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The brain gain of CFOs in China: The case of analyst forecasts

Yunhao Dai [a], Yang Chao [a], Li Wang [b,*]

[a] School of Economics, Huazhong University of Science and Technology, Wuhan 430074, PR China
[b] Government Accounting Institute, Research Institute of Social Science, Zhongnan University of Economics and Law, Wuhan 430073, PR China

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ABSTRACT

We study the impact of CFOs with foreign experience on analysts' forecast accuracy in emerging markets. Using a unique data set from China, we find that analysts' forecast accuracy increases when firms hire CFOs with foreign experience, confirming the brain gain effect of CFOs. Our results are robust after addressing potential endogeneity by introducing the propensity score matched (PSM) procedure and Heckman two-stage method. Channel analyses show that CFOs with foreign experience are related to decreased earnings management and a greater probability of hiring high-quality auditors, indicating that the improvement in financial reporting quality and information environment brought by returnee CFOs mainly drive our results. Further cross-section tests reveal that compared to firms with more external pressure, the positive effect of returnee CFOs on analysts' forecast accuracy is more pronounced among firms with fewer analyst coverage and belonging to less competitive industries. Returnee CFOs with foreign work experience exert a more significant impact on analysts' forecast accuracy than those with foreign study experience. Overall, we provide the first evidence on the brain gain of CFOs in terms of analyst forecasts.

1. Introduction

Chief financial officers (CFOs) belong to top executive teams in firms, who are primarily responsible for the management of firms' financial reporting system and are viewed as watchdogs for financial reporting quality (Feng, Ge, Luo, & Shevlin, 2011; Ge, Matsumoto, & Zhang, 2011; Mian, 2001). CFOs typically oversee the firm's process of preparing financial reports and implementation of accounting principles, therefore they tend to have the most direct impact of all the senior managers on the accounting-related decisions and potentially influence the quality of financial reporting through their role as conduits of information to managers, directors and other capital market participants, such as security analysts (Aier, Comprix, Gunlock, & Lee, 2005; Francis, Hasan, Park, & Wu, 2015; Ge et al., 2011). Instead of hiring CFOs based on their demographic traits and accounting or financial expertise (Aier et al., 2005; Chava & Purnanandam, 2010; Francis et al., 2015; Sun, Kent, Qi, & Wang, 2019), firms appear to have embraced a new personal characteristic of CFOs, that is, foreign experience earned from developed economies.[1]

With the adoption of reform and opening-up policy in the late 1970s, China has experienced spectacular economic growth during the last few decades and plays an increasingly considerable role in the global markets. However, as the largest transition economy, China still lags in the accumulation of high-skilled talents. The outflow of Chinese emigrants pursuing education in developed countries has become sizable and many of them also gain foreign work experience after obtaining their degrees (Liao, Ma, & Yu, 2017). Since the early 1990s, Chinese governments have devoted great efforts and launched a series of policies aiming to recruit outstanding technology- and innovation-oriented overseas talents to work back in China, and provides them with favorable treatment, including pecuniary incentives, housing subsidies, and other medical or education benefits (Giannetti, Liao, & Yu, 2015; Zweig, 2006), to solve the problems regarding the scarcity of managerial talents.[2] In the recent two decades, China effectively witnessed an increasing number of skilled individuals with foreign experience returning and some of the managerial talents returnees could serve on corporate top managers. These returnee managers in firms are expected to bring advanced knowledge and managerial expertise, equipped with international vision and

* Corresponding author.
E-mail addresses: daiyunhao@hust.edu.cn (Y. Dai), m201974208@hust.edu.cn (Y. Chao), wangli@zuel.edu.cn (L. Wang).

[1] We use the terms CFOs' foreign experience and returnee CFOs interchangeably hereafter.

[2] For instance, "The Thousand Talents Plan" launched by central government in 2008 is designed to attract overseas talents to fostering entrepreneurship activity, promoting the entry of new business, and cultivating academic and industrial research in China (Giannetti et al., 2015; Wen et al., 2020; Yuan & Wen, 2018).

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network, compared to those without foreign experience. However, consider corporate governance practice is weak in China, whether overseas talents having their intended effects remains an open empirical question. Despite existing evidence documents the "brain gain" effect of returnees' foreign experience on firm performance when talents are positioned as CEOs, directors, and entrepreneurs (Dai, 2019; Dai, Kong, & Liu, 2018; Giannetti et al., 2015; Yuan & Wen, 2018). Whether and how foreign experience earned by CFOs transform into firm and analyst outcomes is largely overlooked.

As a professional user of financial statements, securities analysts also perform the function of information intermediary between corporate executives and investors. Mikhail, Walther, and Willis (1999) suggest that an analyst is more likely to turnover if her/his forecast accuracy is lower than peers so that forecast accuracy matters to security analysts. Previous studies have shown that the analyst's traits, motivation, and experience (Clement, 1999; Xu, Chan, & Jiang, 2013), as well as the availability of information (Cohen, Frazzini, & Malloy, 2010; Han, Kong, & Liu, 2018; Lang & Lundholm, 1996), can affect the accuracy of earnings forecasts. Given that corporate financial reports are the major source of firm-specific information incorporate into analysts' earnings forecasting, there is surprisingly little empirical evidence examining whether the characteristics of firm disclosures producer, namely CFOs, could impact the overall information environment and have consequences for analysts' earnings forecasts.

Therefore, building upon existing studies, we investigate the causal effect of CFOs' foreign experience on analyst forecast accuracy in the context of China. We formally define a returnee CFO if she or he has worked or studied outside mainland China. By using a sample of Chinese listed firms from 2008 to 2018, we find that CFOs with foreign experience contribute to decreasing analysts' earnings forecast errors, which consistent with the prediction that firms hiring returnee CFOs are associated with greater forecast accuracy of analysts. Our results still hold after controlling for endogeneity by introducing the propensity score matched (PSM) procedure and Heckman two-stage method. Channel analyses reveal that an improved information environment brought by returnee CFOs, embedded with decreased earnings management and a greater probability of hiring high-quality auditors, may mainly drive our results. Our cross-sectional tests further suggest that this positive effect on analyst forecast accuracy is more pronounced for firms with fewer analysts coverage and belonging to less competitive industries, confirming that hiring returnee CFOs is an effective substitute for external pressure. Besides, the increased precision of analysts' forecasts is shown to benefit more from CFOs with foreign work experience instead of their educational degrees. Overall, we highlight the brain gain effect of returnee CFOs as it matters for firms' transparency and analysts' forecast performance.

This study contributes to the literature in at least two ways. First, our findings add to the flourishing stream of literature concerning the economic consequences of hiring managers with foreign experience. Specifically, we connect foreign experience with CFOs, who act as a watchdog for financial reporting quality. Extant studies show that CEOs and directors with foreign experience improve their firms' long-term value (Giannetti et al., 2015), investment efficiency (Dai et al., 2018), information transparency (Liao et al., 2017), CSR engagement (Zhang, Kong, & Wu, 2018), corporate innovation (Yuan & Wen, 2018) and IPO outcomes (Duan, Hou, & Rees, 2020). However, research on the issue of returnee CFOs has been sparse. Giannetti et al. (2015) focus on the board of directors because the corporate directors usually play two important roles in the firm: monitoring and advising managers (Fama & Jensen, 1983; Jensen, 1993), which may be particularly important in emerging markets. In our paper, we mainly focus on the CFO who is responsible for setting the firm's financial policies, and also in charge of the financial reporting process (Indjejikian & Matějka, 2009; Mian, 2001; Wang, Shin, & Francis, 2012). Ge et al. (2011) point out that CFO typically oversees the firm's financial reporting process and can impact the accounting choices. As a representative of senior management, previous studies find that CFOs may possess superior information about the firms than CEOs (Wang et al., 2012), and the incentives of CFO may play a more important role in making the decision, especially for financial policies (Chava & Purnanandam, 2010; Jiang, Petroni, & Wang, 2010; Kim, Li, & Zhang, 2011). Thus, we think the role played by directors and CFOs in firms should be different. Our study provides additional empirical evidence on the brain gain of returnee CFOs, which would be of particular interest to managers and policymakers who are greatly concerned about attracting highly-skilled talents with foreign experience.

Second, we provide some of the first evidence on the causal effect of CFOs' characteristics on analysts' forecast accuracy. Although analysts' forecast performance in emerging markets has attracted numerous researches, most of them emphasize the analysts' traits and firm-specific information (Clement, 1999; Han et al., 2018; Xu et al., 2013). Little evidence is available about CFOs' heterogeneity and how they relate to analysts' earnings forecasts. The upper echelons theory suggests that the demographic characteristics of top executives play a significant role in shaping organizational outcomes (Hambrick & Mason, 1984). Recent studies show that the CFO demographic characteristics, such as age, gender, and education backgrounds may influence corporate financial reporting quality (Liao, Smith, & Liu, 2019; Luo, Peng, & Zhang, 2020; Sun et al., 2019). As foreign experience can contribute to the transmit knowledge about management practices and corporate governance to firms in emerging markets (Giannetti et al., 2015), which can improve corporate financial reporting quality and reduce information asymmetry, we focus on the impact of overseas CFO on analyst forecast accuracy. Besides, considering that scarcity of managerial talents and poor corporate information environment are problems common to many emerging countries, we expect that our results can draw broader conclusions from the experience of China for the effects of labor flows and return migration on capital market efficiency.

