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Article

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Ownership balance, supervisory efficiency of independent directors and the quality of management earnings forecasts

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ABSTRACT

In the Chinese securities market, with its characteristics of influence through personal relationships (*Guanxi*) and underdeveloped standards of law and enforcement, can independent directors play the supervisory role expected by securities regulators? In this study we use the degree of precision and accuracy in corporate earnings forecasts as proxies for the quality of information disclosure by listed companies and examine the supervisory efficiency of independent directors with respect to information disclosure. Using data from 2007 to 2009, we find that in the absence of ownership balance, independent directors have a significant positive effect on the accuracy of management forecasts. In addition, the personal backgrounds of independent directors have specific effects on management earnings forecasts. Directors with certified public accountant (CPA) expertise significantly improve the precision of management forecasts. However, directors with industrial expertise significantly reduce the precision of management forecasts. In other words, having directors with CPA expertise improves the independence of boards, but having independent directors with industrial expertise has the opposite effect.

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1. Introduction

The absence of ownership balance and the popularity of a single large shareholder are the most commonly mentioned causes of malpractice in Chinese share markets. Therefore, investors have for many years been calling for boards of directors with greater independence. In 2002, the Chinese Securities Regulatory Commission (CSRC) moved to improve the corporate governance structures of Chinese listed companies by issuing *The Guiding Opinions on the Establishment of Systems of Independent Directors* (hereafter referred to as the *Guiding Opinions*). Thereafter, the efficiency of independent directors became one of the most widely studied fields in the Chinese capital market. There are many extant studies on the relationship between independent directors and firm performance, which generally agree that supervision is the most important responsibility of independent directors (Ye et al., 2007; Wang, 2007a; Zhao et al., 2008). Recently, Wang et al. (2008) argue that the improvement in listed companies' levels of disclosure and transparency serves both to curb the dominance of large shareholders and to provide a basis for the appraisal of independent directors' supervisory efficiency.

In testing this theory, the main question that previous studies confront is how to measure the level of information disclosure in listed companies. The easiest and most accepted way is to use the rating scores given by independent institutions.¹ In China, however, only companies listed on the Shenzhen Securities Exchange (hereafter referred to as the SZE) are rated annually and those on the Shanghai Securities Exchange are not. The sample of rated companies is therefore limited, which raises difficulties for using rating scores as a proxy for the level of information disclosure. Because of this difficulty, previous studies have usually used variables such as earnings quality to proxy for the level of information disclosure. The measurement of earnings quality requires the use of statistical models and the derived variables may not be significantly related to the quality of information disclosure. For example, among the three variables used by Hu and Tang (2008), only the degree of earnings aggressiveness is significantly related to the rating scores given by the SZE and the degree of earnings management or earnings smoothness are not.

Another way to measure the level of information disclosure is to study the quality of one specific aspect of corporate reporting. The assumption here is that a measure of disclosure quality produced by examining any one aspect of corporate reporting could proxy for the general level of disclosure provided by a firm (Botosan, 1997). This assumption was tested and confirmed by Lang and Lundholm (1996), who document a significant rank-order correlation between annual report and other publication disclosure rankings, compared with the correlation between annual report and investor relations disclosure rankings. Building on this approach, Botosan (1997) used the degree of voluntary information disclosure found in a firm's annual report alone to serve as a proxy for the degree of disclosure provided by a firm across all avenues and created a transparency scoring system called the *DScore*. Li (2008) scored companies based on the readability of annual reports. Other studies (Graham et al., 2005; Wang, 2007b) have used the attributes of management earnings forecasts to proxy for the general level of disclosure. For Chinese listed companies, Bai (2009) find that the precision and the accuracy of management forecasts are significantly related to the transparency rating scores given by the SZE. In line with this approach, we choose the precision and accuracy of management forecasts to proxy for the general level of disclosure and use this measure to study the supervisory efficiency of independent directors.

We choose the quality of management forecasts to proxy for the general level of corporate disclosure for three reasons. First, management forecasting is an important aspect of corporate disclosure that has a significant influence on investors and financial analysts (Bai, 2009; Healy and Palepu, 2001). Numerous studies have used the quality of management forecasts to proxy for the level of information disclosure, such as Graham et al. (2005) and Wang (2007b).² Second, there is considerable scope for manipulation in management forecasting. Studies on voluntary management forecasts have found that management can manipulate the timing, precision and accuracy of management forecasts (Karamanou and Vafeas, 2005; Rogers and Stocken, 2005).

¹ For example, studies on American firms (Sengupta, 1998; Lang and Lundholm, 1996, etc.) usually use the rating scores provided by FAF (the Report of the Financial Analysts Federation Corporate Information Committee) and its successor AIMR (The Association for Investment Management and Research, which changed its name to The CFA Institute in 2004).

² Beyer et al. (2010) find that for the average firm, 28.37% of the variance in quarterly stock returns occurred on days when accounting disclosures (including earnings announcements, earnings pre-announcements, management forecasts, analyst forecasts or other SEC-form filings) are made. Surprisingly, management forecasts provided, on average, approximately 55% of accounting-based information (pp. 299–300).

In Chinese share markets, most management forecasts are mandatory and securities regulators specify the timing of disclosures. However, there are no specifications concerning the precision and accuracy of management forecasts and this deficiency provides management with many opportunities to manipulate forecasts.³ This variability in forecasting standards provides us with a good opportunity to examine the supervisory efficiency of independent directors.⁴ Third, it is very easy to measure the quality of management forecasts in hindsight, without the use of sophisticated statistical models.

Our study makes two main contributions. First, we use an easily measureable proxy for the general level of corporate disclosure to examine the supervisory efficiency of independent directors in companies with varied ownership structures. The results are complementary to those found by previous studies, such as Wang et al. (2008), and also provide insights into the influence that independent directors have on improving transparency. Second, we examine the factors influencing mandatory management forecasts and compare them with factors influencing voluntary management forecasts. This comparison provides relatively solid support for the improvement of regulations on management forecasts in China.

The remainder of this paper is organized as follows. Section 2 discusses the institutional background and reviews the related literature. Section 3 develops our research hypothesis and provides variable definitions. Section 4 reports the empirical results and Section 5 concludes the study.

2. Institutional background and literature review

2.1. Institutional background

Requirements for management forecasts by companies listed on the Chinese stock markets began in 1998. Song and Ji (2012) provide a detailed description of the related institutional background, explaining that listed companies have to make management forecasts if their annual earnings are expected to exceed a certain threshold (henceforth, “the threshold”). This requirement makes management forecasts mandatory rather than voluntary when the expected earnings exceed the threshold—a unique characteristic not found in more developed capital markets. Bai (2009) finds that the information disclosure ratings given by the Shenzhen Securities Exchange have a significant positive relationship with the precision and accuracy of contemporary annual management forecasts.⁵ Therefore, Bai concludes that the quality of management forecasting is a good proxy for the overall quality of information disclosure by listed firms.

Management forecasts provide significant corporate information content. For example, Luo and Song (2012) find that there are significant market reactions to management forecasts. Bai (2007) and Xue (2001) arrive at similar conclusions. In summary, there are significant positive (or negative) abnormal market returns from management forecasts announcing good (or bad) news.

Listed companies who have made wrong or misleading management forecasts are likely to be publicly criticized by securities regulators. However, Song and Ji (2012) find that the application of penalties is selective in that most punishments for fraudulent forecasts go to firms with poor economic performance. Luo and Song (2012) find that, other things being equal, firms that have made inaccurate management forecasts in prior years receive a lower market reaction to their current forecasts. These researchers conclude that wrong or mis-

³ According to the listing rules, “Listed companies should ensure that there is no material difference between the financial data reported in earnings pre-announcements and the actual data reported in periodic reports. If the difference is more than 20 percent, the listing firm should apologize in the form of a board note when disclosing the corresponding periodic report. In the meantime, the board must explain the reason for the difference and the responsibilities of internal personnel”. However, earnings pre-announcements are different from management forecasts.

⁴ In some cases owner managers might fail to communicate their forecasts to independent directors before disclosing them to the public. However, independent directors can still affect the quality of management forecasts in two ways. First, about 50% of annual management forecasts are announced in third-quarter reports, which must be confirmed by independent directors. Second, as Ajinkya et al. (2005) argue, independent directors might not directly influence management forecasts disclosed apart from periodic reports, but these directors can still indirectly influence management forecasts by fostering an environment that encourages greater transparency.

