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CEO ability and corporate opacity

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ABSTRACT

This paper examines the effect of CEO ability on corporate opacity. High-ability CEOs may seek to create greater transparency to convey their ability to the market, while low-ability CEOs may signal-jam the market's inferences about their talent by limiting the available information. An analysis of S & P 500 firms indicates that firms with high-ability CEOs are significantly less opaque than firms with low-ability CEOs, and that corporate opacity decreases value more for firms managed by low-ability CEOs. Low-ability CEOs hiding behind opacity get away with it owing to lack of strong corporate governance, suggesting that corporate governance is critical for hiring and retaining talented CEOs, and also for preventing low-ability CEOs from exploiting corporate opacity. These findings are robust to the use of samples that are propensity score matched on firm complexity and past firm performance, and also to the use of alternative ability proxies and alternative measures of CEOs' choice of transparency.

1. Introduction

Publicly traded firms are required by regulators to provide extensive disclosure, yet considerable variation still exists in the additional information provided to the capital markets. Firms have substantial discretion about the informativeness of the mandatory disclosures and the details provided (Lang & Lundholm, 1996). There has been a remarkable body of research evaluating the consequences of variations. Healy and Palepu (2001), for example, consider the main consequences of firm transparency to be the reduction of information asymmetries and mitigation of agency costs. Information asymmetry problems may lead capital markets to undervalue good firms (Akerlof, 1970). Abundant information allows precise valuations and induces investors to hold the company's stock. Such an increase in liquidity also increases the demand and therefore raises the stock price, in turn decreasing the cost of capital (Diamond & Verrecchia, 1991; Easley & O'Hara, 2004; Healy & Palepu, 2001). In addition, Verrecchia (1983, 2001) suggests that investors interpret withheld information as unfavorable and consequently discount the firm's value. Studies also associate corporate opacity with the agency problem between controlling and outside shareholders. Faccio, Lang, and Young (2001), for instance, suggest that high opacity makes it difficult for outside shareholders to recognize expropriation. Leuz, Nanda, and Wysocki (2003) argue that controlling shareholders may increase firm opacity to enable them to capture private benefits. In addition, Anderson, Duru, and Reeb (2009) report that corporate opacity can lead to severe conflicts of interests between founding family members and minority shareholders.

CEOs, along with a group of well-experienced directors, lead corporate decision making, which undoubtedly includes the decision about corporate opacity. In this paper, I argue that the CEO's ability level may be an important factor in corporate opacity. While the CEO is aware of his/her own abilities, investors may not be able to observe them fully. The CEO, then, is also aware that the market will assess his/her abilities through firm characteristics, such as firm performance or the success of investment and/or R & D decisions (Holmstrom, 1999).

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Several papers establish an empirical link between CEO ability and firm performance, suggesting that CEOs with greater ability provide better firm performance for their shareholders (Bertrand & Schoar, 2003; Falato, Li, & Milbourn, 2009; Pérez-González, 2006; Uygur, 2015). Very able CEOs may also choose to disclose more information in order to signal the market about their superior skills, whereas less able CEOs may signal-jam the market's inferences about their ability levels by not providing full information and misleading the market, so that they hide behind the shield of high corporate opacity (Fudenberg & Tirole, 1986; Holmstrom, 1999; Narayanan, 1985; Stein, 1989).¹ This argument is similar to Holmstrom's (1999) suggestion that an undervalued manager would be willing to take more risky projects in order to prove himself/herself, whereas others would jam the signals by not taking the investments; thus risk-taking in itself would signal talent. Similarly, I argue that high-ability CEOs promote corporate transparency. If so, we could expect to observe a negative relation between CEO ability and corporate opacity.

An alternative explanation for any association between CEO ability and corporate opacity may involve the CEO's choice of employer—or the firm's choice of CEO. A low-ability CEO may seek to work in a highly opaque firm to make it difficult for outsiders to evaluate his/her performance. Less transparent firms might want to hire the best CEOs, but they probably cannot, because high-ability CEOs want to signal their abilities to the market and will not be willing to work in a company that impedes such signals.

These two arguments are both plausible, and it is very difficult to distinguish between them. However, they both suggest that CEO ability is associated with financial transparency. Thus, I hypothesize that there is a negative association between CEO ability and corporate opacity.

I develop an opacity index to evaluate the relative opacity of the firms in my sample (Anderson et al., 2009). As a proxy for CEO ability, I use the firm's performance compared to that of peer firms. *CEO ability* is measured as the average firm performance for the previous three years, adjusted by the industry (Banker, Darrrough, Huang, & Plehn-Dujowich, 2012; Hermalin & Weisbach, 1998; Rajgopal, Shevlin, & Zamora, 2006).

