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Managerial Ability and Earnings Quality

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ABSTRACT: We examine the relation between managerial ability and earnings quality. We find 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.

Keywords: *managerial ability; managerial efficiency; earnings quality; accruals quality*.

Data Availability: *Data are publicly available from the sources identified in the text*.

I. INTRODUCTION

We examine the relation between managerial ability and earnings quality. We anticipate that superior managers are more knowledgeable of their business, leading to better judgments and estimates and, thus, higher quality earnings.[1] Alternatively, the benefit

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[1] Following Dechow and Schrand (2004), we consider high-quality earnings to be those that accurately reflect companies' current operating performance, and assume that managers take a shareholder/analyst perspective when determining the desired attributes of earnings (see Dechow et al. 2010). As we discuss further below, the managers we focus on are CFOs and their delegates, as we are interested in the accuracy of accrual estimations.

of higher quality earnings may not be sufficient to warrant the time and attention of skilled management, especially if the variance of feasible estimates is small, in which case we may not find an association between managerial ability and earnings quality.[2]

While the archival literature in the area of earnings quality has largely focused on firm-specific characteristics, such as firm size and board independence (Dechow and Dichev 2002; Klein 2002), we examine the manager-specific aspect of earnings quality. Our study is in the vein of Bertrand and Schoar (2003), who find that managers have an effect on firm choices such as acquisitions or research and development expenditures; Aier et al. (2005), who document that CFOs with more accounting expertise have fewer restatements; and Francis et al. (2008), who document that earnings quality varies inversely with CEO reputation.[3]

Our main measure of managerial ability (hereafter, the MA-Score) is developed in Demerjian et al. (2012), although we perform robustness checks using historical returns, media citations, and manager fixed effects (e.g., Fee and Hadlock 2003; Milbourn 2003; Francis et al. 2008; Dyreng et al. 2010). Demerjian et al. (2012) first estimate total firm efficiency, where efficient firms are those that generate more revenues from a given set of inputs. Total firm efficiency is influenced by both the manager, who can, to varying degrees, predict future demand and understand industry trends, and the firm, because (for example) managers in larger firms can negotiate better terms. Thus, Demerjian et al. (2012) partition total efficiency between the firm and the manager, and verify that the component attributed to the manager is associated with a variety of characteristics, including managerial pay and the price reaction to management departures from the firm.[4] Prior research is limited to measures such as media coverage and historical returns, which are difficult to attribute solely to the manager versus the firm (Francis et al. 2008), or manager fixed effects, where there is evidence of a manager-specific effect, but the quantifiable effect is limited to managers who switch firms (e.g., Bertrand and Schoar 2003; Bamber et al. 2010; Ge et al. 2011). The MA-Score allows us to better distinguish the effect of the manager from the effect of the firm and to retain an ordinal ranking of quality for a large sample of firms.[5]

We expect a more able management team to estimate accruals more accurately. For example, we expect more able managers to be more knowledgeable of their client base and macro-economic conditions when estimating bad debt expense, be more knowledgeable of the expected future benefits of recorded assets, and to be more able to understand and apply complex standards (e.g., McNichols 2002; Plumlee and Yohn 2010).

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[2] Costs of poor earnings quality include higher cost of capital (Francis et al. 2004) and economically significant negative price reactions to the announcement of earnings restatements (Palmrose et al. 2004).

[3] We hypothesize a positive relation between ability and earnings quality, which is opposite to the relation documented in Francis et al. (2008). Francis et al. (2008) measure CEO reputation with the number of articles mentioning the executive and document a negative association between the number of news articles pertaining to the company's CEO and earnings quality based on the Dechow and Dichev (2002) accruals quality measure. We find that this negative relation in Francis et al. (2008) appears to be due, at least in part, to measurement error in the accruals quality measure (see Section IV).

[4] As we clarify in the following sections, Demerjian et al. (2012) estimate total firm efficiency using data envelopment analysis, a type of frontier analysis that measures relative efficiency (see also Knechel et al. 2009). They then remove identifiable firm characteristics, such as size, that affect the firm's relative efficiency but are unlikely to be a direct result of the quality of management. They attribute the unexplained portion of total firm efficiency to the management team. They document that their measure outperforms existing measures of ability such as historical stock returns and media citations.

[5] The ability score is for the management team. In our setting we would like to determine the quality of CFOs and their delegates, as we focus on the estimation of accruals, whereas CEOs are more focused on the overall strategy of the firm. Although we cannot disentangle the ability score by CEO and CFO, the ability score does encompass CFOs and their delegates, whereas media citations are, by definition, focused on the CEO. We also identify, in Section V, CFOs who switch firms within our sample to document CFO-specific fixed effects on accruals quality and correlate the CFOs' scores from their old firms with the accruals quality after their arrival in their new firms.

We consider four measures of earnings quality: the existence of an earnings restatement (Anderson and Yohn 2002), the persistence of earnings (Richardson et al. 2005), errors in the bad debt provision (McNichols and Wilson 1988), and the extent to which accruals map into cash flows (Dechow and Dichev 2002).[6] In general, we find that earnings quality is positively associated with managerial ability. This finding is consistent with the premise that more capable managers are better able to estimate accruals, which results in a more precise measure of earnings.

We contribute to both the earnings quality literature and the managerial ability literature by establishing a positive and significant relation between managerial ability and earnings quality, which suggests a means of improving earnings quality. Many of the factors associated with earnings quality, such as firm size, industry, or operating cycle, result from strategic goals and competitive advantages of the firm. Consequently, it may not be advantageous to improve earnings quality by changing these characteristics. In contrast, we conclude that given the set of earnings-estimation challenges resulting from the firm's operating decisions, higher ability managers will be able to better deal with these complexities and report higher quality earnings relative to similar firms operating in similar environments. This finding is important for board members when considering the costs and benefits of managers because managerial ability affects not only the operations of the firm, but also the quality of its reported earnings and, in turn, its share-price attributes and litigation exposure.

Our results also help reconcile the counter-intuitive prior findings that more reputable managers are associated with lower accruals quality (Francis et al. 2008). We find that this relation appears to be due, in part, to the impact of fundamental firm characteristics on the accruals quality measure. As noted by Dechow and Dichev (2002), the accruals quality measure is influenced by both intentional and unintentional errors, and many unavoidable unintentional errors stem from complex operating environments (Dechow and Dichev 2002). Following the spirit of Ball and Shivakumar (2006), we modify the Dechow and Dichev model to allow the coefficients of the model to vary with firm fundamentals. This allows the model to incorporate variations in the expected relation between accruals and cash flows across firms (see also Wysocki 2009). Our modifications allow us to document a positive and significant association between managerial ability and accruals quality.

In the next section, we develop our hypothesis with a review of the literature. In Section III we describe our sample, test variables, and descriptive statistics. In Section IV we present the main results, and in Section V we consider alternative ability measures and conduct a change analysis for a subset of managers in our sample who switch firms. We conclude the study in the final section.

II. HYPOTHESIS DEVELOPMENT AND RELATED LITERATURE

Earnings quality is an important characteristic of financial reports that affects the efficient allocation of resources. Because earnings are the main input to investors' and analysts' valuation models, firms with poor earnings quality tend to have higher costs of capital (e.g., Francis et al. 2004) and those experiencing restatements or SEC enforcement actions tend to experience an economically significant negative price reaction to the announcement (Feroz et al. 1991; Palmrose et al. 2004). Following Dechow and Schrand (2004), we define high-quality earnings to be those that accurately reflect companies' current operating performance.

We expect managers' ability to form accurate judgments and estimates to vary across individuals. We expect more able managers to be more knowledgeable about the firm and the industry, as well as to be better able to synthesize information into reliable forward-looking

[6] We use the term "earnings quality" to capture the general construct of higher quality reported earnings, while we use the term "accruals quality" to discuss the Dechow and Dichev measure of earnings quality based on the mapping of accruals to cash flows.

estimates with which to report higher quality earnings (e.g., Libby and Luft 1993). Specifically, we expect accruals estimated by high-ability managers to be more accurate than those estimated by low-ability managers. For example, consider the allowance for bad debt estimate. A less able manager might apply the historical rate of bad debt for the firm, while a more able manager might adjust the historical rate by considering the macro-economic and industry trends, as well as changes in the firm's customer base. Similarly, we expect more able managers to report more accurate and justifiable depreciation rates, fair values, and other accrual estimates. Thus, holding the firm constant, we expect a more able manager to report higher quality earnings.