⁵ We conduct a similar correlation analysis for the 2002–2009 period. The results indicate that the Pearson (Spearman) correlation coefficient between the information disclosure ratings and the precision of management forecasts is 0.1508 (0.1251) and the corresponding correlation between the information disclosure ratings and management forecast error is -0.1788 (-0.1484), all significant at the level of 1%.

leading management forecasts do harm to the reputation of listed companies and thereby reduce the credibility of subsequent forecasts, as also concluded by Williams (1996).

2.2. Literature review

2.2.1. Precision and accuracy of management forecasts

Management forecasts take four forms: general impressions, open-interval estimates, closed-interval estimates and point estimates. General impression forecasts are the least precise and point estimate forecasts the most precise. Theoretical analysis (Kim and Verrecchia, 1991, for example) and psychological studies (Rapoport et al., 1990, for example) both indicate that the precision of information directly influences the receiver's acceptance of the signal's information content. Usually, higher precision information indicates that the sender has greater certainty concerning the signal and the receiver responds by giving greater weight to the signal. Concerning the precision of management forecasts, Baginski et al. (1993) find that price reactions to management forecasts are influenced by the precision of management forecasts. Specifically, the price reactions to point estimates are larger than reactions to range estimates. Although Pownall et al. (1993) find no relationship between price reactions and management forecast precision, the experimental results of Hirst et al. (1999) provide one explanation for this exception to the rule. These researchers find that only when the accuracy of prior management forecasts has been high can investors seriously consider the precision of current management forecasts. If prior management forecasts have been inaccurate, the current management forecast (however accurate it is) has no effect on investors' judgments.

Inaccurate management forecasts can not only mislead market participants (Bai, 2009; Hassell and Jennings, 1986), but also harm the forecaster's reputation for accurate disclosure (Luo and Song, 2012). In extreme situations, inaccurate management forecasts might incur litigation (Skinner, 1994) or enforcement actions (Song and Ji, 2012). Hirst et al. (1999), Hutton and Stocken (2007) and Luo and Song (2012) all find that the accuracy of prior management forecasts directly affects investors' belief in the credibility of current forecasts. Bai (2009) finds that analyst forecasts are directly affected by the precision and accuracy of contemporary management forecasts. Williams (1996) and Song (2012) both find that analyst forecast revisions are affected not only by the deviation between management forecasts and analyst forecasts, but also by the accuracy of prior management forecasts.

2.2.2. Independence of boards and the quality of information disclosure

The quality of information disclosure is an attribute that is hard to measure. Therefore, studies on Chinese capital markets use various other proxies to examine the supervisory efficiency of independent directors and these studies have mixed results. Hu and Tang (2008) use the quality of earnings to proxy for the quality of information disclosure.⁶ They find that independent directors significantly improve the quality of information disclosure, with the measure of earnings management an exception to this pattern. Yang and Yang (2006) use the frequency of restatements as a proxy for the quality of disclosure. They find that a board's percentage of independent directors has no significant influence on the likelihood of restatements. Wang (2007a) also finds no significant relationship between the quality of disclosure (measured by the extent of earnings management) and the percentage of independent directors on the board. Zhi and Tong (2005) find that the frequency and percentage of changes in independent directors is positively related to the extent of earnings management. These authors argue that independent directors have expertise, but are not sufficiently independent, and this is the key reason why independent directors have not played effective roles in corporate governance. This argument was confirmed by the results of Zhao et al. (2008), who employ the degree of accounting conservatism to proxy for the quality of disclosure. These researchers find that independent directors have a significant positive influence on accounting conservatism and that this influence is stronger for firms with better corporate governance. However, Wang et al. (2008) find that even in companies with lower ownership balance (and therefore worse corporate governance), the supervisory efficiency of independent directors was significant, which is

⁶ Hu and Tang (2008) employ four variables to measure the quality of earnings. These variables are the extent of earnings management, the information disclosure ratings given by the Shenzhen Securities Exchange, the degree of earnings aggressiveness and the degree of earnings smoothness.

in contrast with the results of Zhao et al. (2008). These inconsistencies may arise from the variable measurements and designs of these studies.⁷ However, the models used in both the Wang et al. (2008) and Zhao et al. (2008) studies are derived from the famous Basu model and their sample periods are both from 2002 to 2004.

Studies on developed markets have also used the degree of earnings management (for example, Klein, 2002; Davidson et al., 2005; Peasnell et al., 2005) or the degree of accounting conservatism (for example, Beekes et al., 2004; Ahmed and Duellman, 2007) to examine independent directors' influence on the quality of information disclosure. These studies have arrived at relatively consistent conclusions that independent directors significantly increase the degree of accounting conservatism and decrease the degree of earnings management. At the same time, studies on developed markets have directly examined the relationship between the independence of boards and the quality of management forecasts. The results of these studies have been mixed. For example, Karamanou and Vafeas (2005) find that the precision of management forecasts is higher for firms with a higher percentage of independent directors, but Ajinkya et al. (2005) find no significant influence.⁸ Ajinkya et al. (2005) find that the optimistic bias is smaller for firms with a higher percentage of independent directors, but Karamanou and Vafeas (2005) find no significant influence. Of course there are also some consistent results. For example, both Karamanou and Vafeas (2005) and Ajinkya et al. (2005) find that the accuracy of management forecasts is positively related to the percentage of independent directors.

2.2.3. Independent directors' expertise and the quality of information disclosure

Xie et al. (2003) use current abnormal accruals to measure the quality of information disclosure and examine the relationship between independent directors' expertise and the quality of disclosure. These authors find that independent directors with financial expertise or legal expertise have no significant effect on current abnormal accruals, but directors with corporate governance expertise can significantly decrease the level of current abnormal accruals. This finding is consistent with the results of Bedard et al. (2004). However, Abbott et al. (2004) find that having at least one financial expert on the audit committee significantly decreases the probability of financial restatements. Wang et al. (2008) also argue that independent directors with financial backgrounds can help to detect fraudulent reports and improve the credibility of financial reports. These authors also point out that independent directors with legal backgrounds can help control management irregularities and decrease litigation risks with regard to information disclosure. Wang et al. (2008) also suggest that independent directors may exert greater supervisory effort to ensure the firm maintains a good reputation.

2.2.4. Other factors influencing the precision and accuracy of management forecasts

Studies on factors influencing the precision of management forecasts are less numerous than those on the accuracy of management forecasts. Baginski and Hassell (1997) find that the precision of management forecasts is positively related to analyst following and negatively related to both firm size and earnings volatility. Baginski et al. (2002) find that the precision of management forecasts issued by Canadian firms is higher than that of their counterparts in the USA because the litigation risks in Canada are lower than in the USA. Baginski and Hassell (1997) and Karamanou and Vafeas (2005) both find that the precision in reporting bad news is significantly lower than in reporting good news, because managers wish to avoid dampening the market. Hribar and Yang (2006) find that over-confident managers are more likely to make management forecasts of higher precision.

There is a wealth of studies on the accuracy of management forecasts. The factors examined in these studies include corporate governance structures, firm size, earnings volatility, timing of disclosure, and other factors. Karamanou and Vafeas (2005) find that the size of boards has no significant influence on the accuracy of management forecasts, but larger board size does decrease the likelihood of optimistically biased forecasts. Johnson et al. (2001) find a significant negative relationship between firm size and the accuracy of management forecasts, but Ajinkya et al. (2005) and Hribar and Yang (2006) find no such significant relationship. Waymire

⁷ Wang et al. (2008) use a pooled sample with 3046 firm-year observations and employ the ratio of the shares held by the single largest shareholder to the sum of shares held by the second to fifth largest shareholders as a proxy for the degree of ownership balance. Zhao et al. (2008) use a panel sample with 2979 firm-year observations to obtain an index of corporate governance through factor analysis.

⁸ Ajinkya et al. (2005) attribute this result to the directors' fear of greater litigation exposure that might result from more specific forecasts.