We organize the remainder of the study as follows. Section 2 reviews important related literature and proposes hypotheses. Section 3 introduces the data and empirical strategy. Section 4 presents the main empirical results. Section 5 provides further mechanisms and robustness analyses. Finally, Section 6 concludes the study.

2. Literature review and hypothesis development

2.1. Talents with foreign experience

Our study builds on two important streams of literature. The first one is about talents with foreign experience. Globalization during the past few decades witnessed the increasing mobility of talents all around the world, which can be represented as a new channel for international spillover of knowledge and skills (Filatotchev, Liu, Lu, & Wright, 2011; Liu, Lu, Filatotchev, Buck, & Wright, 2010). These migrating talents who either studied or worked in developed countries and eventually returned to the emerging economics are verified considerably beneficial to their home countries with the advanced technological and managerial skills that they accumulated abroad (Dai et al., 2018; Yuan & Wen, 2018), thus the backflow of talents with foreign experience finally introduces the "brain gain" effect (Giannetti et al., 2015).

The macro influence of the "brain gain" effect has been recognized. Mountford (1997) finds that the temporary possibility of emigration may permanently increase the average level of productivity of a source economy. Saxenian (2005) reveals Chinese and Indian returning immigrants accelerate brain circulation and contribute to economic development in their home countries. Beine, Docquier, and Rapoport (2008) confirm a positive impact of skilled migration prospects on gross human capital levels in a cross-section of 127 developing countries. Wang, Duan, Hou, and Liu (2015) also suggest that returnees contribute to modern business through facilitating knowledge transfer, increasing innovation, boosting productivity, and ensuring economic growth. Overall, such a "brain gain" effect mitigates the concerns of the "brain

drain" phenomenon observed in early times that the talents from developing countries are attracted to developed countries (Bhagwati & Hamada, 1974). The evidence shows that the migration of skilled human capital from emerging markets might have not only costs but also positive and indirect benefits.

Recently, the emphasis has been given to the micro favorable impacts of managerial returnees on firms' outcomes. The upper echelons theory suggests that strategic choices and organizational outcomes can be partially predicted by the individual-specific attributes of top management (Hambrick & Mason, 1984). As one of the most important human capital traits, some extant literature has confirmed the advantages to the firm of the foreign experience of CEOs (Conyon, Haß, Vergauwe, & Zhang, 2019; Duan et al., 2020), management teams (Dai et al., 2018; Wen, Ke, & Sun, 2019; Yuan & Wen, 2018), board members (Giannetti et al., 2015; Wen, Cui, & Ke, 2020; Zhang et al., 2018), returnee entrepreneurs (Dai & Liu, 2009; Li, Zhang, Li, Zhou, & Zhang, 2012; Liu, Lu, et al., 2010; Liu, Wright, & Filatotchev, 2015; Liu, Wright, Filatotchev, Dai, & Lu, 2010), and auditors (Chen, Dai, Kong, & Tan, 2017). Evidence shows that managers with foreign experience are expected to have creative abilities, highly specialized skills, superior management practices, and border social networks, which help them outperform those without foreign experience. For instance, Giannetti et al. (2015) claim that returnee directors tend to impose strict monitoring practices over management and in turn beneficial for corporate governance and operating performance. Dai et al. (2018) connect a causal linkage between managers' foreign experience and firms' investment efficiency. Yuan and Wen (2018) find that managerial foreign experience matters for corporate innovation. Liao et al. (2017) also suggest that emerging markets may achieve corporate transparency by attracting directors with international experience, and an improved information environment brought by returnee directors leads to a lower cost of equity financing and a positive spillover effect to peer firms. By focusing on CFOs, Li, Wei, and Lin (2016) emphasize that hiring US-experienced CFOs in cross-listed foreign firms could attract more US institutional investors and analysts, implying the important roles of CFOs' foreign experience in reducing information disadvantage.

2.2. Analysts' forecast accuracy

The second branch of literature related to our work is the determinants of analysts' forecast accuracy. As professional information intermediaries, security analysts facilitate the distribution of financial information and devote themselves to providing valuable information to capital market participants (Merkley, Michaely, & Pacelli, 2017). Specifically, analysts seek to achieve superior forecast performance by using their active information acquisition and outstanding information processing skills. It is therefore worth noting that the information matters most for analysts' forecast accuracy.

Given that analysts consistently treat the firm-provided disclosures as the most important source of information incorporate into their earnings forecasting, thus their behaviors rely heavily on the quality of reporting. Lang and Lundholm (1996) suggest that firms with more informative disclosure policies enjoy a larger analyst following and more accuracy in analysts' earnings forecasts. Barron, Kile, and O'Keefe (1999) find high Management Discussion and Analysis (MD&A) ratings are associated with less error in analysts' earnings forecasts, confirming the predictive value of MD&A information. Byard and Shaw (2003) provide evidence that higher-quality public disclosures better enable analysts to forecast precisely. In an international setting, Hope (2003) also documents a negative association between financial opaqueness and forecast accuracy. Lehavy, Li, and Merkley (2011) examine the effect of the annual report readability on analysts' behavior, showing that the overall linguistic complexity of firms' reports is associated with less accurate earnings forecasts. Chen et al. (2017) find individual auditors with international working experience provide high-quality audits and improve their clients' financial reporting quality, which helps analysts better judge the financial situation of a specific firm. Dhaliwal, Radhakrishnan, Tsang, and Yang (2012) extend research on CSR disclosure, finding that the publication of stand-alone CSR reports is likely to represent a greater amount and better availability of information to analysts concerning how well firms handle issues related to stakeholders, and analysts do use CSR-related information to improve their forecast accuracy. These studies generally imply that firms with better public disclosure quality will have more reliable information, which should lower analysts' costs of providing forecasts, as well as reduced forecast errors. Other than firm announcements and reports, sell-side analysts can also obtain informational advantages from media reports, conference calls, corporate site visits, and private interactions with managers to improve their forecast accuracy (Bowen, Davis, & Matsumoto, 2002; Bradshaw, 2011; Cheng, Du, Wang, & Wang, 2016; Green, Jame, Markov, & Subasi, 2014; Han et al., 2018), offering additional insights on estimating analysts' forecast performance based on accessible information.

2.3. Hypothesis development

In modern corporations, the CFOs retains the ultimate responsibility for a firm's financial system, they thus exert the most direct impact on a wide range of firms' accounting choices and outcomes among other senior managers (Graham, Harvey, & Rajgopal, 2005; Jiang et al., 2010; Mian, 2001). Especially, emerging literature has documented that the personal characteristics of CFOs play an important role in determining the financial reporting practices, such as their financial expertise (Aier et al., 2005), gender (Francis et al., 2015), risk preferences (Chava & Purnanandam, 2010) and other demographic traits (Sun et al., 2019). Based on previous studies, we focus on the foreign experience of CFOs, another important but under-investigated factor, to examine whether returnee CFOs can influence analysts' behavior differently from local CFOs.

Relying on the Hambrick and Mason (1984)'s view of upper echelons theory, we expect a positive relationship between CFOs with foreign experience and analysts' forecast accuracy, as mediated by better financial report quality. First, returnee CFOs possess professional knowledge and expertise from their overseas experience, which could establish a competitive advantage and bring about superior career performance related to financial reporting quality. It is plausible that high-quality disclosures provided by returnee CFOs could alleviate corporate information asymmetry and facilitate information flow to the capital market more effectively, which may help foster an improved information environment and encourage capital market participants to acquire more firm-specific information. Second, having learned how foreign organization work, CFOs with foreign experience may facilitate the adoption of superior management practices and be more effective at performing their supervision function in financial policy implementation, which help enhances firm-level corporate governance and results in a precision of analysts' earnings forecasts (Haß, Vergauwe, & Zhang, 2014). Third, returnee CFOs in emerging markets usually gain their foreign experience from developed countries with a well-protected legal and business background. Thus, they tend to have higher standards of ethical responsibility with strict self-control and reduced managerial myopia behavior for greater corporate transparency, potentially leading to better-evaluating performance of analysts.

However, CFOs with foreign experience may not necessarily contribute to analyst forecast activities. Emerging markets are often characterized by weak legal and governance environments. The CFOs may be captured by other executives (e.g., CEO or Chairman) and controlling shareholders, thus hinder their ability to provide high-quality financial statements, even for CFOs with foreign experience (Giannetti et al., 2015; Liao et al., 2017). Iliev and Roth (2018) also point out that directors' foreign board experiences may not translate across countries due to the different economic and legal environments.

Although the positive effect of CFOs with foreign experience on

analyst's forecast accuracy may fail due to weak legal and governance environments. Given that China is in a stage of rapid development, and both the corporate governance and legal environment have been making progress (Jiang & Kim, 2015). We believe that hiring CFOs with foreign experience may translate into a high-quality information environment and finally leads to greater analysts' forecast accuracy. Accordingly, we state our hypothesis as follows:

Hypothesis: *Ceteris paribus, firms with returnee CFOs are associated with greater analysts' forecast accuracy.*

3. Data and variables

3.1. Data description

Our initial sample covers all Chinese A-share listed firms on the Shanghai Stock Exchange (SHSE) and the Shenzhen Stock Exchange (SZSE) from 2008 to 2018. We apply the following filters to select the research sample: (1) we exclude financial firms (e.g., banks, insurance companies, and investment trusts) due to their different financial structures and regulations; (2) we eliminate firm-years without sufficient information on CFO background, analyst forecasts, and other firm-specific variables. Applying the above criteria yielded a final sample of 10,301 firm-year observations representing 2228 unique firms. Table 1 presents the process of sample selection. The data required for this study are obtained from the China Stock Market & Accounting Research (CSMAR) database and supplemented by the WIND database, which is widely used in studies concerning China. To mitigate the effect of outliers, we winsorize all firm-year continuous variables at the 1st and 99th percentiles.