H1: Managerial ability is positively associated with earnings quality.

It is possible that the majority of the variation in earnings quality is driven by innate firm characteristics that managers cannot affect, in which case we will not find an association between the ability of managers and the quality of earnings. It is also possible that the benefits to the incremental improvement in earnings quality resulting from the intervention by an able manager do not exceed the cost of that manager's time, in which case, again, we will not find an association between the manager's ability and the firm's earnings quality.

To date, the bulk of the literature on earnings quality has examined firm-specific characteristics. For example, Dechow and Dichev (2002) document that earnings quality is poorer for firms that are smaller, are experiencing losses, have greater sales and cash flow volatility, and have longer operating cycles. Each of these innate firm characteristics makes accruals more difficult to estimate. In addition to these innate characteristics, earnings quality has been found to vary with firm infrastructure, such as internal control quality (Doyle et al. 2007; Ashbaugh-Skaife et al. 2008) and monitors such as auditors (e.g., Becker et al. 1998) and boards (Klein 2002).

With respect to the effect of managers on the firm, Bamber et al. (2010) find that individual managers appear to have particular "styles" that are associated with their propensity to issue guidance and the characteristics of the resulting guidance (e.g., the precision of the guidance). In a similar vein, both Ge et al. (2011) and DeJong and Ling (2010) examine manager fixed effects on certain financial reporting policies and, similar to Bamber et al. (2010), document that individual managers matter because firms' accounting and disclosure policies vary with manager fixed effects. As previously noted, this approach allows researchers to document a manager-specific effect, but it is constrained to managers who switch employers among the sample firms. Fixed effects are also usually limited to larger firms as executives within smaller firms often switch to private firms (Ge et al. 2011).

Of particular relevance for our study, both Aier et al. (2005) and Francis et al. (2008) examine whether earnings quality varies with managerial characteristics. Aier et al. (2005) document an association between CFO expertise (years worked as CFO, experience at another company, advanced degrees, and professional certifications) and restatements, concluding that firms employing CFOs who have greater expertise have fewer restatements. Francis et al. (2008) examine the relation between earnings quality and CEO reputation, measured by the number of business press articles mentioning each CEO. They find a *negative* relation between CEO reputation and earnings quality. They conclude that "boards of directors hire specific managers due to the reputation and expertise these individuals bring to managing the more complex and volatile operating environments of these firms" Francis et al. (2008).

In sum, there is mixed archival evidence on the impact of managers on earnings quality. Although there is some evidence that managers with greater expertise are associated with fewer earnings restatements, Francis et al. (2008) document that more reputable managers are associated with lower earnings quality. The latter association is consistent with some firms having less predictable, and thus lower quality, earnings by the nature of their business (Dechow and Schrand 2004; LaFond 2008) and these firms hiring better managers. Although it is more difficult to estimate

accruals within certain environments, such as more volatile firms, we expect that better managers can estimate accruals more accurately for a given environment, for example, within loss firms.

We consider four earnings quality measures. The first is earnings restatements, which are *de facto* evidence of inaccurate earnings (Dechow et al. 2010).[7] The second is earnings persistence, where we partition earnings into accrual and cash flow components to examine accruals persistence more directly (Sloan 1996; Richardson et al. 2005). Our third earnings quality measure is the accuracy of the bad debt provision (McNichols and Wilson 1988). Finally, we examine the mapping of working capital accruals into cash from operations, based on Dechow and Dichev (2002).

Each of these measures is affected by both unintentional errors and intentional errors, and more able managers may be more likely to introduce intentional errors, either to signal their private information about the firm or to extract perquisites from the firm and the shareholders. We focus on earnings quality measures that capture estimation errors in accruals, but do not attempt to distinguish between intentional and unintentional errors.[8]

III. DATA, VARIABLE DEFINITIONS, AND DESCRIPTIVE STATISTICS

We obtain our data from the 2010 Annual Compustat File for the bulk of our earnings quality variables and controls; from CRSP to form historical returns, an alternate managerial ability measure; from ExecuComp to track CFOs across firms; from IRRC to obtain board independence data; and from Audit Analytics for recent years of restatements and internal control opinions. We also obtain several datasets made available by researchers, including managerial ability from Demerjian et al. (2012), media citations from Baik et al. (2011), restatements from Hennes et al. (2008) and Plumlee and Yohn (2010), and internal control quality data from Doyle et al. (2007).

We begin with all firms with managerial ability data and at least one of our earnings quality variables. We then exclude firm-years with acquisition activity in excess of 5 percent of assets, resulting in a maximum of 78,423 firm-year observations from 1989–2009. The period begins with 1989 because 1988 is the first year for which firms widely reported cash flow statements, and the Dechow and Dichev accruals quality variable requires one year of historical cash flow data. The sample ends in 2009 because our earnings quality variables described in the following section require at least one year of future realizations. We exclude firms with material acquisition activity as it could unduly affect both the measure of managerial ability and our earnings quality measures.

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[7] Some erroneous estimates of accruals are corrected prospectively, in that adjustments are made going forward, but prior earnings are not restated. In these cases, restatements offer an arguably weaker measure of earnings quality than the other measures we examine. Many erroneous judgments and estimates, however, are retrospectively restated. For example, when marking-to-market, managers must determine whether to rely on traded prices or other valuations when traded prices do not appear to be reflective of the fair value. Further, managers must determine whether to write-down assets based on their judgment of whether the assets will be realized as future benefits. In their appendix, Plumlee and Yohn (2010) highlight restatements for both of these settings in which managers' judgments were *ex post* deemed to be wrong. We corroborate in subsequent analyses that a large number of restatements are attributable to managerial judgments and estimates, and that these are the types of restatements that are associated with managerial ability.

[8] Because we examine a broad cross-section, we do not expect to find strong evidence of earnings management, on average (Dechow and Skinner 2000). It is possible that better managers are more likely to smooth earnings or otherwise use earnings management as a signaling mechanism (Tan and Jamal 2006), but it is also possible that they can more effectively use earnings management to extract personal benefits. Our measure of managerial ability is based on efficiency, and does not incorporate ethical considerations (Kim et al. 2012). In the event of earnings management, however, we expect more able managers to be better able to manage earnings *successfully*, for example, accelerating sales only if they know there will be sufficient sales in the next period to cover the acceleration, thereby avoiding large accrual reversals and restatements. We leave a direct examination of the interaction between managerial ability and earnings management for future research.

Variable Definitions

Managerial Ability Measure

Our main measure of managerial ability, the MA-Score, is developed by Demerjian et al. (2012), who generate an estimate of how efficiently managers use their firms' resources. All firms use capital, labor, and innovative assets to generate revenues. High-quality managers will generate a higher rate of output from given inputs than lower quality managers, for example by applying superior business systems and processes, such as supply chains and compensation systems.

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.[9] Thus, the measured resources reflect tangible and intangible assets, innovative capital (R&D), and other inputs that are not reported separately in the financial statements, such as labor and consulting services, but whose costs are included in cost of sales and SG&A. We provide the motivation and definition for each of these variables in Appendix A.

Demerjian et al. (2012) use DEA to solve the following optimization problem:

$$\max_{\mathbf{v}} \boldsymbol{\theta} = \frac{Sales}{v_1 CoGS + v_2 SG\&A + v_3 PPE + v_4 OpsLease + v_5 R\&D + v_6 Goodwill + v_7 OtherIntan}.$$

The optimization finds the firm-specific vector of optimal weights on the seven inputs, $\boldsymbol{v}$, by comparing each of the input choices of an individual firm to those of the other firms in its estimation group. The efficiency measure that DEA produces, $\boldsymbol{\theta}$, takes a value between 0 and 1, reflecting constraints in the optimization program. Observations with a value of 1 are the most efficient and the set of firms with efficiency equal to 1 trace a frontier through the efficient set of possible input combinations. Observations with efficiency measures less than 1 fall below the frontier. A firm's DEA score indicates the degree to which the firm is efficient. A firm with a score of less than 1 would need to reduce costs or increase revenues to achieve efficiency.

