The role of credibility in the relation between management forecasts and analyst forecasts in Japan

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Abstract

This study examines the relation between management forecasts and analysts' forecasts to determine whether a moderating role exists for credibility. Management credibility is evaluated by management's prior forecasting ability and the firm's underlying corporate governance structure. Analyst credibility on the other hand is assessed using their prior forecasting ability only. Using Structural Equation Modelling, we find management credibility affects how much reliance analysts place upon information contained in management initial earnings forecasts when making their own forecasts. We also show a moderating role for analyst credibility in the relation between analysts' consensus initial forecasts and management forecast revisions. Our findings highlight the importance of reputation in the dissemination of earnings information.

Keywords: Management forecast; analysts' forecast; credibility; forecast revisions

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1 Introduction

We explore the relation between management forecasts and analyst forecasts to determine whether a moderating role exists for credibility. Two types of credibility are examined: management credibility and analyst credibility. Management credibility is evaluated by management's forecasting ability (based upon prior forecast outcomes) and the firm's underlying Corporate Governance (CG) structure. Analyst credibility is assessed by their forecasting ability only, based upon prior forecast outcomes. Two questions are addressed by this study: (1) does management credibility moderate the relation between management's initial forecasts and initial analyst forecasts? and, (2) is the relation between analyst forecasts and subsequent management forecast revisions moderated by analyst credibility?

In Japan, management forecasts for the following year's earnings are effectively mandatory. These management forecasts are disclosed at the same time as the annual earnings announcement and analyst forecasts follow shortly thereafter. Management forecasts can reduce information asymmetry between managers and those outside the firm, and are likely to be an important source of information for analysts, particularly at the start of the fiscal year when few alternative sources of performance information are available (Ota, 2011). In this study, we differentiate the first (initial) forecasts of the financial year for both analysts and management from their subsequent forecasts.

Managers have incentives to bias their forecasts (Rogers and Stocken, 2005). Therefore, we posit that perceptions of management's competence and trustworthiness, and the firm's CG structure (two aspects of management credibility) influence perceptions of management credibility. This in turn impacts analysts' reliance on the information in management forecasts

65 when making their own forecasts of future firm performance.[1] Specifically, we investigate the
66 moderating role of management credibility on the relation between management and analyst
67 forecasts.

68 Although managers are generally thought of as having an information advantage about the
69 performance of the firm, in some firms performance is heavily influenced by external economic
70 factors which are outside managers' control. Also analysts have access to detailed
71 macroeconomic information which is not readily available to managers. As a consequence,
72 analysts potentially have an information advantage over managers in predicting future firm
73 performance. In these circumstances management forecasts can be less accurate than those of
74 financial analysts (Hutton et al., 2012), and managers may use the information in analyst
75 earnings forecasts to inform their own forecast revisions. Accordingly, we expect analyst
76 credibility to play a role in affecting the level of reliance that managers place on information
77 contained in analyst forecasts, thus moderating the relation between analyst forecasts and
78 management forecast revisions.

79 Japan has a comparatively low level of litigation relative to countries like the US (Ginsburg
80 and Hoetker, 2006). Therefore Japanese managers are unlikely to face substantial legal costs if
81 they provide biased forecasts although they may bear reputational costs from so doing.[2]
82 Although much prior work has investigated voluntary management forecast disclosures for US

[1] We examine the analyst forecasts of next period earnings that are made available immediately after the release of the current year annual summary report, to examine how analysts respond to the initial management forecast released with the annual summary report.

[2] Therefore it is perhaps unsurprising that Kato et al. (2009) find evidence of optimism in managers' initial earnings forecasts. Nonetheless this initial optimism is managed downwards through subsequent forecast revisions later in the financial year (Aguilera et al., 2017). Potential motives for the managerial optimism in initial earnings forecasts in Japan include managers' inherent over-confidence in their ability (Malmendier and Tate, 2005), excessive reliance on superior past performance in making future forecasts (Lakonishok et al., 1994), as well as a desire to demonstrate to stakeholders that they are doing a good job.

83 firms, few studies focus specifically on management disclosures in Japan. Notable exceptions
84 include Aguilera et al. (2017), Iwasaki et al. (2016), Kato et al. (2009), and Ota (2010, 2011).
85 Iwasaki et al. (2016) show that management's earnings forecasts are managed to avoid negative
86 forecast innovations and that the market rewards firms for doing so.[3] However, prior work finds
87 forecast optimism is more likely in smaller firms, firms with poor performance and those
88 experiencing financial distress (Kato et al., 2009; Ota, 2011).
89 In contrast to the US, the extent and timing of management forecast disclosures in Japan is
90 specified in legal and stock exchange regulations. The Financial Instruments and Exchange
91 Law requires firms to file their annual reports within three months of the firm's
92 year-end, but the stock exchanges in Japan require timely disclosure under the securities listing
93 regulations [Part 2, Chapter 4, Section 2]. Management's initial forecasts of next year's
94 expected ordinary income, net income and sales are released alongside the announcement of
95 this year's actual earnings, which usually occurs "25-40 trading days after fiscal year end,"
96 (Ota, 2011, p.1319). Firms are required to issue revised forecasts where the forecast changes
97 by ±10% for sales and ±30% for ordinary income/net income (Kato et al., 2009, p. 1577).
98 Therefore firms are obliged to ensure that updates to forecasts are made on a timely basis.
99 We use Structural Equation Modelling (SEM) to determine relations between management
100 and analyst forecasts, with data from firms listed on the First Section of the Tokyo Stock
101 Exchange (TSE). SEM is a powerful tool for modelling complex relationships among observed
102 variables and latent constructs. Latent constructs are unobservable and are represented by
103 multiple observed variables. These constructs may be endogenous, similar to the dependent
104 variable in an Ordinary Least Squares (OLS) regression, or exogenous, which means they are
105 determined by factors external to the model (Hair et al., 2010). While SEM has not been widely

[3] Forecast innovation is defined as the expected improvement (or decline) in next year's earnings relative to the current year's reported earnings.

106 used in the accounting literature to date, it has been used to operationalise different measures
107 of CG (see for example, Daily et al., 1999). It has also been used to capture the impact of the
108 complementary and substitution roles of CG on CEO compensation in Taiwanese firms (Lin,
109 2005) and company performance in Australian firms (Azim, 2012). SEM has also been used in
110 Landsman et al. (2012) to investigate whether the introduction of International Financial
111 Reporting Standards has resulted in greater information content in company earnings
112 announcements (as proxied by abnormal return volatility and abnormal trading volume).

113 In summary, our results indicate that management credibility moderates the relation
114 between management initial forecasts for the year and subsequent analyst forecasts. More
115 specifically, the reliance that analysts place on management forecasts increases with the level
116 of management credibility. Our SEM analysis also shows a moderating role for analyst
117 credibility in the relation between analyst forecasts and management forecast revisions. When
118 revising their forecast, the level of reliance that management places on analyst forecasts
119 increases with analyst credibility.

120 In additional analysis, we examine the mediating role of management and analyst
121 credibility. The results show that management's initial forecast has a direct effect on analyst
122 forecasts but there is no indirect effect through management credibility. Similarly, the SEM
123 analysis shows analyst forecasts having a direct effect on management forecast revisions
124 although no indirect effect exists through analyst credibility.

125 Our paper contributes to the literature in the following ways. First, to our knowledge, earlier
126 studies have not considered the role of analyst forecasts (and their associated credibility) in
127 informing management forecast revisions. For firms whose performance is heavily affected by
128 external economic factors, the credibility of financial analysts is likely to be an important factor
129 influencing whether managers use analyst forecasts to inform their own forecast revisions.
130 Second, we model the relation between management and analyst forecasts in a SEM framework

and include management credibility and analyst credibility separately as moderating factors. Credibility has not been considered by prior studies in this way previously although source credibility is known to influence forecast reliance (Mercer, 2004). Third, we use latent variables in SEM to measure credibility, an unobservable variable. Management credibility is shown by observable factors indicating prior forecast ability including optimism, accuracy, consistency and earnings surprise, and firm CG. Similarly, the unobservable analyst credibility is proxied by factors indicating previous forecasting accuracy, optimism and dispersion. While other studies examine the effects of these forecasting factors individually, we consider these together synergistically in a SEM model.

The remainder of the paper is structured as follows: Section 2 reviews the relevant literature and develops the hypotheses, Section 3 discusses the data and sample, while Section 4 outlines the research method. Section 5 contains the results from our main analysis and Section 6 presents additional results. Section 7 concludes the paper.

