Managerial Ability and Analyst Forecast Behavior: Large Sample Evidence

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Prior literature documents that the managerial ability, derived from frontier analysis, is positively associated with accounting quality (Demerjian, Lev, Lewis, and McVay 2013; Baik, Farber and Lee 2011). In addition, prior literature indicates that number of analysts following a firm is positively associated with accounting quality, and analyst forecast dispersion is negatively associated with accounting quality (Lang and Lundholm 1996; Irani and Karamanou 2003). I examine the relation between managerial ability and the number of analysts following a firm as well as analyst forecast dispersion. I find that managerial ability is positively associated with analyst following a firm and negatively associated with analyst forecast dispersion. In addition, the effects are more pronounced after Sarbanes–Oxley Act of 2002, and are more pronounced for firms with complicated financial reports. Collectively, our findings support the notion that the managerial ability is relevant to analysts' decision making.

Keywords: managerial ability, analyst forecast

INTRODUCTION

Prior research suggests that managerial ability is informative to the financial information users and relevant to their decisions. For example, Baik, Farber and Lee (2011) test the relation between stock return and managerial ability and indicate that investors are more responsive to the news in management earning forecast associated with higher managerial ability; Krishnan and Wang (2014) suggest that managerial ability is informative to auditors and managerial ability is relevant to auditors' decisions. I investigate whether the managerial ability is informative to the analysts and relevant to analysts' decisions. Specifically, I examine the relation between the managerial ability and analyst forecast behavior. I use two important properties of analyst forecast behavior: the number of analysts following a firm and the dispersion of analyst forecast.

Prior research suggests that earnings quality is positively associated with managerial ability (Demerjian, Lev, Lewis, and McVay 2013), and that the management earnings forecasts for firms with high –ability CEOs are more frequent and accurate (Baik, Farber and Lee 2011). Prior literature also suggests that higher quality disclosure increases analysts' following and reduces analyst forecast dispersion (e.g., Lang and Lundholm, 1996; Healy et al., 1999; Botosan and Harris, 2000; Core, 2001; Francis et al., 2002; Roulstone, 2003; Liu et al. 2014). I bridge the gap by examining the association between managerial ability and analyst forecast behavior. I provide large sample evidence that managerial ability is positively associated with analyst following a firm and negatively associated with analyst forecast dispersion. In addition, the results are more pronounced after Sarbanes–Oxley Act of 2002, and are more pronounced for

firms with complicated financial reports. Collectively, our findings support the notion that the managerial ability is relevant to analysts' decisions.

The rest of the study proceeds as follows. Next section describes background and hypothesis development. This section is followed by a discussion of the research design. I then describe the data and sample, followed by the presentation of empirical results. The final section summarizes the findings.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Prior literature documents that managerial ability is positively associated with accounting quality. Demerjian, Lev, Lewis, and McVay (2013) suggest that earnings quality is positively associated with managerial ability. Specifically, more able managers are associated with fewer subsequent restatements, higher earnings and accruals persistence, lower errors in the bad debt provision, and higher quality accrual estimations. The results are consistent with the premise that managers can and do impact the quality of the judgments and estimates used to form earnings. Baik, Farber and Lee (2011) indicate that likelihood of management earnings forecast issuance increases in CEO ability. This result is consistent with Trueman's 1986 theory (Trueman 1986) that high-ability managers are more likely than low-ability managers to signal their ability to anticipate changes in their firm's prospects. In addition, forecast accuracy increases in CEO ability. These findings are consistent with the notion that forecasts associated with high ability CEOs reflect information about their ability to anticipate changes in their firms' underlying economics.

Financial analysts use accounting information (among other sources) to base their recommendations (Krishnan, Li and Wang 2013; Easton 2007). Prior literature suggests that higher quality disclosure increases analysts' following and reduces analyst forecast dispersion (e.g., Lang and Lundholm, 1996; Healy et al., 1999; Botosan and Harris, 2000; Core, 2001; Francis et al., 2002; Roulstone, 2003; Liu et al. 2014). The corresponding prediction I test is:

H1: Managerial ability is positively associated the number of analysts following a firm and negatively associated with the analyst forecast dispersion.

SOX imposes considerably greater potential penalties on chief executive officers (CEOs) and chief financial officers (CFOs) who engage in financial wrongdoing. Therefore, risk-averse managers are likely to report lower earnings by reducing discretionary accruals following SOX (Lobo and Zhou 2010). They document that firms subject to SOX are more conservative in financial reporting in the post-SOX period as evidenced by lower signed discretionary accruals, the Ball and Shivakumar (2005) conditional conservatism measure, and the Penman and Zhang (2002) unconditional conservatism measure. The corresponding prediction I test is:

H2: The associated between managerial ability and the number of analysts following a firm, and between the managerial ability and analyst forecast dispersion is more pronounced after SOX.