(1986) reports no significant relationship between earnings volatility and the accuracy of management forecasts, but Ajinkya et al. (2005) find a significant negative relationship. Johnson et al. (2001), Ajinkya et al. (2005) and Karamanou and Vafeas (2005) all find that the time gap between the forecast day and the fiscal year end is negatively related to the accuracy of management forecasts.⁹

3. Research hypothesis and variable definitions

3.1. Research hypothesis

Studies on voluntary management forecasts usually assume that if managers seek to maximize company value for shareholders, they should make management forecasts more frequently, more precisely and more accurately (Skinner, 1994; Kasznik and Lev, 1995; Williams, 1996). However, managers can also manipulate management forecasts for their own interests. Independent directors from outside the company can mitigate managerial self-interest and influence the issuance and content quality of earnings forecasts by directly reviewing the disclosure policies and earnings releases, as well as by fostering an environment that encourages greater transparency. However, outside directors may also be ineffective, either because they are appointed by, or have allegiance to company managers, or because their board culture discourages conflict. The effectiveness of outside directors and the extent to which they represent shareholder interests could also be influenced by the fear of litigation and reputation costs (Ajinkya et al., 2005, pp. 348–349).

Although the results of studies on independent directors' supervisory roles are mixed, securities regulators expect that independent directors play important supervisory roles and improve the general level of corporate disclosure. Thus our research hypothesis is as follows.

H1: The percentage of independent directors is positively related to the quality of management forecasts.

The corporate governance environment should influence the supervisory roles of independent directors. On one hand, a good corporate governance environment will probably strengthen the supervisory efficiency of independent directors (Zhao et al., 2008). On the other hand, a bad corporate governance environment will probably induce a lower quality of corporate disclosure (Wang et al., 2008), thereby causing a higher risk of fraudulent behavior. In a poor governance environment, independent directors might also try to reduce their own personal risk. Therefore, our two sub-hypotheses are as follows.

H1a: In the case of lower company ownership balance, the percentage of independent directors is positively related to the quality of management forecasts.

H1b: In the case of higher company ownership balance, the percentage of independent directors is positively related to the quality of management forecasts.

For this analysis we categorize ownership balance by using a z-score, which is equal to the shares held by the largest shareholder divided by the sum of shares held by the second- to fifth-largest shareholders. If the z-score is no higher than the industry median of the same year, we allocate it to the higher ownership balance group. Otherwise, we allocate it to the lower ownership balance group.

3.2. Variable definitions

Table 1 provides the definitions of variables used in our analysis. The dependent variables include *PRECISION*, *BIAS* and *FE*.

⁹ In most of the world, voluntary management forecasts usually occur before the end of the fiscal year, but this is not necessarily true in China. Chinese listed companies' management forecasts can occur either in October, which is before the end of fiscal year, or in January, which is within one month after the end of the fiscal year. If we choose only observations occurring before the end of fiscal year, the sample size would be dramatically smaller.

For *PRECISION*, we classify the types of management forecasts into four categories according to their degree of precision. These are forecasts based on (i) general impression estimates, (ii) open-interval estimates, (iii) closed-interval estimates and (iv) point estimates. As the first type of estimate is the least precise and the last type the most precise, we assign general impression estimates a value of 0, open-interval estimates a value of 1, closed-interval estimates a value of 2 and point estimates a value of 3, so that the variable *PRECISION* has a value between 0 and 3. *BIAS* is used to examine whether independent directors can systematically decrease optimistic bias in management forecasts and *FE* measures the accuracy of management forecasts. The calculations of accuracy of forecasts of net income are based on the type of forecast used in each observation, with the number of points used in point estimates, the mean in closed-interval estimates and the lower end in open-interval estimates.

The independent variables include the independence of the board (*OUT*) and proxies for independent directors' characteristics, such as their financial expertise (*CPA*), legal expertise (*LAW*), industrial expertise (*HY_EXP*), expertise in corporate governance (*GOV_EXP*), their reputation as reflected in membership of other boards (*REPUT*) and their compensation (*COMPEN*).

The *Guiding Opinions* specify that "at least one of the independent directors should be a professional accountant (the term 'professional accountant' meaning a person with a senior title or qualifications as a certified public accountant)". According to this specification, every listed company should have at least one professional accountant as an independent director. Therefore, having at least one professional accountant is an almost homogeneous condition across all listed companies. However, having a certified public accountant (*CPA*) on the board is more exceptional and we have tried to detect if such accounting expertise has a measurable effect on the accuracy of management forecasts (Wang et al., 2008).

Concerning other types of director expertise, the *Guiding Opinions* allow listed companies greater choice in selecting independent directors with relevant professional backgrounds. Therefore, the number of independent directors with legal backgrounds, industrial expertise or expertise in corporate governance vary across companies. This variation provides us with opportunities to examine the effects of independent directors with these different kinds of expertise on their companies' management styles.

Concerning professional reputation, we could expect that independent directors who stand on a greater number of company boards should have higher supervisory efficiency. However, in terms of efficient working time, the more boards that an independent director serves on, the less time that director can allocate to each

Table 1
Variable definitions.

Variable	Definition
<i>BIAS</i>	Forecast net income – actual net income/total assets, winsorized at 1st and 99th percentiles by year
<i>COMPEN</i>	Equals one if the mean compensation of independent directors is higher than the median of the industry and zero otherwise
<i>CPA</i>	Equals one if the company has at least one independent director with a CPA background and zero otherwise
<i>EV</i>	Equals the standard deviation of net income in the past 3 years divided by their absolute mean, winsorized at 95th percentile by year
<i>FE</i>	Equals $ BIAS $
<i>GOV_EXP</i>	Equals one if the company has at least one independent director who is also a manager of other companies and zero otherwise
<i>HY_EXP</i>	Equals one if the company has at least one independent director with an industrial background and zero otherwise
<i>IND</i>	Industry dummies
<i>LAW</i>	Equals one if the company has at least one independent director with a legal background and zero otherwise
<i>MONTH</i>	Equals one if the company's forecasts are made before the end of fiscal year, two if the forecasts are made within one month after the end of fiscal year and three if the forecasts are made between February and April
<i>OUT</i>	The percentage of independent directors on the board
<i>PRECISION</i>	Rated on a scale of zero to three, with zero for general impression estimates, one for open-interval estimates, two for closed-interval estimates and three for point estimates
<i>REPUT</i>	The mean number of companies in which the independent directors serve as board members
<i>ROA</i>	Equals net income of current year/total assets, winsorized at 1st and 99th percentiles by year
<i>SIZE</i>	Natural log of total assets
<i>ST</i>	Equals one if the company is in the state of special treatment and zero otherwise
<i>UE</i>	Net income of current year – net income of last year/total assets, winsorized at 1st and 99th percentile by year
<i>YEAR</i>	Dummy variables to control for the years 2008 and 2009

company, and the fiduciary effect of their expertise could be weakened. Therefore, we have no expected effect from the variable *REPUT*.

The influence of compensation on independent directors is double-edged. Higher compensation could impel independent directors to play more active roles. However, higher compensation might also induce lower fiduciary effort, in that directors may be so dependent on their compensation that they are reluctant to challenge the company's primary owners.

The control variables for our study are defined according to extant literature on voluntary management forecasts. The variable *EV* measures the volatility of earnings. Studies on voluntary management forecasts have found that the precision of management forecasts are negatively related to the volatility of earnings. The variable *UE* measures unexpected earnings, or income not anticipated by management. Johnson et al. (2001) and Ajinkya et al. (2005) find that the accuracy of management forecasts is negatively related to the magnitude of unexpected earnings. Eames and Glover (2003) argue that it is necessary to control for the level of earnings in analyzing forecasting errors, so we include *ROA* to control for this effect.¹⁰ Koch (2002) finds that companies in financial distress are more likely to issue wrong or misleading management forecasts. To account for this we use the variable *ST* instead of the Ohlson score to proxy for financial distress in the Chinese business environment. The variable *MONTH* controls for the timing of management forecasts. When management forecasts are disclosed later in the financial year, management has more information for earnings forecasts and therefore produces management forecasts with higher precision and accuracy. The variable *SIZE* is used to control for the influence of firm size. In addition, the quality of management forecasts might vary across years and between industries. We include *YEAR* and *IND* dummies to control for these effects.