Substantial evidence suggests that opacity and low CEO ability impair firm performance, and therefore firm value (Bertrand & Schoar, 2003; Diamond & Verrecchia, 1991; Easley & O'Hara, 2004; Healy & Palepu, 2001). How, then, do low-ability CEOs keep their jobs? One plausible explanation is lack of strong corporate governance. To address this question, I analyze board monitoring effectiveness, measured by CEO duality and governance index (G-index).

In order to test the robustness of my findings, I consider possible endogeneity problems that may be driving my results because of firm complexity and past firm performance. Rosen (1982) and Rose and Shepard (1997) argue that high-ability CEOs are matched with more complex firms. Bushman, Chen, Engel, and Smith (2004) also suggest that organizational complexity may affect corporate transparency decisions. Therefore, any finding that supports my arguments may be driven by firm complexity, rather than CEO ability. To address this concern I create a propensity score matched sample that matches firms with high-ability and low-ability CEOs on their predicted propensities to complexity. I also use alternative ability proxies and more direct measures of CEOs' choice of transparency, such as use of accruals.

This study makes two potential contributions. First, my analysis brings to light the notion that CEO ability is an important factor in corporate opacity. Second, it highlights the possibility that board monitoring effectiveness is crucial to prevent low-ability CEOs from exploiting corporate opacity.

The remainder of the paper is organized as follows. Section 2 describes the data, variables of interest, and control variables. Summary statistics and results of univariate and multivariate analysis are explained in Section 3. Section 4 discusses the impact of corporate governance on the association of CEO ability and corporate opacity. Section 5 presents the results of the robustness tests, and Section 6 concludes the paper.

2. Data and variables

The sample consists of the companies included in the S&P 500 Index between 1998 and 2010. The final sample consists of 369 unique firms and 3845 firm-year observations. I obtain the company and industry data from the COMPUSTAT database, and the corporate opacity data from the CRSP and IBES databases.

2.1. Corporate opacity

I develop an opacity index to evaluate the relative opacity of each firm in my sample. The index uses four different corporate opacity proxies, namely trading volume, bid-ask spread, number of analysts following the firm, and analysts' forecast error. As in the 2009 study by Anderson and colleagues, the index is constructed so that the degree of corporate opacity increases as the index score increases.

Trading volume (*Dollar volume*) is included in the opacity index as a proxy for information uncertainty (Leuz & Verrecchia, 2000). It is calculated as the natural log of the average daily dollar volume of each firm during the fiscal year. The bid-ask spread (*Spread*), which Diamond and Verrecchia (1991) use to proxy for information asymmetry, is calculated by taking the difference of the fiscal year-end ask and bid prices, and dividing by the average of the bid and ask prices. The data for *Dollar volume* and *Spread* are collected from the CRSP database. Lang and Lundholm (1996) suggest that number of analysts following (*Analysts*) and analysts' forecast error (*Forecast Error*) may be used to measure market scrutiny and information availability. I use the natural logarithm of number of

¹ Although these papers evaluate different questions, they all develop a “signal-jamming” model, in which one player intends to mislead the other player by distorting, manipulating, or selecting information.

analysts following. The analysts' forecast error is calculated as the squared difference between the maximum and the minimum forecast value, scaled by the average forecast value. *Analysts* and *Forecast Error* data are gathered from the IBES database.

2.2. CEO ability

CEO ability is measured as the average firm performance for the previous three years, adjusted by the industry (Banker et al., 2012; Hermalin & Weisbach, 1998; Rajgopal et al., 2006). I use return on assets data from the COMPUSTAT database.

2.3. Firm performance

To measure firm performance I use Tobin's q, calculated as the ratio of the market value of the firm to its book value. In the multivariate analysis, following the literature (Chung & Jo, 1996; Gompers, Ishii, & Metrick, 2010), I use the natural log of Tobin's Q; the data are gathered from the COMPUSTAT database.

2.4. Corporate governance

To test board monitoring effectiveness I use two measures. *CEO duality* is an indicator variable that equals one if the CEO also has the title of chair (Coles, Daniel, & Naveen, 2014; Goyal & Park, 2002). Data on titles come from the COMPUSTAT database. The governance index (G-index) is that of Gompers, Ishii, and Metrick (2003); the data come from the authors' website and are available only for years 1998–2006.

2.5. Control variables

I control for the factors listed in the literature as potentially affecting corporate opacity and firm value. *Firm size* is measured by the natural log of book value of total assets. *Research and development (R & D) intensity* is calculated as R & D expenses scaled by total assets. *Capital expenditure* is the ratio of capital expenses to total assets. *Growth* is sales growth over total assets. *Debt ratio* is long-term debt scaled by total assets. *Risk* is the standard deviation of monthly stock returns for the previous 3 fiscal years. *Past performance* is the return on assets from the previous year, calculated as the ratio of net income to the book value of total assets from the previous year. *Firm age* is the number of years the firm has been included in the Compustat database. Lastly, I include dummy variables for each 2-digit SIC code and for each year in my sample to control for year and industry fixed effects.