2 Relevant Literature and Hypotheses

2.1 Analyst Reliance on Management Forecasts

Managers have expert knowledge of their business, its strategy and operations and therefore are in a good position to predict future firm performance. However, management forecast accuracy will depend upon the level of firm complexity, the volatility of earnings, the quality of accounting information systems, as well as the managers' competence at forecasting. Even if management have a clear idea of the firm's likely performance, they may choose to bias the forecast depending on incentives, the ability of the market to detect such biases and the potential threat of litigation (Rogers and Stocken, 2005). Prior evidence indicates Japanese

154 managers' initial earnings forecasts tend to be optimistic (Kato et al., 2009; Aguilera et al.,
155 2017) although subsequent forecasts are revised downward throughout the year.[4]

156 The relation between management and analysts' forecasts is likely to depend on the
157 credibility of disclosures. If management disclosures are not perceived to be credible, there
158 may be very low correlation between management and analysts' forecasts. Prior research
159 identifies that manager's negative or "bad news" disclosures are inherently more credible
160 (Williams, 1996; Hutton et al., 2003) as managers prefer to avoid disclosures which may
161 adversely affect debt contracts or compensation arrangements. For example, Skinner (1994)
162 shows that the stock price response is greater for "bad news" than "good news" in forecasts.
163 Also, disclosures from firms in financial distress are perceived as less credible (Koch, 2002)
164 as managers have incentives to mislead. The characteristics of the disclosure itself, such as the
165 precision of the forecast, the time horizon of the forecast, the amount of additional supporting
166 information disclosed (Hirst et al., 2007; Hutton et al., 2003) and the overall plausibility of the
167 disclosure (Williams, 1996; Hansen and Noe, 1998; Koch, 2002) are also important.
168 Disclosures which are more precise, with a shorter time horizon (i.e., the timing of the
169 disclosure is nearer to the release date of the annual earnings) and include additional supporting
170 information relating to sales or other items increase the disclosure's credibility.

171 In addition to the actual disclosure, management's credibility is important in how analysts
172 react to "news" contained in management forecasts. Perceptions of management credibility are
173 based upon managers' prior forecasting behaviour, i.e., the reputation which managers have
174 built up over time in forecasting (Mercer, 2004; Hutton and Stocken, 2009). Managers which

[4] Many reasons have been put forward for this behaviour including: the low litigation environment in Japan, the existence of corporate groupings (keiretsu) and the private transfer of information within the corporate group, to avoid reporting a loss (Cho et al., 2011), or to motivate the workforce in a policy of continuous improvement (Kato et al., 2009). Alternatively, managers may over-estimate returns from their investments because of over-confidence in their ability (Malmendier and Tate, 2005) or underweighting of overall industry performance on the firm's individual performance.

release more accurate prior forecasts are viewed as more credible (Williams, 1996; Hirst et al., 1999; Ng et al., 2013; Yang, 2012). Therefore, current year forecasts are perceived as less credible where persistent biases are evident in forecasting. The level of external and internal assurance of financial reporting is also likely to impact the assessment of management credibility. Prior evidence shows monitoring provided by CG is positively associated with both the frequency and accuracy of earnings forecasts (Karamanou and Vafeas, 2005; Byard et al., 2006) and forecast revisions (Nagata and Nguyen, 2017). CG is also negatively associated with earnings management (Klein 2002; Peasnell et al., 2005).[5] Therefore managers of firms with better CG structures could be perceived as more credible.

In this study, we examine the effect of the initial management forecast of earnings on analysts' first mean consensus forecast of earnings for the year. It is rational for analysts to rely on management forecasts when making their own forecasts if they believe the forecasts to be credible. This approach extends the work initiated by Ball and Brown (1968), by examining the effects of credibility on the relationship between analyst response and earnings expectation. The reliance that analysts place on information contained in the management forecast when formulating their own forecasts is expected to be greater where management forecasts are more credible (either due to management's prior forecasting ability or firm's CG). Specifically, we test the following hypothesis:

H1: *Management credibility moderates analysts' reliance on management forecasts.*

2.2 Management's Reliance on Analyst Forecasts

Managers possess private information regarding the firm's underlying performance and are often perceived as having an informational advantage over analysts. However, analysts have

[5] Despite the differing CG structures in Japan, the 2015 TSE CG principle 3 clearly indicate a relation between CG and timely disclosures, and the board of directors' role in monitoring disclosure (TSE, 2015).

more experience predicting future economic conditions and may be able to objectively assess a firm's competitive position and prospects (Hutton et al., 2012). Therefore, where a firm's performance is predominantly influenced by external economic factors, outside of the control of management, analysts may more accurately predict firm's future performance. In such situations, where managers have previously found it difficult to forecast earnings accurately (and analyst forecasts have been more accurate), it is possible that managers use analysts' forecasts to inform their own current year earnings forecast. If analysts' forecasts are perceived to be credible, we anticipate management place greater reliance upon the information in analyst forecasts when making revisions to their own current year earnings forecast.

Previous research indicates that analyst forecast credibility is related to (and in our study proxied by) the forecasting track record of the analysts. Forecast accuracy is measured by the closeness of the analyst forecast to actual earnings (Kadous et al., 2009).[6] Analyst forecasts that are more accurate in the previous year are perceived as more credible. Keung (2010) shows that the inclusion of supplementary information, such as sales forecast revisions at the same time as earnings forecast revisions, may enhance forecast's credibility. The additional information provided by the analysts may have the benefit of increasing forecast credibility, since investors can use the information to gauge the knowledge of the analysts. Hilary and Hsu (2013) show that forecasts made by analysts with more consistent forecast errors have a greater effect on prices and the consistency in forecast errors has a larger effect than current forecast accuracy. We test the importance of financial analyst credibility in influencing manager's use of consensus analyst forecasts to inform their own forecast revisions.

H2: *Analyst credibility moderates management's reliance on analyst forecasts when they make forecast revisions.*

[6] In our research design we use data on the consensus analyst forecast.

3 Data & Sample

3.1 Data Sources

The financial accounting data and management forecast data is taken from the Nikkei Financial Quest (FQ) database. Analyst data is taken from the Institutional Brokers Estimates System (I/B/E/S) database. We use one year ahead analyst and management forecasts in this study which are announced at the start of the fiscal year. We also collect data on management forecast revisions. An issue with merging the two databases is the inconsistency in the denomination used in the reporting of the earnings data. Earnings can be reported either on a per share basis or per 100 shares. For instance, the same firm can have the management forecast reported on a per share basis in the FQ database and per 100 shares in the I/B/E/S database. To overcome the issue, we scale the earnings reported in each database by the share price reported for the same company in the same database. As the share price is reported on the same denomination as the earnings, this allows us to merge the data from different sources.

We collect CG data from the Corporate Governance Evaluation System (CGES) developed by Nikkei Media Digital Inc. The advantage of CGES rather than alternative sources of CG data (such as ISS Risk Metrics) is that CGES has very good coverage of Japanese listed firms. In addition, CGES rates aspects of CG specific to Japan (e.g., cross shareholdings, dominant companies) and focuses on board structure and ownership which are important features in Japanese firms. Other papers using this CG data include Beekes et al. (2017) and Sakawa et al. (2012).

3.2 Overall Sample

The overall sample comprises firms in TSE First Section over the period 2006 to 2016. Approximately 1,300 firms per year are included in the sample (N=14,179), after the exclusion

246 of financial firms. Of these, 98% have one-year ahead management earnings forecasts.[7] The
247 overall sample is broken down into two subsamples for analysis: Sample 1, known as the
248 Management Forecast (MF) sample, for modelling the effects of initial management forecasts
249 $[MF_t]$ and initial consensus analyst forecasts $[AF_t]$ and Sample 2, also known as the
250 Management Forecast Revision (MFR) sample, for the effects of analyst forecasts on
251 management forecast revisions $[MFR_t]$.

252 The initial MF sample, i.e., firms with management forecast data, contains 13,984 firm
253 years (see Table 1, panel A). The final MF Sample of 3,911 firm years was obtained after the
254 following exclusions: 660 firm years when the management forecast horizon exceeded 370
255 days (to ensure the forecasts are for the next period's earnings); 4,552 firm years when firms
256 had missing analyst forecast data from I/B/E/S; 3,877 firm years when firms had fewer than
257 three analysts contributing to consensus forecasts, 917 firm years when CG and management
258 forecast data was missing, and 67 firms years where the *AFD Reliance* variable is in the 1st and
259 99th percentile, to exclude outliers.[8]

260 The MFR sample is obtained as follows. The final MF sample of 3,911 firm years is the
261 starting point. From this we exclude observations where the *MFR Reliance* variable is in the
262 1st and 99th percentile. This resulted in the omission of 551 firm years and the MFR sample
263 with 3,360 firm year observations. Table 1 Panel B shows the breakdown of both samples by
264 year. There are on average, 300 firms per year.

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266 [Insert Table 1 about here]

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[7] Also, as firms are required to provide regular updates to their forecasts on a timely basis when a certain threshold is breached, 84 percent of the firms that provide a management forecast also provide management forecast revisions. The firms in the First Section are the largest listed firms in Japan and hence there is good analyst coverage of the firms in our sample, with more than 60 percent of the firms covered by analysts in the I/B/E/S dataset.