3.2. Main variables

3.2.1. Analyst forecast error (FERROR)

Our dependent variable is forecast error (*FERROR*), which is negatively associated with analyst earnings forecast accuracy. Following Merkley et al. (2017), Han et al. (2018), and (Dong, Fisman, Wang, & Xu, 2021), forecast error can be measured as the absolute difference between an analyst's forecast and the actual earnings per share (EPS) divided by the absolute value of the actual EPS. For each analyst, we choose her/his last earnings forecast before the earnings announcement in the given year. Because our analysis is conducted at the firm level, we further aggregate forecast error and consider it as an average of earnings forecast errors among all analysts following a particular firm. More formally,

$$FERROR_{i,t} = \frac{1}{n}\sum_{j=1}^{n}\frac{\left|EPS_{i,j,t}^{Forecast} - EPS_{i,t}^{Actual}\right|}{\left|EPS_{i,t}^{Actual}\right|} \quad (1)$$

where subscripts *i, j,* and *t* indicate firm, analyst, and year, respectively. *n* represents the number of analysts covering a particular firm in a given year. $EPS_{i,\ j,\ tForecast}$ is the analyst's EPS forecast, and $EPS_{i,\ tActual}$ is the firm's realized EPS. Intuitively, higher values of *FERROR* signify that earnings forecasts are more deviation from their true values, thus indicating less accurate forecasts for a particular firm.

Table 1
Sample selection.

	Number of observations	Number of unique firms
Firm-years of Chinese A-share listed firms on the SHSE and SZSE from 2008 to 2018	25,301	3512
Less: Observations that analysts have not released earnings forecasts	(5752)	(147)
Less: Observations with missing information of CFO background	(5943)	(513)
Less: Observations in the financial industry	(407)	(74)
Less: Observations with other missing variables	(2898)	(550)
Final sample	10,301	2228

3.2.2. CFO foreign experience

Our main explanatory variable of interest is CFO's foreign experience. Following Giannetti et al. (2015), Dai et al. (2018), and Yuan and Wen (2018), we define that a CFO has foreign experience if she or he has worked or studied outside mainland China. Then we construct an indicator variable *Foreign exp* to gauge returnee CFO, which takes a value of 1 if the firm's CFO has foreign experience and 0 otherwise. Moreover, to better capture different types of returnee CFO, we further introduce the following two measures: *Foreign work exp*, an indicator variable equals 1 if the firm's CFO only has foreign work experience and 0 otherwise; *Foreign study exp*, an indicator variable equals 1 if the firm's CFO only has foreign study experience and 0 otherwise. Especially, foreign study experience includes the experience of earning academic degrees (i.e., bachelor's, master's, and doctoral degrees), being visiting scholars, taking training programs, and having post-doctoral experience (Yuan & Wen, 2018).

3.2.3. Control variables

We also introduce a vector of CFO-, firm- and analyst-level control variables that prior studies find to be related to analyst forecast accuracy (Cheng et al., 2016; Han et al., 2018). Such variables are CFO gender (*CFO Gender*), CFO age (*CFO Age*), CFO education background (*CFO Degree*), average executives tenure (*Executives Tenure*), firm size (*Size*), firm revenue volatility (*Volatility*), institutional shareholder ownership (*Institutional ownership*), the largest shareholder ownership (*Largest*), firm listing age (*FirmAge*), firm profitability (*Loss*), intangible assets ratio (*Intangible*), forecast horizon (*Horizon*), and analyst following (*Analyst following*). Detailed variable definitions are provided in Appendix A.

3.3. Descriptive statistics

Table 2 provides the descriptive statistics of the main variables. In Panel A, the mean (median) forecast *FERROR* is 0.712 (0.250), which is consistent with existing studies (Kong, Liu, & Liu, 2020). The mean value of *Foreign* exp is 0.037, with a standard deviation of 0.188, indicating that approximately 3.7% of CFOs in our sample have foreign experience. Among these, 45.9% (=0.017/0.037) of returnee CFOs have only foreign work experience while 35.1% (=0.013/0.037) have only foreign education experience, whereas the rest of returnee CFOs have both kinds of foreign experience. The median firm has total assets of nearly RMB 3445 million ($=e^{21.960}$), revenue volatility of 0.108, intangible assets of 3.5%, institutional ownership of 6.17%, and an analyst following of nearly 9 ($=e^{2.197}$). Overall, the sample is comparable to the data in the related studies.

Before proceeding with the regression results, we present a univariate comparison of the forecast errors of firms with returnee CFOs versus firms with none. Panel B of Table 2 reports the differences in forecast errors between firm-years with and without CFOs having foreign experience. The estimates indicate that the analysts' forecast errors are on average lower by 0.201 (=0.719–0.518) in firms that have returnee CFOs than in firms that do not. Besides, the differences in means and medians, are both significant, confirming that firm-years with CFOs having foreign experience will enjoy more accurate analyst consensus forecasts.

4. Empirical results

4.1. Effect of CFOs with foreign experience on analysts' forecast accuracy

To capture the effect of the CFOs with foreign experience on analysts' forecast accuracy, we estimate the following baseline regression.

Table 2
Descriptive statistics.

Panel A: Summary statistics

Variable	Obs.	Mean	SD	Min	Median	Max
FERROR	10,301	0.712	1.267	0.013	0.250	7.550
Foreign exp	10,301	0.037	0.188	0.000	0.000	1.000
Foreign work exp	10,301	0.017	0.131	0.000	0.000	1.000
Foreign study exp	10,301	0.013	0.115	0.000	0.000	1.000
CFO Gender	10,301	0.697	0.460	0.000	1.000	1.000
CFO Age	10,301	45.480	6.174	32.000	45.000	61.000
CFO Degree	10,301	3.307	0.990	1.000	3.000	7.000
Executives Tenure	10,301	3.786	2.664	0.082	3.185	11.590
Size	10,301	22.170	1.304	19.270	21.960	26.090
Volatility	10,301	0.178	0.201	0.006	0.108	1.141
Institutional ownership (%)	10,301	8.483	7.924	0.012	6.170	36.610
Largest (%)	10,301	34.900	15.030	9.000	33.080	75.400
FirmAge	10,301	2.105	0.619	1.099	2.079	3.219
Loss	10,301	0.059	0.235	0.000	0.000	1.000
Intangible	10,301	0.048	0.051	0.000	0.035	0.320
Horizon	10,301	5.324	0.234	4.553	5.331	5.864
Analyst following	10,301	2.138	0.850	0.693	2.197	3.761

Panel B: Univariate analysis

	Foreign exp = 0		*Foreign exp* = 1		T-test *p*-value	Wilcoxon test *p*-value
	Mean	Median	Mean	Median		
FERROR	0.719	0.251	0.518	0.204	0.002	0.010
CFO Gender	0.696	1.000	0.723	1.000	0.260	0.260
CFO Age	45.493	45.000	45.034	45.000	0.156	0.231
CFO Degree	3.282	3.000	3.974	4.000	0.000	0.000
Executives Tenure	3.793	3.205	3.604	2.918	0.176	0.222
Size	22.158	21.954	22.432	22.225	0.000	0.000
Volatility	0.177	0.108	0.194	0.117	0.104	0.040
Institutional ownership (%)	8.438	6.109	9.664	7.643	0.003	0.000
Largest	34.909	33.230	34.649	28.770	0.741	0.039
FirmAge	2.107	2.079	2.066	2.079	0.215	0.219
Loss	0.059	0.000	0.050	0.000	0.468	0.468
Intangible	0.048	0.035	0.045	0.033	0.332	0.323
Horizon	5.324	5.332	5.315	5.316	0.461	0.240
Analyst following	2.128	2.197	2.393	2.398	0.000	0.000

This table presents the descriptive statistics. Panel A reports the summary statistics of the main variables. Panel B reports the means and medians of the variables for the sample of firms with returnee CFOs versus firms with none. The difference tests of means and medians are based on the *t*-test and the Wilcoxon rank-sum test, respectively. All variables are defined in Appendix A. All of the continuous variables are winsorized at the 1% and 99% level.

$$FERROR_{it} = \beta_0 + \beta_1 Foreign\ exp_{it} + \sum_{j=0}^{n} \alpha_j Controls_{it} + Year/ Industry\ Fixed\ Effects + \varepsilon_{it} \quad (2)$$

where i indexes firms, t indexes years, and ε_{it} is the random error term. The dependent variable *FERROR* is a firm-level analyst forecast accuracy measure that is defined as the average absolute forecast error of the latest earnings forecast issued by each analyst for firm i in fiscal year t. *Foreign exp* is an indicator variable that takes a value of one if the firm i has a returnee CFO in fiscal year t and zero otherwise. The vector *Controls* denote a series of aforementioned control variables. Finally, we incorporate year and industry fixed effects to control for common time trends and unobservable time-invariant industry-specific factors. Robust standard errors are adopted in all regressions. Our primary interest is the coefficient β_1 because it captures the marginal effect of returnee CFOs on analysts' forecast accuracy, and we expect it to be negative.

We report the results of the baseline OLS regression in Table 3. Without controlling for any covariates, as shown in Column (1), the coefficient of *Foreign exp* is −0.194, which is negative and statistically

Table 3
Effect of CFOs with foreign experience on analysts' forecast accuracy.