3. CEO ability and corporate opacity: Empirical results

3.1. Summary statistics and univariate analysis

Table 1 presents the summary statistics of my sample. Panel A shows the mean, median, standard deviation, minimum, and maximum values of the variables included in the analysis. The table also includes the opacity index and its individual components. Panel B displays the correlation matrix of the variables of interest for the full sample.

There is substantial variation in firm size, with average firm size of \$17.2 billion. Firm performance, measured by Tobin's q, has mean and median values of 2.54 and 1.91, respectively. My sample has an average R & D intensity of 4.59% and an average debt ratio of 19.12%. Supporting my earlier arguments, the CEO ability proxy appears to be negatively related to the opacity index. Specifically, an increase in CEO ability is associated with a significant increase in dollar volume and number of analysts following, and with a decrease in bid-ask spread and analysts' forecast error, although not significant.

Results of mean difference tests comparing the key variables for firms with high-ability CEOs and those with low-ability CEOs are presented in Table 2. Firms with high-ability CEOs are significantly smaller ($8.67 < 8.96$) and more risky ($11.96\% > 10.24\%$) than those with low-ability CEOs. They have higher capital expense ratios ($5.87\% < 5.24\%$) and higher R & D intensity ($5.16\% > 4.03\%$). And in general, high-ability CEOs are better performers ($3.13 > 1.94$). Regarding the differences in corporate opacity measures, the results support my initial hypothesis. High-ability CEOs have firms with significantly higher dollar volume ($18.19 > 17.99$) and greater numbers of analysts following them ($15.13 > 13.70$). Taken as a whole, the results of those differences are visible in the opacity index values. High-ability CEOs' firms are significantly less opaque than those of their low-ability peers ($0.5262 < 0.5737$)—a difference of 9.03% ($[0.5737 - 0.5262] / 0.5262 = 0.0903 = 9.03\%$).

3.2. Multivariate analysis

The hypotheses presented above examine the association between CEO ability—proxied here by firm performance—and corporate opacity. Recognizing that both of these variables may be affected by firm size, R & D intensity, riskiness, and other firm characteristics, I estimate the following multivariate model to test these hypotheses:

Table 1
Descriptive statistics.

Panel A: Descriptive statistics for the entire sample					
Variables	Mean	Median	Std. Dev.	Min.	Max.
Total assets	17,054	6357	56,005	94	2,117,605
R & D intensity (%)	4.59	2.61	5.54	0	60.09
Capital expenditure (%)	5.55	3.98	5.21	0	50.68
Growth (%)	0.007	0.001	0.142	− 0.108	8.36
Debt ratio (%)	19.12	17.61	15.11	0	146.90
Risk (%)	11.10	8.31	11.15	0.20	171.30
Tobin's q	2.54	1.91	2.50	0.47	78.56
Return on assets ($t - 1$)	0.06	0.07	0.17	− 5.77	0.98
Opacity index	0.5499	0.5500	0.17869	0.1	1
Ln (dollar volume)	18.09	18.12	1.28	12.97	22.45
Spread (%)	0.394	0.001	0.600	− 0.100	8.00
Analysts	14.42	14	6.88	1	42
Forecast error (%)	0.14	0.001	4.07	0	216.85

Panel B: Correlation matrix of key variables						
	CEO ability	Ln (dollar volume)	Spread	Analysts	Forecast error	Opacity index
CEO ability	1.000					
Ln (dollar volume)	0.075 (< 0.001)	1.000				
Spread	− 0.001 (0.94)	− 0.436 (< 0.001)	1.000			
Analysts	0.103 (< 0.001)	0.595 (< 0.001)	− 0.200 (< 0.001)	1.000		
Forecast error	− 0.013 (0.41)	0.007 (0.65)	− 0.010 (0.52)	− 0.001 (0.92)	1.000	
Opacity index	− 0.133 (< 0.001)	− 0.749 (< 0.001)	0.446 (< 0.001)	− 0.726 (< 0.001)	0.019 (0.22)	1.000

The table displays the descriptive statistics for corporate opacity and firm characteristics. Panel A presents the mean, median, standard deviation, minimum, and maximum values of the key variables. Panel B shows the correlation matrix of key opacity and performance variables with CEO ability proxy, along with p -values within the parentheses. CEO ability is measured as the average firm performance for the previous three years, adjusted by the industry. CEOs with CEO ability value above the median are considered high ability, and those below the median are called low ability. The opacity index uses four different corporate opacity proxies, namely trading volume, bid-ask spread, analysts following, and analysts' forecast error, and it is constructed so that the degree of corporate opacity increases as the index score increases (for details, please see text). For the definitions of Firm size, Research and development (R & D) intensity, Capital expenditure, Sales growth, Debt ratio, Risk, Firm performance, and Past performance variables, please see text.

Table 2
Descriptive statistics: Mean difference tests between firms with high- vs. low-ability CEOs.