3.3. Regression models

Because *PRECISION* is an ordinal variable, we run ordered logit regressions of Model (1). As *BIAS* and *FE* are continuous variables, we run OLS (ordinary least squares) regressions of Models (2) and (3), respectively.

$$\begin{aligned} \text{PRECISION} = & \alpha_0 + \alpha_1 \text{OUT} + \alpha_2 \text{CPA} + \alpha_3 \text{LAW} + \alpha_4 \text{HY_EXP} + \alpha_5 \text{GOV_EPX} + \alpha_6 \text{REPUT} \\ & + \alpha_7 \text{COMPEN} + \alpha_8 \text{EV} + \alpha_9 \text{ROA} + \alpha_{10} \text{ST} + \alpha_{11} \text{MONTH} + \alpha_{12} \text{SIZE} + \text{YEAR} + \text{IND} + \varepsilon \end{aligned} \quad (1)$$

$$\begin{aligned} \text{BIAS} = & \beta_0 + \beta_1 \text{OUT} + \beta_2 \text{CPA} + \beta_3 \text{LAW} + \beta_4 \text{HY_EXP} + \beta_5 \text{GOV_EPX} + \beta_6 \text{REPUT} + \beta_7 \text{COMPEN} \\ & + \beta_8 \text{UE} + \beta_9 \text{ROA} + \beta_{10} \text{ST} + \beta_{11} \text{MONTH} + \beta_{12} \text{SIZE} + \text{YEAR} + \text{IND} + \eta \end{aligned} \quad (2)$$

$$\begin{aligned} \text{FE} = & \gamma_0 + \gamma_1 \text{OUT} + \gamma_2 \text{CPA} + \gamma_3 \text{LAW} + \gamma_4 \text{HY_EXP} + \gamma_5 \text{GOV_EPX} + \gamma_6 \text{REPUT} + \gamma_7 \text{COMPEN} + \gamma_8 \text{UE} \\ & + \gamma_9 \text{ROA} + \gamma_{10} \text{ST} + \gamma_{11} \text{MONTH} + \gamma_{12} \text{SIZE} + \text{YEAR} + \text{IND} + \mu \end{aligned} \quad (3)$$

4. Empirical results

4.1. Sample description

Our sample includes annual management forecasts issued by China's A-share companies during the 2007–2009 period. To obtain our final sample, we first remove observations from financial industries. Second, we omit observations in which the types of forecasts issued are “uncertain” or “continuous profit”. Third, we remove observations without sufficient data for analysis. Finally, we have 2621 (2225) suitable observations with which to examine the precision (accuracy) of management forecasts.

¹⁰ Results concerning voluntary management forecasts indicate that the precision and accuracy of good news forecasts are higher when the reports are voluntary. We also define the variable *NEWS* with a value of one for good news and zero for bad news. The results of our study indicate that *NEWS* is positively related to *ROA*. However, when we add *NEWS* and *ROA* simultaneously in the regressions, the estimated coefficients of *NEWS* are not significantly different from zero and those of *ROA* are still significantly different from zero. Thus, we use only *ROA* in our regressions to control for the level of earnings and the nature of news.

Table 2
Summary of sample.

	All	Quantitative estimates ^a		Optimistically biased ^b	
<i>A: Year distribution</i>					
2007	792	666	(84.1%)	85	(12.8%)
2008	871	751	(86.2%)	285	(37.9%)
2009	958	808	(84.3%)	197	(24.4%)
	2621	2225	(84.9%)	567	(25.5%)
<i>B: Timing of management forecasts</i>					
Before the end of fiscal year	1050	858	(81.7%)	201	(23.4%)
January, next year	1379	1195	(86.7%)	326	(27.3%)
February	52	48	(92.3%)	6	(12.5%)
March	52	45	(86.5%)	14	(31.1%)
April	88	79	(89.8%)	20	(25.3%)
	2621	2225	(84.9%)	567	(25.5%)

^a Quantitative estimates include open-interval, closed-interval and point estimates. Open-interval estimates only forecast a lower end of the performance, closed-interval estimates forecast the minimum and maximum of the performance, and point estimates forecast a precise number. There is no number with regard to performance in general impression estimates.

^b Refers to overestimated observations among the quantitative estimates. First, we define *MFD* as (forecast net income – actual net income)/absolute value of actual net income. If *MFD* > 10%, then the observation is overestimated (or optimistically biased) and if *MFD* < –10% then the observation is under-estimated (or pessimistically biased).

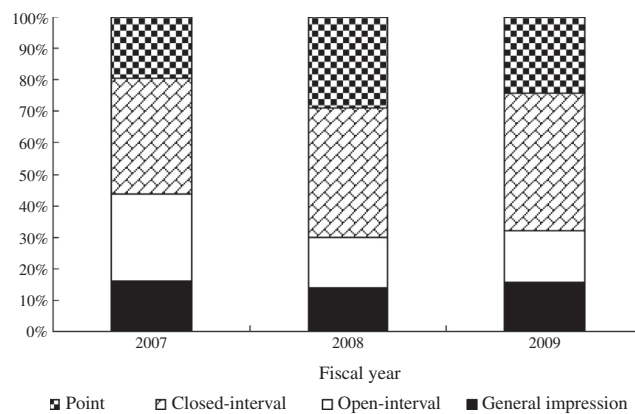


Fig. 1a. Forecast precision by year.

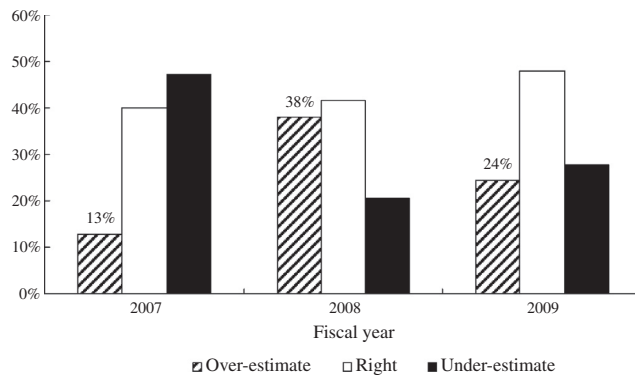


Fig. 1b. Forecast accuracy by year.

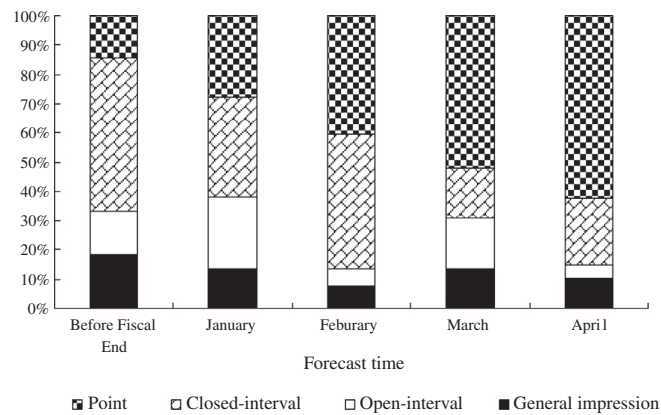


Fig. 2a. Forecast precision and forecast time.

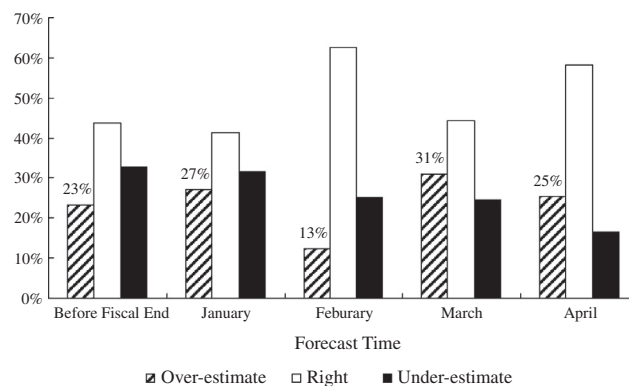


Fig. 2b. Forecast accuracy and forecast time.