The efficiency measure generated by the DEA estimation is attributable to both the firm and the manager, similar to other measures of managerial ability such as historical returns and media coverage. For example, a more able manager will be better able to predict trends, regardless of the size of the firm, while a manager in a larger firm will, on average, be better able to negotiate terms with suppliers, regardless of his or her quality. 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.[10] They estimate the following Tobit regression model by industry:

[9] DEA is a frontier analysis that calculates efficiency as the ratio of weighted outputs to weighted inputs. DEA uses an optimization program to determine the firm-specific optimal or "implicit" weights on the inputs and outputs. The implicit weights capture the efficiency of the firm based on the selected inputs and outputs, allowing the optimal mix of inputs and outputs to vary by firm. This differs from other efficiency measures, such as ROA or ROE, that require an explicit set of weights, generally equal to 1. Since Demerjian et al. (2012) have only one output, sales, its weight is standardized to 1 across observations. For the general DEA model, please see Appendix A.

[10] To the extent that managers also affect some of the independent variables in Equation (1), such as free cash flow, the MA-Score is a conservative (understated) measure of managerial efficiency. We also supplement Demerjian et al.'s (2012) estimation by including risk as an additional independent variable, measured using leverage and beta. We control for risk because superior operating performance that results from riskier operations is not necessarily indicative of higher ability managers. We find similar results when we control for risk, indicating that the ability measure is not simply picking up firms with riskier operations.

$$\begin{aligned} Firm\ Efficiency = {} & \alpha_0 + \alpha_1 Ln(Total\ Assets) + \alpha_2 Market\ Share + \alpha_3 Positive\ Free\ Cash\ Flow \\ & + \alpha_4 Ln(Age) + \alpha_5 BusinessSegmentConcentration \\ & + \alpha_6 Foreign\ Currency\ Indicator + Year\ Indicators + \varepsilon. \end{aligned} \quad (1)$$

The residual from the estimation is the MA-Score, which we attribute to the management team and rely on as our main measure of managerial ability (*MgrlAbility*).[11] We create decile ranks of *MgrlAbility* by year and industry to make the score more comparable across time and industries and to mitigate the influence of extreme observations. Untabulated analyses indicate that results are similar using a continuous variable.

Demerjian et al. (2012) corroborate this measure by performing a number of validity tests. First, the MA-Score is strongly associated with manager fixed effects, suggesting it reflects manager characteristics, not just firm characteristics omitted from Equation (1). Second, they document a negative (positive) stock price reaction when high-ability (low-ability) CEOs announce they are leaving the firm. Third, they find that replacing CEOs with new CEOs of higher ability (lower ability) is associated with improvements (declines) in subsequent firm performance. The MA-Score is also positively correlated with CEO pay and historical returns and outperforms historical returns, historical ROA, compensation, tenure, and media citations in each of their tests. Together, their validity tests provide strong evidence that the MA-Score reflects managerial talent that is distinct from the firm.

While the MA-Score is our main measure of managerial ability, it has several possible sources of error in its measurement. First, Demerjian et al. (2012) acknowledge that in the first-stage DEA estimation the inputs and output are measured with noise. For example, accounting variables, such as sales and cost of goods sold, can be manipulated by management and can be measured differently across firms, and some variables of interest, such as advertising or purchased research and development are not available for most firm-year observations. To the extent that certain input data are not available or are measured with error, the production function underlying the DEA estimation is potentially incomplete or inaccurate. In addition, the second-stage estimation attributes any firm efficiency outside of the set of the identified firm features, which are the explanatory variables in Equation (1), to managerial ability. If the set of firm features is incomplete, then the measure may overstate managerial ability by attributing efficiency inherent to the firm to the manager. Thus, in Section V we also consider alternative measures of managerial ability, including media citations, historical stock returns, and manager fixed effects.

Earnings Quality Measures

Dechow et al. (2010) note that there are a multitude of earnings quality measures used in the literature. To examine the impact of managers on accrual estimation, we select earnings restatements, earnings persistence, errors in the bad debt provision, and the mapping of accruals into cash flows as our four measures of earnings quality. We select these measures because increased correspondence between accruals and the associated economic activity likely reduces earnings restatements, increases earnings persistence, and lowers the likelihood of errors in accruals. Because we expect that better managers are able to report accruals that more closely correspond to the underlying economic activity, we expect the earnings quality metrics that are affected by judgments and accrual estimation to vary with managerial ability. For each of these measures, we consider earnings quality in year t+1 onward, i.e., in periods subsequent to year t, when managerial ability is measured. This reduces the likelihood that an economic shock

[11] The MA-Score data are available at https://community.bus.emory.edu/personal/PDEMERJ/Pages/Home.aspx.

concurrently affects both our measurement of ability and earnings quality. We discuss each earnings quality metric in greater detail in Section IV.[12]

Control Variables

Our main set of control variables is based on the firm-specific determinants of earnings quality noted in Dechow and Dichev (2002) and Hribar and Nichols (2007), including firm size, proportion of losses, sales volatility, cash flow volatility, and operating cycle. We also control for whether the company's auditor is a national audit firm, which is associated with earnings quality (Becker et al. 1998). Finally, we control for change in sales growth and abnormal returns to control for growth and economic shocks to performance, both of which could potentially impact our measures of managerial ability and earnings quality. We provide variable definitions and measurement periods in Table 1.

Descriptive Statistics

For each of our transformed variables (*MgrlAbility*, *Historical Ret*, *Media Citations*, *AQ* [and modifications thereof], *Firm Size*, and *Operating Cycle*), we present the untransformed variable for ease of interpretation in Table 1. By construction, managerial ability has a mean and median close to 0, as this is a residual from Equation (1). The five-year historical return has a mean of approximately 6 percent and, on average, CEOs are cited by the media approximately 44 times per year or 219 times over five years. Approximately 13 percent of firms experience a restatement in the next three years, and firm-specific earnings persistence averages approximately 0.23.[13] The error in the provision for bad debt as a percentage of sales (*BDE Error*) has a mean and median of 0.01. Mean (median) *AQ* is −0.03 (−0.03), similar to that in Francis et al. (2004) and Dechow and Dichev (2002), where we have multiplied the standard deviation by −1.

In Panel B of Table 1 we partition our earnings quality measures by managerial ability, where low-quality (high-quality) managers are those in the bottom (top) quintile of managerial ability, where quintiles are formed by industry-year. Historical returns are significantly higher among high-quality managers, consistent with Fee and Hadlock (2003) and Demerjian et al. (2012), although media citations are significantly lower for managers with higher ability, a relation we explore in Section V. Restatements are more prevalent among low-quality managers, median firm-specific earnings persistence is higher among high-quality managers, and errors in the provision for bad

[12] We do not consider the absolute value of discretionary accruals, earnings smoothness and benchmarking, as the relation between improved accruals estimation and these metrics is not clear. For example, abnormally high accruals may be high-quality accruals that are associated with cash flows, while abnormally low accruals may reflect extreme negative performance, which also reflects the underlying economics of the firm. Neither of these "abnormal" accruals provides information on the manager's ability to appropriately estimate accruals, as the measure does not incorporate *ex post* realizations. We do not consider timely loss recognition, as it is not apparent whether more or less timely loss recognition better reflects the underlying economics of the firm. As noted in Dechow et al. (2010), ERCs are a poor measure of earnings quality because much of the earnings information can be voluntarily disclosed prior to the earnings announcement. Finally, of the three external indicators of earnings quality—restatements, AAERs, and internal control disclosures—we consider only restatements. We do not consider AAERs because these tend to be more fraudulent than basic errors in estimation (Hennes et al. 2008). We do not consider internal control deficiencies as an outcome because the determinants of internal control problems are largely firm-specific, such as having adequate resources to establish and maintain these controls. The role of an able manager in the determination of strong internal controls is less clear, and does not speak to management's ability to estimate accruals.

[13] We identify the firm-specific persistence in order to have a stand-alone measure of persistence. The 0.23 firm-specific persistence coefficient is lower than the typical coefficient for cross-sectional persistence because it is a time-series, firm-specific coefficient, based on quarterly observations of earnings per share rather than the more traditional annual observations of ROA. When we estimate a cross-sectional regression by year, we find a mean earnings per share persistence coefficient of 1 and an ROA persistence coefficient of about 0.70.