Variables	Mean value			
	Firms with high-ability CEOs	Firms with low-ability CEOs	Difference	t -Value
Ln (total assets)	8.67	8.96	− 0.29	− 6.98***
R & D intensity (%)	5.16	4.03	1.13	5.18***
Capital expenditure (%)	5.87	5.24	0.63	3.43***
Growth (%)	0.01	0.004	− 0.06	− 1.03
Debt ratio (%)	15.89	22.34	− 6.45	− 13.50***
Risk (%)	11.96	10.24	1.72	4.76***
Tobin's Q	3.13	1.94	1.18	14.93***
Opacity index	0.5262	0.5737	− 0.0475	− 8.32***
Ln (dollar volume)	18.19	17.99	0.19	4.66***
Spread (%)	0.39	0.39	0.00	0.03
Analysts	15.13	13.70	1.43	6.42***
Forecast error (%)	0.09	0.19	− 0.10	− 0.81
Number of observations	1922	1923		

The table displays the results of the mean difference tests between firms with high-ability and low-ability CEOs. CEO ability is measured as the average firm performance for the previous three years, adjusted by the industry. CEOs with CEO ability value above the median are considered high ability, and those below the median are called low ability. The opacity index uses four different corporate opacity proxies, namely trading volume, bid-ask spread, analysts following, and analysts' forecast error, and it is constructed so that the degree of corporate opacity increases as the index score increases (for details, please see text). For the definitions of Firm size, Research and development (R & D) intensity, Capital expenditure, Sales growth, Debt ratio, Risk, Firm performance, and Past performance variables, please see text.

* Denotes significance at a 10% level.

** Denotes significance at a 5% level.

*** Denotes significance at a 1% level.

Table 3
Regression results—impact of ability on opacity.

Variables	Dependent variable				
	Opacity index	Volume	Spread	Analysts	Forecast error
	(1)	(2)	(3)	(4)	(5)
CEO ability	− 0.039 (− 7.71)***	0.1853 (6.68)***	− 0.0426 (− 2.61)***	1.0423 (4.79)***	0.0282 (0.19)
Ln (total assets)	− 0.057 (− 30.71)***	0.6708 (66.13)***	− 0.0093 (− 1.57)	2.0204 (25.40)***	0.0310 (0.56)
R & D intensity	− 0.8197 (− 15.69)***	6.6563 (23.60)***	− 0.2360 (− 1.42)	40.003 (18.09)***	0.0676 (0.04)
Capital expenditure	− 0.0904 (− 1.77)*	1.2315 (4.46)***	0.0050 (0.31)	16.444 (7.60)***	0.5750 (0.38)
Growth	− 4.851 (− 3.06)***	51.965 (6.07)***	− 17.631 (− 3.50)***	0.8482 (0.01)	− 2.856 (− 0.06)
Debt ratio	0.2103 (13.51)***	− 1.377 (− 16.39)***	0.4540 (9.18)***	− 6.976 (− 10.59)***	0.0361 (0.08)
Risk	− 0.0015 (− 7.45)***	− 0.0212 (19.40)***	− 0.0031 (− 4.85)***	0.0442 (5.14)***	0.0083 (1.39)
Performance _(t−1)	− 0.0266 (− 7.64)***	0.2169 (11.50)***	− 0.0208 (− 1.88)**	0.452 (3.06)***	− 0.0460 (− 0.44)
Intercept, industry and year dummies	Yes	Yes	Yes	Yes	Yes
Adj. R ²	0.4367	0.6795	0.5120	0.3110	0.0250
Sample size	3845	3845	3845	3845	3845

The table displays the results of the regression analysis of the impact of CEO ability on corporate opacity. CEO ability is measured as the average firm performance for the previous three years, adjusted by the industry. CEOs with CEO ability value above the median are considered as high ability, and those below the median are called low ability. The opacity index uses four different corporate opacity proxies, namely trading volume, bid-ask spread, analysts following, and analysts' forecast error, and it is constructed so that the degree of corporate opacity increases as the index score increases (for details, please see text). For the definitions of Firm size, Research and development (R & D) intensity, Capital expenditure, Sales growth, Debt ratio, Risk, Firm performance, and Past performance variables, please see text.

- * Denotes significance at a 10% level.
- ** Denotes significance at a 5% level.
- *** Denotes significance at a 1% level.

$$\begin{aligned}
 \text{Firm opacity} &= \alpha_0 + \alpha_1 (\text{Ability}) + \alpha_2 (\text{Firm size}) + \alpha_3 (\text{R\&D}) + \alpha_4 (\text{Growth}) \\
 &+ \alpha_5 (\text{CAPX}) + \alpha_6 (\text{Debt ratio}) + \alpha_7 (\text{Risk}) + \alpha_8 (\text{Performance}_{t-1}) + \\
 &\sum \alpha_i (\text{Industry dummy}) + \sum \alpha_j (\text{Year dummy}) + \varepsilon
 \end{aligned}$$

Firm opacity is the opacity index, developed using trading volume, bid-ask spread, analysts following, and analysts' forecast error as opacity measures. *Ability* is an indicator variable that equals one when *CEO ability* is above median value. The first control variable, firm size, is the natural log of total assets. Others include R & D expense, capital expenditure, sales growth, long-term debt (all adjusted by total assets), stock return volatility, and past performance. Industry dummies control for each 2-digit SIC code, and year dummies control for each year in the sample.