[8] We explain the computation of *AFD Reliance* and *MFR Reliance* in Sections 4.1 and 4.2, respectively.

4 Research Method

We employ SEM with measures of credibility as latent variables to test two distinct relations between management and analyst forecasts. The first encompasses the relation between initial management Earnings Per Share (EPS) forecasts and analyst initial EPS forecasts, moderated by management's prior forecasting ability and CG. The second covers the relation between analyst forecast deviations (i.e., the difference between the initial management and analyst EPS forecasts) and management forecast revisions, moderated by analyst credibility.

4.1 The Relation between Initial Management Forecasts and Analyst Forecasts

First, we compute the level of reliance analysts place upon management's initial forecasts in making their own forecasts. *AFD Reliance* is defined as follows:

$$AFD\ Reliance_t = -|AF_t - MF_t| \quad (1)$$

Where: MF_t is the initial management EPS forecast for year t and AF_t is the initial analyst consensus mean forecast EPS for year t. Table 2 provides detailed definitions for variables discussed in this section.[9]

If the analysts rely entirely on the management forecast, $AFD\ Reliance_t$ will take on the value of zero. However, if the consensus analyst forecast deviates from the management forecast, $AFD\ Reliance_t$ will take on a more negative value.

[9] Note that these forecasts are scaled by the relevant base price and hence account for any scaling issue due differences in the magnitude of the share prices.

289 [Insert Table 2 about here]

290

291 We examine management credibility using a latent variable *MF_CR*. To measure the latent
292 variable, we use observable variables based on managers' prior forecasting history (Williams,
293 1996, Graham et al., 2005) and observable proxies for good CG practice. Table 2, Panel B lists
294 the definitions for these observable variables. Our first measure of management forecast
295 credibility is previous forecast optimism. Optimism in forecasting is defined as an indicator
296 variable equal to one if the management forecast error was positive, and zero otherwise. To
297 measure the forecast optimism over the past five years ($MF\_Optimism_{t-5,\ t-1}$), we average the
298 indicator variable for the years *t*-1 to *t*-5. The second measure is previous forecast accuracy. If
299 managers have built a reputation for accurate reporting of performance, it is likely that current
300 year management forecasts are perceived to be more credible (Hirst et al., 1999). We use the
301 absolute value of Management Forecast Error (*MFE*) to estimate management forecast
302 accuracy and take the average of the measure for the past five years, i.e., *t*-5 to *t*-1, to estimate
303 $MF\_Accuracy_{t-5,t-1}$.[10]

304 Our third measure of management forecast credibility is the previous year's earnings
305 surprise. We define the previous earnings surprise ($MF\_Surprise_{t-1}$) as the actual EPS for the
306 year *t-1* minus the last management EPS forecast for year *t-1*, deflated by the previous year's
307 base price. Our fourth measure is management forecast consistency. Following Hilary et al.
308 (2014), we compare the variation in management and analysts' consensus forecasts to compute
309 consistency. $MF\_Consistency_{t-5,t-1}$ is defined as an indicator variable equal to one if the standard
310 deviation of MFEs from *t-1* to *t-5*, was lower than the standard deviation of consensus Analyst
311 Forecast Errors (*AFE*) from *t-1* to *t-5*, and zero otherwise. *AFE* is measured as the mean

[10] *MFE* is defined as the initial management forecast EPS for the year *t* [MF_t] less the actual EPS for the year *t*, scaled by the share price two days before the forecast announcement date.

consensus forecast EPS less the actual EPS. Our final measure relates to whether "bad news" is predicted by management. Hutton et al. (2003) conclude that bad news is more informative than good news. $MF\_Bad\_News_{t-1}$ is an indicator equal to one if the initial management forecast deflated by base price is below the prior month median consensus analyst forecast EPS deflated by base price, and zero otherwise.

To measure CG, we use variables that reflect monitoring of management and the perception of management's credibility. From prior research (e.g., Klein, 2002) and the TSE CG Code (TSE, 2015) we identify five major CG variables that are most likely to influence the credibility of the management: $IDORTO_{t-1}$, $FRGN_{t-1}$, $CROSS_{t-1}$, $ANTEI_{t-1}$, and $WEBEVL_{t-1}$. All CG measures are measured at year *t-1*. Boards with more outside directors ($IDORTO_{t-1}$) are shown to be associated with fewer instances of fraud and lower earnings management (Beasley, 1996; Klein, 2002). Ownership structures and corporate groupings are influential on firm behaviour in Japan, and by implication, can also influence perceptions of credibility. For example, we expect greater external monitoring when there is a more foreign ownership ($FRGN_{t-1}$) of the firm. The existence of stable shareholders ($ANTEI_{t-1}$) and cross-shareholdings ($CROSS_{t-1}$) may reduce the impact of external monitoring, resulting in less accurate management disclosures.[11] We also include a disclosure score from CGES representing an evaluation of the company's website ($WEBEVL_{t-1}$), which is a proxy for the firm's overall transparency.

4.2 The Relation between Analyst Forecasts and Management Forecast Revisions

[11] Cross-shareholding and stable shareholding in Japan have typically been the focus of prior studies on Japan. However ownership structures have been changing. Cross shareholdings and stable shareholdings have declined (Yoshikawa & McGuire, 2008), providing the opportunity for greater foreign ownership in Japanese firms.

In the second model, we investigate whether the relationship between analyst forecast and subsequent management forecasts revisions are influenced by analyst credibility. To do so, we first compute $MFR\ Reliance_t$ as follows:

$$MFR\ Reliance_t = -|MFR_t - AF_t| \quad (2)$$

Where: MFR_t is the revised management EPS forecast in year t and AF_t is the initial analyst consensus mean EPS forecast for year t. $MFR\ Reliance_t$ shows the amount of reliance that management places on the analyst consensus forecast when revising their forecasts. When the management relies entirely on the analyst consensus forecast, $MFR\ Reliance_t$ will take on the value of zero. However, if the revised management forecasts deviates from the analyst forecast, $MFR\ Reliance_t$ will take on a more negative value.

Table 2, Panel C lists the definitions of the observable variables used to measure the latent variable Analyst Credibility *(AF_CR)*. Our first measure of analyst credibility is prior year's analyst forecast accuracy (AF_ABSFE_{t-1}) which is estimated as the absolute value of the forecast error for the prior year (*t-1*), deflated by the previous year's base price. More accurate analyst forecasts are expected to be associated with greater analyst credibility. Our second measure relates to the dispersion in analysts' forecasts, $AF\_Dispersion_{t-1}$, measured as the standard deviation in analyst forecasts at year-end of the prior fiscal year (*t-1*), and deflated by the previous year's base price. Our third measure of analyst credibility is previous optimism, $AF\_Optimism_{t-1}$, which is an indicator variable equal to one if the prior year's *AFE* is positive, and 0 otherwise. Forecasts which contain bias or are optimistic are likely to be perceived as less credible. Our fourth measure of analyst credibility is forecast consistency, $AF\_Consistency_{t-5,\ t-1}$, measured by the standard deviation of *AFE* deflated by the base price over the past five years. More consistent forecasts are likely to be perceived as more credible. Our fifth measure of analyst credibility examines the percentage change in dispersion in

analysts' forecasts following the release of the initial management forecast for year *t-1* (*AF_SDDrop*$_{t-1}$). Following Baginksi et al. (1993), we measure *AF_SDDrop*$_{t-1}$ as:

$$AF\_SDDrop_{t-1} = \frac{(AF\_STDEV_{PRE} - AF\_STDEV_{POST})}{AF\_STDEV_{PRE}} \quad (3)$$

Where: AF_STDEV_{PRE} is the standard deviation of analyst forecasts in the month prior to the first management forecast of the year *t-1,* and AF_STDEV_{POST} is the standard deviation of analyst forecasts in the month following the initial management forecast of the year *t-1.* We also include the mean number of analysts following the firm during the current year, *ANA_Number*$_t$.

5 Results

5.1 Descriptive Statistics

Table 3 Panel A presents the descriptive statistics for the variables used in the study. The mean of MF_t is 5.7 while the mean of AF_t is 6.0 percent.[12] This shows that even though both forecasts are fairly close in value, analysts are on average more optimistic than management in their forecasts. Correspondingly, *AFD* $Reliance_t$ has a mean of -0.9 percent, showing that analysts do not rely entirely on management when formulating their EPS forecasts.

[Insert Table 3 about here]

The variable *MF_Optimism*$_{t-5,t-1}$ shows that, based on the past five years, management are, more often than not, pessimistic with their initial EPS forecasts (mean = 0.483 and median = 0.4). *MF_Accuracy*$_{,t-1}$ and *MF_Surprise*$_{t-1}$ compare the initial and last management forecast

[12] The forecasts are expressed as a percentage of the share price and allow comparison across firms.