TABLE 1

Descriptive Statistics

Panel A: Descriptive Statistics for the Full Sample (1989–2009)

Variable	n	Mean	Median	Std. Dev.	25%	75%
MgrlAbility[a]	78,423	0.00	−0.01	0.15	−0.09	0.07
Historical Ret[a]	40,871	0.06	−0.35	2.17	−1.00	0.50
Media Citations[a]	10,110	219.11	93.00	693.55	46.00	180.00
Restate	46,022	0.13	0.00	0.33	0.00	0.00
F.S. EarnPer	68,447	0.23	0.18	0.40	−0.02	0.48
BDE Error	1,124	0.01	0.01	0.05	0.00	0.01
AQ[a]	51,925	−0.03	−0.03	0.03	−0.05	−0.01
Modified $AQ_{LOSS\%}$[a]	52,316	−0.05	−0.03	0.05	−0.07	−0.02
Modified $AQ_{SI\_LOSS\%}$[a]	52,316	−0.05	−0.04	0.05	−0.07	−0.02
Modified $AQ_{NEGCFO\%}$[a]	52,317	−0.05	−0.04	0.05	−0.07	−0.02
TotalEarnQuality	17,128	0.91	1.00	0.56	0.55	1.33
ΔWC	78,423	0.01	0.01	0.12	−0.03	0.05
CFO	78,423	−0.01	0.06	0.32	−0.03	0.13
FirmSize[a]	78,423	1,134.66	84.80	4,645.46	17.92	423.29
Loss%	73,231	0.40	0.33	0.37	0.00	0.80
SalesVolatility	68,152	0.23	0.16	0.23	0.09	0.30
CashFlowVolatility	65,641	0.10	0.06	0.14	0.04	0.12
OperCycle[a]	77,444	158.72	112.65	281.68	68.01	174.53
ΔSalesGrowth	67,849	−0.05	0.00	3.14	−0.15	0.31
AbnormalReturn	62,928	0.02	−0.11	0.73	−0.39	0.23
FutureEarnings	78,423	−0.12	0.02	0.73	−0.10	0.08

[a] For each of our transformed variables (*MgrlAbility*, *Historical Ret*, *Media Citations*, *AQ*, *Modified AQ*, *FirmSize*, and *OperCycle*), we present the untransformed variable for ease of interpretation.

Panel B: Accruals Quality Variables by Managerial Ability

	Lowest Quintile of *MgrlAbility*		Highest Quintile of *MgrlAbility*		Diff.	Diff.
Variable	Mean	Median	Mean	Median	Mean	Med.
MgrlAbility[a]	−0.18	−0.17	0.20	0.18	***	***
Historical Ret[a]	−0.42	−0.65	0.79	0.09	***	***
Media Citations[a]	278.48	107.00	151.07	79.00	***	***
Restate	0.14	0.00	0.12	0.00	***	***
F.S. EarnPer	0.21	0.15	0.25	0.20		***
BDE Error	0.02	0.01	0.00	0.01	***	***
AQ[a]	−0.036	−0.025	−0.037	−0.028	***	***
TotalEarnQuality	0.82	0.89	0.93	1.00	***	***

*** Denotes a difference in the mean (median) under a t-test (Chi-square test) with a two-tailed p-value of less than 0.01.
[a] For each of our transformed variables (*MgrlAbility*, *Historical Ret*, *Media Citations*, *AQ*, *Modified AQ*, *Firm Size*, and *OperCycle*), we present the untransformed variable for ease of interpretation.
All continuous variables are winsorized at the extreme 1 percent. All variables are reported as of year *t* in this table only.

(continued on next page)

TABLE 1 (continued)

Panel C: Variable Definitions

Variable	Description	Definition
Ability Measures		
MgrlAbility	Managerial ability	The decile rank (by industry and year) of the MA-Score, which is managerial efficiency from Demerjian et al. (2012) in year *t*; the residual from Equation (1); see Appendix A.
Historical Ret	Historical return	The decile rank (by industry and year) of the five-year past value-weighted industry-adjusted return (year $t-4$, t) using monthly CRSP data.
Media Citations	Media citations	The decile rank (by industry and year) of the number of articles mentioning the CEO over the preceding five-year period (year $t-4$, t).
Earnings Quality Measures		
Restate	Restatement	An indicator variable that is equal to 1 if the firm announced a restatement in years $t+1$, $t+2$, or $t+3$, and 0 otherwise (available from 1997–2009).
Restate Judgments	Restatement relating to judgments and estimates	An indicator variable that is equal to 1 if the firm announced a restatement in years $t+1$, $t+2$, or $t+3$ classified as *standards-based* or *complexity-based* per Plumlee and Yohn (2010), and 0 otherwise (available from 2003–2006). Standards-based restatements are one of three types: (1) restatements stemming from lack of clarity in the standard; (2) restatements resulting from mistakes in judgment; and (3) restatements stemming from errors in applying complex rules. Complexity-based restatements are those resulting from the complexity of a transaction.
Restate Other	Restatement relating to items other than judgment	An indicator variable that is equal to 1 if the firm announced a restatement in years $t+1$, $t+2$, or $t+3$ not classified as a restatement relating to judgments and estimates as defined above, per Plumlee and Yohn (2010), and 0 otherwise (available from 2003–2006).
F.S. EarnPer	Firm-specific earnings persistence	The firm-specific time-series coefficient on earnings (per share) in a regression of one-quarter-forward earnings on current-quarter earnings. We estimate firm-specific quarterly earnings persistence over years $t+1$ through year $t+4$.

(continued on next page)

TABLE 1 (continued)

Variable	Description	Definition
BDE Error	Unexplained bad debt expense	The absolute value of the residual (φ_t) from Equation (4) where three industries are considered: printing and publishing, nondurable wholesale goods, and business services.
AQ	Standard deviation of accrual errors	The decile rank (by industry and year) of -1 $\times$ Standard Deviation (ε_{t+1}, ε_{t+2}, ε_{t+3}, ε_{t+4}), where ε_{t+n} is the residual from Equation (6) estimated by industry-year, where industries are defined per Fama and French (1997).
Modified $AQ_{Loss\%}$	Modified standard deviation of accrual errors	The decile rank (by industry and year) of -1 $\times$ Standard Deviation (ε_{t+1}, ε_{t+2}, ε_{t+3}, ε_{t+4}), where ε_{t+n} is the residual from Equation (8) estimated by industry and the quintile rank of *Loss%*, where ranks are assigned annually by industry. Industries are defined per Fama and French (1997).
Modified $AQ_{SI\_Loss\%}$	Modified standard deviation of accrual errors	The decile rank (by industry and year) of -1 $\times$ Standard Deviation (ε_{t+1}, ε_{t+2}, ε_{t+3}, ε_{t+4}), where ε_{t+n} is the residual from Equation (8) estimated by industry and the quintile rank of *Loss% Before Special Items*, where ranks are assigned annually by industry. Industries are defined per Fama and French (1997).
Loss% Before Special Items	Loss percentage before special items	The percentage of years reporting losses in net income (IBC) excluding the impact of special items over at least three of the last five years (t–4, t). We exclude the impact of special items by subtracting positive special items from IBC and adding back negative special items to IBC.
Modified $AQ_{NegCFO\%}$	Modified standard deviation of accrual errors	The decile rank (by industry and year) of -1 $\times$ Standard Deviation (ε_{t+1}, ε_{t+2}, ε_{t+3}, ε_{t+4}), where ε_{t+n} is the residual from Equation (8) estimated by industry and the quintile rank of *Negative CFO%* where ranks are assigned annually by industry. Industries are defined per Fama and French (1997).
Negative CFO%	Negative CFO percentage	The percentage of years reporting negative cash flows from operations over at least three of the last five years (t–4, t).
TotalEarnQuality	Earnings quality summation variable	The sum of three earnings quality variables: (1) the rank of estimation accruals quality (*Modified* $AQ_{Loss\%}$); (2) the rank of firm-specific earnings persistence; and (3) -1 $\times$ *Restate*. Thus, the variable ranges from a low of -1 to a high of 2.