Table 3 presents the results of the first model. Column 1 evaluates the effect of CEO ability on corporate opacity. Columns 2 through 5 examine the impact of CEO ability on volume, spread, number of analysts, and analysts' forecast error, respectively. In accord with my initial set of hypotheses, which suggests that CEO ability is negatively associated with corporate opacity, the coefficient estimate of the CEO ability variable is negative and significant. This result implies that high-ability CEOs manage less opaque firms—either because less able CEOs seek out jobs in more opaque firms, or because while high-ability CEOs lower opacity so they can signal their abilities to the market, low-ability CEOs signal-jam the market's inferences about their talent by limiting the available information. While I cannot yet distinguish between these two notions, I find a strong negative association between CEO ability and corporate opacity. The individual components of the opacity index also provide supporting results: CEO ability is significantly and positively associated with volume and number of analysts, and negatively associated with analysts' forecast error.

4. The impact of corporate governance

Again, how do low-ability CEOs survive? After hiring a CEO, the board checks its assessment of his/her ability against the firm's profits, and can replace him/her if it chooses (Hermalin & Weisbach, 1998). However, although a CEO who performs poorly is more likely to be replaced, this may not happen if the board is not strong enough or if the CEO has too much power over the board. In that case, the board will not be able to perform its core function, which is monitoring the CEO, and performance may continue to be poor. In other words, to borrow an expression from Coles et al. (2014), CEOs can “get away with” low ability because of weak governance.

If low-ability CEOs have less accurate forecasts and make inferior decisions for their shareholders, the firm's increased opacity may decrease its value even more. Accordingly, I expect to find the poorest firm performance in the subsample of firms that are both opaque and managed by a low-ability CEO. To test this notion, I split my sample into four different subsamples, dividing first by the firm's opacity level and then, within each group, by the CEO's ability level. I examine the performance values of these four groups of firms, measured by Tobin's q. The results are presented in Table 4.

As previous studies have found, firm performance decreases significantly with increased opacity, for both low-ability CEOs (1.70 < 2.26) and high-ability ones (2.95 < 4.09). More importantly, supporting my expectations, the worst performance of the four (q = 1.70) is that for low-ability CEOs in highly opaque firms. Again, how do these low-ability CEOs keep their jobs?

Board monitoring decreases with CEO duality (Goyal & Park, 2002) and with higher values of the governance index (G-index),

Table 4
2-by-2 tables: Firm performance with different CEO ability and opacity levels.

Tobin's Q	Low-ability CEOs	High-ability CEOs	t-Stat
Less opaque	2.26	4.09	− 9.69***
More opaque	1.70	2.95	− 12.88***
t-Stat	3.54***	7.88***	

The sample is divided into four different subsamples, by the firm's opacity level and the CEO's ability level. First, the sample is ranked by the opacity index to determine the more and less opaque firms. Then, within each subsample, firms are ranked by their CEO ability values. Top and bottom halves for CEO ability are compared. As a result, there are four groups: more opaque firms managed by low-ability CEOs, more opaque firms managed by high-ability CEOs, and so on. The table displays the performance values of these four groups of firms. CEO ability is measured as the average firm performance for the previous three years, adjusted by the industry. Firm performance is measured by Tobin's q, and it is calculated as the ratio of the market value of the firm to its book value.

* Denotes significance at a 10% level.

** Denotes significance at a 5% level.

*** Denotes significance at a 1% level.

which imply dictatorship of CEOs and weaker shareholder rights (Gompers et al., 2003). Goyal and Park (2002) provide evidence that CEO turnover is significantly less sensitive to firm performance when the CEO and chair responsibilities are vested in the same individual. I examine the effect of board monitoring effectiveness on the association between CEO ability and corporate opacity. The results are presented in Table 5.

Panel A displays the results of mean difference tests of board monitoring effectiveness values, measured by CEO duality and G-index, comparing firms with high- and low-ability CEOs. Both CEO duality and G-index values are significantly lower for firms with high-ability CEOs, supporting the idea that stronger boards can attract and hire talented CEOs. Panel B and Panel C in Table 5 show the distributions of CEO duality and G-index values, respectively, among the high-low ability and high-low opacity combinations. As I expected, the highest CEO duality (0.67) and highest G-index values (10.17) belong to highly opaque firms managed by a low-ability CEO—the same ones that exhibit the poorest firm performance. These results provide additional support for the idea that low-ability CEOs hiding behind opacity *get away with it* because of less effective monitoring by their boards.