EPS in year *t-1* respectively, to the actual EPS in year *t-1*. $MF\_Accuracy_{,t-5,t-1}$ shows the average forecast accuracy based on the past five years. The mean of 2.7 percent suggests a relatively high error rate in the initial management forecast provided. The statistics show low levels of surprise, where the mean and median of $MF\_Surprise_{t-1}$ are both 0.1 percent. Consistent with prior research, our data suggests forecasting accuracy improves throughout the year.[13] We also find management are more consistent in their forecasts than analysts. That is, the standard deviation of their forecast errors are smaller than the standard deviation of consensus analysts forecast errors. Last, in 64 percent of cases, the initial management forecast estimate is lower than the mean analyst forecast made in the month prior to initial management forecast.

Table 3 Panel A also presents the descriptive statistics for the CG structure variables. We identified five CG variables that are most likely to influence the credibility of the management: $IDORTO_{t-1}$, $FRGN_{t-1}$, $CROSS_{t-1}$, $ANTEI_{t-1}$, and $WEBEVL_{t-1}$. These variables show approximately one in ten directors are outside directors without experience in a controlling company, affiliated company or a main bank ($IDORTO_{t-1}$). Less than a quarter (24%) of the stocks are foreign owned ($FRGN_{t-1}$) and approximately 8% of shares are held by domestic companies with cross-shareholdings ($CROSS_{t-1}$) relations. In addition, less than a third of the shares (31%) in our sample firms are held by stable shareholders ($ANTEI_{t-1}$).

Panel B presents the descriptive statistics for the variables used to examine the relation between analyst forecast and management forecast revisions. The mean value of the analyst forecast (AF_t) is 5.9 percent and the mean value of the revised management forecast (MFR_t) is 5.3 percent. Comparing the statistics from Panel A, we observe that management are more likely to revise their forecast downwards, i.e., $MFR_t < MF_t$. Also, management are less likely

[13] Note the other difference between the two measures is that we take the absolute of the difference between forecast and actual EPS when calculating $MF\_Accuracy_{t-1}$ and we use the signed value for $MF\_Surprise_{t-1}$. We made the conclusion based on comparing the maximum value of the two measures.

to rely on the analyst forecast when formulating their revised forecast than vice versa, i.e., $MFR\ Reliance_t < AFD\ Reliance_t$.

For analyst credibility, the statistics show that analysts are on average more optimistic with their prior year forecasts (*AF_Optimism*$_{t-1}$ proportion = 0.523). The mean *AF_SDDrop*$_{t-1}$ value of 0.048 suggests a decrease in the standard deviation of analyst forecasts in the month after the release of the management forecast, compared to the month after. The median of 0.169 shows that for more than half of the firms, there is a decrease in the standard deviation of analyst forecasts after the release of the management forecast. This is consistent with the notion that management forecasts help to resolve uncertainty for analysts. The mean forecast accuracy (*AF_ABSFE*$_{t-1}$) is 0.026, the mean forecast consistency (*AF_Consistency*$_t$) is 0.034, and the average analyst following (*ANA_Number*$_t$) is 9.63.

Table 4 presents correlation matrices for the Management Forecast sample (Sample 1) and the Management Forecast Revision sample (Sample 2) in Panels A and B respectively. In Panel A we observe a strong correlation between MF_t and AF_t (ρ =0.91), suggesting that much of the information used in the management forecasts are reflected in the analyst forecast. We also observe significant correlations between *AFD Reliance*$_t$ and measures of management's prior forecasting ability, and *FRGN*$_{t-1}$. While $AFD\ Reliance_t$ is negatively correlated with both *MF_Accuracy*$_{t-1}$ and *MF_Bad_News*$_{t-1}$, it is positively correlated with *MF_Suprise*$_{t-1}$.

In contrast to the strong correlation between MF_t and AF_t, the correlation between AF_t and MFR_t shown in Panel B is relatively weaker (ρ =0.735). *MFR Reliance*$_t$ is significantly negatively correlated with most of the measures of analyst credibility including *AF_Optimism*$_{t-1}$, *AF_Dispersion*$_{t-1}$, *AF_ABSFE*$_{t-1}$ *and AF_Consistency*$_{t-1}$.

[Insert Table 4 about here]

5.2 *Effects of Management Forecasts on Analyst Forecasts*

Our first research question investigates the effects of management forecast credibility and CG on the relationship between management forecasts and analyst forecasts. The results are shown in Table 5 and Figure 1 which reproduces the STATA output from the SEM Builder. The numbers adjacent to the arrows in Figure 1 show the loading of the variables used for management credibility (CG variables and measures of prior forecast properties) on the latent variable (*MF_CR).* For example, the loading of *MF_Optimism* is -0.068, which is statistically significant (p = 0.002). The relationships (untabulated) between the underlying latent variable and all underlying variables for management credibility, except for $MF\_Accuracy_{t-5,t-1}$ and $MF\_BadNews_{t-1,}$ are statistically significant at conventional levels.

We use the following tests to examine the fit of our model: the likelihood ratio (χ^2), Root Mean Squared Error of Approximation (RMSEA), the Comparative Fit Index (CFI) and the Standardized Room Mean Squared Residual (SRMR).[14] Table 5, shows our model is a good fit in one of the four tests only (the SRMR test).

The path coefficient between *MF_CR* and $AFD\ Reliance_t$ of 0.081 is significant at the 0.01 level and infers that management credibility moderates the relationship between analyst and management forecasts. These results lend support to hypothesis H1, that is analysts place a greater reliance on the management forecasts when management are more credible.

In further analysis, we recognise the inherent difficulties management faces in forecasting EPS by dividing the sample based on prior EPS volatility (high and low EPS volatility) to determine whether analyst reliance on management's initial forecasts is affected by the difficulty in predicting EPS.[15] Untabulated results show that, consistent with our expectations,

[14] Hair et al. (2010) discuss the problems of using the χ^2 statistic is assessing model fit in larger sample sizes. It is not unexpected that there is a statistically significant result for this test, given our sample size.
[15] EPS volatility is estimated using the standard deviation of the EPS for the previous five years.

when EPS uncertainty is higher, management credibility has a stronger effect on analyst reliance.

[Insert Table 5 and Figure 1 about here]

5.3 Effects of Analyst Forecasts on Management Forecasts

Our second research question investigates the existence and relative importance of analyst credibility on the relation between analyst forecasts and management forecast revisions. Table 6 and Figure 4 present the results of the SEM with *AF_CR* as the latent variable and $MFR\ Reliance_t$ as the outcome variable. The numbers adjacent to the arrows in Figure 2 show the loading of our indicator variables for analyst credibility on our latent variable (*AF_CR*). For example, the loading of $AF\_Optimism_{t-5,t-1}$ is -0.11 which is statistically significant at <0.001 level. All indicator variables for analyst credibility (except for ANA_Number_t) are statistically significant at conventional levels.

Analysis of the goodness of fit statistics in Table 5 indicates only one of the four tests (SRMR) shows the model is a good fit. The path coefficient is 0.327, statistically significant at the 0.01 level, and hence support hypothesis H2 that analyst credibility moderates the relation between analyst and management forecasts. Further analysis indicates that EPS volatility does not affect this relationship, i.e., EPS uncertainty does not change analyst credibility's moderating role.

[Insert Table 6 and Figure 2 about here]

6 Additional Results

6.1 *Industry and year effects*

In additional analysis, we address the concern that our measures, *AFD Reliance* and *MFR Reliance*, do not capture the reliance that analyst (management) place on the management (analyst) forecasts, and that management and analysts may be reacting to the same industry events. To do so, we adjust MF_t, AF_t and MFR_t by the industry and year median to remove these effects.[16] The summary statistics (untabulated) show the means of the adjusted MF and AF measures are, by construction, close to zero (i.e., -0.2 and -0.3 percent, respectively). We present the results for the SEMs in Table 5 Panel B and Table 6 Panel B. As shown in the tables, the results are consistent with those using unadjusted measures. That is, management credibility (*MF_CR*) moderates the reliance that analysts place on management forecasts. Similarly, analyst credibility (*AF_CR*) has the same moderating effect on the reliance that management place on analysts' consensus forecasts.

6.2 *Alternative specification of the MF_CR latent variable*

In the SEM analysis (see Table 5), we use observable variables such as management forecast accuracy in prior years and five corporate governance proxies to measure the latent variable capturing management credibility, *MF_CR*. In additional analysis, we include other CG variables to measure the latent variable. Firms with smaller boards (BRD_NUM_{t-1}) and board committees (FLG_COMM_{t-1}) may also be associated with more effective monitoring.[17] In

[16] We were unable to source Global Industrial Classification Standard data for all of our sample and the Nikkei industry classifications were too finely partitioned. Therefore, we create our own industry classifications based upon the Nikkei data, The 13 industry segments in this study are created from the 36 Nikkei Industry Medium Level segments by merging related segments. Further details available on request available from the corresponding author.