Table 2 reports the distribution of our sample and Figs. 1a, 1b, 2a and 2b depict the percentage differences between factors. Qualitative observations make up less than 15% of our total sample. Concerning the accuracy of management forecasts, nearly 50% of the observations in 2007 are under-estimated, which might relate to the application of new accounting standards and the volatility of financial markets. In 2008, the percentage of overestimated forecasts is about 38%, which is considerably greater than in 2007 or 2009. This change may be a result of the 2008 global financial crisis. In 2009, the percentage of accurate forecasts (or forecasts that were less than 10% different from actual results) rose to 48%, which is a higher level of accuracy than in the previous 2 years. Also, management forecasts made in January show slightly higher precision than forecasts made before the end of fiscal year. However, management forecasts made between February and April have higher forecast accuracy than those made near the end of the fiscal year.

4.2. Descriptive analysis

The details concerning independent directors are summarized in Table 3. The results are consistent with extant literature in showing that the percentage of independent directors required by most listed companies is generally around 33% of board members. Where the percentage of independent directors is slightly above 33%, it is usually just because board size is not a multiple of three.¹¹ Fig. 3a indicates that boards whose percentage of independent directors is more than 40% are more likely to make forecasts using range or point

¹¹ When the size of the board is less than nine and the number of independent directors has to be no less than three as regulated, the percentage of independent directors must be more than one third. To test the influence of board size, we re-run the regressions with an additional dummy *BDUM* (equals one if the size of the board is nine and zero otherwise). The unreported results were unaffected.

Table 3
Summary of independent directors.

	Precision of management forecasts equals				Accuracy of management forecasts ^a		
	0	1	2	3	Over	Accurate	Under
<i>A: Percentage of independent directors on the board</i>							
<1/3	13	15	25	26	26	25	15
=1/3	215	295	581	333	284	518	407
(1/3%, 40%]	99	128	272	161	149	235	177
(40%, 50%]	65	70	179	113	101	172	89
>50%	4	9	10	8	7	15	5
Ratio test	$\chi^2 = 10.78$				$\chi^2 = 21.54^{***}$		
<i>B: Number of independent directors who are CPAs</i>							
0	307	401	580	413	357	579	458
1	82	106	457	213	197	359	220
2	6	10	29	15	13	27	14
≥3	1		1				1
Ratio test	$\chi^2 = 119.91^{***}$				$\chi^2 = 9.12$		
<i>C: Number of independent directors with legal backgrounds</i>							
0	209	287	566	340	314	518	361
1	152	199	454	260	216	393	304
2	32	25	43	41	33	49	27
≥3	3	6	4		4	5	1
Ratio test	$\chi^2 = 21.68^{***}$				$\chi^2 = 8.03$		
<i>D: Number of independent directors with industrial backgrounds</i>							
0	244	267	548	448	312	535	416
1	125	196	390	150	201	327	208
2	25	43	118	39	47	93	60
≥3	2	11	11	4	7	10	9
Ratio test	$\chi^2 = 76.97^{***}$				$\chi^2 = 6.13$		
<i>E: Number of independent directors with corporate governance backgrounds</i>							
0	219	302	726	385	356	623	434
1	135	178	277	199	169	277	208
2	28	28	57	49	37	57	40
≥3	14	9	7	8	5	8	11
Ratio test	$\chi^2 = 43.54^{***}$				$\chi^2 = 3.33$		
<i>F: Mean number of corporate boards on which independent directors stand</i>							
1	110	118	276	181	157	242	176
(1, 2]	215	267	563	333	289	510	364
(2, 3]	66	118	207	122	114	198	135
>3	5	14	21	5	7	15	18
Ratio test	$\chi^2 = 15.76^*$				$\chi^2 = 5.27$		
<i>G: Mean compensation of independent directors</i>							
<30,000	151	144	331	224	183	308	208
30,000–50,000	163	218	470	243	241	399	291
50,000–100,000	66	134	242	153	126	236	167
>100,000	16	21	24	21	17	22	27
Ratio test	$\chi^2 = 27.15^{***}$				$\chi^2 = 5.11$		

** Represent significance levels of 5% respectively.

* Represent significance levels of 10% respectively.

*** Represent significance levels of 1% respectively.

estimates. Also, as the percentage of independent directors increases, the percentage of accurate forecasts increases (accurate forecasts meaning those within 10% of the actual results) and the percentage of overestimated forecasts decreases.

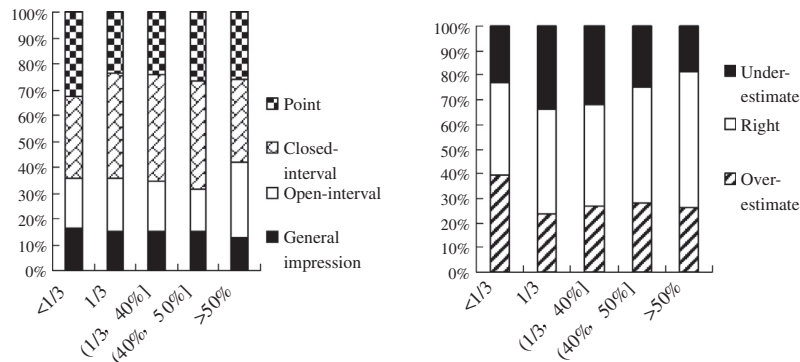


Fig. 3a. Precision and accuracy of management forecasts and independent directors.

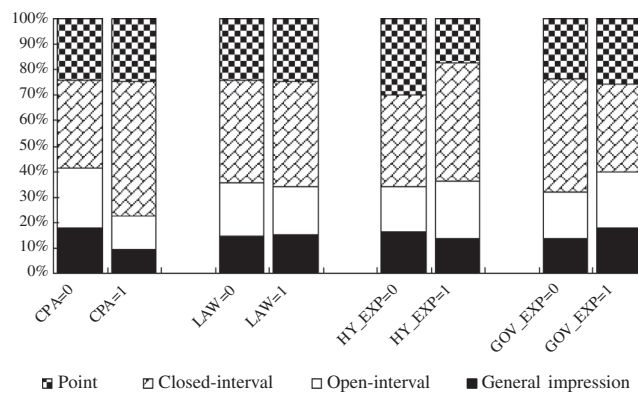


Fig. 3b(1). Independent directors' backgrounds and the precision of management forecasts.

In Fig. 3b(1), the observations concerning boards whose $CPA = 1$ and those whose $CPA = 0$ are not significantly different in their percentage of point estimates. However, the $CPA = 1$ boards make a higher percentage of range estimates than the $CPA = 0$ boards, resulting in higher forecast precision. The observations from boards whose $LAW = 0$ and those whose $LAW = 1$ are not significantly different in their distributions of forecast precision. The observations from boards whose $HY_EXP = 0$ and those whose $HY_EXP = 1$ are not significantly different in their percentages of qualitative estimates, but the $HY_EXP = 1$ boards have a higher percentage of point estimates. Similarly, the observations from boards whose $GOV_EXP = 0$ and those whose $GOV_EXP = 1$ are not significantly different in the percentage of point estimates, but the $GOV_EXP = 1$ boards have a higher percentage of range estimates. In other words,

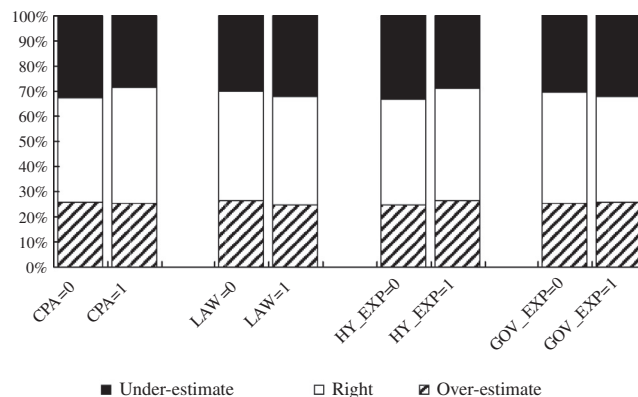


Fig. 3b(2). Independent directors' backgrounds and the accuracy of management forecasts.

