Review of Accounting Studies*, 16(1), 143-182. doi:10.1007/s11142-010-9131-6

625 Dai, L., Parwada, J. T., & Zhang, B. (2015). The Governance Effect of the Media's News Dissemination Role:  
626 Evidence from Insider Trading. *Journal of Accounting Research*, 53(2), 331-366.  
627 doi:<https://doi.org/10.1111/1475-679X.12073>

628 Darrough, M. N., & Stoughton, N. M. (1990). Financial disclosure policy in an entry game. *Journal of*  
629 *accounting and economics*, 12(1-3), 219-243.

630 Dutta, S., & Gigler, F. (2002). The Effect of Earnings Forecasts on Earnings Management. *Journal of*  
631 *Accounting Research*, 40(3), 631-655. doi:<https://doi.org/10.1111/1475-679X.00065>

632 Ederer, F., & Manso, G. (2011). Incentives for innovation: Bankruptcy, corporate governance, and  
633 compensation systems. In *Handbook on law, innovation and growth*: Edward Elgar Publishing.

634 Elghuweel, M. I., Ntim, C. G., Opong, K. K., & Avison, L. (2017). Corporate governance, Islamic governance  
635 and earnings management in Oman: A new empirical insights from a behavioural theoretical  
636 framework. *Journal of Accounting in Emerging Economies*, 7(2), 190-224.

637 Ezeani, E., Kwabi, F., Salem, R., Usman, M., Alqatamin, R. M. H., & Kostov, P. (2023). Corporate board and  
638 dynamics of capital structure: Evidence from UK, France and Germany. *International Journal of*  
639 *Finance & Economics*, 28(3), 3281-3298.

640 Ezeani, E., Salem, R., Kwabi, F., Boutaine, K., Bilal, & Komal, B. (2022). Board monitoring and capital  
641 structure dynamics: evidence from bank-based economies. *Review of Quantitative Finance and*  
642 *Accounting*, 58(2), 473-498.

643 Ezeani, E., Salem, R. I. A., Usman, M., & Kwabi, F. (2023). Board characteristics and corporate cash holding:  
644 evidence from the UK, France and Germany. *International Journal of Accounting & Information*  
645 *Management*.

646 Feng, M., Li, C., & McVay, S. (2009). Internal control and management guidance. *Journal of Accounting*  
647 *and Economics*, 48(2), 190-209. doi:<https://doi.org/10.1016/j.jacceco.2009.09.004>

648 Gonedes, N. J., Dopuch, N., & Penman, S. H. (1976). Disclosure rules, information-production, and capital  
649 market equilibrium: The case of forecast disclosure rules. *Journal of accounting research*, 89-137.

650 Gong, Y., Xia, Y., Xia, X., & Wang, Y. (2023). Management earnings forecasts bias, internal control, and  
651 stock price crash risk: New evidence from China. *Emerging Markets Finance and Trade*, 59(8),  
652 2331-2343.

653 Gramlich, J. D., & Sørensen, O. (2004). Voluntary management earnings forecasts and discretionary  
654 accruals: Evidence from Danish IPOs. *European Accounting Review*, 13(2), 235-259.

655 Griliches, Z. (2007). *R&D, patents and productivity*: University of Chicago Press.

656 Gul, F. A., Zhou, G., & Zhu, X. (2013). Investor protection, firm informational problems, Big N auditors, and  
657 cost of debt around the world. 32(3), 1-30.

658 Hall, B. H., & Lerner, J. (2010). Chapter 14 - The Financing of R&D and Innovation. In B. H. Hall & N.  
659 Rosenberg (Eds.), *Handbook of the Economics of Innovation* (Vol. 1, pp. 609-639): North-Holland.

660 Hall, B. H., Mairesse, J., & Mohnen, P. (2010). Measuring the Returns to R&D. In *Handbook of the*  
661 *Economics of Innovation* (Vol. 2, pp. 1033-1082): Elsevier.