Next, I test whether the impact of the managerial ability on the forecasting variables is stronger for filers with complicated operation and complicated financial reports. We conjecture that managerial ability would have more pronounced effects on analysts' activities for filers with complicated operation and complicated financial reports, on the premise that the able managers would give analysts greater and higher quality information about the filers. The corresponding prediction I test is:

H3: The associated between managerial ability and the number of analysts following a firm, and between the managerial ability and analyst forecast dispersion is more pronounced for firms with complicated financial reports.

EMPIRICAL METHOD

Empirical Models
Following prior literature (e.g., Lang and Lundholm, 1996; Liu et al., 2014), I use the models below to test the effect of managerial ability on analysts' forecast activities:

$$FOLLOW_{it} = \alpha_0 + \alpha_1\,MA_{it} + \alpha_2\,SIZE_{it} + \alpha_3\,EPS_{it} + \alpha_4\,LOSS_{it} + \alpha_5\,LEVERAGE_{it} +$$
$$\alpha_6\,VOLATILITY_i + \sum Year + \sum Industry + \varepsilon_{it} \qquad (1)$$

$$DISPERS_{it} = \alpha_0 + \alpha_1\,MA_{it} + \alpha_2\,SIZE_{it} + \alpha_3\,EPS_{it} + \alpha_4\,LOSS_{it} + \alpha_5\,LEVERAGE_{it} +$$
$$\alpha_6\,VOLATILITY_i + \sum Year + \sum Industry + \varepsilon_{it} \qquad (2)$$

where $FOLLOW_{it}$ is natural log of the number of analyst followings for firm i in quarter t (see Table 1 for variable definitions). $DISPERS_{it}$ is analyst forecast dispersion for firm i in quarter t, which is defined as standard deviation of analyst forecasts for firm i in quarter t. MA_{it} is managerial ability. See section 3.2 for detailed discussion. $SIZE_{it}$ is the natural log of firm i's total assets at the end of quarter t. EPS_{it} is firm i's earnings per share (EPS) at the end of quarter t. while $LOSS_{it}$ equals one if EPS_{it} is negative and 0 otherwise. $LEVERAGE_{it}$ is the leverage ratio (total liability divided by total assets) of firm i at the end of quarter t. $VOLATILITY_i$ is the volatility of stock returns, which equals the standard deviation of monthly stock returns for 12 months in the year. I further control for year and industry effects. See Appendix 1 for variable definitions.

$$FOLLOW_{it} = \alpha_0 + \alpha_1\,MA_{it} + \alpha_2\,SOX^*MA_{it} + \alpha_3\,EPS_{it} + \alpha_4\,LOSS_{it} + \alpha_5\,LEVERAGE_{it} +$$
$$\alpha_6\,VOLATILITY_i + \sum Year + \sum Industry + \varepsilon_{it} \qquad (3)$$

SOX is a dummy variable equal 1 when year is greater or equal to 2002 and 0 otherwise. The variable of interest is the interaction of SOX and MA.

$$DISPERS_{it} = \alpha_0 + \alpha_1\,MA_{it} + \alpha_2\,SOX^*MA_{it} + \alpha_3\,EPS_{it} + \alpha_4\,LOSS_{it} + \alpha_5\,LEVERAGE_{it} +$$
$$\alpha_6\,VOLATILITY_i + \sum Year + \sum Industry + \varepsilon_{it} \qquad (4)$$

$$FOLLOW_{it} = \alpha_0 + \alpha_1\,MA_{it} + \alpha_2\,HIGH\_SIZE^*MA_{it} + \alpha_3\,EPS_{it} + \alpha_4\,LOSS_{it} +$$
$$\alpha_5\,LEVERAGE_{it} + \alpha_6\,VOLATILITY_i + \sum Year + \sum Industry + \varepsilon_{it} \qquad (5)$$

HIGH_SIZE is a dummy variable equal to 1 when rank is equal to 3 or 4 when partition the full sample into five quintiles (ranks: 0, 1, 2, 3 and 4) based on SIZE. The variable of interest is the interaction of HIGH_SIZE and MA.

$$DISPERS_{it} = \alpha_0 + \alpha_1\,AER_{it} + \alpha_2\,HIGH\_SIZE^*MA_{it} + \alpha_3\,EPS_{it} + \alpha_4\,LOSS_{it} +$$
$$\alpha_5\,LEVERAGE_{it} + \alpha_6\,VOLATILITY_i + \sum Year + \sum Industry + \varepsilon_{it} \qquad (6)$$

Measure of Managerial Ability (MA)
Our main measure of managerial ability, MA, is developed by Demerjian et al. (2012). This measure is widely used by researchers (e.g., Baik et al. 2011; Demerjian et al. 2013; Krishnan and Wang 2014) and outperforms all other measures.