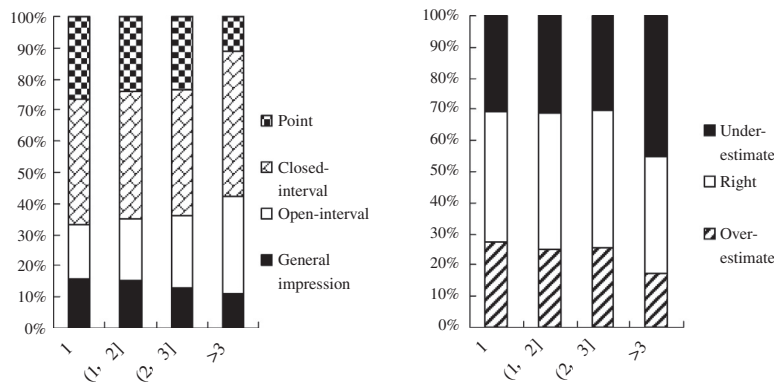


Fig. 3c. Precision and accuracy of management forecasts and the mean number of boards on which independent directors stand.

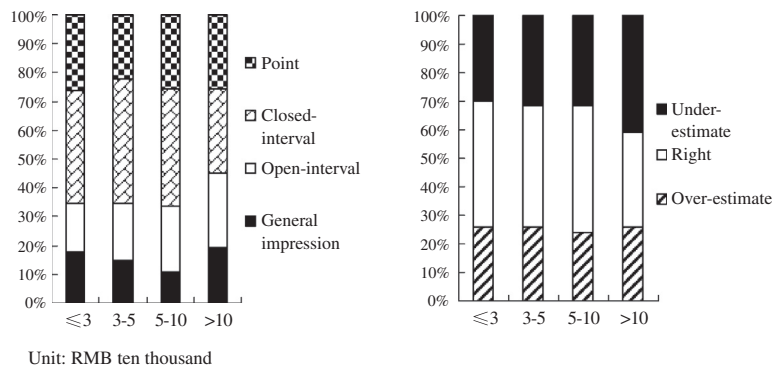


Fig. 3d. Precision and accuracy of management forecasts and independent directors' mean compensation.

independent directors with industrial expertise or corporate governance expertise seem to have negative effects on the precision of management forecasts. The results shown in Fig. 3b(2) indicate that the personal attributes of independent directors have almost no effect on the accuracy of management forecasts.

Fig. 3c shows that as the number of boards that the independent directors serve on increases, their boards' percentage of quantitative estimates also increases. However, their percentage of point estimates also decreases, which makes it difficult to judge the effects of director reputation on forecast precision. As for the accuracy of their management forecasts, boards with independent directors serving on a larger numbers

Table 4
Descriptive statistics of continuous variables.

Variable	Q1	Mean	Median	Q3	Std.
<i>A: Forecast precision</i>					
EV	0.4748	2.0549***	0.9087	1.8943	4.5052
ROA	0.0034	0.0228***	0.0278	0.0647	0.1752
SIZE	6.6922	7.5160***	7.3983	8.2903	1.3840
<i>B: Forecast bias and error</i>					
BIAS	−0.0064	0.0007	−0.0005	0.0044	0.0306
FE	0.0019	0.0131***	0.0053	0.0130	0.0277
ROA	0.0076	0.0357***	0.0346	0.0709	0.1450
UE	−0.0226	0.0114***	0.0145	0.0422	0.1997
UE	0.0170	0.0819***	0.0349	0.0731	0.1825
SIZE	6.7335	7.5597***	7.4568	8.3421	1.3657

* Represent significance levels of 10% respectively.

** Represent significance levels of 5% respectively.

*** Represent significance levels of 1% respectively.

of other boards show a decrease in their percentage of overestimated forecasts, but they show no improvement overall in their percentage of accurate estimates. Fig. 3d indicates that independent directors' compensation has no significant effect on the precision or accuracy of management forecasts.

Table 4 reports the descriptive summary of continuous variables. The result for *BIAS* indicates that there is no significantly optimistic or pessimistic bias in management forecasts. In other words, management forecasts are mainly unbiased. However, the mean value of *FE* is significantly positive, indicating that there are significant errors in management forecasts.

Table 5 reports the correlation coefficients between the main variables. In the full sample and the sample of companies with higher ownership balance, the percentage of independent directors has no significant correla-

Table 5
Correlations between main variables.

Variable	Full sample		Higher balance		Lower balance	
	Pearson	Spearman	Pearson	Spearman	Pearson	Spearman
<i>A: Forecast precision (PRECISION)</i>						
OUT	0.0172	0.0233	−0.0073	0.0033	0.0440*	0.0450*
CPA	0.1360**	0.1296**	0.1386**	0.1282**	0.1332**	0.1309**
GOV_EXP	−0.0484**	−0.0417*	−0.0062	0.0094	−0.0925**	−0.0924**
LAW	0.0059	0.0077	−0.0246	−0.0217	0.0376	0.0378
HY_EXP	−0.0601**	−0.0765**	−0.0706**	−0.0980**	−0.0492**	−0.0570**
REPUT	−0.0239	−0.0335	−0.0287	−0.0359*	−0.0190	−0.0316
COMPEN	−0.0051	−0.0119	−0.0075	−0.0177	−0.0027	−0.0076
[UE]	−0.0486**	−0.0680**	−0.0683**	−0.0601**	−0.0195	−0.0741**
ROA	0.0562**	0.0685**	0.0696**	0.0869**	0.0384	0.0475**
EV	−0.0727**	−0.0680**	−0.0398*	−0.0560**	−0.1062**	−0.0765**
MONTH	0.1542**	0.1354**	0.1565**	0.1356**	0.1519**	0.1369**
ST	−0.0652**	−0.0218	−0.0823**	−0.0266	−0.0463**	−0.0138
SIZE	−0.0662**	−0.0808**	−0.0778**	−0.0937**	−0.0542**	−0.0635**
<i>B: Forecast bias (BIAS)</i>						
OUT	0.0412*	0.0481**	0.0808**	0.0566*	0.0122	0.0403
CPA	0.0104	0.0493**	0.0072	0.0318	−0.0394	0.0667**
GOV_EXP	0.0013	−0.0162	0.0331	−0.0167	0.0124	−0.0183
LAW	−0.0180	−0.0169	−0.0445	−0.0470	−0.0210	0.0167
HY_EXP	−0.0168	0.0250	−0.0135	0.0305	−0.0146	0.0181
REPUT	−0.0090	−0.0177	−0.0019	−0.0346	−0.0294	0.0022
COMPEN	−0.0349	−0.0320	−0.0399	−0.0244	−0.3614**	−0.0399
UE	−0.2488**	−0.4228**	−0.1957**	−0.3875**	0.3711**	−0.4599**
ROA	−0.1096**	−0.3589**	−0.0678**	−0.2900**	0.0849**	−0.4395**
MONTH	0.0835**	0.0544**	0.0829**	0.0263	0.1354**	0.0859**
ST	0.1617**	0.0509**	0.1804**	0.0697**	−0.1564**	0.0298
SIZE	−0.1888**	−0.1374**	−0.2093**	−0.1521**	0.0000	−0.1091**
<i>C: Forecast error (FE)</i>						
OUT	0.0636**	−0.0208	0.1228**	0.0231	−0.0069	−0.0668**
CPA	−0.0345	−0.0221	−0.0405	−0.0009	−0.0289	−0.0441
GOV_EXP	0.0144	−0.0087	0.0463	−0.0077	−0.0257	−0.0102
LAW	−0.0029	−0.0121	0.0351	0.0573*	−0.0483	−0.0844**
HY_EXP	−0.0568**	−0.0094	−0.0769**	−0.0160	−0.0336	−0.0027
REPUT	−0.0159	−0.0088	−0.0233	0.0152	−0.0057	−0.0334
COMPEN	−0.0402*	0.0138	−0.0554*	0.0064	−0.0225	0.0213
[UE]	0.5123**	0.3668**	0.5064**	0.3746**	0.5464**	0.3587**
ROA	0.0284	0.1678**	0.0958**	0.1830**	−0.1012**	0.1521**
MONTH	0.0294	−0.0928**	0.0444	−0.0728**	0.0112	−0.1128**
ST	0.3056**	0.1683**	0.3865**	0.2450**	0.2005**	0.0823**
SIZE	−0.2572**	−0.0589**	−0.2962**	−0.0898**	−0.2073**	−0.0304

* Represent significance levels of 10% respectively.