Table 5
Impact of corporate governance on the association between CEO ability and corporate opacity.

Panel A: Mean difference tests between firms with high- vs. low-ability CEOs				
Variables	Mean value			
	Firms with high-ability CEOs	Firms with low-ability CEOs	t-Value	Number of observations
CEO duality	0.5504	0.6398	− 4.16***	2073
G index	9.36	9.76	− 2.44***	1000

Panel B: 2-by-2 tables for CEO duality with different CEO ability and opacity levels				
CEO duality	Low-ability CEOs	High-ability CEOs	t-Stat	
Less opaque	0.59	0.51	2.63***	
More opaque	0.67	0.59	2.57***	
t-Stat	− 2.50**	− 2.54**		

Panel C: 2-by-2 tables for G-index with different CEO ability and opacity levels				
G index	Low-ability CEOs	High-ability CEOs	t-Stat	
Less opaque	9.26	9.10	0.75	
More opaque	10.17	9.74	1.78*	
t-Stat	− 3.91***	− 2.87***		

The table displays the results of the analysis of the impact of corporate governance on the association between CEO ability and corporate opacity. *CEO duality* is an indicator variable that equals one if the CEO also has the title of chair. Governance index (G-index) is the governance index of Gompers et al. (2003). CEOs with CEO ability value above the median are considered high ability, and those below the median are called low ability. The opacity index uses four different corporate opacity proxies, namely trading volume, bid-ask spread, analysts following, and analysts' forecast error, and it is constructed so that the degree of corporate opacity increases as the index score increases (for details, please see text).

* Denotes significance at a 10% level.

** Denotes significance at a 5% level.

*** Denotes significance at a 1% level.

Table 6
Complexity matched sample results.

Panel A: Matched sample results, descriptive statistics				
Variables	Mean value			
	High vs. low	Difference	t-Value	p value
Ln (dollar volume)	>	0.4434	6.03	< 0.01***
Spread (%)	<	-0.0900	-0.30	0.38
Analysts	>	1.3283	3.18	< 0.01***
Forecast error (%)	<	-0.0280	-4.02	< 0.01***
Opacity index	<	-0.0619	-6.14	< 0.01***
Number of observations	1096			

Panel B: Matched sample results, multivariate analysis of the impact of ability on opacity		
Variables	Dependent variable = Opacity index	
	(1)	(2)
CEO ability	-0.030 (-2.93)**	-0.040 (-4.17)**
Ln (total assets)	-0.062 (-17.26)**	-0.056 (-16.64)**
R & D intensity	-0.635 (-6.62)**	-0.684 (-7.69)**
Capital expenditure	-0.591 (-4.50)**	-0.750 (-6.08)**
Growth	-5.131 (-2.80)**	-5.223 (-3.08)**
Debt ratio	0.272 (7.79)**	0.227 (6.93)**
Risk	-0.001 (-4.29)**	-0.002 (-7.79)**
Performance _{t-1}	-0.027 (-3.84)**	-0.019 (-2.98)**
Intercept, industry and year dummies		Yes
Adj. R2	0.3232	0.4261
Sample size	1082	1082

The table presents the descriptive matched sample results. The matched sample is based on propensity scores with the following determinants: R & D intensity, firm size, leverage, sales growth, and industry. The matched sample consists of firms with high-ability CEOs matched with those with low-ability CEOs at 10% propensity score. The table shows the one-tailed dependent t-test results for the differences of key variables between firms with high-ability CEOs and their matched firms with low-ability CEOs. CEO ability is measured as the average firm performance for the previous three years, adjusted by the industry. CEOs with CEO ability value above the median are considered high ability, and those below the median are called low ability. The opacity index uses four different corporate opacity proxies, namely trading volume, bid-ask spread, analysts following, and analysts' forecast error, and it is constructed so that the degree of corporate opacity increases as the index score increases (for details, please see text).

* Denotes significance at a 10% level.

** Denotes significance at a 5% level.

*** Denotes significance at a 1% level.

5. Robustness tests

5.1. Firm complexity

As I note above, when firms are choosing their CEOs, their complexity levels may be an important determinant, and thus my results may be driven by firm complexity rather than CEO ability. To address this potential endogeneity problem, I create a sample that matches firms with high- and low-ability CEOs on their predicted propensity for complexity (Villalonga, 2004). Following Coles, Daniel, and Naveen (2008), I use firm size and leverage as determinants of firm complexity, and include R & D intensity, sales growth, and industry as additional determinants. Matching at a 10% propensity score yields 1096 firm-year observations, 548 for firms with high-ability CEOs and the other 548 for equally complex firms with low-ability CEOs.