Demerjian et al. (2012) use data envelopment analysis (DEA) to estimate firm efficiency within industries, comparing the sales generated by each firm, conditional on the following inputs used by the firm: Cost of Goods Sold, Selling and Administrative Expenses, Net PP&E, Net Operating Leases, Net Research and Development, Purchased Goodwill, and Other Intangible Assets. Demerjian et al. (2012) use DEA to solve the following optimization problem:

$$Max_v\theta = Sales\ (v_1\ CoGS + v_2\ SG\&A + V_3\ PPE + v_4\ OpLease + v_5\ R\&D +$$
$$v_6\ Goodwill + v_7\ OtherIntan \tag{7}$$

The efficiency measure that DEA produces, takes a value between 0 and 1. The efficiency measure generated by the DEA estimation is attributable to both the firm and the Manager. Demerjian et al. (2012) therefore modify the DEA generated firm efficiency measure by purging it of key firm-specific characteristics expected to aid or hinder management's efforts, including firm size, market share, positive free cash flow, and firm age, which aid management, and complex multi-segment and international operations, which challenge management. They estimate the following Tobit regression model by industry:

$$Firm\ Efficiency = \alpha_1 + \alpha_2\ Ln\ (Total\ Assets) + \alpha_3\ Market\ Share + \alpha_4\ Positive\ Free\ Cash\ Flow +$$
$$\alpha_5\ Ln\ (Age) + \alpha_6\ BusinessSegmentConcentration + \alpha_7\ Foreign\ Currency\ Indicator +$$
$$\alpha_8\ Year\ Indicators + \varepsilon \tag{8}$$

The residual from the estimation is the MA-Score, which is attributable to the management team and rely on as our main measure of managerial ability.

DATA AND SAMPLE

The measure of managerial ability is developed in Demerjian et al. (2012). I start with all 190,843 firm-year observations of managerial ability data for fiscal years 1980 through 2012. Financial data is from Compustat. Observations with no financial data are eliminated. This reduced the sample to 181,505 observations. Stock price data is from CRSP and analyst forecast data is from IBES. Observations with no CRSP and IBES data were eliminated. This further reduced the sample to 168,579.

EMPIRICAL RESULTS

Table 1 shows the summary statistics. The mean analyst following is 1.5416, the mean analyst forecast dispersion is 0.1292, the mean MA is 0.00103, and mean SIZE is 6.03657.

TABLE 1
SUMMARY STATISTICS

Variables	Mean	Median	Standard Deviation
FOLLOW	1.54160	1.60943	0.95509
DISPER	0.12920	0.04000	0.12404
MA	0.00103	0.01222	0.14895
SIZE	6.03657	5.80700	1.89088
MA*SOX	0.00139	0.00000	0.11133
MA*HIGH_SIZE	0.00691	0.00000	0.09236
EPS	0.02273	0.03028	0.45484
LEVERAGE	0.42507	0.42507	0.26589
VOLATILITY	0.14824	0.12570	0.09834

$FOLLOW_{it}$ = The natural log of number of analyst following for firm i in quarter t.
$DISPERS_{it}$ = Analyst forecast dispersion, which is the standard deviation (STDEV) of analyst forecasts.
MA_{it} = Managerial ability. See section 3.2 for detailed discussion.
$SIZE_{it}$ = The natural log of firm i's total assets at the end of quarter t.
$HIGH\_SIZE_{it}$ = Dummy variable equal to 1 when rank is equal to 3 or 4 when partition the full sample into five quintiles (ranks: 0, 1, 2, 3 and 4) based on SIZE.
EPS_{it} = Earnings per share for firm i in quarter t.
$LEVERAGE_{it}$ = The leverage ratio of firm i at the beginning of quarter t.
$VOLATILITY_{it}$ = The volatility of stock returns, equals the standard deviation of monthly stock returns at year t.

Table 2 shows the regression results of impact of managerial ability (MA) on the forecasting variables. The coefficient of MA on FOLLOW is 0.40417, positive and significant at 1% level, suggesting managerial ability is positively related to the number of analyst following a firm. The coefficient of MA on DISPER is -0.0574, negative and significant at 1% level, suggesting managerial ability is negatively related to analyst forecast dispersion. In sum, these results are in line with H1. The coefficients for other variables are generally consistent with existing literature.