662 Hsieh, T.-S., Song, B. Y., Wang, R. R., & Wang, X. (2019). Management earnings forecasts and bank loan  
663 contracting. *Journal of Business Finance & Accounting*, 46(5-6), 712-738.  
664 doi:<https://doi.org/10.1111/jbfa.12371>

665 Hsu, P.-H., Tian, X., & Xu, Y. (2014). Financial development and innovation: Cross-country evidence.  
666 *Journal of Financial Economics*, 112(1), 116-135.  
667 doi:<https://doi.org/10.1016/j.jfineco.2013.12.002>

668 Huang, D., Liu, B., Chan, K. C., & Chen, Y. (2023). Intended and unintended effects of mandatory R&D  
669 disclosure on innovation outcomes. *Economic Modelling*, 119, 106144.  
670 doi:<https://doi.org/10.1016/j.econmod.2022.106144>

671 Huang, H. J., Habib, A., Sun, S. L., Liu, Y., & Guo, H. (2021). Financial reporting and corporate innovation:  
672 a review of the international literature. *Accounting & Finance*, 61(4), 5439-5499.

673 Huang, X., Li, X., Tse, S., & Tucker, J. W. (2018). The effects of a mixed approach toward management  
674 earnings forecasts: Evidence from China. *Journal of Business Finance & Accounting*, 45(3-4), 319-  
675 351.

676 Huang, X., & Sun, L. (2017). Managerial ability and real earnings management. *Advances in Accounting*,  
677 39, 91-104. doi:<https://doi.org/10.1016/j.adiac.2017.08.003>

678 Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *The American*  
679 *economic review*, 76(2), 323-329.

680 Jia, N. (2019). Corporate innovation strategy and disclosure policy. *Review of Quantitative Finance and*  
681 *Accounting*, 52, 253-288.

682 Jiang, H., Habib, A., & Gong, R. (2015). Business Cycle and Management Earnings Forecasts. *Abacus*, 51(2),  
683 279-310. doi:<https://doi.org/10.1111/abac.12047>

684 Jog, V., & McConomy, B. J. (2003). Voluntary disclosure of management earnings forecasts in IPO  
685 prospectuses. *Journal of Business Finance & Accounting*, 30(1 - 2), 125-168.

686 Kasznik, R., & Lev, B. (1995). To Warn or Not to Warn: Management Disclosures in the Face of an Earnings  
687 Surprise. *The Accounting Review*, 70(1), 113-134.

688 Khan, M. B., Kayani, U. N., Saleem, H., & Aysan, A. F. (2024). Loan guarantee, management earnings  
689 forecasts and cost of debt: evidence from Chinese manufacturing firms. *Cogent Economics &  
690 Finance*, 12(1), 2314887.

691 Kim, J.-B., Shroff, P., Vyas, D., & Wittenberg - Moerman, R. (2018). Credit default swaps and managers'  
692 voluntary disclosure. *Journal of Accounting Research*, 56(3), 953-988.

693 Knott, A. M., & Vieregger, C. (2019). Does R&D drive growth. Available at SSRN 2382885.

694 Komal, B., Bilal, Ezeani, E., Shahzad, A., Usman, M., & Sun, J. (2023). Age diversity of audit committee  
695 financial experts, ownership structure and earnings management: Evidence from China.  
696 *International Journal of Finance & Economics*, 28(3), 2664-2682.

697 Komal, B., Ezeani, E., Shahzad, A., Usman, M., & Sun, J. (2021). Age diversity of audit committee financial  
698 experts, ownership structure and earnings management: Evidence from China. *International  
699 Journal of Finance & Economics*.

700 Komal, B., Ezeani, E., Usman, M., Kwabi, F., Abbas, A., & Ye, C. (2023). Do the educational profile, gender,  
701 and professional experience of audit committee financial experts improve financial reporting  
702 quality? *Journal of International Accounting, Auditing and Taxation*, 100580.

703 Kwabi, F., Owusu, A., Ezeani, E., & Boateng, A. (2024). The impact of political uncertainty on the cost of  
704 capital. *Review of Quantitative Finance and Accounting*, 1-33.

705 Leuz, C., & Verrecchia, R. E. (2000). The economic consequences of increased disclosure. *Journal of  
706 accounting research*, 91-124.