Panel A in Table 6 presents the descriptive results for the matched sample, showing one-tailed dependent t-test results for the differences on key variables between firms with high-ability CEOs and their matched firms with low-ability CEOs. To analyze whether the results above hold for my matched sample, I test whether high-ability CEOs manage less opaque firms than their matched low-ability peers. High-ability CEOs have more trading volume, more analysts following, and lower forecast error than low-ability CEOs. Not surprisingly, then, the opacity index value is significantly lower for high-ability CEOs.

Panel B in Table 6 shows the multivariate analysis results using the matched sample. Using the same model used in previous sections for the full sample, I evaluate the association between CEO ability and corporate opacity. The coefficient estimate of ability is negative and significant, suggesting that high-ability CEOs manage less opaque firms than their low-ability peers. In general, these results support the earlier findings, and act as a robustness check.

Table 7
Alternative ability measures.

	CEO ability	CEO tenure	CEO age	MBA degree	Elite school
CEO ability	1.000				
CEO tenure	0.089 (< 0.001)	1.000			
CEO age	0.047 (0.003)	0.296 (< 0.001)	1.000		
MBA dummy	0.009 (0.57)	− 0.091 (< 0.001)	− 0.036 (0.03)	1.000	
Elite school	0.019 (0.23)	0.016 (0.31)	0.039 (0.01)	0.292 (< 0.001)	1.000

The table displays the correlation matrix of the CEO ability measures, along with *p*-values within the parentheses. MBA dummy is a dummy variable that equals one if the CEO has an MBA degree, and zero otherwise. Elite school is a dummy variable that equals one if the CEO has a degree from an elite university, and zero otherwise. CEO age and CEO tenure are also included. CEO ability is measured as the average firm performance for the previous three years, adjusted by the industry. CEOs with CEO ability value above the median are considered high ability, and those below the median are called low ability.

Table 8
Earnings management measures.

Panel A: Correlation matrix of earnings management measures and ability				
	Ability dummy	EM1	EM2	EM3
CEO ability	1.000			
EM1	− 0.020 (0.22)	1.000		
EM2	− 0.030 (0.05)	0.033 (0.04)	1.000	
EM3	0.0014 (0.38)	0.026 (0.11)	0.443 (< 0.001)	1.000

Panel B: Regression results, impact of ability on earnings management				
Variables	Dependent variable = Earnings management measures			
	EM1	EM2	EM3	
	(1)	(2)	(3)	
CEO ability	− 0.872 (− 1.08)	− 0.006 (− 2.15)**	− 0.007 (− 2.73)***	
Control variables	Yes	Yes	Yes	
Intercept, industry and year dummies	Yes	Yes	Yes	
Adj. R2	0.0011	0.0272	0.1037	
Sample size	3560	3696	3701	

The table displays the descriptive and multivariate statistics for the earnings management measures. Panel A shows the correlation matrix of CEO ability and earnings management measures, along with *p*-values within the parentheses. Panel B shows the regression results of the main model, using the earnings management measures as the dependent variable. CEO ability is measured as the average firm performance for the previous three years, adjusted by the industry. CEOs with CEO ability value above the median are considered high ability, and those below the median are called low ability. For the details of the earnings management measures, EM1, EM2, and EM3, please see text. For control variables such as firm size, R & D intensity, capital expenditure, sales growth, debt ratio, risk, and performance, please see text for details.

* Denotes significance at a 10% level.

** Denotes significance at a 5% level.

*** Denotes significance at a 1% level.

5.2. Alternative ability measures

To test whether firm performance is aligned with other measures of CEO ability, I compare it with *CEO tenure* (Murphy, 1986), *CEO age* (Milbourn, 2003), and two measures of CEO education (Bertrand & Schoar, 2003). *MBA dummy* is a dummy variable that equals one if the CEO has an MBA degree, and zero otherwise. *Elite school* is a dummy variable that equals one if the CEO has a degree from an elite university, and zero otherwise.² The CEO education data were hand collected from proxy statements. Table 7 presents the correlation matrix of the main CEO ability measure and the alternative ability measures. Supporting previous studies, all of the alternative ability measures are positively associated with *CEO ability*.

5.3. Earnings management measures

The opacity measure used above combines trading volume, bid ask spread, number of analysts, and forecast error. It could be argued that these measures are also associated with other firm characteristics and that more direct measures of CEO actions are

² US News elite school rankings: <http://colleges.usnews.rankingsandreviews.com/best-colleges/rankings/national-universities?int=9ff208>.

Table 9
Matched sample results.