(continued on next page)

TABLE 1 (continued)

Variable	Description	Definition
TotalEarnQuality2	Earnings quality summation variable	The sum of three earnings quality variables: (1) the rank of estimation accruals quality using the annual AQ metric (*Modified* $AQ_{Loss\%Ann}$); (2) the rank of firm-specific earnings persistence; and (3) $-1 \times$ *Restate*. Thus, the variable ranges from a low of -1 to a high of 2.
Control Variables		
FirmSize	Firm size	The natural log of the firm's assets (AT) reported at the end of year *t*.
SalesVolatility	Sales volatility	The standard deviation of sales [(SALE)/average assets (AT)] over at least three of the last five years (*t*–4, *t*).
CashFlowVolatility	Cash flow volatility	The standard deviation of cash from operations [(OANCF)/average assets (AT)] over at least three of the last five years (*t*–4, *t*).
OperCycle	Operating cycle	The natural log of the length of the firm's operating cycle, defined as sales turnover plus days in inventory [(SALE/360)/(average RECT) + (COGS/360)/(average INVT)] and is averaged over at least three of the last five years (*t*–4, *t*).
Loss%	Loss history	The percentage of years reporting losses in net income (IBC) over at least three of the last five years (*t*–4, *t*).
National Auditor	National auditor indicator	An indicator variable set equal to 1 for firms audited by national audit firms in year *t*, 0 otherwise.
Δ*SalesGrowth*	One-year change in % sales growth	The one-year change in sales growth defined as current year's sales growth ($\Delta SALE_t/SALE_{t-1}$) less prior year's sales growth ($\Delta SALE_{t-1}/SALE_{t-2}$).
AbnormalReturn	Abnormal return	One-year market-adjusted buy-and-hold return for year *t* where market returns are value-weighted.
PctInd	Board independence	The percentage of board members classified as independent based on IRRC's classification (available from 1996–2007).
ICW	Internal control weakness	An indicator variable for firms reporting material weaknesses in internal control (available from 2002–2007).
Other Variables		
FutureEarnings	Future net income	Future earnings (IBC) scaled by average total assets (AT).
Earnings	Net income	Earnings (IBC) scaled by average total assets (AT).

(continued on next page)

TABLE 1 (continued)

Variable	Description	Definition
ΔWC	Working capital accruals	The change in working capital scaled by average total assets, where working capital is defined as follows: [− (RECCH + INVCH + APALCH + TXACH + AOLOCH)].
ΔREV	Change in sales	Current year change in sales (SALE) scaled by average total assets (AT).
PPE	Property, plant, and equipment	Current year level of property, plant, and equipment (PPENT) scaled by average total assets (AT).
CFO	Cash from operations	Cash from operations (OANCF) scaled by average total assets (AT).
Accruals	Accruals	Accruals (scaled by average total assets (AT)), where Accruals = Earnings − CFO.

Subscripts in Panel C correspond to the timing of the variable in all subsequent tables.

debt are larger among low-quality managers, providing initial support for our hypothesis. We do not find consistent evidence when examining earnings quality based on the Dechow and Dichev measure, and explore this further in our multivariate analysis.

In Table 2 we find that managerial ability, measured with the MA-Score, is positively correlated with future earnings and negatively correlated with historical losses. Managerial ability is negatively correlated with restatements and errors in the provision for bad debt, and positively correlated with firm-specific earnings persistence. The Dechow and Dichev accruals quality measure, however, is negatively associated with the managerial ability, consistent with Francis et al. (2008) and our results in Panel B of Table 1.

IV. TEST DESIGN AND RESULTS

Earnings Restatements

Our first measure of earnings quality is earnings restatements, which are *ex post* evidence of erroneous reported earnings and thus have been used as a signal of poor earnings quality (Dechow et al. 2010). Although restatements can occur for reasons other than errors in accrual estimation, this earnings quality measure is the least reliant on an estimation procedure and, thus, provides a relatively unambiguous signal of earnings quality. Moreover, we expect restatements to be associated with errors in accrual estimation, as most restatements impact an accrual account (Palmrose and Shultz 2004). This assertion is supported by Plumlee and Yohn (2010), who find that a large number of restatements are a result of management's judgments and estimates.[14]

[14] Although some accrual errors will result in prospective adjustments, other mistakes in judgments and estimates will result in retroactive restatements (Plumlee and Yohn 2010). Plumlee and Yohn (2010) provide examples of how complexity and mistakes in judgments result in restatements. For example, firms have restated earnings when they chose to rely on their own estimate of fair value for a security whose last traded price was not necessarily indicative of fair value and *ex post* the SEC disagreed with the judgment made by management. As another example, firms have been required to restate earnings when subsequent information differs from management's expectations at the end of the fiscal year.

TABLE 2

Univariate Correlations

	Mgrl-Ability	*Historical Ret*	*Media Citations*	*Future Earnings*	*Loss%*	*Firm Size*	*Restate*	*F.S. EarnPer*	*BDE Error*	*AQ*	*Modified AQ_{LOSS}*	*Modified AQ_{SI}*	*Modified AQ_{CFO}*
MgrlAbility		**0.23**	**−0.10**	**0.27**	**−0.22**	0.00	**−0.02**	**0.04**	**−0.22**	**−0.02**	**0.03**	**0.03**	0.00
Historical Ret	**0.24**		−0.02	**0.41**	**−0.44**	**0.22**	**−0.03**	**0.13**	−0.05	**0.16**	**0.23**	**0.22**	**0.20**
Media Citations	**−0.09**	−0.01		**−0.10**	**0.02**	**0.52**	0.01	**−0.10**	−0.03	**0.11**	**0.07**	**0.08**	**0.10**
FutureEarnings	**0.08**	**0.26**	−0.02		**−0.56**	**0.29**	**−0.02**	**0.12**	**−0.17**	**0.23**	**0.33**	**0.32**	**0.29**
Loss%	**−0.21**	**−0.43**	0.00	**−0.33**		**−0.45**	**0.01**	**−0.07**	**0.32**	**−0.31**	**−0.42**	**−0.41**	**−0.37**
FirmSize	**−0.02**	**0.21**	**0.53**	**0.30**	**−0.45**		**0.06**	**0.02**	**−0.18**	**0.41**	**0.42**	**0.42**	**0.43**
Restate	**−0.02**	**−0.03**	0.01	−0.01	0.01	**0.06**		**−0.03**	−0.03	0.00	**−0.02**	**−0.01**	0.00
F.S. EarnPer	**0.04**	**0.13**	**−0.10**	**0.03**	**−0.06**	**0.02**	**−0.03**		**0.09**	**0.02**	**0.04**	**0.03**	**0.02**
BDE Error	**−0.16**	**−0.13**	0.11	**−0.13**	**0.32**	**−0.18**	0.00	**0.07**		0.02	0.04	0.04	0.06
AQ	**−0.02**	**0.17**	**0.11**	0.18	**−0.31**	**0.41**	0.00	**0.01**	0.02		**0.79**	**0.79**	**0.83**
Modified $AQ_{LOSS\%}$	**0.03**	**0.23**	**0.08**	**0.22**	**−0.41**	**0.42**	**−0.02**	**0.03**	−0.05	**0.78**		**0.92**	**0.87**
Modified $AQ_{SI\_Loss\%}$	**0.03**	**0.23**	**0.08**	**0.22**	**−0.41**	**0.43**	**−0.01**	**0.03**	−0.07	**0.79**	**0.92**		**0.87**
Modified $AQ_{NegCFO\%}$	0.00	**0.20**	**0.10**	**0.21**	**−0.37**	**0.44**	−0.01	**0.02**	−0.02	**0.83**	**0.87**	**0.87**	

Bold denotes significant correlation coefficients at the 10 percent alpha level.

This table reports Pearson correlation coefficients below the diagonal and Spearman correlation coefficients above the diagonal. We decile rank *MgrlAbility*, *Historical Ret*, *Media Citations*, *F.S. EarnPer*, *AQ*, and *AQ* modifications by industry-year.

See Table 1, Panel C for variable definitions.

Restate is an indicator variable that is equal to 1 if there is an announcement of a financial restatement in years t+1, 2, or 3. In our main analysis, we use the restatement data from Hennes et al. (2008) for restatements announced from 1997–2006 and from Audit Analytics for restatements announced from 2007–2010.[15] We then supplement our main analysis with those restatements identified as due to management's judgments and estimates per Plumlee and Yohn (2010), using the sample from their study.[16]

To determine whether managerial ability varies with earnings restatements, we estimate the following equation using a pooled logistic regression:

$$\begin{aligned} Restate_{t+1,t+3} = {} & \alpha_0 + \boldsymbol{\alpha_1 MgrlAbility_t} + \alpha_2 FirmSize_t + \alpha_3 SalesVolatilty_{t-4,t} \\ & + \alpha_4 CashFlowVolatility_{t-4,t} + \alpha_5 OperCycle_{t-4,t} + \alpha_6 Loss\%_{t-4,t} \\ & + \alpha_7 NationalAuditor_t + \alpha_8 \Delta SalesGrowth_t + \alpha_9 AbnormalReturn_t + \varepsilon_{t+1,t+3}. \end{aligned} \tag{2}$$

We include each of the control variables discussed above. Because our tests rely on panel data, standard errors may be correlated within years and across time by firm. Thus, unless otherwise noted, in this and all subsequent estimations we either cluster our standard errors by firm and year (Petersen 2009) or include firm fixed effects.