707 Li, F. (2010). The information content of forward - looking statements in corporate filings—A naïve  
708 Bayesian machine learning approach. *Journal of Accounting Research*, 48(5), 1049-1102.

709 Li, O. Z., & Zhuang, Z. (2012). Management Guidance and the Underpricing of Seasoned Equity Offerings\*.  
710 *Contemporary Accounting Research*, 29(3), 710-737. doi:[https://doi.org/10.1111/j.1911-  
711 3846.2011.01120.x](https://doi.org/10.1111/j.1911-3846.2011.01120.x)

712 Liu, B., Cullinan, C., Zhang, J., & Wang, F. J. A. E. (2016). Loan guarantees and the cost of debt: Evidence  
713 from China. 48(38), 3626-3643.

714 March, J. G. (1991). Exploration and exploitation in organizational learning. *Organization science*, 2(1), 71-  
715 87.

716 Maslar, D. A., Serfling, M., & Shaikh, S. (2021). Economic downturns and the informativeness of  
717 management earnings forecasts. *Journal of accounting research*, 59(4), 1481-1520.

718 McConomy, B. J. (1998). Bias and accuracy of management earnings forecasts: An evaluation of the impact  
719 of auditing. *Contemporary accounting research*, 15(2), 167-195.

720 McNichols, M. (1989). Evidence of informational asymmetries from management earnings forecasts and  
721 stock returns. *Accounting Review*, 1-27.

722 Md Zaini, S., Samkin, G., Sharma, U., & Davey, H. (2018). Voluntary disclosure in emerging countries: a  
723 literature review. *Journal of Accounting in Emerging Economies*, 8(1), 29-65.

724 Morellec, E., Nikolov, B., & Schürhoff, N. (2012). Corporate governance and capital structure dynamics.  
725 *The journal of finance*, 67(3), 803-848.

726 Nanda, R., & Nicholas, T. (2014). Did bank distress stifle innovation during the Great Depression? *Journal  
727 of Financial Economics*, 114(2), 273-292. doi:<https://doi.org/10.1016/j.jfineco.2014.07.006>

728 Ntim, C. G., Opong, K. K., Danbolt, J., & Thomas, D. A. (2012). Voluntary corporate governance disclosures  
729 by post - Apartheid South African corporations. *Journal of Applied Accounting Research*, 13(2),  
730 122-144.

731 Obenpong Kwabi, F., Owusu-Manu, S., Boateng, A., Ezeani, E.-B., & Du, M. (2022). Economic policy  
732 uncertainty and cost of capital: the mediating effects of foreign equity portfolio flow. *Review of*  
733 *Quantitative Finance and Accounting*, 59(2), 457-481.

734 Owusu, A., Kwabi, F., Ezeani, E., & Owusu-Mensah, R. (2022). CEO tenure and cost of debt. *Review of*  
735 *Quantitative Finance and Accounting*, 59(2), 507-544.

736 Penman, S. H. (1980). An empirical investigation of the voluntary disclosure of corporate earnings  
737 forecasts. *Journal of Accounting Research*, 132-160.

738 Petkova, R. (2006). Do the Fama–French factors proxy for innovations in predictive variables? *The journal*  
739 *of finance*, 61(2), 581-612.

740 Pittman, J. A., & Fortin, S. (2004). Auditor choice and the cost of debt capital for newly public firms. *Journal*  
741 *of Accounting and Economics*, 37(1), 113-136. doi:<https://doi.org/10.1016/j.jacceco.2003.06.005>

742 Preussner, N. A., & Aschauer, E. (2022). The accuracy and informativeness of management earnings  
743 forecasts: A review and unifying framework. *Accounting Perspectives*, 21(2), 273-330.

744 Qin, X., & Zhang, X. (2019). De-politicization and innovation: Evidence from China. *Journal of Accounting*  
745 *and Public Policy*, 38(4), 106668. doi:<https://doi.org/10.1016/j.jaccpubpol.2019.05.005>

746 Rakow, K. (2010). The effect of management earnings forecast characteristics on cost of equity capital.  
747 *Advances in Accounting*, 26(1), 37-46.