** Represent significance levels of 5% respectively.

*** Represent significance levels of 1% respectively.

Table 6

Ordered-logit results of independent directors' effects on the precision of management forecasts.

	Exp.	Full sample (<i>N</i> = 2621)			Higher balance (<i>N</i> = 1327)			Lower balance (<i>N</i> = 1294)		
		Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
OUT	+		0.6652 (0.84)	0.6553 (0.81)		−0.4146 (0.17)	−0.2696 (0.07)		2.2918** (4.59)	2.0850** (3.77)
CPA				0.5335*** (47.76)			0.5700*** (27.04)			0.4997*** (20.24)
GOV_EXP				−0.2525*** (10.41)			−0.0789 (0.49)			−0.4229*** (14.31)
LAW				−0.0587 (0.62)			−0.1687 (2.53)			0.0260 (0.06)
HY_EXP				−0.3150*** (16.00)			−0.4113*** (13.27)			−0.1890* (2.85)
REPUT				−0.0838 (1.95)			−0.0831 (0.94)			−0.1045 (1.47)
COMPEN				0.0776 (1.04)			0.0078 (0.01)			0.1506 (1.94)
Intercept 3		−0.1555 (0.30)	−0.3965 (1.04)	−0.4021 (0.99)	−0.4000 (0.99)	−0.2460 (0.20)	−0.2050 (0.12)	−0.0072 (0.00)	−0.8214 (2.11)	−0.8588 (2.19)
Intercept 2		1.7028*** (35.21)	1.4622*** (14.07)	1.4986*** (13.76)	1.6353*** (16.34)	1.7895*** (10.31)	1.8837*** (10.39)	1.7234*** (16.45)	0.9133 (2.61)	0.9185 (2.51)
Intercept 1		2.8658*** (97.20)	2.6256*** (44.79)	2.6884*** (43.73)	2.6338*** (41.52)	2.7879*** (24.75)	2.9060*** (24.46)	3.0967*** (51.55)	2.2907*** (16.19)	2.3320*** (15.94)
EV		−0.0348*** (15.53)	−0.0351*** (15.75)	−0.0349*** (15.72)	−0.0142 (1.47)	−0.0141 (1.44)	−0.0174 (2.18)	−0.0554*** (15.21)	−0.0555*** (15.26)	−0.0548*** (14.39)
ROA		0.7721*** (12.36)	0.7704*** (12.28)	0.7406*** (11.37)	0.8603*** (10.41)	0.8641*** (10.50)	0.8713*** (10.49)	0.8419** (4.35)	0.8625** (4.56)	0.7728* (3.63)
ST		−0.5106*** (22.53)	−0.5143*** (22.81)	−0.5201*** (22.78)	−0.5638*** (14.29)	−0.5631*** (14.25)	−0.6326*** (17.38)	−0.4355 (7.49)	−0.4523 (8.05)	−0.3993 (6.15)
MONTH		0.4498*** (102.36)	0.4488*** (101.83)	0.4682*** (108.46)	0.5024*** (61.62)	0.5034*** (61.76)	0.5202*** (64.35)	0.4151 (42.82)	0.4145 (42.64)	0.4402 (47.01)
SIZE		−0.1968*** (41.83)	−0.1965*** (41.68)	−0.1815*** (32.99)	−0.1528*** (12.65)	−0.1531*** (12.68)	−0.1433*** (10.09)	−0.2312 (25.63)	−0.2314 (25.64)	−0.2069 (19.16)
Industry and year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Rescaled <i>R</i> ² (%)	8.77	8.80	11.50	11.64	11.65	14.75	9.96	10.31	13.18	
−2 Log <i>L</i>	6676.03***	6675.22***	6602.74***	3489.45***	3287.95***	3244.54***	3511.44***	3306.26***	3267.44***	

Wald chi-square statistics in parentheses.

For variables with expected signs, the significance level is one-tailed and for other variables the significance level is two-tailed.

* Represent significance levels of 10% respectively.

** Represent significance levels 5% respectively.

*** Represent significance levels of 1% respectively.

tions with precision. However in the case of companies with lower ownership balance, the correlation coefficients between *OUT* and *PRECISION* are positive and significant at the level of 10%. There is a large gap between the actual effect of independent directors on the accuracy of management forecasts and the effect expected by securities regulators. Specifically, in the full sample and the sample of higher ownership balanced companies, *OUT* and *BIAS* are positively related, indicating that the higher the percentage of independent directors, the higher the likelihood of overestimated forecasts. Similarly, in the full sample and the sample of higher ownership balanced companies, the Pearson coefficient between *OUT* and *FE* is significantly positive, indicating that the higher the percentage of independent directors, the higher the percentage of forecast errors. Obviously, these results are in contrast to those expected by security market regulators. However, in the sample of lower ownership balance companies, the Spearman coefficient between *OUT* and *FE* is significantly negative, indicating that independent directors might play a positive supervisory role in such companies.

The results indicate that the effects of independent directors' personal characteristics on the quality of management forecasts vary from case to case. The precision of management forecasts has a significantly positive

Table 7

OLS results of independent directors' effects on the bias of management forecasts.

	Exp.	Full sample ($N = 2225$)			Higher balance ($N = 1131$)			Lower balance ($N = 1094$)		
		Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
OUT	–		0.0225** (1.85)	0.0226** (1.85)		0.0541** (2.95)	0.0526** (2.85)		–0.0153 (0.95)	–0.0156 (0.97)
CPA				0.0011 (0.85)			0.0012 (0.65)			0.0009 (0.51)
GOV_EXP				0.0003 (0.23)			0.0012 (0.61)			–0.0012 (0.68)
LAW				–0.0016 (1.26)			–0.0040** (2.11)			0.0005 (0.33)
HY_EXP				0.0006 (0.44)			0.0013 (0.67)			0.0001 (0.05)
REPUT				0.0006 (0.62)			0.0009 (0.62)			0.0001 (0.05)
COMPEN				0.0009 (0.71)			0.0010 (0.52)			0.0005 (0.28)
UE		–0.0539*** (12.24)	–0.0541*** (12.29)	–0.0541*** (12.24)	–0.0404*** (6.95)	–0.0414*** (7.13)	–0.0416*** (7.13)	–0.0832*** (11.74)	–0.0832*** (11.75)	–0.0831*** (11.67)
ROA		0.0345*** (5.68)	0.0346*** (5.70)	0.0344*** (5.64)	0.0264*** (3.24)	0.0269*** (3.31)	0.0271*** (3.32)	0.0404*** (4.03)	0.0403*** (4.02)	0.0400*** (3.96)
MONTH		0.0017** (2.44)	0.0017** (2.39)	0.0018** (2.46)	0.0014 (1.28)	0.0013 (1.21)	0.0013 (1.24)	0.0019** (2.03)	0.0019** (2.04)	0.0020** (2.09)
ST		0.0119*** (5.76)	0.0117*** (5.66)	0.0118*** (5.67)	0.0118*** (3.85)	0.0116*** (3.79)	0.0117*** (3.78)	0.0138*** (4.88)	0.0139*** (4.93)	0.0141*** (4.95)
SIZE		–0.0035*** (6.85)	–0.0035*** (6.80)	–0.0036*** (6.85)	–0.0043*** (5.47)	–0.0042*** (5.36)	–0.0045*** (5.49)	–0.0024*** (3.50)	–0.0024*** (3.50)	–0.0024*** (3.33)
Intercept		0.0158*** (3.27)	0.0075 (1.13)	0.0073 (1.07)	0.0252*** (3.42)	0.0044 (0.43)	0.0059 (0.55)	0.0044 (0.68)	0.0099 (1.15)	0.0095 (1.08)
Industry and year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2 (%)		14.02	14.12	14.03	12.20	12.81	12.89	18.39	18.39	18.00

The dependent variable is *BIAS*.Student *t* values in parentheses.

For variables with expected signs, the significance level is one-tailed and for other variables, the significance level is two-tailed.

* Represent significance levels of 10% respectively.