In Table 3 the first (second) estimation considers all restatements, and excludes (includes) firm fixed effects. As in our univariate analysis, we document a negative relation between managerial ability and restatements, supporting our hypothesis that more able managers are associated with higher quality earnings. The more efficient the manager, the less likely the firm is to restate ($\alpha_1 = -0.21$; $p < 0.05$). Given that the unconditional likelihood of having a restatement is 13 percent, untabulated results indicate that the marginal effect is economically significant at −2.4 percent.

In the second set of estimations in Table 3, we examine the restatements from 2003–2006 considered in Plumlee and Yohn (2010) and partition the sample between those restatements associated with management's judgments and estimates in column 3 and all other restatements in column 4. We find that only those restatements associated with management's judgments and estimates are associated with managerial ability.[17] These findings support our use of *Restate* as an earnings quality metric affected by managers' judgments and estimates. Again, however, a limitation of *Restate* as a measure of earnings quality is that many errors in judgments and accruals estimates will not result in a retrospective restatement, illustrating the importance of considering multiple earnings quality measures. We expect each of our remaining earnings quality measures to be lower in the presence of errors in judgments and estimates, even when these errors do not result in a restatement of previously issued financial statements.

Earnings Persistence

Our second measure of earnings quality is earnings persistence, which is frequently discussed as a measure of earnings quality (e.g., Dechow et al. 2010). We expect higher ability managers to choose better projects, have an improved understanding of risk, and manage the firm's operations more efficiently (by construction). Thus, we expect more able managers to have more persistent

[15] We thank the authors for the GAO-based dataset, which is available at http://sbaleone.bus.miami.edu/.

[16] We thank the authors for providing us both the restatement data and their coding of the restatements between those related to judgments and estimates and other restatements.

[17] Other restatements include internal errors and manipulation. We do not estimate these specifications with firm fixed effects, which require variation in the dependent variable for estimation and, thus, result in a sample size of only 1,834 of the 10,568 observations.

TABLE 3
Restatements and Managerial Ability

$$Restate_{t+1,t+3} = \alpha_0 + \boldsymbol{\alpha_1 MgrlAbility_t} + \alpha_2 FirmSize_t + \alpha_3 SalesVolatility_{t-4,t} + \alpha_4 CashFlowVolatility_{t-4,t} + \alpha_5 OperCycle_{t-4,t} + \alpha_6 Loss\%_{t-4,t} + \alpha_7 NationalAuditor_t + \alpha_8 \Delta SalesGrowth_t + \alpha_9 AbnormalReturn_t + \varepsilon_{t+1,t+3}.$$

		Dependent Variable =			
	Pred.	***Restate***	***Restate***	***Restate Judgments***	***Restate Other***
MgrlAbility	−	−0.21**	−0.22**	−0.50**	−0.13
		−2.09	*−2.20*	*−2.33*	*−1.08*
FirmSize	+	0.13***	0.47***	−0.06	−0.02
		3.81	*11.39*	*1.26*	*0.35*
SalesVolatility	+	0.21*	−0.26	−0.05	0.83***
		1.62	*−1.58*	*−0.21*	*3.74*
CashFlowVolatility	+	0.07	−0.35	0.74	−0.33
		0.83	*−0.90*	*1.57*	*−0.88*
OperCycle	+	−0.08*	−0.11	−0.20***	0.10*
		−1.78	*−1.31*	*−2.86*	*1.83*
Loss%	+	0.32***	0.32***	0.03	0.29***
		3.47	*2.78*	*0.19*	*2.58*
NationalAuditor	−	−0.23	−0.09	0.42	0.24
		−1.58	*−1.04*	*1.60*	*0.98*
Δ*SalesGrowth*	?	0.00	0.00	0.00	0.02
		0.53	*0.26*	*0.00*	*0.94*
AbnormalReturn	?	0.05	0.04	0.07	0.02
		1.00	*1.54*	*0.92*	*0.20*
Restatement Obs.		4,453	4,453	1,104	1,393
Total Observations		33,035	12,182	10,568	10,568
Pseudo R^2		1.00%	NA	1.14%	0.85%
Firm Fixed Effects		Excluded	Included	Excluded	Excluded

*, **, *** Denote a two-tailed p-value of less than 0.10, 0.05, and 0.01, respectively.
This table reports the results from the logistic regression of earnings restatements on managerial ability and controls for innate firm characteristics. Z-statistics are presented in italics below the coefficients and are based on standard errors that are clustered by firm and year for specifications excluding firm fixed effects. We decile rank *MgrlAbility* by industry-year. Intercept is included, but not tabulated.
See Table 1, Panel C for variable definitions.

earnings, and expect this effect to influence both accruals and cash flows, both of which are designed to reflect the underlying economics of the firm.[18]

Prior research has shown that accruals tend to have a lower persistence than cash flows and one reason for this is that they contain more uncertainty, thereby requiring managerial estimation (e.g.,

[18] It is possible for managers to artificially smooth earnings and thus appear to have higher earnings persistence. This artificial persistence should not extend, however, to the breakdown of accruals and cash flows.

Richardson et al. 2005). Thus, in addition to more persistent accruals and cash flows related to operations, we expect an incremental effect of managerial ability on the persistence of the accrual component of earnings. In sum, we have two expectations related to our hypothesis that higher ability managers report higher quality earnings: (1) earnings reported by higher ability managers are more persistent than earnings reported by lower ability managers due to both superior operations and superior accrual estimation, and (2) higher ability managers' impact on accruals exceeds their impact on cash flows because the former reflects both operational efficiency *and* superior accrual estimation. We examine earnings persistence using the following model:

$$\begin{aligned} Earnings_{t+1,t+n} = {} & \alpha_0 + \alpha_1 Earnings_t + \boldsymbol{\alpha_2 Earnings_t \times MgrlAbility_t} + \alpha_3 MgrlAbility_t \\ & + \alpha_4 FirmSize_t + \alpha_5 SalesVolatility_{t-4,t} + \alpha_6 CashFlowVolatility_{t-4,t} \\ & + \alpha_7 OperCycle_{t-4,t} + \alpha_8 Loss\%_{t-4,t} + \alpha_9 NationalAuditor_t \\ & + \alpha_{10} \Delta SalesGrowth_t + \alpha_{11} AbnormalReturn_t + \varepsilon_{t+1,t+n}. \end{aligned} \tag{3}$$

We calculate earnings as earnings before extraordinary items (Xpressfeed [hereafter "XFN"] variable = IBC) scaled by average total assets (XFN = AT) and then separate earnings into accruals and cash flow components. Because earnings persistence is not desirable for loss firms, we estimate profit and loss firms separately and only tabulate results for profit firms.[19]

In Table 4 we examine the impact of managerial ability on earnings persistence and then more formally examine our hypothesis by investigating the relative impact of ability on the persistence of accruals and cash flows. In the first column of estimates, which control for firm fixed effects, the base persistence is 0.30 and is increasing with managerial ability. Earnings persistence is expected to increase from 0.30 to 0.66 (0.30 + 0.36) for firms with positive earnings when moving from the lowest to the highest decile of managerial ability. Although not tabulated, we find similar results when firm fixed effects are excluded.

When we partition earnings into accruals and cash flows, managerial ability increases the persistence of both components, but increases the accrual component more than the cash flow component. The accruals reported by positive earnings firms have a base persistence of 0.36 when firm fixed effects are excluded. The incremental coefficient on accruals for firms with higher ability managers is 0.42 ($p < 0.01$). In comparison, the base persistence of cash flows is 0.69, and the incremental coefficient on cash flows for firms with higher ability managers is 0.26 ($p < 0.01$), and this incremental effect is statistically smaller than that of accruals ($p < 0.05$). We find similar results when we include firm fixed effects in the model. These findings support our hypothesis that higher quality managers are better able to estimate accruals, resulting in higher earnings quality, and also support our prediction that higher quality managers operate their businesses more effectively.