748 Ren, S., Huang, M., Liu, D., & Yan, J. (2023). Understanding the impact of mandatory CSR disclosure on  
749 green innovation: Evidence from Chinese listed firms. *British Journal of Management*, 34(2), 576-  
750 594.

751 Romer, P. M. (1990). Endogenous technological change. *Journal of political Economy*, 98(5, Part 2), S71-  
752 S102.

753 Salem, R., Ezeani, E., & Song, X. (2023). The relationship between religiosity and voluntary disclosure  
754 quality: a cross-country evidence from the banking sector. *Review of Quantitative Finance and*  
755 *Accounting*, 60(3), 983-1023.

756 Salem, R. I. A., Ezeani, E., Gerged, A. M., Usman, M., & Alqatamin, R. M. (2021). Does the quality of  
757 voluntary disclosure constrain earnings management in emerging economies? Evidence from  
758 Middle Eastern and North African banks. *International Journal of Accounting & Information*  
759 *Management*, 29(1), 91-126.

760 Spence, M. (1973). Job Market Signaling," *Quarterly Journal of Economics*, 87 (3), 355-74.(1977). *Consumer*  
761 *Misperceptions, Product Failure and Producer Liability," Review of Economic Studies*, 44(3), 561-  
762 572.

763 Spence, M. (1978). Job market signaling. In *Uncertainty in economics* (pp. 281-306): Elsevier.

764 Tan, D., Komal, B., Ezeani, E., Usman, M., & Salem, R. (2022). Carbon emission disclosures and financial  
765 reporting quality: Does ownership structure and economic development matter? *Environmental*  
766 *Science & Policy*, 137, 109-119.

767 Tian, X., & Wang, T. Y. (2014). Tolerance for Failure and Corporate Innovation. *The Review of Financial*  
768 *Studies*, 27(1), 211-255. doi:10.1093/rfs/hhr130

769 Usman, M., Ezeani, E., Salem, R. I. A., & Song, X. (2022). The impact of audit characteristics, audit fees on  
770 classification shifting: evidence from Germany. *International Journal of Accounting & Information*  
771 *Management*.

772 Usman, M., Nwachukwu, J., Ezeani, E., Salem, R. I. A., Bilal, B., & Kwabi, F. O. (2023). Audit quality and  
773 classification shifting: evidence from UK and Germany. *Journal of Applied Accounting Research*.

774 Van de Ven, A. H. (1986). Central problems in the management of innovation. *Management Science*, 32(5),  
775 590-607.

776 Verrecchia, R. E. (2001). Essays on disclosure. *Journal of accounting and economics*, 32(1-3), 97-180.

777 Wang, K. T., & Zhu, N. Z. (2023). Conditional mandates on management earnings forecasts: The impact on  
778 the cost of debt. *Abacus*, 59(4), 901-953.



- 779 Wang, Y., Chen, Y., & Wang, J. (2015). Management earnings forecasts and analyst forecasts: Evidence  
780 from mandatory disclosure system. *China Journal of Accounting Research*, 8(2), 133-146.
- 781 Waymire, G. (1986). Additional evidence on the accuracy of analyst forecasts before and after voluntary  
782 management earnings forecasts. *Accounting Review*, 129-142.
- 783 Yamada, A. (2016). Mandatory management forecasts, forecast revisions, and abnormal accruals. *Asian*  
784 *Review of Accounting*, 24(3), 295-312.
- 785 Zeng, T., & Lin, H. C. J. C. M. S. (2011). Ownership structure and R&D spending: evidence from China's  
786 listed firms. 5(1), 82-93.
- 787 Zhao, X., Lynch, J. G., Jr., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and Truths about  
788 Mediation Analysis. *Journal of Consumer Research*, 37(2), 197-206. doi:10.1086/651257
- 789 Zhong, R. (2018). Transparency and firm innovation. *Journal of Accounting and Economics*, 66(1), 67-93.  
790 doi:<https://doi.org/10.1016/j.jacceco.2018.02.001>

791