Variables	Mean value			
	High ability vs. low ability	Difference	t-value	p value
Ln (dollar volume)	>	0.1009	1.36	1.36*
Spread (%)	<	0.0534	1.49	0.93
Analysts	>	0.6693	1.61	0.05**
Forecast error (%)	<	0.2410	1.03	0.84
Opacity index	<	-0.0146	-1.46	0.07*
Number of observations	1034			

The table presents the descriptive analysis using the matched sample results. The matched sample is based on propensity scores with the following determinants: past firm performance, firm size, and industry. The table shows the one-tailed dependent *t*-test results for the differences of key variables between firms with high-ability CEOs and their matched firms with low-ability CEOs. CEO ability is measured as the average firm performance for the previous three years, adjusted by the industry. CEOs with CEO ability value above the median are considered high ability, and those below the median are called low ability. The opacity index uses four different corporate opacity proxies, namely trading volume, bid-ask spread, analysts following, and analysts' forecast error, and it is constructed so that the degree of corporate opacity increases as the index score increases (for details, please see text).

*** Denotes significance at a 1% level.

* Denotes significance at a 10% level.

** Denotes significance at a 5% level.

needed, such as the choice to manage earnings or use accruals. Drawing on the existing earnings management literature, I therefore utilize the use of discretionary accruals as a measure of earnings management activities (Bartov, Gul, & Tsui, 2000). First of all, following Dechow, Sloan, and Sweeney (1995), Healy (1985), and Leuz et al. (2003), I compute total accruals as

$$Accruals = (\Delta CA - \Delta Cash) - (\Delta CL - \Delta STD - \Delta \Delta TP) - Dep,$$

where ΔCA is change in total current assets, $\Delta Cash$ is change in cash/cash equivalents, ΔCL is change in total current liabilities, ΔSTD is change in short-term debt included in current liabilities, ΔTP is change in income taxes payable, and Dep is depreciation and amortization expense. Later, I create three different earnings management measures. $EM1$ is calculated by dividing *Accruals* by *Cash flow from operations*, following Leuz et al. (2003). $EM2$ is *Discretionary accruals*, following DeAngelo (1986). Lastly, following Healy (1985), I calculate $EM3$ as the difference between total accruals, scaled by lagged total assets, and nondiscretionary accruals, where nondiscretionary accruals are the mean of total accruals scaled by lagged total assets from the estimation period.

Table 8 displays the findings of the earnings management analysis. Panel A shows the correlation matrix. CEO ability is negatively and significantly associated with $EM1$ and $EM2$, implying that high-ability CEOs get into fewer earnings management activities, and thereby supporting the main findings. Panel B shows the results of using the main regression model to test the robustness of the findings, while replacing the opacity index with the earnings management measure as the dependent variable. CEO ability has negative coefficient estimates (significant for $EM2$ and $EM3$), suggesting once more that high-ability CEOs manage their companies' earnings less than their low-ability peers do. In sum, the findings of this paper are robust to the use of earnings management measures as alternatives to the opacity index and its constituents.

5.4. Past firm performance

The results above suggest that low-ability CEOs hide behind firm opacity. However, it might also be possible that a poorly performing company, regardless of its CEO's talent, chooses to be less transparent simply to avoid the negative market reaction. To test this possibility, I create a sample that matches firms with high- and low-ability CEOs on their propensity to exhibit similar past performance, firm size, and industry. The firms are matched at the 10% propensity score, and there are 1034 firm-year observations in the matched sample, 517 for firms with high-ability CEOs and the other 517 for their matched firms with low-ability CEOs.

Table 9 presents the results for the matched sample, showing one-tailed dependent *t*-test results for the differences in key variables between firms with high-ability CEOs and their matched firms with low-ability CEOs. To analyze whether the results above hold for my matched sample, I test whether high-ability CEOs manage less opaque firms than their matched low-ability peers. The findings suggest that high-ability CEOs have significantly more trading volume and higher numbers of analysts following than low-ability CEOs, regardless of the firms' past performances. In addition, the opacity index value is significantly lower for high-ability CEOs. Therefore, my findings are not driven by past poor performance.

6. Conclusion

Previous studies indicate that corporate transparency has many tempting benefits, such as reduction of information asymmetries and mitigation of agency costs, along with performance or valuation premiums. My finding that there is a negative relation between CEO ability and corporate opacity provides an alternative point of view, and it suggests two different explanations. High-ability CEOs may be using discretion to maximize transparency in their own interest as well as that of their shareholders, while low-ability CEOs may be signal-jamming the market's inferences about their talent by limiting the available information. Alternatively, it might be that

low-ability CEOs seek out more opaque firms in order to mask their expected poor performance. While it is difficult to distinguish between these two notions, the negative association between CEO ability and corporate opacity is strong. This finding is robust to the use of samples matched on firm complexity and past firm performance, to alternative ability proxies, and to more direct measures of CEOs' choice of transparency.

While both opacity and low CEO ability separately damage firm performance and value, the combination is even worse. I find that firms with low-ability CEOs and the poorest performance are also likely to have CEO duality and a high governance index, both indicators of weak board monitoring. These findings suggest that corporate governance is a key element in hiring and keeping talented CEOs, and also in preventing the less talented from exploiting corporate opacity.

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