[17] Whilst board committees are common features of CG in other countries (e.g., UK, USA), they are less common in Japan. In traditional Japanese CG, there is a two-board structure comprising the board of directors and the board of corporate auditors. However since 2003, companies in Japan have been given the option of adopting an Anglo-American style of CG to include board committees (audit, nomination and remuneration committees).

addition, we include several other measures of ownership: institutional ($INST_{t-1}$), influential ($NFLOAT_{t-1}$), management (ENT_{t-1}), and dominant shareholders ($DOMI_{t-1}$). Untabulated results show the relation between *MF_CR* and *AFD_Reliance* is positive but not statistically significant at the conventional levels. This shows the results from the SEM analysis are sensitive to the model specification.

6.3 Mediating effects (Registered Protocol)[18]

The analysis conducted thus far assumes credibility plays a moderating role in the relation between management and analyst forecasts. However, credibility can also take on a mediating role.[19] This happens when an independent variable's effect on a dependent variable is transmitted through the mediator. In path analysis language, mediation is the indirect effect on an independent variable of a dependent variable that goes through a mediator variable, which in this case is credibility.

[Insert Table 7 about here]

Definitions for the variables used in this part of the paper are shown in Table 7. In this analysis, we examine the relation between Management Forecast Innovation [MFI_t] and Analyst Forecast Innovation [AFI_t]. MFI_t is defined as the initial management forecast EPS for the year (t) less the actual EPS for the prior year (t-1), deflated by the share price two days before the forecast announcement date. AFI_t is defined as the initial analyst consensus mean forecast EPS for the year less the actual EPS for the prior year (t-1) deflated by the share price

[18] The analysis presented in this section is based on the research design proposed in the Stage II protocol document. At the request of the reviewer in a subsequent review, we adopted the research design presented in the main section of the paper.

[19] For further discussion of the distinction between moderation and mediation of variables, see Baron and Kenny (1986).

two days before the forecast announcement date. We examine the indirect effects of management forecasts on analyst forecasts through the latent variables for management credibility, *MF_CR* (as previously defined). The analysis is conducted in a manner similar to Bhattacharya et al. (2012) and Hilary et al. (2016). The direct and indirect paths through the latent variables in our model are indicated by the path arrows in Figure 3. There is a direct path between MFI_t and AFI_t, and a direct path between *MF_CR* and *AFI*. An indirect path exists between MFI_t and AFI_t via *MF_CR*. Table 8 presents the results of the SEM with MFI_t as the source variable, AFI_t as the outcome variable, and *MF_CR* as the latent variable.

[Insert Figure 3 and Table 8 about here]

The ratio of the direct path coefficient (1.001) to the total effect (0.9498) is the portion of the correlation between MFI_t and AFI_t that is attributable to the direct path. The mediated or indirect path (-0.0509) is the product of the path coefficient between MFI_t and *MF_CR* (-0.8384), and the path coefficient between *MF_CR* and AFI_t (0.0607). The ratio of the mediated path to the total effect captures the proportion of the correlation between MFI_t and AFI_t that is attributable to the mediated effect. While the direct effect of management forecast on analyst forecast is strong, the insignificant indirect effect suggests management forecast credibility does not mediate the effect of management's initial forecast innovation on analyst forecasts.

In the next part of our analysis, we examine the relation between analyst forecast deviation [AFD_t] and management forecast revision update [$MFRU_t$]. AFD_t is the initial analyst consensus mean forecast EPS for year (t) less the initial management forecast for the year (t), deflated by the share price two days before the forecast announcement date. $MFRU_t$ is defined as the revised management forecast EPS for the year (t) less the initial management forecast

EPS for the year (*t)*, deflated by the share price two days before the forecast announcement date. We examine whether the relation between analyst forecast deviation and management forecast revisions are affected by analysts' credibility [*AF_CR*]. *AF_CR* is as previously defined.

Figure 4 presents the path diagram showing the direct and indirect paths between analyst forecast deviation and management forecast revisions. We expect a direct path between AFD_t and $MFRU_t$, and an indirect path which works through *AF_CR.* Table 9 shows the results of the SEM with AFD_t as the source variable, $MFRU_t$ as the outcome variable, and *AF_CR* as the latent variable. The ratio of the direct path coefficient (0.1169) to the total effect (0.1146) is the portion of the correlation between AFD_t and $MFRU_t$ that is attributable to the direct path. The mediated or indirect path (-0.0023) is the product of the path coefficient between AFD_t and *AF_CR* (-0.0228), and the path coefficient between *AF_CR* and $MFRU_t$ (0.0996). The ratio of the mediated path to the total effect captures the proportion of the correlation between AFD_t and MFR_t that is attributable to the mediated effect. The direct effect of analyst forecast deviation on management forecast revisions is strong, however we do not find evidence to support the notion that analyst credibility mediates the effect of analyst forecast on management forecast revisions.

[Insert Figure 4 and Table 9 about here]

7 Conclusions

We use SEM to investigate key relationships between management and analysts' forecasts to determine whether there is a moderating role for credibility. SEM is relatively unexplored in this literature to date, but is a powerful method to model latent variables such as credibility.

We model the relation between management and analyst forecasts in a SEM framework and include management credibility and analyst credibility separately as moderating factors. We chose to study Japanese firms as management forecasts are effectively mandatory in Japan. This omits the selection bias apparent in other countries (e.g., US) where managers have a choice about whether to disclose forecasts. In addition, where management's expectations change, the management's forecasts must be revised on a timely basis, providing a rich history of management forecast data.

We investigate whether the relation between management forecasts and analyst forecasts is moderated by credibility in TSE listed First Section firms between 2006 and 2016. Two distinct aspects of this relation are examined. With the first, our results show that management credibility (proxied by prior forecasting ability and firm's CG) influences the reliance analysts place upon information in management's initial forecast in making their own EPS forecasts. Additional results show that management's initial forecast has only a direct effect on analysts' forecasts.

In the second aspect of this relation, the moderating effect of analyst credibility on the relation between analyst forecasts and management forecast revisions is examined. We show that management's reliance on analyst forecasts is determined by how credible analyst forecasts have been historically. The SEM analysis shows analyst credibility has a moderating effect on the relation. Where analysts are perceived to be more credible, managers exhibit reliance upon information in analysts' consensus forecasts in making their own forecast.

Our findings put the focus on credibility in better understanding the relationship between management and analyst forecasts. Each party's reliance on the other's forecast is influenced by historical forecasting ability and in the case of analysts, also by the corporate governance mechanisms within the firm. The implication is the importance of reputation building and reputation maintenance by both management and analysts in the forecasting environment.

588

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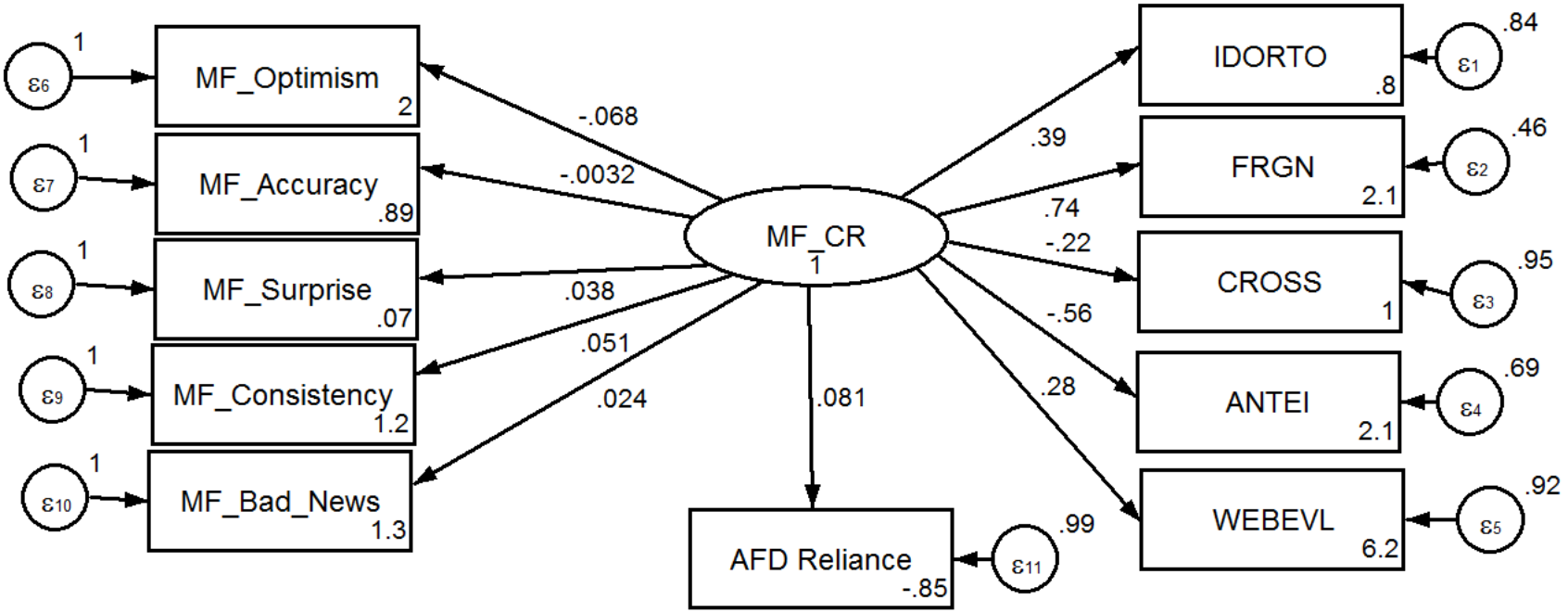
691