We also replace one-year-forward earnings with average earnings from year t+1 to t+3 in order to reduce the impact of economic shocks occurring in any particular year. Results are similar, although the interaction between managerial ability and accruals becomes insignificant when firm fixed effects are included.

McNichols and Wilson (1988) Error in the Provision for Bad Debt

Our third measure of earnings quality is the provision for bad debt, modeled in McNichols and Wilson (1988), as follows:

[19] For this test, in order to continue to present the dependent variable in year t+1, we include earnings in year t, the same period in which managerial ability is estimated. Results are not sensitive to this timing choice. For example, untabulated results indicate that conclusions remain unchanged if we continue to measure managerial ability at time t, but consider how much of year t+1 earnings persists into year t+2.

TABLE 4

Earnings Persistence and Managerial Ability

$$Earnings_{t+1,t+n} = \alpha_0 + \alpha_1 Earnings_t + \boldsymbol{\alpha_2 Earnings_t \times MgrlAbility_t} + \alpha_3 MgrlAbility_t + \alpha_4 FirmSize_t + \alpha_5 SalesVolatility_{t-4,t} + \alpha_6 CashFlowVolatility_{t-4,t} + \alpha_7 OperCycle_{t-4,t} + \alpha_8 Loss\%_{t-4,t} + \alpha_9 NationalAuditor_t + \alpha_{10} \Delta SalesGrowth_t + \alpha_{11} AbnormalReturn_t + \varepsilon_{t+1,t+n}.$$

		Dependent Variable =					
	Pred.	***Future Earnings*$_{t+1}$**			***Average Future Earnings*$_{t+1,t+3}$**		
Earnings	+	0.30***			0.25***		
		9.01			*6.81*		
Earnings × MgrlAbility	+	0.36***			0.09*		
		7.90			*1.74*		
Accruals	+		0.36***	0.23***		0.31***	0.24***
			5.18	*6.64*		*4.99*	*6.25*
Accruals × MgrlAbility	+		0.42***	0.35***		0.41***	0.03
			6.55	*7.14*		*4.71*	*0.51*
CFO	+		0.69***	0.45***		0.62***	0.30***
			12.63	*12.36*		*7.52*	*7.37*
CFO × MgrlAbility	+		0.26***	0.26***		0.28***	0.08
			5.01	*5.46*		*2.84*	*1.57*
MgrlAbility	?	−0.01**	0.00	0.00	0.00	0.00	0.00
		−2.01	*0.66*	*0.49*	*0.01*	*0.62*	*0.13*
Total Observations		33,735	33,735	33,735	28,016	28,016	28,016
R^2		2.07%	15.96%	3.11%	0.07%	10.20%	0.01%
Test (F-statistic): *Accruals × MgrlAbility = CFO × MgrlAbility*			5.62**	7.04***		2.66*	2.41
Firm Fixed Effects		Included	Excluded	Included	Included	Excluded	Included

*, **, *** Denote a two-tailed p-value of less than 0.10, 0.05, and 0.01, respectively.

(continued on next page)

TABLE 4 (continued)

This table presents the OLS regression results investigating the relation between managerial ability and earnings persistence for firms with positive earnings in year *t*. t-statistics are presented in italics below the coefficients and are based on standard errors that are clustered by firm and year in specifications excluding firm fixed effects. We decile rank *MgrlAbility* by industry-year. Our main set of control variables (*FirmSize*, *SalesVolatility*, *CashFlowVolatility*, *OperCycle*, *Loss%*, Δ*SalesGrowth*, *AbnormalReturn*, and *NationalAuditor*) are included in the model. For succinctness, however, results for the control variables are not tabulated. Intercept is included, but not tabulated.
See Table 1, Panel C for variable definitions.

$$\begin{aligned} \textit{Bad Debt Expense}_t = {} & \alpha_0 + \alpha_1 \textit{Allowance for Doubtful Accounts}_{t-1} + \alpha_2 \textit{Write-Offs}_t \\ & + \alpha_3 \textit{Write-Offs}_{t+1} + \varphi_t, \end{aligned} \tag{4}$$

where *Bad Debt Expense* and *Write-Offs* are hand-collected from the firm's SEC filings and *Allowance for Doubtful Accounts* is available from Xpressfeed (XFN = RECD). All variables are deflated by sales in year *t*. Implicit in our use of this model is a balance sheet perspective to estimating bad debt, adherence to GAAP, and perfect foresight of future write-offs.

The error (φ_t) has two components: a discretionary "earnings management" component and a forecast error component (McNichols and Wilson 1988). If managers' estimates are unbiased, on average, then errors in the bad debt accrual will vary with forecast accuracy, and we expect this error (φ_t) to decrease with managerial ability. Jackson and Liu (2010), however, present evidence that the mean earnings management portion of φ_t is positive; specifically, they find that managers tend to overstate the allowance for doubtful accounts that they can later reverse into income. Under the assumption that all managers engage in the same degree of earnings management, the variation in the bad debt error will be driven by variation in accrual-estimation quality, and thus we continue to expect the error to decrease with managerial ability.[20]

Because the data for this analysis must be hand-collected from SEC filings, we limit the analysis to firms with managers in the top or bottom quintiles of managerial ability and, following McNichols and Wilson (1988), to three accounts-receivable-intensive industries: (1) printing and publishing, (2) nondurable wholesale goods, and (3) business services, to estimate:

$$\begin{aligned} \textit{BDE Error}_{t+1} = {} & \alpha_0 + \boldsymbol{\alpha_1 \textit{HighAbilityIndicator}_t} + \alpha_2 \textit{FirmSize}_t + \alpha_3 \textit{SalesVolatility}_{t-4,t} \\ & + \alpha_4 \textit{CashFlowVolatility}_{t-4,t} + \alpha_5 \textit{OperCycle}_{t-4,t} + \alpha_6 \textit{Loss\%}_{t-4,t} \\ & + \alpha_7 \textit{NationalAuditor}_t + \alpha_8 \Delta \textit{SalesGrowth}_t + \alpha_9 \textit{AbnormalReturn}_t + \varepsilon_{t+1}, \end{aligned} \tag{5}$$

where *BDE Error* is the absolute value of the residual from Equation (4), and *HighAbilityIndicator* is an indicator variable that is equal to 1 (0) if the managerial ability score in year *t* is in the top (bottom) quintile relative to industry-year peers. A negative coefficient on *HighAbilityIndicator* is consistent with more able managers forming better estimates of bad debt provisions. Results are presented in Table 5. In support of our hypothesis, α_1 is -0.01 ($p < 0.01$), consistent with managers with higher ability scores producing higher quality bad debt provisions.[21]

The Dechow and Dichev Measure of Accruals Quality

Our final measure of earnings quality follows Dechow and Dichev (2002), who posit that high-quality accruals are eventually realized as cash flows. Incorrectly estimated accruals are less likely to be realized as cash flows. We hypothesize that the better managers know their business, the less likely they are to have erroneous accruals. We determine how well a firm's accruals map into cash flows by estimating the following regression by industry (Fama and French 1997) and year:[22]

[20] Alternatively, if higher ability managers engage in more earnings management, then our tests are conservative. Only if higher ability managers engage in less earnings management would the findings of Jackson and Liu (2010) weaken the basis for our conclusions. In this setting, the negative relation between managerial ability and the bad debt error (φ_t) could result from better estimations, less earnings management, or both. In this latter case, the bad debt error analysis is a weak test of the relation between managerial ability and estimation quality, but continues to speak to the broader conclusions regarding earnings quality.

[21] Because our sample selection procedure for this analysis results in a small sample of firm-years that do not necessarily contain the same firm over multiple years (i.e., we do not have panel data), we do not cluster standard errors by firm and year, nor do we estimate a firm fixed effects specification. In untabulated results, however, we continue to observe a negative and significant relation between managerial ability and *BDE Error* when we cluster standard errors by year or include year fixed effects.

[22] We delete those observations for which the industry group has less than 20 observations in any given year.