	Dependent variable: *FERROR*			
	Model 1	Model 2	Model 3	Model 4
Foreign exp	−0.194***	−0.178***	−0.131***	−0.111**
	(0.052)	(0.053)	(0.050)	(0.049)
CFO Gender		0.010	0.006	−0.003
		(0.027)	(0.027)	(0.026)
CFO Age		−0.002	−0.001	−0.000
		(0.002)	(0.002)	(0.002)
CFO Degree		−0.037***	−0.022*	−0.015
		(0.013)	(0.013)	(0.013)
Executives Tenure		−0.020***	−0.017***	−0.015***
		(0.005)	(0.005)	(0.005)
Size			−0.044***	0.004
			(0.013)	(0.014)
Volatility			−0.034	0.001
			(0.064)	(0.063)
Institutional ownership			−0.019***	−0.007***
			(0.001)	(0.002)
Largest			−0.006***	−0.005***
			(0.001)	(0.001)
FirmAge			0.092***	0.038*
			(0.023)	(0.023)
Loss			1.132***	0.985***
			(0.073)	(0.074)
Intangible			−0.154	−0.183
			(0.243)	(0.240)
Horizon				0.976***
				(0.059)
Analyst following				−0.182***
				(0.018)
Intercept	1.360***	1.575***	2.465***	−3.446***
	(0.146)	(0.184)	(0.291)	(0.431)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	10,301	10,301	10,301	10,301
Adj.R^2	0.022	0.025	0.093	0.134

This table presents the regression results of the effect of CFOs with foreign experience on analysts' forecast accuracy. The dependent variable is forecast error, which is negatively associated with analysts' forecast accuracy and measured as the absolute difference between an analyst's forecast and the actual earnings per share (EPS) divided by the absolute value of the actual EPS. We further aggregate forecast error at the firm level and consider it as an average of earnings forecast errors among all analysts following a particular firm. The main explanatory variable of interest is CFOs' foreign experience, defined as 1 if the firm's CFO has worked or studied outside mainland China and 0 otherwise. All variables are defined in Appendix A. The robust standard errors are shown in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

significant at the 1% level, indicating that CFOs with foreign experience increase the accuracy of analysts' forecasts, yielding a lower consensus forecast error. In Columns (2), (3), and (4), we add a comprehensive set of personal traits, firm control variables, and analyst characteristics related to forecasting accuracy sequentially and progressively. Across all three specifications, our results also exhibit a similar significantly negative relationship between returnee CFOs and analysts' forecast errors, thereby confirming our hypothesis. These coefficients are economically significant as well. Take the results in Column (4) as an example, firms hiring one returnee CFO is associated with 0.111 decreases in forecast error of analysts. Given that the average value of *ERROR* in our sample is 0.712, the consensus forecast error is reduced by 15.6% after hiring returnee CFOs relative to the unconditional mean.

The signs and significance levels of the estimates of the control variables are as expected. Consistent with previous studies (Kong et al., 2020; Lang & Lundholm, 1996; Li, Wong, & Yu, 2020), large, profitable, young firms and those with more institutional ownership will experience higher analyst forecast accuracy. Forecast errors are positively associated with forecast horizon, which suggests that analysts' long-horizon forecasts involve greater judgment and are subject to more

uncertainty than shorter horizon forecasts (Dehaan, Madsen, & Piotroski, 2017; Han et al., 2018). We find a negative relationship between the number of analysts following the firm and its analysts' forecast errors, in line with the fact that having a larger analyst following is associated with greater accuracy (Alford & Berger, 1999). We find no evidence of CFOs' gender and age characteristics affecting forecast accuracy, but the education degree of CFOs and the average tenure of executives are adversely associated with consensus forecast errors.

4.2. Endogeneity tests

Although our evidence indicates a positive relation between CFOs with foreign experience and analysts' forecast accuracy, the results are still subject to the threat of endogeneity. For example, it might be possible that firms with a more accurate forecast of analysts are more attractive to returnee CFOs. Another primary concern is that hiring CFOs with foreign experience may not be a random choice for firms, which may induce self-selection bias. Accordingly, in the section, we employ the propensity score matched (PSM) procedure and Heckman two-stage method, to formally address possible endogeneity problems.

4.2.1. PSM procedure

Given that treatment firms (i.e., firms with returnee CFOs) and control firms (i.e., firms without returnee CFOs) might differ systematically from each other in many characteristics. The primary benefit of using the propensity score matching (PSM) procedure is that it allows us to more clearly attribute any observed effects of analyst forecasts to the appointment of returnee CFOs itself, rather than to the firm characteristics associated with the appointment of CFOs with foreign experience (Yuan & Wen, 2018).

Following existing studies (Conyon et al., 2019; Wen et al., 2019; Yuan & Wen, 2018), we first regress our indicator variable *Foreign* exp on a set of control variables aforementioned and estimate the propensity score of hiring a returnee CFO for each firm. We then match each treatment firm with five control firms with the closest propensity. The matching is conducted with replacement and these firms constitute the PSM control sample. Panel A of Table 4 presents the results of the covariate balance check of PSM. Results show that there are no significant differences in the means of any covariates, indicating that our matching process has successfully removed meaningful observable differences between the treatment and control groups.

We re-estimate Eq. (2) using the treatment and propensity-score matched control sample. Panel B of Table 4 also exhibits a significantly negative coefficient of *Foreign exp* at the 10% level, providing evidence that returnee CFOs promote analysts' forecast accuracy after controlling for potential endogeneity.

4.2.2. Heckman two-stage method

Firms with lower consensus forecast errors might be more likely to hire CFOs with foreign experience. In other words, A firm's decision to appoint a returnee CFO may be non-random and correlated to certain unobservable firm characteristics. To mitigate this concern, we further introduce the Heckman two-stage method.

In the first stage, we construct a Probit model to estimate the probability of firms hiring returnee CFOs. Consider that Heckman's model requires an exogenous variable that is associated with firms' propensity to appoint CFOs with foreign experience, but not correlated with analysts' forecast accuracy. Following Yuan and Wen (2018) and Wen et al. (2020), we use the percentage of hiring returnee CFOs by other firms within the same industry and year (*Industry Foreign CFO*) to satisfy this requirement. Because firms with a similar industrial environment may share common incentives to hire returnee CFOs, however, the industry peer firms' hiring strategies are beyond the control of a given firm and less likely to be closely correlated with the firm's analyst forecast accuracy. Specifically, Column (1) of Table 5 shows that *Industry Foreign CFO* is positively significant at the 1% level, confirming the validity of our exogenous variable. The inverse Mills ratio (*IMR*) is generated from the first stage and then included in the second stage regression to control for the potential self-selection bias. We find an insignificant coefficient on *IMR*, implying that the unobserved determinants that motivate firms to hire CFOs with foreign experience are insensitive with analyst forecasts and the self-selection bias might not be a critical threat in our research. The result of Heckman's second stage regression shown in Column (2) of Table 5 indicates that the coefficient on *Foreign exp* remains negative and statistically significant, thereby further suggesting that our findings are unlikely to be driven by the potential self-selection bias.

Table 4
PSM results.

Panel A: Post-matching diagnosis: Comparison between the treatment and control groups

	Mean		*P*-value
	Treatment group	Control group	
CFO Gender	0.723	0.720	0.923
CFO Age	45.034	45.279	0.579
CFO Degree	3.974	3.928	0.599
Executives Tenure	3.604	3.717	0.547
Size	22.432	22.467	0.734
Volatility	0.194	0.189	0.746
Institutional ownership (%)	9.664	9.389	0.636
Largest	34.649	35.909	0.311
FirmAge	2.067	2.088	0.631
Loss	0.050	0.052	0.921
Intangible	0.045	0.046	0.832
Horizon	5.315	5.306	0.557
Analyst following	2.393	2.402	0.879

Panel B: Test results using matched sample

	Dependent variable: *FERROR*
	Model 1
Foreign exp	−0.095* (0.053)
CFO Gender	−0.045 (0.056)
CFO Age	−0.002 (0.004)
CFO Degree	0.006 (0.019)
Executives Tenure	−0.033*** (0.010)
Size	−0.035 (0.032)
Volatility	−0.029 (0.138)
Institutional ownership	−0.004 (0.003)
Largest	−0.003* (0.002)
FirmAge	0.082 (0.051)
Loss	1.053*** (0.174)
Intangible	−0.625 (0.436)
Horizon	0.813*** (0.147)
Analyst following	−0.133*** (0.036)
Intercept	−2.153* (1.177)
Year FE	Yes
Industry FE	Yes
Observations	1946
Adj.R^2	0.138

This table presents the regression results using propensity-score matched (PSM) procedure. Panel A reports the results from a balance test on variables measured as post-matching diagnosis. Panel B presents the regression results using the matched sample. All variables are defined in Appendix A. The robust standard errors are shown in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

5. Further analysis

5.1. Potential mechanisms

In this section, we extend our analysis to shed light on the underlying mechanism. We expect an improved information environment, such as decreased earnings management and better auditor choice, which may mainly drive our results.

Table 5
Heckman 2SLS results.