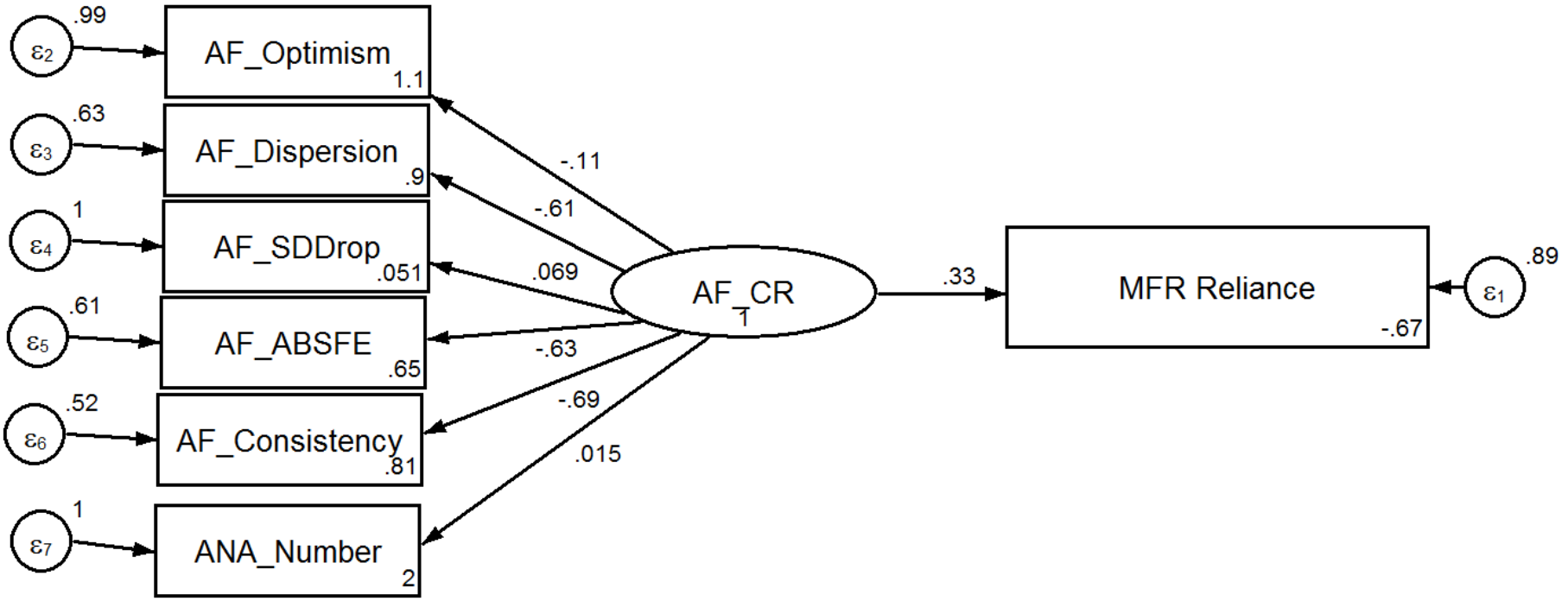
FIGURE 1
SEM Model Showing Paths between AFD Reliance and Two Latent Credibility Variables
(Standardized coefficients)



Note: Rectangles represent observed variables and ellipse indicates a latent (unobserved) variable. Error terms are indicated in circles and variances are indicated next to each error term. There are ten observable variables which contribute to the latent variable management credibility (*MF_CR):* These are $MF\_Optimism_{t-5,t-1}$, $MF\_Accuracy_{t-5,t-1}$, $MF\_Surprise_{t-1}$, $MF\_Consistency_{t-5,t-1}$, $MF\_Bad\_News_{t-1}$, $IDORTO_{t-1}$, $FRGN_{t-1}$, $CROSS_{t-1}$, $ANTEI_{t-1}$, and $WEBEVEL_{t-1}$. The numbers adjacent to the arrows leading from the latent variable show the loading of variables on the latent variable (*MF_CR).* The numbers in the rectangles [observed variables] represent the constant term in the SEM estimation for the observable variable. Source: STATA SEM Builder Output. Variables are defined in Table 2.

FIGURE 2

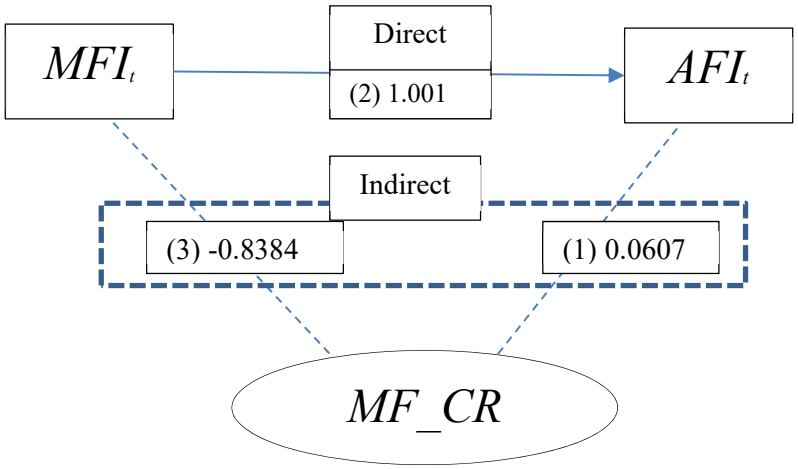
SEM Model Showing Paths between MFR Reliance and One Latent Credibility Variable (Standardized coefficients)



Note: Rectangles represent observed variables and ellipse indicates a latent (unobserved) variable. Error terms are indicated in circles. There are six observable variables which contribute to the latent variable analyst credibility (*AF*_CR). These are $AF\_Optimism_{t-1}$, $AF\_Dispersion_{t-1}$, AF_SDDrop_{t-1}, AF_ABSFE_{t-1}, $AF\_Constistency_{t-5,t-1}$ and ANA_Number_{t}. The numbers adjacent to the arrows leading from the latent variable show the loading of variables on the latent variable (*AF*_CR). The numbers in the rectangles [observed variables] represent the constant term in the SEM estimation for the observable variable. Source: STATA SEM Builder Output. Variables are defined in Table 2.

FIGURE 3

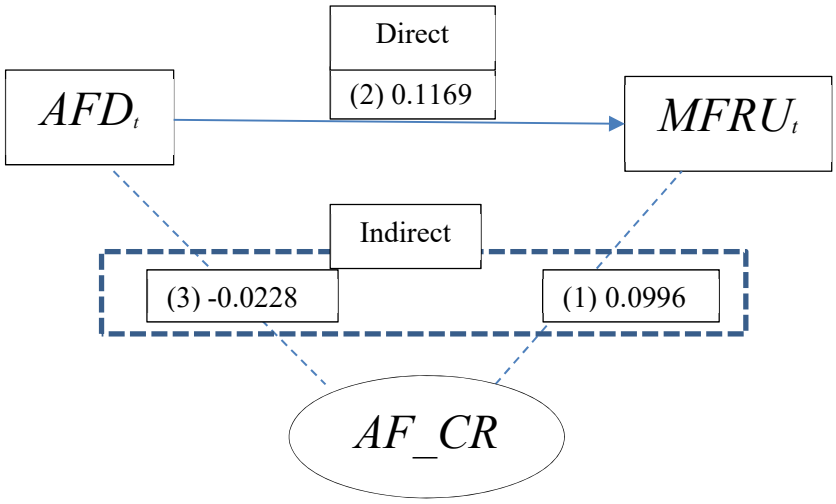
Path Diagram Showing Direct and Indirect Paths between Management Forecast Innovations and Analyst Forecast Innovations



Note: Rectangles represent observed variables and ellipses represent latent (unobserved) variables. Latent variables are measured by multiple observed variables, as discussed in section 4.1. Direct effects are indicated by a solid line arrow and indirect effects are indicated by a dashed line arrow. Variables are defined in Table 7.