** Represent significance levels 5% respectively.

*** Represent significance levels of 1% respectively.

relation with *CPA* and this correlation is not influenced by the level of ownership balance. However, inconsistent with Wang et al. (2008), the level of forecast precision is negatively correlated with *HY_EXP*.¹² Legal experts have no significant effect on the precision of management forecasts and the independent directors who are experts in corporate governance have negative effects on the precision of management forecasts. Also, the negative effects are most pronounced in the observations of companies with lower ownership balance.¹³

¹² Wang et al. (2008) use a comprehensive index ($INDEX = CPA + HY_EXP + LAW$). If the positive effect of one factor is much larger than the negative effect of another factor, the overall effect of the comprehensive index is still positive. In our results, the positive result of *CPA* is much larger than the negative result of *HY_EXP*, so the overall effect of *INDEX* is of course positive. We argue that the reasons that industrial experts do not play their expected roles might be (1) that industrial experts are familiar with their industries and might play a positive role in operational strategy, but they are not financial experts and might know little about financial analysis; (2) that many industrial experts are retired and their energy in playing the director's role may be limited; (3) industrial experts might have closer relationships with managers and thereby lose their independence.

¹³ The negative effects of corporate governance experts might be due to their dependence "in substance". Independent directors who are managers of other companies might be controlled by managers of our sample companies and lose their independence. In extreme cases there may be collusion.

Table 8

OLS results of independent directors' effects on the accuracy of management forecasts.

	Exp.	Full sample ($N = 2225$)			Higher balance ($N = 1131$)			Lower balance ($N = 1094$)		
		Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
OUT	–		0.0108 (1.07)	0.0105 (1.04)		0.0365*** (2.44)	0.0344** (2.28)		–0.0133 (1.00)	–0.0123 (0.92)
CPA				–0.0013 (1.28)			–0.0012 (0.77)			–0.0012 (0.83)
GOV_EXP				0.0006 (0.52)			0.0009 (0.58)			0.0001 (0.05)
LAW				0.0009 (0.89)			0.0015 (0.96)			–0.0036*** (2.62)
HY_EXP				0.0011 (0.97)			0.0015 (0.90)			0.0003 (0.19)
REPUT				0.0009 (1.13)			0.0004 (0.32)			0.0020* (1.82)
COMPEN				0.0013 (1.21)			0.0016 (1.01)			0.0001 (0.05)
[UE]		0.0802*** (22.89)	0.0801*** (22.82)	0.0802*** (22.83)	0.0645*** (13.55)	0.0639*** (13.43)	0.0641*** (13.44)	0.1075*** (19.28)	0.1077*** (19.30)	0.1082*** (19.37)
ROA		–0.0287*** (7.50)	–0.0287*** (7.50)	–0.0291*** (7.58)	–0.0242*** (4.75)	–0.0242*** (4.76)	–0.0245*** (4.80)	–0.0244*** (3.78)	–0.0245*** (3.80)	–0.0252*** (3.90)
MONTH		–0.0017*** (2.94)	–0.0018*** (2.96)	–0.0018*** (2.97)	–0.0019** (2.16)	–0.0019** (2.21)	–0.0019** (2.18)	–0.0018** (2.21)	–0.0018** (2.20)	–0.0018** (2.31)
ST		0.0028 (1.54)	0.0028 (1.51)	0.0029 (1.57)	0.0091*** (3.26)	0.0091*** (3.27)	0.0094*** (3.33)	–0.0027 (1.14)	–0.0026 (1.08)	–0.0027 (1.13)
SIZE		0.0006 (1.31)	0.0006 (1.30)	0.0008* (1.81)	–0.0013** (2.01)	–0.0013* (1.95)	–0.0015** (2.13)	0.0002 (0.36)	0.0002 (0.36)	0.0000 (0.04)
Intercept		0.0190*** (4.65)	0.0150*** (2.74)	0.0154*** (2.72)	0.0256*** (4.18)	0.0117 (1.41)	0.0113 (1.28)	0.0108** (1.97)	0.0155** (2.14)	0.0158** (2.14)
Industry and year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2 (%)		28.83	28.83	28.87	29.22	29.54	29.38	30.80	30.80	31.13

The dependent variable is *FE*.Student *t* values in parentheses.

For variables with expected signs, the significance level is one-tailed and for other variables, the significance level is two-tailed.

* Represent significance levels of 10% respectively.

** Represent significance levels 5% respectively.

*** Represent significance levels of 1% respectively.

When analyzing forecast bias, the positive correlation between *CPA* and *BIAS* appears in the full sample and in the sample of companies with lower ownership balance. The negative correlation between *COMPEN* and *BIAS* occurs only in the sample of lower ownership balance companies. The other personal characteristics have no significant effect on *BIAS*.

For forecast error, the correlations between *FE* and *CPA* are in contrasting directions for the two subsamples. Among the observations of lower ownership balance companies, legal experts do increase the accuracy of management forecasts, but among observations of higher ownership balance companies the presence of legal experts decreases forecast accuracy.¹⁴ Industrial experts have positive effects on forecast accuracy, but these effects are mainly evident in higher ownership balance companies. The results of *COMPEN* are similar to those of *HY_EXP*.

¹⁴ This result may be related to legal experts' judgment of litigation risks. In the case of lower ownership balance, the likelihood of irregularities in information disclosure might be higher (Wang et al., 2008) and this could increase litigation risk. Legal experts might try to decrease their litigation risk through efforts to improve the quality of information disclosure. In the cases of higher ownership balance, litigation risks are lower. Legal experts might then do nothing or even take advantage of gaps in the laws and regulations, thus reducing the quality of information disclosure.

4.3. Regression results

The results of regressions on forecast precision are reported in Table 6. Only in the lower ownership balance sample are the estimated coefficients on OUT significantly positive, which is consistent with the descriptive statistics. The estimated coefficients on CPA are significantly positive in all regressions, but those on HY_EXP are all significantly negative. In other words, after controlling for other factors that might determine the precision of management forecasts, the effects of CPA and HY_EXP are still significant.

Table 7 reports the OLS results of forecast bias. For the full sample and the subsample of higher ownership balance, the coefficients on OUT are both significantly positive, indicating that the likelihood of overestimated forecasts increases as the percentage of independent directors increases. These results indicate that independent directors might play negative roles instead of the expected positive fiduciary roles.

The regressions on FE are reported in Table 8. The results indicate that inconsistent with the expectations of securities regulators, independent directors play negative roles in situations of higher ownership balance. In addition, the coefficients on CPA are all negative, although they are insignificantly different from zero.

4.4. Robustness tests

In the above analysis, CPA, LAW, HY_EXP and GOV_EXP are all dummy variables. In a robustness test, we define them as the number of corresponding independent directors. The results from using these continuous variables are consistent with the reported results.

The observations of management forecasts were classified into four types, each with a different numerical level of precision. In a robustness test, we classify them into two types, either as qualitative estimates or quantitative estimates. The unreported results are consistent with previous findings.

The index of ownership balance that we use has no consideration of shareholders other than the largest five shareholders. In a robustness test, we consider the second to tenth largest shareholders. The unreported results are consistent with previous findings.

When analyzing the accuracy of management forecasts, the sample includes open-interval estimates. In a robustness test, we exclude open-interval estimates and use only range estimates and point estimates. The final sample consists of 1708 observations, with 839 of these observations concerning companies with lower ownership balance. We re-run the regressions and the unreported results are qualitatively the same.

5. Conclusions

Management forecasts are an important part of listed firm's information disclosure (Bai, 2009) and independent directors should play key supervisory roles in improving the quality of such forecasts (Wang et al., 2008). Therefore, we might expect that the increased presence of independent directors should improve the quality of management forecasts. Our results indicate that in the case of companies with lower ownership balance, independent directors do improve the precision of management forecasts, but they have no significant effect on the bias or error of management forecasts. In the case of companies with higher ownership balance, independent directors tend to have negative effects on the quality of management forecasts.

The results suggest that the effects of independent directors' expertise are varied. Independent directors who are also CPAs can significantly improve the precision of management forecasts, but they have no significant influence on the accuracy of the forecasts. Independent directors with industrial or corporate governance backgrounds commonly have a negative effect on the precision of management forecasts. Independent directors with legal backgrounds have no significant effect on the precision of management forecasts, but they improve forecast accuracy in the case of companies with lower balance ownership.

Overall, the supervisory efficiency of independent directors is relatively low. The expertise and skills of independent directors make little difference to the quality of management forecasts.

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