	First stage	Second stage
	Dependent variable: *Foreign exp*	Dependent variable: *FERROR*
Foreign exp		−0.113***
		(0.049)
CFO Gender	0.052	0.013
	(0.054)	(0.048)
CFO Age	−0.0026	−0.001
	(0.005)	(0.003)
CFO Degree	0.254***	0.074
	(0.020)	(0.192)
Executives Tenure	−0.026**	−0.026
	(0.010)	(0.020)
Size	0.044*	0.023
	(0.026)	(0.038)
Volatility	0.201*	0.088
	(0.117)	(0.169)
Institutional ownership	0.004	−0.005
	(0.004)	(0.003)
Largest	0.002	−0.004***
	(0.002)	(0.002)
FirmAge	−0.064	0.019
	(0.047)	(0.055)
Loss	−0.028	0.986***
	(0.112)	(0.081)
Intangible	−0.094	−0.232
	(0.555)	(0.253)
Horizon	−0.069	0.955***
	(0.113)	(0.079)
Analyst following	0.110***	−0.142
	(0.036)	(0.088)
Industry Foreign CFO	10.67***	4.832
	(1.620)	(8.564)
IMR		0.441
		(0.888)
Intercept	−3.363***	−5.025
	(0.839)	(3.197)
Year FE	Yes	Yes
Industry FE	Yes	Yes
Observations	9792	9792
Adj.R^2		0.131

This table presents the regression results of Heckman two-stage model. In the first stage, we use *Foreign exp* as the main dependent variable and construct a probit model to estimate the probability of firms hiring returnee CFOs. *Industry Foreign CFO* is an exogenous variable, which is the mean percentage of hiring returnee CFOs by other firms within the same industry and year. The second stage is the ordinary least square regression of CFOs' foreign experience on analysts' forecast errors. *IMR* denotes the inverse Mills ratio, which is generated from the first step and included in the second step of this model. All variables are defined in Appendix A. The robust standard errors are shown in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

5.1.1. Earnings management

As a representative of senior management in firms, CFOs' primary responsibility is financial reporting and they are considered involving in accounting manipulations (Feng et al., 2011; Geiger & North, 2006; Jiang et al., 2010). Survey evidence suggests an overwhelming majority of interviewed CFOs are interested in meeting or beating earnings benchmarks to harvest stock market gains and their welfare (Graham et al., 2005). However, consider that the overseas experience from developed countries may help returnees possess advanced knowledge, superior management skills, and strict monitoring practices over financial reporting, thus we predict firms to become more transparent and manage earnings to a lower extent if CFOs have foreign experience. To capture earnings manipulation, we respectively estimate accrual-based earnings management ($|DA|$) and real earnings management (*REM*).

First, we measure discretionary accruals using a modified Jones Model based on Dechow, Sloan, and Sweeney (1995) to decompose the total accruals into normal and discretionary components as follows:

$$\frac{TA_t}{Asset_{t-1}} = \alpha_1 \times \frac{1}{Asset_{t-1}} + \alpha_2 \times \frac{\Delta REV_t}{Asset_{t-1}} + \alpha_3 \times \frac{PPE_t}{Asset_{t-1}} + \varepsilon_t \quad (3)$$

where *TA* refers to total accruals, measured as net profit minus net cash flow from operating activities. *Asset* denotes the total assets of the firm. Δ*REV* denotes the change in revenues. *PPE* denotes the gross property, plant, and equipment. The coefficient estimates of $\widehat{\alpha}_1$, $\widehat{\alpha}_2$, and $\widehat{\alpha}_3$ are obtained from model (3) for each industry and year, and then we calculate *DA* as follows:

$$DA = \frac{TA_t}{Asset_{t-1}} - \left[\widehat{\alpha}_1 \times \frac{1}{Asset_{t-1}} + \widehat{\alpha}_2 \times \frac{(\Delta REV_t - \Delta REC_t)}{Asset_{t-1}} + \widehat{\alpha}_3 \times \frac{PPE_t}{Asset_{t-1}}\right] \quad (4)$$

where Δ*REC* denotes the change in net receivables. *DA* denotes the discretionary accruals and we adopt the absolute value of *DA* as the proxy for accrual management in our analysis. Higher values of $|DA|$ indicate larger accrual-based earnings management.

Besides detecting abnormal accruals, studies also suggest that managers manipulating real activities to avoid reporting annual losses. Following Roychowdhury (2006) and Cohen and Zarowin (2010), we consider three metrics to develop our proxies for real earnings management: the abnormal levels of cash flow from operations (*AbCFO*), production costs(*AbPROD*), and discretionary expenses (*AbDiscE*). The specific calculations are as follows:

$$\frac{CFO_{i,t}}{Assets_{i,t-1}} = \alpha_1 \frac{1}{Assets_{i,t-1}} + \alpha_2 \frac{Sales_{i,t}}{Assets_{i,t-1}} + \alpha_3 \frac{\Delta Sales_{i,t}}{Assets_{i,t-1}} + \varepsilon_{i,t} \quad (5)$$

$$\frac{PROD_{i,t}}{Assets_{i,t-1}} = \alpha_1 \frac{1}{Assets_{i,t-1}} + \alpha_2 \frac{Sales_{i,t}}{Assets_{i,t-1}} + \alpha_3 \frac{\Delta Sales_{i,t}}{Assets_{i,t-1}} + \alpha_4 \frac{\Delta Sales_{i,t-1}}{Assets_{i,t-1}} + \varepsilon_{i,t} \quad (6)$$

$$\frac{DiscE_{i,t}}{Assets_{i,t-1}} = \alpha_1 \frac{1}{Assets_{i,t-1}} + \alpha_2 \frac{Sales_{i,t-1}}{Assets_{i,t-1}} + \varepsilon_{i,t} \quad (7)$$

where *CFO* denotes cash flow from operations. *PROD* denotes the production costs, defined as the sum of *COGS* (cost of goods sold) and the change in inventories. *DiscE* denotes the discretionary expenditures, defined as the sum of advertising expenses, R&D expenses, and selling, general, and administrative (SG&A) expenses. The abnormal *CFO* (*AbCFO*), abnormal production costs (*AbPROD*), and abnormal discretionary expenses (*AbDiscE*) are estimated as the residuals from the industry-year regressions of the model (5), (6), and (7), respectively. Finally, following Roychowdhury (2006) and Zang (2012), we combine the three real activities manipulation measures into one proxy, *REM*. Also, the higher the amount of this aggregate measure, the more likely that the firm is engaging in inventory overproduction, sales manipulations, and cutting discretionary expenditures to manage reported earnings upwards.

$$REM = AbPROD - AbCFO - AbDiscE \quad (8)$$

Panel A of Table 6 reports the impacts of CFOs' foreign experience on firms' earnings management. The coefficient estimates on *Foreign exp* are negative and significant in the last three columns, implying the presence of returnee CFOs is associated with a lower degree of both accrual-based and real earnings management. Thus, a mitigation effect of earnings management may help us understand why CFOs with foreign experience positively promote analysts' forecast accuracy.

5.1.2. Audit quality

As an important external supervision mechanism, auditing is valued for its ability to provide independent assurance of the credibility of accounting information. A high ranking of auditing firms is generally argued to capture better audit quality, so as greater assurance of high financial reporting quality (Chen et al., 2017; DeFond & Zhang, 2014; Gul, Fung, & Jaggi, 2009). Consider the expertise accumulated abroad enables returnee CFOs to facilitate the adoption of strong corporate

Table 6
Mechanisms.

Panel A: Earnings management				
	Dependent variable: $\|DA\|$		Dependent variable: *REM*	
	Model 1	Model 2	Model 3	Model 4
Foreign exp	−0.006	−0.010**	−0.055***	−0.041***
	(0.004)	(0.004)	(0.014)	(0.014)
CFO Gender		−0.004**		−0.006
		(0.002)		(0.006)
CFO Age		0.000		0.000
		(0.000)		(0.000)
CFO Degree		0.003***		−0.013***
		(0.001)		(0.003)
Executives Tenure		−0.000		−0.003***
		(0.000)		(0.001)
Size		0.001		−0.012***
		(0.001)		(0.003)
Volatility		0.012**		0.138***
		(0.005)		(0.019)
Institutional ownership		0.000***		−0.006***
		(0.000)		(0.000)
Largest		−0.000***		−0.0016***
		(0.000)		(0.000)
FirmAge		−0.005***		−0.009*
		(0.002)		(0.006)
Loss		−0.019**		0.098***
		(0.008)		(0.021)
Intangible		−0.126***		−0.380***
		(0.015)		(0.053)
Intercept	0.034*	0.019	−0.020	0.386***
	(0.020)	(0.026)	(0.027)	(0.056)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	8512	8512	8052	8052
Adj.R^2	0.016	0.034	0.040	0.110

Panel B: Audit quality				
	Dependent variable: *Big4*		Dependent variable: *Big10*	
	Model 1	Model 2	Model 3	Model 4
Foreign exp	0.773***	0.788***	0.283***	0.232***
	(0.079)	(0.087)	(0.070)	(0.070)
CFO Gender		−0.166***		−0.106***
		(0.054)		(0.028)
CFO Age		0.005		0.004*
		(0.004)		(0.002)
CFO Degree		0.129***		0.042***
		(0.022)		(0.014)
Executives Tenure		−0.028***		0.007
		(0.010)		(0.005)
Size		0.632***		0.143***
		(0.023)		(0.013)
Volatility		−0.802***		−0.088
		(0.170)		(0.068)
Institutional ownership		0.002		−0.003*
		(0.003)		(0.002)
Largest		0.008***		0.003***
		(0.002)		(0.001)
FirmAge		−0.122**		−0.161***
		(0.048)		(0.025)
Loss		−0.154		0.004
		(0.117)		(0.056)
Intangible		2.294***		−0.116
		(0.400)		(0.273)
Intercept	−2.223***	−16.400***	−1.089***	−4.141***
	(0.377)	(0.667)	(0.131)	(0.287)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	9983	9983	10,261	10,261
Adj.R^2	0.097	0.389	0.064	0.080

This table presents the regression results of potential underlying mechanisms. Table A presents the effect of CFOs with foreign experience on corporate earnings management. To capture earnings manipulation, we respectively estimate accrual-based earnings management ($|DA|$) and real earnings management (*REM*). Table B presents the effects of CFOs with foreign experience on corporate audit quality. *Big4* equals the value of 1 if a firm hires the international Big4 auditing firms in the given year, and 0 otherwise. By ranking the 10 largest auditing firms according to the total size of the firms they audited in the given year, we define another dummy variable *Big10*, which takes the value of 1 if a firm hires the top10 auditing firms in the given year, and 0 otherwise. All variables are defined in Appendix A. The robust standard errors are shown in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

governance practices and internationalization, we expect that firms having CFOs with foreign experience is more likely to hire top-ranking auditing firms to strengthen firms' external auditing system and guarantee high-quality disclosures.