FIGURE 4

Path Diagram Showing Direct and Indirect Paths between Analyst Forecast Deviation and Management Forecast Revisions



Note: Rectangles represent observed variables and ellipse indicates a latent (unobserved) variable. Latent variables will be measured by multiple observed variables, as discussed in section 4.2. Direct effects are indicated by a solid line arrow and indirect effects are indicated by a dashed line arrow. Variables are defined in Table 7.

TABLE 1
Sample Selection

Panel A: Overall Sample Selection

		No. of firm years
Number of firm year observations issuing management forecast of EPS from 2006 to 2016		13,984
Less:		
(a) Management forecast horizon > 370 days	660	13,324
(b) Firms with missing analyst forecast data on I/B/E/S	4,552	8,772
(c) Firms with fewer than 3 analysts contributing to consensus forecasts	3,877	4,895
(d) Firms with missing CG and MF related data	917	3,978
(e) Outliers where *AFD Reliance* is in 1% and 99% percentile	67	3,911
Management Forecast [MF] Sample (for modelling the effects of MF_t on AF_t		3,911
Less:		
Outliers where *MFR Reliance* is in 1% and 99% percentile	551	
Management Forecast Revision [MFR] Sample for modelling the effects of AF_t on MFR_t		3,360

Panel B: Sample size by year

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total
MF Sample	323	377	396	369	369	378	392	367	320	332	288	3,911
MFR Sample	293	322	366	346	335	307	332	302	240	262	255	3,360

TABLE 2
Variable Definitions

Panel A: Management and Analyst Forecast Variables

Variable Label	Definition
AF_t	Analyst Forecast defined as the initial analyst (based on consensus mean) forecast EPS for the year (t) deflated by the share price two days before the announcement date.
MF_t	Management Forecast defined as the initial management forecast EPS for the year (t) deflated by the share price two days before the announcement date.
$AFD\ Reliance_t$	*AFD Reliance* is defined as $-|AF - MF|$.
MFR_t	*MFR* is defined as the revised management forecast EPS for the year (t) deflated by the base price (share price two days before the announcement date).
$MFR\ Reliance_t$	*MFR Reliance* is defined as $-|MFR - AF|$.

Panel B: Latent Variable: Management Forecast Credibility (*MF_CR*)

Variable Label	Definition
$MF\_Optimism_{t-5,t-1}$	Average of the following indicator variable for the past five years (t-5 to t-1). For year t, the indicator variable is set equal to 1 if the Management Forecast Error (MFE) was positive; 0 otherwise. MFE is defined as the initial management forecast EPS for the year t less the actual EPS for the year t, deflated by the share price two days before the forecast announcement date.
$MF\_Accuracy_{t-5,t-1}$	Average of the absolute value of the MFE for the past five years (t-5 to t-1).
$MF\_Surprise_{t-1}$	Actual EPS for year t-1 minus the final management forecast for EPS for year t-1, deflated by the share price two days before the forecast announcement date.
$MF\_Consistency_{t-5,t-1}$	Indicator variable equal to 1 if the standard deviation of the MFE (from *t-1* to *t-5*) is less than the standard deviation of the consensus Analyst Forecast Error (AFE) (from *t-1* to *t-5)*, 0 otherwise. AFE defined as the mean consensus analyst forecast EPS less actual EPS as reported by I/B/E/S, deflated by the share price two days before the analyst forecast announcement date. (Source: Hilary et al., 2014)
$MF\_Bad\_News_{t-1}$	Indicator variable equal to 1 if initial management forecast EPS estimate for year t-1 is below previous month's analyst median consensus EPS; 0 otherwise. (Source: Hutton et al., 2003)
$IDORTO_{t-1}$	Percentage of outside directors (i.e. without job experience in banks, controlling companies, affiliated companies and main banks)
$FRGN_{t-1}$	Percentage of shares held by foreign shareholders
$CROSS_{t-1}$	Percentage of shares held by domestic companies with cross-shareholding relations
$ANTEI_{t-1}$	Percentage of shares held by stable shareholders
$WEBEVL_{t-1}$	Total evaluation score of company website from the ease to understand, ease of use, and information quantity, sourced from Nikko IR co. The range is from 0 to 100. Higher scores indicate higher disclosure quality.

Panel C: Latent Variable: Analyst Credibility (*AF_CR*)

Variable Label	Definition
AF_ABSFE_{t-1}	Absolute value of AFE for year *t*-1.
$AF\_Dispersion_{t-1}$	Standard deviation of analyst forecasts for year *t*-1.
$AF\_Optimism_{t-1}$	Indicator variable equal to 1 if AFE for year *t*-1 was positive; 0 otherwise.
$AF\_Consistency_{t-5,t-1}$	Standard deviation of AFE over the past five years.
AF_SDDrop_{t-1}	Standard deviation of analyst forecasts in month prior to initial management forecast in year *t*-1 minus standard deviation in analyst forecast in month following initial management forecast in year *t*-1, scaled by standard deviation of analyst forecasts in month prior to initial management forecast
ANA_Number_{t}	Number of analysts following the firm. We take the average number of analysts following at the start and at the end of the current year.

TABLE 3
Descriptive Statistics

Panel A: Management Forecast Sample (*N*=3,911)

Variable	Mean	Std. Dev.	Min	25%	Median	75%	Max
MF_t	0.057	0.034	-0.414	0.042	0.056	0.072	0.226
AF_t	0.060	0.033	-0.338	0.046	0.060	0.075	0.220
$AFD\ Reliance_t$	-0.009	0.011	-0.118	-0.012	-0.006	-0.003	0.000
$MF\_Optimism_{t-5,t-1}$	0.483	0.244	0.000	0.400	0.400	0.600	1.000
$MF\_Accuracy_{t-5,t-1}$	0.027	0.030	0.001	0.010	0.018	0.032	0.412
$MF\_Surprise_{t-1}$	0.001	0.014	-0.235	-0.001	0.001	0.005	0.092
$MF\_Consistency_{t-5,t-1}$	0.601	0.490	0.000	0.000	1.000	1.000	1.000
$MF\_Bad\_News_{t-1}$	0.638	0.481	0.000	0.000	1.000	1.000	1.000
$IDORTO_{t-1}$	9.805	12.198	0.000	0.000	6.667	16.667	85.714
$FRGN_{t-1}$	24.100	11.611	0.810	15.890	22.760	30.700	76.020
$CROSS_{t-1}$	7.701	7.346	0.000	1.380	6.050	11.560	45.000
$ANTEI_{t-1}$	30.855	14.815	0.540	19.310	27.980	40.710	75.350
$WEBEVL_{t-1}$	58.940	9.514	33.400	52.000	58.000	65.000	92.900

Panel B: Management Forecast Revision Sample (*N*=3,360)

Variable	Mean	Std. Dev.	Min	25%	Median	75%	Max
AF_t	0.059	0.034	-0.323	0.046	0.059	0.075	0.220
MFR_t	0.053	0.045	-0.559	0.039	0.055	0.072	0.360
$MFR\ Reliance_t$	-0.017	0.026	-0.303	-0.020	-0.010	-0.004	0.000
$AF\_Optimism_{t-1}$	0.531	0.499	0.000	0.000	1.000	1.000	1.000
$AF\_Dispersion_{t-1}$	0.009	0.009	0.000	0.003	0.006	0.010	0.132
AF_SDDrop_{t-1}	0.048	0.938	-31.667	-0.085	0.169	0.405	1.000
AF_ABSFE_{t-1}	0.026	0.040	0.000	0.005	0.013	0.029	0.396
$AF\_Consistency_{t-5,t-1}$	0.034	0.042	0.001	0.011	0.021	0.042	0.704
ANA_Number_t	9.626	4.851	3.000	5.583	8.667	13.083	28.250

Note: Variables as defined in Table 2.