TABLE 2
ANALYSIS OF IMPACT OF MANAGERIAL ABILITY (MA) ON ANALYST FOLLOWING (FOLLOW) AND FORECAST DISPERSION (DISPER)

Independent Variables	Dependent Variables	
	FOLLOW	DISPER
Intercept	-0.47601	-0.0592
	(0.01)***	(0.01)***
MA	0.40417	-0.0574
	(0.01)***	(0.01)***
SIZE	0.36211	0.00736
	(0.01)***	(0.01)***
EPS	2.3E-06	-0.0505
	(0.01)***	(0.01)***
LOSS	0.05748	0.10943
	(0.01)***	(0.01)***
LEVERAGE	-0.51008	0.09018
	(0.01)***	(0.01)***
VOLATILITY	0.29650	0.42726
	(0.01)***	(0.01)***
Year Effect	Yes	Yes
Industry Effect	Yes	Yes
Adj. R^2	0.16	0.07

$FOLLOW_{it}$ = The natural log of number of analyst following for firm i in quarter t.
$DISPERS_{it}$ = Analyst forecast dispersion, which is the standard deviation(STDEV) of analyst forecasts.
MA_{it} = Managerial ability. See section 3.2 for detailed discussion.
$SIZE_{it}$ = The natural log of firm i's total assets at the end of quarter t.
EPS_{it} = Earnings per share for firm i in quarter t.
$LOSS_{it}$ = Dummy variable that equals 1 if EPS at the end of year t is negative and 0 otherwise.
$LEVERAGE_{it}$ = The leverage ratio of firm i at the beginning of quarter t.
$VOLATILITY_{it}$ = The volatility of stock returns, equals the standard deviation of monthly stock returns at year t.

Table 3 shows regression results of impact of managerial ability (MA) on forecasting variables after SOX. In this case, coefficients on MA show the impact of MA on forecasting variables before SOX: MA is positively related to analyst following and negatively related to analyst forecast dispersion, both at 1% significance level. The coefficients on MA*SOX shows the incremental impact of MA on forecasting variables after SOX: the coefficient of MA on analyst following is 0.46364 (0.32875+0.13489) and the coefficient of MA on analyst forecast dispersion is -0.06085 (-0.0526-0.00825). These results provide support for our H2.

TABLE 3
ANALYSIS OF IMPACT OF MANAGERIAL ABILITY (MA) ON ANALYST FOLLOWING (FOLLOW) AND FORECAST DISPERSION (DISPER) AFTER SOX

Independent Variables	Dependent Variables	
	FOLLOW	DISPER
Intercept	-0.47482	-0.0593
	(0.01)***	(0.01)***
MA	0.32875	-0.05260
	(0.01)***	(0.01)***
MA*SOX	0.13489	-0.00825
	(0.01)***	(0.04)**
SIZE	0.36196	0.00738
	(0.01)***	(0.01)***
EPS	2.30E-6	-0.0505
	(0.01)***	(0.01)***
LOSS	0.05734	0.10945
	(0.01)***	(0.01)***
LEVERAGE	-0.50970	0.09013
	(0.01)***	(0.01)***
VOLATILITY	0.29435	0.42735
	(0.01)***	(0.01)***
Year Effect	Yes	Yes
Industry Effect	Yes	Yes
Adj. R^2	0.15	0.07

$FOLLOW_{it}$ = The natural log of number of analyst following for firm i in quarter t.
$DISPERS_{it}$ = Analyst forecast dispersion, which is the standard deviation (STDEV) of analyst forecasts.
MA_{it} = Managerial ability. See section 3.2 for detailed discussion.
$SIZE_{it}$ = The natural log of firm i's total assets at the end of quarter t.
EPS_{it} = Earnings per share for firm i in quarter t.
$LOSS_{it}$ = Dummy variable that equals 1 if EPS at the end of year t is negative and 0 otherwise.
$LEVERAGE_{it}$ = The leverage ratio of firm i at the beginning of quarter t.
$VOLATILITY_{it}$ = The volatility of stock returns, equals the standard deviation of monthly stock returns at year t.
SOX = Dummy variable equal 1 when year is greater or equal to 2002 and 0 otherwise.