In Panel B of Table 6, we further investigate the mechanism of external audit quality. We consider the choice of auditors and construct two indicator variables, *Big4* and *Big10*. *Big4* equals the value of 1 if a firm hires the international Big4 auditing firms in the given year, and 0 otherwise (Chen et al., 2017; Dai, 2019). By ranking the 10 largest auditing firms according to the total size of the firms they audited in the given year, we define another dummy variable *Big10*, which takes the value of 1 if a firm hires the top10 auditing firms in the given year, and 0 otherwise. As expected, the coefficients of *Foreign exp* are all significantly positive at the 1% level, provide strong evidence that CFOs with foreign experience have a higher probability to appoint high-quality auditing firms. Taken together, we suggest that the improvement of financial reports quality by returnee CFOs appears to be the plausible underlying mechanism to increase the precision of analysts' earnings forecasts.

5.2. Heterogeneity

Next, we examine whether there is a cross-sectional variation in the impact of CFOs with foreign experience on analysts' forecast accuracy based on two aspects: external pressure and types of foreign experience.

5.2.1. Moderating of external pressure

We first investigate how analyst coverage might affect our main findings. Besides the information intermediary function, sell-side analysts also play an important external supervision role in corporate governance (Jensen & Meckling, 1976; Moyer, Chatfield, & Sisneros, 1989). Equipping with an industry background, experienced in tracking the firm they follow, actively engaged with managers to acquire information, and expertise in detecting abnormal changes of operating performance as well as mitigating real earnings management, analysts are often considered to be sophisticated users of financial reports information (Irani & Oesch, 2016; Yu, 2008). In practice, analysts also contribute to the exposure of fraud in firms such as Compaq and Motorola Inc. (Chen, Cumming, Hou, & Lee, 2016; Dyck, Morse, & Zingales, 2010). As the external monitoring effect of financial analysts can be a substitute for CFOs' intrinsic foreign experience to promote high-quality financial reporting, firms without returnee CFOs that are more reliant on external supervision are expected to be more sensitive to the influence of analyst coverage.

Specifically, we use the number of analysts tracking a given firm as the proxy for external supervision, and further divide the full sample into two groups according to the level of analysts following. *High Analyst Following* group contains firms that attracting higher coverage of analysts, based on the industry-year sample median value of analysts following. Otherwise, the firms are included in the *Low Analyst Following* group. Then we separately estimate model (2) for both subsamples. The results are shown in Panel A of Table 7. We find that before controlling for any covariates, the negative effects of CFOs with foreign experience exist in both groups, but slightly stronger for firms with less analyst coverage. After including control variables, the coefficients of *Foreign* exp is significantly negative in the *Low Analyst Following* group, while it is negative but not statistically significant in the *High Analyst Following*

Table 7
Heterogeneity analysis: the role of external pressure.

Panel A: Analyst following

	Dependent variable: *FERROR*			
	Model 1	Model 2	Model 3	Model 4
	High Analyst Following	Low Analyst Following	High Analyst Following	Low Analyst Following
Foreign exp	−0.103*	−0.215*	−0.040	−0.244**
	(0.055)	(0.112)	(0.051)	(0.106)
CFO Gender			0.023	−0.042
			(0.028)	(0.046)
CFO Age			−0.002	0.001
			(0.002)	(0.004)
CFO Degree			−0.006	−0.025
			(0.013)	(0.025)
Executives Tenure			−0.014**	−0.016*
			(0.005)	(0.009)
Size			0.018	−0.020
			(0.015)	(0.027)
Volatility			0.008	−0.008
			(0.075)	(0.108)
Institutional ownership			−0.007***	−0.003
			(0.002)	(0.004)
Largest			−0.005***	−0.005***
			(0.001)	(0.001)
FirmAge			0.032	0.061
			(0.026)	(0.042)
Loss			1.292***	0.849***
			(0.146)	(0.086)
Intangible			−0.186	−0.175
			(0.282)	(0.386)
Horizon			1.151***	0.934***
			(0.100)	(0.072)
Analyst following			−0.254***	−0.127**
			(0.031)	(0.051)
Intercept	1.306***	1.401***	−4.346***	−3.068***
	(0.189)	(0.225)	(0.639)	(0.663)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	5605	4696	5605	4696
Adj.R^2	0.032	0.024	0.154	0.101

Panel B: Industry competition

	Dependent variable: *FERROR*			
	Model 1	Model 2	Model 3	Model 4
	Low HHI	High HHI	Low HHI	High HHI
Foreign exp	−0.100	−0.185***	−0.077	−0.114**
	(0.097)	(0.050)	(0.092)	(0.048)
CFO Gender			0.009	−0.028
			(0.039)	(0.034)
CFO Age			0.002	−0.002
			(0.003)	(0.003)
CFO Degree			−0.014	−0.025*
			(0.020)	(0.015)
Executives Tenure			−0.023***	−0.007
			(0.008)	(0.006)
Size			0.001	0.047***
			(0.037)	(0.016)
Volatility			0.137	−0.035
			(0.117)	(0.069)
Institutional ownership			−0.006**	−0.008***
			(0.003)	(0.002)
Largest			−0.005***	−0.005***
			(0.001)	(0.001)
FirmAge			0.087*	0.015
			(0.045)	(0.026)
Loss			1.043***	0.847***
			(0.108)	(0.099)
Intangible			−0.077	−0.244
			(0.478)	(0.230)
Horizon			1.140***	0.802***
			(0.080)	(0.085)
Analyst following			−0.202***	−0.146***
			(0.027)	(0.022)
Intercept	1.509***	1.454***	−4.312***	−3.236***
	(0.191)	(0.159)	(0.869)	(0.572)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	4975	5326	4975	5326
Adj.R^2	0.029	0.038	0.146	0.134

This table presents the heterogeneity results of external pressure on the relation between CFOs with foreign experience and analysts' forecast accuracy. Panel A reports the grouping results for analyst following. *High Analyst Following* group contains firms that attracting higher coverage of analysts, based on the industry-year sample median value of analysts following. Otherwise, the firms are included in the *Low Analyst Following* group. Panel B reports the grouping results for industry competition. *High HHI* group contains firms belonging to less competitive industries, based on the within-year median value of *HHI*, calculated as the sum of the squares of the market shares of all firms for each two-digit CSRC industry. Otherwise, the firms are included in the *Low HHI* group. All variables are defined in Appendix A. The robust standard errors are shown in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

group, which confirmed our conjecture that CFOs with foreign experience exert a more pronounced impact on analysts forecast accuracy when corresponding to weak external pressure, thereby suggesting that hiring returnee CFOs is an effective substitute for external monitoring such as analyst coverage.

We next examine how product market competition influences the brain gain effect of CFOs on analysts' forecasts. Firms operating in competitive industries are subject to continuous pressure that can affect their decision-making significantly. Existing studies have documented that intense industry competition can serve as an external governance mechanism that effectively alleviating the conflict agency problems between shareholders and management and providing corporate managers with incentives to behave efficiently (Chhaochharia, Grinstein, Grullon, & Michaely, 2017; Giroud & Mueller, 2010, 2011). Balakrishnan and Cohen (2013) indicate that product market competition is negatively related to the incidence of financial accounting misreporting. Ali, Klasa, and Yeung (2014) provide evidence that firms in more concentrated industries provide less informative disclosures and associated with greater analysts' forecast errors, higher forecast dispersion, and higher volatility of analyst forecast revisions. Therefore, the highly-intense industry competition can act as disciplining force in shaping the corporate financial information environment and we expect the positive relationship between CFOs with foreign experience and analysts' forecast accuracy to be stronger in the concentrated firms whose quality of financial statement can only rely on CFOs' expertise instead of external governance.

The industry competition is captured by the Herfindahl-Hirschman index (*HHI*) based on sales. The *HHI* is calculated as the sum of the squares of the market shares of all firms for each two-digit CSRC industry. The higher the *HHI* score, the higher the concentration and the less the industry competition. Then we separately partition the full sample by the within-year median value of *HHI* and present the results where the value of *HHI* is below and above the median, respectively. The results in Panel B of Table 7 show that the negative effect of returnee CFOs on analysts' forecast errors is pronounced only for firms belonging to less competitive industries (*High HHI*), which further implies that hiring returnee CFOs can be treated as an effective substitute for another external governance such as industry competition.