TABLE 4
Correlation between Variables

Panel A: Management Forecast Sample (*N* = 3,911)

		1	2	3	4	5	6	7	8	9	10	11	12
1	MF_t	1											
2	AF_t	0.9142*	1										
3	$AFD\ Reliance_t$	0.1296*	0.0411*	1									
4	$MF\_Optimism_{t-5,t-1}$	-0.1084*	-0.1298*	-0.0296	1								
5	$MF\_Accuracy_{t-5,t-1}$	0.0476*	0.0652*	-0.2560*	0.1965*	1							
6	$MF\_Surprise_{t-1}$	0.1040*	0.0999*	0.0452*	-0.1596*	-0.0366*	1						
7	$MF\_Consistency_{t-5,t-1}$	-0.0096	-0.0063	-0.0158	0.0031	0.0198	0.0046	1					
8	$MF\_Bad\_News_{t-1}$	-0.1417*	0.0517*	-0.0610*	-0.0558*	-0.0375*	-0.0590*	-0.0098	1				
9	$IDORTO_{t-1}$	0.0031	0.0043	0.0079	-0.0014	0.0597*	-0.0041	0.0185	0.0335*	1			
10	$FRGN_{t-1}$	0.0531*	0.0480*	0.0986*	-0.1174*	-0.0595*	0.0334*	0.0352*	0.0156	0.2712*	1		
11	$CROSS_{t-1}$	-0.0064	-0.0074	-0.017	-0.0525*	-0.0137	-0.0077	-0.0001	-0.0235	-0.1180*	-0.1731*	1	
12	$ANTEI_{t-1}$	0.0121	0.0043	0.0182	-0.0624*	-0.0963*	-0.0206	-0.026	0.001	-0.1831*	-0.4320*	0.0763*	1
13	$WEBEVL_{t-1}$	-0.0202	-0.0169	0.0132	0.0172	0.0549*	-0.0256	0.0484*	0.0165	0.2970*	0.1470*	-0.0920*	-0.1710*

Panel B: Management Forecast Revision Sample (*N*=3,360)

		1	2	3	4	5	6	7	8
1	AF_t	1							
2	MFR_t	0.7351*	1						
3	$MFR\ Reliance_t$	0.0305	0.3615*	1					
4	$AF\_Optimism_{t-1}$	-0.1572*	-0.2022*	-0.1264*	1				
5	$AF\_Dispersion_{t-1}$	-0.0034	-0.0391*	-0.1618*	0.016	1			
6	AF_SDDrop_{t-1}	-0.0114	-0.0129	-0.0003	0.012	-0.0945*	1		
7	AF_ABSFE_{t-1}	-0.3161*	-0.2689*	-0.2457*	0.1900*	0.3676*	-0.0397*	1	
8	$AF\_Consistency_{t-5,t-1}$	0.0546*	-0.0265	-0.2165*	-0.0084	0.4493*	-0.0187	0.4268*	1
9	ANA_Number_t	0.0141	0.0286	0.0324	-0.0417*	0.0216	0.0788*	-0.0138	-0.0146

*Note: *Indicates significance at 5% level or better. Variables as defined in Table 2.*

TABLE 5
Standardised Effects of Management Credibility on the Relationship between Management Forecasts and Analyst Forecasts

Panel A: Relationship between *MF* and *AF* measured by *AFD Reliance*

	Outcome	Coefficient
AFD Reliance		
	MF_CR --> AFD Reliance	0.0806***
Fit Statistics	*Likelihood ratio* (χ^2)	1083.67***
	RMSEA	0.078
	AIC	95328.978
	CFI	0.587
	SRMR	0.056
	No. of obs.	3,911

* $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$

Panel B: Relationship between *MF Adjusted* and *AF Adjusted* measured by *AFD Reliance Adjusted*

	Outcome	Coefficient
AFD Reliance		
	MF_CR --> AFD Reliance Adjusted	0.0792***
Fit Statistics	*Likelihood ratio* (χ^2)	1043.57***
	RMSEA	0.076
	AIC	95076.239
	CFI	0.597
	SRMR	0.055
	No. of obs.	3,911

* $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$

Note: Variables as defined in Table 2. See Section 6.2 for discussion of variables used in Panel B.

TABLE 6
Standardised Effects of Analyst Credibility on the Relationship between Analyst Forecast Deviation and Management Forecast Revisions

Panel A: Relationship between *MFR* and *AF* measured by *MFR Reliance*

	Outcome	Coefficient
MFR Reliance		
	AF_CR -->MFR Reliance	0.3266***
Fit Statistics	Likelihood ratio (χ^2)	252.83***
	RMSEA	0.071
	AIC	-28296
	CFI	0.887
	SRMR	0.038
	No of obs.	3,360

* $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$

Panel B: Relationship between *MFR Adjusted* and *AF Adjusted* measured by *MFR Reliance Adjusted*

	Outcome	Coefficient
MFR Reliance		
	AF_CR -->MFR Reliance	0.3062***
Fit Statistics	Likelihood ratio (χ^2)	245.04***
	RMSEA	0.070
	AIC	-28624
	CFI	0.888
	SRMR	0.037
	No of obs.	3,360

* $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$

Note: Variables are defined in Table 2. See Section 6.2 for discussion of variables used in Panel B.

TABLE 7
Management and Analyst Forecast Variable Definitions for Mediating Effects Analysis

AFI_t	Analyst Forecast Innovation defined as the initial analyst (based on consensus mean) forecast EPS for the year (t) less the actual EPS for the prior year (t-1), deflated by the share price two days before the forecast announcement date.
AFD_t	Analysts Forecast Deviation defined as the initial analyst (based on consensus mean) forecast EPS for the year (t) less the initial management forecast EPS for the year (t), deflated by the share price two days before the forecast announcement date.
MFI_t	Management Forecast Innovation defined as the initial management forecast EPS for the year (t) less the actual EPS for the prior year (t-1), deflated by the share price two days before the forecast announcement date.
$MFRU_t$	Management Forecast Revision Update is defined as the revised management forecast EPS for the year (t) less the initial management forecast EPS for the year (t), deflated by the share price two days before the forecast announcement date.

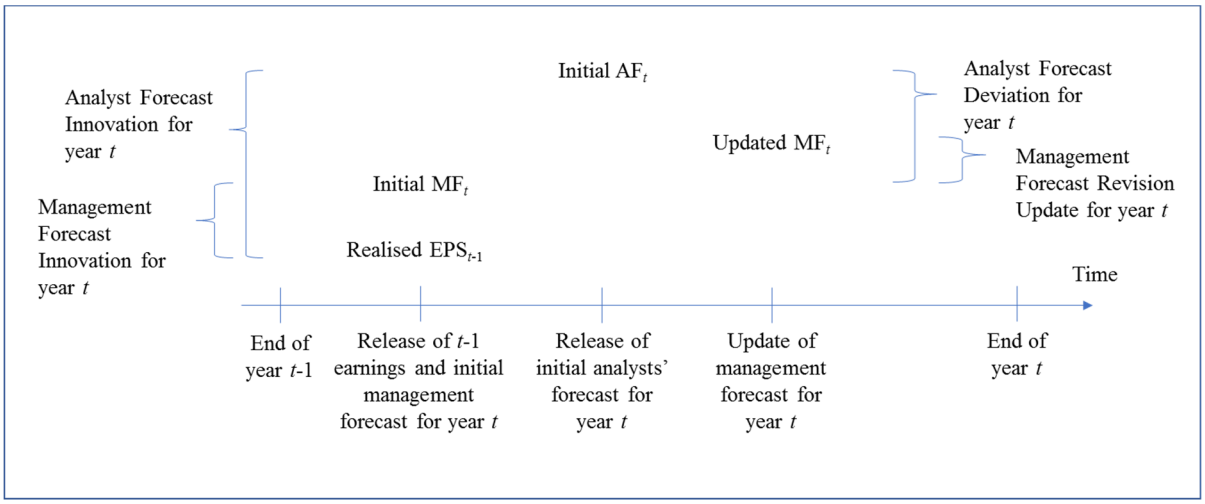


TABLE 8
Standardised Effects of Management Forecasts on Analyst Forecast Innovations

Unadjusted AFI and MFI

Outcome	Path	Direct Effect	Indirect Effect	Total Effect
AFI_t				
	(1) MF_CR --> AFI_t	0.0607		
	(2) MFI_t --> AFI_t	1.001***		
MF_CR				
	(3) MFI_t --> MF_CR	-0.8384***		
	(4) MFI_t --> AFI_t =(1) × (3)		-0.0509	
	(5) MFI_t --> AFI_t =(2) + (4)			0.9498***
Fit Statistics	*Likelihood ratio* (χ^2)			2762.33***
	RMSEA			0.115
	AIC			122,362
	CFI			0.789
	SRMR			0.080
	N			3,889

* $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$

Note: Variables are defined in Table 7.

TABLE 9
Standardised Effects of Analyst Forecast Deviation on Management Forecast Revisions

Unadjusted MFRU and AFD

Outcome	Path	Direct Effect	Indirect Effect	Total Effect
$MFRU_t$				
	(1)AF_CR --> $MFRU_t$	0.0996***		
	(2)AFD --> $MFRU_t$	0.1169***		
AF_CR				
	(3)AFD_t --> AF_CR	-0.0228		
	(4) AFD_t --> $MFRU_t$ (1) × (3)		-0.0023	
	(5) AFD_t -> $MFRU_t$ (2) + (4)			0.1146***
Fit Statistics	*Likelihood ratio* (χ^2)			374.13***
	RMSEA			0.075
	AIC			-47,940
	CFI			0.822
	SRMR			0.041
	N			3,326

* $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$

Note: Variables are defined in Table 7.