Table 4 shows regression results of impact of managerial ability (MA) on forecasting variables for firms with complicated financial reports. In this case, coefficients on MA show the impact of MA on forecasting variables for firms with simpler financial reports: MA is positively related to analyst following and negatively related to analyst forecast dispersion, both at 1% significance level. The coefficients on MA*HIGH_SIZE shows the incremental impact of MA on forecasting variables for firms with complicated financial reports: the coefficient of MA on analyst following is 0.52574 (0.29796+0.22778) and the coefficient of MA on analyst forecast dispersion is -0.07379 (-0.0476-0.02619). These results provide support for our H3.

TABLE 4
ANALYSIS OF IMPACT OF MANAGERIAL ABILITY (MA) ON ANALYST FOLLOWING (FOLLOW) AND FORECAST DISPERSION (DISPER) FOR FIRMS WITH COMPLICATED FINANCIAL REPORTS

Independent Variables	Dependent Variables	
	FOLLOW	DISPER
Intercept	0.16854	-0.0141
	(0.01)***	(0.01)***
MA	0.29796	-0.04760
	(0.01)***	(0.01)***
MA*HIGH_SIZE	0.22778	-0.02619
	(0.01)***	(0.04)**
EPS	0.00001	-0.0505
	(0.01)***	(0.01)***
LOSS	-0.26817	0.10349
	(0.01)***	(0.01)***
LEVERAGE	0.26973	0.10722
	(0.01)***	(0.01)***
VOLATILITY	-0.12661	0.39582
	(0.01)***	(0.01)***
Year Effect	Yes	Yes
Industry Effect	Yes	Yes
Adj. R^2	0.06	0.07

$FOLLOW_{it}$ = The natural log of number of analyst following for firm i in quarter t.
$DISPERS_{it}$ = Analyst forecast dispersion, which is the standard deviation (STDEV) of analyst forecasts.
MA_{it} = Managerial ability. See section 3.2 for detailed discussion.
$SIZE_{it}$ = The natural log of firm i's total assets at the end of quarter t.
$HIGH\_SIZE_{it}$ = Dummy variable equal to 1 when rank is equal to 3 or 4 when partition the full sample into five quintiles (ranks: 0, 1, 2, 3 and 4) based on SIZE.
EPS_{it} = Earnings per share for firm i in quarter t.
$LOSS_{it}$ = Dummy variable that equals 1 if EPS at the end of year t is negative and 0 otherwise.
$LEVERAGE_{it}$ = The leverage ratio of firm i at the beginning of quarter t.
$VOLATILITY_{it}$ = The volatility of stock returns, equals the standard deviation of monthly stock returns at year t.

CONCLUSION

I investigate the association between managerial ability, derived from frontier analysis, and the number of analyst following a firm, as well as the analyst forecast dispersion. I bridge the gap in the existing literature: prior literature documents that the managerial ability is positively associated with accounting quality (Demerjian, Lev, Lewis, and McVay 2013; Baik, Farber and Lee 2011). In addition, prior literature indicates that number of analysts following a firm is positively associated with accounting quality, and analyst forecast dispersion is negatively associated with accounting quality (Lang and Lundholm 1996; Irani and Karamanou 2003). I examine the relation between managerial ability and the number of analysts following a firm as well as analyst forecast dispersion. I find that managerial ability is positively associated with analyst following a firm and negatively associated with analyst forecast dispersion. Additionally, the effects are more pronounced after Sarbanes–Oxley Act of 2002, and are more pronounced for firms with complicated financial reports. Collectively, our findings support the notion that the managerial ability is relevant to analysts' decision making.

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APPENDIX 1
VARIABLE DEFINITIONS

Variables	Definition
FOLLOW$_{it}$	The natural log of number of analyst following for firm i in quarter t.
DISPERS$_{it}$	Analyst forecast dispersion, which is the standard deviation (STDEV) of analyst forecasts.
MA$_{it}$	Managerial ability. See section 3.2 for detailed discussion.
SIZE$_{it}$	The natural log of firm i's total assets at the end of quarter t.
HIGH_SIZE$_{it}$	Dummy variable equal to 1 when rank is equal to 3 or 4 when partition the full sample into five quintiles (ranks: 0, 1, 2, 3 and 4) based on SIZE.
EPS$_{it}$	Earnings per share for firm i in quarter t.
LOSS$_{it}$	Dummy variable that equals 1 if EPS at the end of year t is negative and 0 otherwise.
LEVERAGE$_{it}$	The leverage ratio of firm i at the beginning of quarter t.
VOLATILITY$_{it}$	The volatility of stock returns, equals the standard deviation of monthly stock returns at year t.
SOX	Dummy variable equal 1 when year is greater or equal to 2002 and 0 otherwise.