5.2.2. Work abroad vs. study abroad

We further distinguish the types of CFOs' foreign experience into two categories, work experience, and studying experience, and examine whether they have different effects on analysts' forecasts. Following Yuan and Wen (2018), Zhang et al. (2018), and Wen et al. (2020), *Foreign work* exp (*Foreign study exp*) is a dummy variable that, if the firm's CFO only has foreign work (studying) experience equals one, otherwise zero. Table 8 reports the results of the test. The coefficients on *Foreign work exp* in Columns (1) and (3) are negatively significant at the 10% level, and those of *Foreign study exp* in Columns (2) and (3) are negative but insignificant. In Column (4), we further break the CFOs' foreign study experience down into two types of experience, one is CFOs' foreign study experience for being in a bachelor, or master, or training program; the other one is CFOs' foreign study experience for having a doctoral, or visiting scholars, or post-doctoral experience.[3] The results show that the coefficients on *Foreign bachelor/master/trading program* and *Foreign doctoral/visiting scholars/postdoctoral* are both insignificant, which suggesting that both the types of CFOs' foreign study experience do not contribute to analysts' forecast accuracy. As education indicates a person's knowledge base, however, working abroad allows managers to access more advanced specialized skills and superior management practice, which provides them more substantial exposure in foreign countries. Thus, we hold the view that increased precision of analysts' earnings forecasts benefits the most from CFOs' foreign work experience instead of their educational degrees.

Table 8
Heterogeneity analysis: types of foreign experience.

	Dependent variable: *FERROR*			
	Model 1	Model 2	Model 3	Model 4
Foreign work exp	−0.133*		−0.134*	−0.135*
	(0.071)		(0.071)	(0.071)
Foreign study exp		−0.033	−0.037	
		(0.086)	(0.086)	
Foreign bachelor/ master/trading program				−0.096
				(0.066)
Foreign doctoral/visiting scholars/postdoctoral				0.103
				(0.294)
CFO Gender	−0.004	−0.003	−0.004	−0.003
	(0.026)	(0.026)	(0.026)	(0.026)
CFO Age	−0.000	−0.000	−0.000	−0.000
	(0.002)	(0.002)	(0.002)	(0.002)
CFO Degree	−0.017	−0.018	−0.017	−0.016
	(0.012)	(0.013)	(0.013)	(0.013)
Executives Tenure	−0.015***	−0.015***	−0.015***	−0.015***
	(0.005)	(0.005)	(0.005)	(0.005)
Size	0.004	0.004	0.004	0.004
	(0.014)	(0.014)	(0.014)	(0.014)
Volatility	−0.000	−0.000	0.000	0.001
	(0.063)	(0.063)	(0.063)	(0.063)
Institutional ownership	−0.007***	−0.007***	−0.007***	−0.007***
	(0.002)	(0.002)	(0.002)	(0.002)
Largest	−0.005***	−0.005***	−0.005***	−0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
FirmAge	0.039*	0.039*	0.039*	0.039*
	(0.023)	(0.023)	(0.023)	(0.023)
Loss	0.985***	0.985***	0.985***	0.985***
	(0.074)	(0.074)	(0.074)	(0.074)
Intangible	−0.188	−0.182	−0.188	−0.184
	(0.240)	(0.240)	(0.240)	(0.240)
Horizon	0.977***	0.976***	0.977***	0.976***
	(0.059)	(0.059)	(0.059)	(0.059)
Analyst following	−0.182***	−0.183***	−0.182***	−0.182***
	(0.018)	(0.018)	(0.018)	(0.018)
Intercept	−3.435***	−3.432***	−3.437***	−3.437***
	(0.431)	(0.432)	(0.431)	(0.432)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	10,301	10,301	10,301	10,301
Adj.R^2	0.134	0.134	0.134	0.134

This table presents the heterogeneity results of CFOs' foreign work experience and foreign study experience on analysts' forecast accuracy. *Foreign work* exp (*Foreign study* exp) is a dummy variable that, if the firm's CFO only has foreign work (studying) experience equals one, otherwise zero. All variables are defined in Appendix A. The robust standard errors are shown in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

5.3. Robustness test

The effect of CFOs with foreign experience on analysts' forecast accuracy may be driven by improved analyst forecasting skills over time.[4] To mitigate the potential effect of analysts' forecasting ability, we construct an analyst-level sample and try to control the personal forecasting ability by using different model specifications.

First, we control for the analysts' characteristics such as whether the analyst is a star analyst or not (*Star Analyst*), the number of quarters since the first forecast made by the analyst (*Analyst Experience*), the number of firms covered by the analyst (*Follow CoNumber*), the number of research reports released by the analyst (*Forecast Number*), the gender of the analyst (*Analyst Gender*) and the education levels of the analyst (*Analyst Degree*). The detailed variable definitions can be found in Appendix A. In Column (1) of Table 9, we find that the coefficient on *Foreign* exp is still significantly negative after controlling for the analyst characteristics variables that may reflect her/his forecasting ability.

In Column (2) of Table 9, we further control for the analyst fixed effects to mitigate the influence of unobservable factors, and the coefficient on *Foreign exp* is still significantly negative.

Finally, we only keep the samples for each analyst to release forecasts for firms with and without CFOs with foreign experience. For example, for firm X and Y, firm X has a CFO with foreign experience, and firm Y doesn't have a CFO with foreign experience. Then, we require that the analyst ABC should release forecast for both firm X and Y in the given year. We also control the analyst characteristic variables and analyst fixed effects. Thus, the coefficient on *Foreign exp* may reflect the difference of analyst forecast accuracy for the same analyst but release forecast for firms with and without CFOs with foreign experience. The results in Column (3) of Table 9 show that the coefficient on *Foreign exp* is still significantly negative.

Overall, based on the results under different model specifications, we think that our results are robust after considering the potential effect of improved analyst forecasting skills over time.

We also conduct a battery of additional tests to ensure the robustness of our findings.[5] First, to ensure that the effect we document is only produced by the CFOs' foreign experience rather than by other senior managers, we manually collect the information of other C-suites' foreign experience, including Chairman, CEO, COO, and CTO. The results in Column (1) of Table 10 show that, after controlling other C-suite's foreign experience, the coefficient on *Foreign exp* is still negative and significant.

Second, consider that corporate internal governance can also influence analysts' forecast accuracy, we further include several additional control variables: CEO and chairman duality (*Duality*), independent director ratio (*Independent director*), location consistency between independent directors and company (*Same Location*). We also construct the variable *SYNCH* following Morck, Yeung, and Yu (2000), Jin and Myers (2006), and Dang, Dang, Hoang, Nguyen, and Phan (2020). A higher value of *SYNCH* indicates higher stock price synchronicity and a lower information environment. The results in Column (2) of Table 10 show that, after controlling the corporate governance and information

[3] Thanks for reviewer's suggestion.

[4] Thanks for reviewer's suggestion.

[5] Thanks for reviewer's suggestion.

Table 9
Robustness tests: Analyst-level evidence.

	Dependent variable: *FERROR*		
	Model 1	Model 2	Model 3
Foreign exp	−0.051***	−0.061***	−0.077***
	(0.014)	(0.015)	(0.015)
Star Analyst	0.006	0.000	0.020
	(0.011)	(0.018)	(0.018)
Analyst Experience	−0.000	0.012*	0.000
	(0.000)	(0.007)	(0.001)
Follow CoNumber	−0.001**	−0.001*	−0.001**
	(0.000)	(0.001)	(0.001)
Forecast Number	0.000*	0.001*	0.000
	(0.000)	(0.000)	(0.000)
Analyst Gender	0.017*		
	(0.009)		
Analyst Degree	−0.008		
	(0.009)		
CFO Gender	0.006	0.001	−0.016
	(0.009)	(0.009)	(0.012)
CFO Age	−0.001	−0.001	−0.001
	(0.001)	(0.001)	(0.001)
CFO Degree	−0.004	−0.004	0.005
	(0.004)	(0.004)	(0.005)
Executives Tenure	−0.012***	−0.012***	−0.012***
	(0.002)	(0.002)	(0.002)
Size	0.018***	0.017***	0.020***
	(0.004)	(0.005)	(0.006)
Volatility	0.027	0.015	0.009
	(0.021)	(0.022)	(0.030)
Institutional ownership	−0.008***	−0.007***	−0.008***
	(0.000)	(0.001)	(0.001)
Largest	−0.004***	−0.004***	−0.004***
	(0.000)	(0.000)	(0.000)
FirmAge	0.025***	0.024***	0.013
	(0.007)	(0.008)	(0.010)
LOSS	1.342***	1.302***	1.357***
	(0.048)	(0.049)	(0.063)
Intangible	−0.002	−0.043	−0.091
	(0.093)	(0.094)	(0.115)
Horizon	0.546***	0.552***	0.541***
	(0.012)	(0.013)	(0.018)
Analyst following	−0.199***	−0.203***	−0.204***
	(0.008)	(0.009)	(0.011)
Intercept	−1.356***	−1.342***	−1.319***
	(0.127)	(0.148)	(0.180)
Year FE	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Analyst FE	No	Yes	Yes
Observations	65,658	65,428	37,065
Adj.R^2	0.141	0.184	0.164

This table presents the results of the effect of CFOs with foreign experience on analysts' forecast accuracy by using the analyst-level sample. Column (1) control for analysts' characteristics variables. Column (2) further control for the analyst fixed effects. Column (3) require that the analysts should release forecast for both firms with and without CFOs with foreign experience, and also control for analysts' characteristics and analyst fixed effects. All variables are defined in Appendix A. The robust standard errors are shown in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

asymmetry variables, the coefficient on *Foreign exp* is still negative and significant.

Third, to control for the momentum effect on analysts' forecast accuracy, following Low and Tan (2016), we construct the variable *52-week high price*, calculated as the ratio of current stock price to the 52-week-high price. We also calculate the *Recency Ratio* as one minus the number of weeks since 52-week-high prices divided by 52. A higher value of *52-week high price* and *Recency Ratio* implies higher momentum. The results in Column (3) of Table 10 show that, after controlling the momentum control variables, the coefficient on *Foreign exp* is still negative and significant.

Fourth, following Giannetti et al. (2015), we exclude the samples that CFOs worked for a foreign branch of a Chinese company, and re-estimate Eq. (2). The results in Column (4) of Table 10 show that the coefficient on *Foreign exp* is still negative and significant,

Table 10
Robustness tests.

	Model 1	Model 2	Model 3	Model 4	Model 5
Foreign exp	−0.126**	−0.111**	−0.099**	−0.138***	−0.170*
	(0.050)	(0.049)	(0.048)	(0.044)	(0.102)
Oversea Chairman	0.034				
	(0.050)				
Oversea CEO	−0.090				
	(0.215)				
Oversea COO	0.026				
	(0.048)				
Oversea CTO	0.483				
	(0.306)				
Duality		0.027			
		(0.028)			
Independent director		0.102			
		(0.207)			
Same Location		−0.011			
		(0.024)			
SYNCH		−0.135***			
		(0.020)			
52-week high price			−1.155***		
			(0.092)		
Recency Ratio			0.982***		
			(0.320)		
Control variables	Yes	Yes	Yes	Yes	Yes
Intercept	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Firm FE	No	No	No	No	Yes
Observations	10,301	10,186	10,042	10,254	10,188
Adj.R^2	0.135	0.141	0.150	0.135	0.087

This table presents the results of the effect of CFOs with foreign experience on analysts' forecast accuracy with a battery of robustness tests. Column (1) adds other C-suites' foreign experience characteristics in baseline regression. Column (2) includes several corporate internal governance and information environment control variables. Column (3) control for the momentum effect on analysts' forecast accuracy. Column (4) exclude the samples that CFOs worked for a foreign branch of a Chinese compay. Column (5) re-estimates the baseline regression using the firm fixed effects model. All variables are defined in Appendix A. The robust standard errors are shown in parentheses. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

Finally, to further mitigate potential problems that may arise from omitting time-invariant firm-specific characteristics, we re-estimate the baseline regression using the firm fixed effects model. In Column (5) of Table 10, we find a robust negative association between returnee CFOs and analysts' forecast errors, thereby consistently supporting our early findings.[6]

6. Conclusion

This study investigates the role of CFOs with foreign experience on analysts' forecast accuracy in the context of China. In line with theoretical predictions, we find that CFOs' foreign experience is negatively

[6] It is possible that the effect of CFOs with foreign experience on analysts' forecast accuracy is taking place in centain industries like techonology where there may be a substantial amount of foreign graduates within the organization that cultivates a stronger culture of corporate governance. We have tried to split our sample into sub-samples based on the industry characteristics, such as high-tech industry vs. non-high-tech industry, high capital-labor ratio industry vs. low capital-labor ratio industry, and high employee education level industry vs. low employee education level industry. However, we do not find any evidence that the effect of CFOs with foreign experience on analysts' forecast accuracy is stronger in high-tech industry, high capital-labor ratio industry, or high employee eudction level industry. Thanks for reviewer's suggestion.

associated with analysts' earnings forecast errors and the magnitude is significant both statistically and economically, suggesting that foreign experience earned from developed countries can contribute to the human capital of CFOs, which echoes the findings of Giannetti et al. (2015). Our results hold after addressing potential endogeneity by introducing the propensity score matched (PSM) procedure and Heckman two-stage method. Two plausible mechanisms are decreased earnings management and a greater probability of hiring high-quality auditors, demonstrating that improved information environment brought by returnee CFOs mainly drives our results. Finally, our results reveal a significant cross-sectional variation of the relation. In particular, compared to firms with more external pressure, the analysts' forecast performance promotion effect is larger among firms with fewer analysts coverage and belonging to less competitive industries. Returnee CFOs with foreign work experience exert a more significant impact on analysts' forecast accuracy than those with foreign study experience.

By documenting the positive impact of CFOs' foreign experience on analysts' forecast accuracy, we contribute to the literature by providing additional empirical evidence on the brain gain effect of returnee CFOs and highlighting the role of CFOs' foreign experience as an important factor driving firms' transparency and analysts forecast performance. More importantly, we expect our study helps to draw broader conclusions from the experience of China for the positive impacts of labor backflows on capital market efficiency. Given the common facts of talent shortage in emerging markets, our study is also supportive of governments and firms' strategies to establish favorable policies and make great efforts to attract high-quality overseas talents vigorously.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Variable definitions

Variables	Definitions
FERROR	Analyst forecast error, measured as the absolute difference between an analyst's forecast and the actual earnings per share (EPS) divided by the absolute value of the actual EPS. For each analyst, retaining only the most recent forecast before the earnings announcement in the given year. Then we calculate it as an average of earnings forecast errors among all analysts following a particular firm to aggregate the firm-level forecast error. High values of *FERROR* indicate less analyst forecast accuracy.
Foreign exp	CFO's foreign experience. Dummy variable equals one if a firm has CFO with foreign experience, otherwise equals zero.
Foreign work exp	CFO's foreign working experience. Dummy variable equals one if a firm has CFO only with foreign working experience, otherwise equals zero.
Foreign study exp	CFO's foreign studying experience. Dummy variable equals one if a firm has CFO only with foreign studying experience, otherwise equals zero.
Foreign bachelor/master/trading program	CFO's foreign studying experience. Dummy variable equals one if a firm has CFO only with foreign studying experience for being in a bachelor, or master, or training program, otherwise equals zero.
Foreign doctoral/visiting scholars/ postdoctoral	CFO's foreign studying experience. Dummy variable equals one if a firm has CFO only with foreign studying experience for having a doctoral, or visiting scholars, or post doctoral experience, otherwise equals zero.
Oversea Chairman	Chairman's foreign experience. Dummy variable equals one if a firm has Chairman with foreign experience, otherwise equals zero.
Oversea CEO	CEO's foreign experience. Dummy variable equals one if a firm has CEO with foreign experience, otherwise equals zero.
Oversea COO	COO's foreign experience. Dummy variable equals one if a firm has COO with foreign experience, otherwise equals zero.
Oversea CTO	CTO's foreign experience. Dummy variable equals one if a firm has CTO with foreign experience, otherwise equals zero.
CFO Gender	Dummy variable equals one if CFO gender is male, otherwise equals zero.
CFO Age	CFO age.
CFO Degree	CFO educational levels, 1 = high school and below; 2 = junior college; 3 = bachelor; 4 = master; 5 = doctor.
Executives Tenure	The average tenure of company executives.
Size	Natural logarithm of a company's total assets.
Volatility	The standard deviation of the ratio of operating income to total assets for the last 3 years.
Institutional ownership (%)	The number of shares held by institutional investors divided by the total number of shares.
Largest (%)	Shareholding percentage of the largest shareholder.
FirmAge	Listing age of a firm, measured as the natural logarithm of one plus the difference between the current year and the listing year.
Loss	Dummy variable equals one if the firm's net profit is negative, otherwise equals zero.
Intangible	The proportion of intangible assets to total assets.
Horizon	The natural logarithm of the average number of days between the most recent forecast and the actual earnings announcement date for all analysts following the firm.
Analyst following	The natural logarithm of the total number of analysts following the firm.
|DA|	The absolute value of a company's abnormal accruals in a given year, using a modified Jones model (Dechow et al., 1995).
REM	Real earnings management.
Big4	Dummy variable equals one if the firm is audited by an international Big 4 auditing firm, otherwise equals zero.
Big10	Dummy variable equals one if the firm is audited by a top10 auditing firm according to the total size of the firms they audited in the given year, otherwise equals zero.
HHI	Industry herfindahl-hirschman index based on sales, calculated as the sum of the squares of the market shares of all firms in the industry.
Duality	Dummy variable equals one if the CEO and chairman are the same person, otherwise equals zero.
Same Location	Dummy variable equals one if the locations of independent directors and company are the same, otherwise equals zero.
Independent director	The proportion of the number of independent directors on the board to the total number of directors on the board.
SYNCH	Calculated as Dang et al. (2020).
52-week high price	Calculated as the ratio of current stock price to the 52-week-high price following Low and Tan (2016).
Recency Ratio	Calculated as one minus the number of weeks since 52-week-high prices divided by 52 following Low and Tan (2016).

(*continued on next page*)

(*continued*)

Variables	Definitions
Star Analyst	Dummy variable equals to one if the analyst is a star analyst in given year, otherwise equals zero.
Analyst Experience	The number of quarters since the first forecast made by the analyst.
Follow CoNumber	The number of firms covered by the analyst.
Forecast Number	The number of research reports released by the analyst.
Analyst Gender	Dummy variable equals one if Analyst gender is male, otherwise equals zero.
Analyst Degree	Analyst educational levels, 1 = high school and below; 2 = junior college; 3 = bachelor; 4 = master; 5 = doctor.

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