TABLE 5

Errors in the Allowance for Bad Debt and Managerial Ability

$$BDE\ Error_{t+1} = \alpha_0 + \boldsymbol{\alpha_1 HighAbilityIndicator_t} + \alpha_2 FirmSize_t + \alpha_3 SalesVolatilty_{t-4,t} + \alpha_4 CashFlowVolatility_{t-4,t} + \alpha_5 OperCycle_{t-4,t} + \alpha_6 Loss\%_{t-4,t} + \alpha_7 NationalAuditor_t + \alpha_8 \Delta SalesGrowth_t + \alpha_9 AbnormalReturn_t + \varepsilon_{t+1}.$$

	Pred.	Dependent Variable = *BDE Error*
HighAbilityIndicator	−	−0.01***
		−2.77
FirmSize	+	0.00
		1.13
SalesVolatility	+	0.00
		1.25
CashFlowVolatility	+	0.02*
		1.65
OperCycle	+	0.01
		1.74
Loss%	+	0.01***
		4.24
NationalAuditor	−	0.00
		0.60
ΔSalesGrowth	?	0.00
		1.32
AbnormalReturn	?	0.00
		1.12
Total Observations		838
R^2		9.00%

*, *** Denote a two-tailed p-value of less than 0.10 and 0.01, respectively.
This table presents the OLS regression results investigating the relation between managerial ability and errors in the bad debt provision. t-statistics are presented in italics below the coefficients (we do not cluster by firm and year or include firm fixed effects because we do not have a sufficient number of same-firm observations). *BDE Error* is the absolute value of the residual from Equation (5), and *HighAbilityIndicator* is an indicator variable that is equal to 1 (0) if the managerial ability score in year *t* is in the top (bottom) quintile relative to industry-year peers. Requisite information for this test requires hand-collection from SEC filings. Thus, we limit the analysis to firms in three industries (following McNichols and Wilson [1988]) where accounts receivable (relative to assets) and bad debt expense (relative to earnings) are large: (1) printing and publishing; (2) nondurable wholesale goods; and (3) business services. We consider only those firm-year observations where managerial ability falls among the highest and lowest quintile relative to industry-year peers. Intercept is included, but not tabulated.
See Table 1, Panel C for variable definitions.

$$\Delta WC_t = \alpha_0 + \alpha_1 CFO_{t-1} + \alpha_2 CFO_t + \alpha_3 CFO_{t+1} + \alpha_4 \Delta REV_t + \alpha_5 PPE_t + \varepsilon_t. \quad (6)$$

The residual from the regression measures the extent to which current accruals map into past, present, or future cash flows, with smaller absolute residuals indicating superior mapping. Following McNichols (2002), we include the current-year change in sales (ΔREV) and the current-

year level of property, plant, and equipment (*PPE*) in Equation (6); variable definitions are in Table 1.

Following prior research, we take the standard deviation of the residual over a rolling four-year period, and multiply this standard deviation by −1 so that the variable is increasing with earnings quality. Thus, $AQ_t = -1 \times$ Standard Deviation (ε_{t+1}, ε_{t+2}, ε_{t+3}, ε_{t+4}).[23] To maintain consistency with the MA-Score, we create decile ranks of our earnings quality variable by year and industry.

To examine our hypothesis using this measure of earnings quality, we estimate the following regression:

$$\begin{aligned} AQ_{t+1,t+4} = {} & \alpha_0 + \boldsymbol{\alpha_1 MgrlAbility_t} + \alpha_2 FirmSize_t + \alpha_3 SalesVolatility_{t-4,t} \\ & + \alpha_4 CashFlowVolatility_{t-4,t} + \alpha_5 OperCycle_{t-4,t} + \alpha_6 Loss\%_{t-4,t} \\ & + \alpha_7 NationalAuditor_t + \alpha_8 \Delta SalesGrowth_t + \alpha_9 AbnormalReturn_t + \varepsilon_{t+1,t+4}. \end{aligned} \quad (7)$$

The results in Table 6 indicate that, counter to our expectations, but consistent with Francis et al. (2008), earnings quality is decreasing in managerial ability when firm fixed effects are excluded, although managerial ability is insignificant when firm fixed effects are included. Prior work notes that some accruals are simply more difficult to estimate, and this estimation difficulty is associated with the firm's operating environment (Dechow and Dichev 2002; McNichols 2002; LaFond 2008). Thus, Francis et al. (2008) conclude that better managers are hired to manage more challenging firms, thereby providing an explanation for this counter-intuitive finding.

Dechow et al. (2010) and others note that most model-based accruals quality measures contain a large firm-specific component. The Dechow and Dichev model constrains the coefficient on cash flows to be the same across observations (e.g., Ball and Shivakumar 2006; Wysocki 2009) and, thus, the resulting measure of accruals quality contains measurement error that is systematically associated with firm characteristics, such as volatility. Although we control for innate factors known to affect accruals quality, it is possible that the effect of these innate factors varies across firms and, thus, the controls are inadequate.

Ball and Shivakumar (2006) modify the Dechow and Dichev model by allowing the coefficient on current-period cash flows to vary among observations with negative cash from operations, their proxy for economic losses, and document a large degree of variation.[24] To illustrate the effect of this modification, in their Table 3, Panel A, the pooled coefficient on current-period operating cash flows is −0.57 among firms with positive operating cash flows, while it is −0.12 (−0.57 + 0.45) among firms with negative operating cash flows. Absent this type of modification, the coefficient on cash flows is forced to be the same across firms, and differences in the expected relation between accruals and cash flows are relegated to the residual term, affecting our measure of earnings quality. Again, it is unlikely that standard control variables, which are also constrained to have the same effect across firms, will be sufficient to ameliorate this effect. Thus, it is possible that better

[23] Because managers may not necessarily be in place for the full aggregation period, we also consider a one-year accrual error by considering the absolute value of the residual from Equation (6) directly. Dechow and Dichev (2002, footnote 6) also estimate a one-year accrual error. The greater the residual, in absolute terms, the poorer the accruals quality. Results are quantitatively and qualitatively similar using this modification; thus, we focus on the traditional measure in our main analyses for succinctness. In our additional analyses, however, where we track managers across firms, we use the annual residual to better match accruals quality with specific managers.

[24] Ball and Shivakumar (2006) highlight that the matching effect of accruals is expected to lead to a negative correlation between accruals and cash flows (e.g., Dechow 1994). In contrast, they note that opposite to the noise-reducing role of operating accruals, the gain and loss recognition role of accruals is a source of positive correlation between accruals and current-period operating cash flow (Ball and Shivakumar 2006, 212–213). They then examine several cash flow and market-return-based measures of economic losses. Note that in Panel A of Table 7, we document a positive association between accruals and cash flows for the quintile of firms with the most losses.

TABLE 6

Accruals Quality and Managerial Ability

$$AQ_{t+1,t+4} = \alpha_0 + \boldsymbol{\alpha_1 MgrlAbility_t} + \alpha_2 FirmSize_t + \alpha_3 SalesVolatility_{t-4,t} + \alpha_4 CashFlowVolatility_{t-4,t} + \alpha_5 OperCycle_{t-4,t} + \alpha_6 Loss\%_{t-4,t} + \alpha_7 NationalAuditor_t + \alpha_8 \Delta SalesGrowth_t + \alpha_9 AbnormalReturn_t + \varepsilon_{t+1,t+4}.$$

		Dependent Variable =	
	Pred.	***AQ***	
MgrlAbility	+	−0.03***	0.00
		−3.39	*0.52*
FirmSize	+	0.04***	0.02***
		17.11	*7.63*
SalesVolatility	−	−0.14***	0.05***
		−8.53	*4.48*
CashFlowVolatility	−	−0.42***	0.15***
		−8.08	*4.94*
OperCycle	−	0.00	0.00
		0.04	*0.13*
Loss%	−	−0.11***	−0.04***
		−8.17	*−4.56*
NationalAuditor	+	0.02***	0.02***
		2.66	*3.28*
Δ*SalesGrowth*	?	−0.01*	0.00
		−1.64	*0.15*
AbnormalReturn	?	0.01***	0.00
		4.57	*0.83*
Total Observations		31,957	
R^2		18.93%	9.83%
Firm Fixed Effects		Excluded	Included

*, *** Denote a two-tailed p-value of less than 0.10 and 0.01, respectively.
This table reports the results from the OLS regression of accruals quality on managerial ability and controls for innate firm characteristics. t-statistics are presented in italics below the coefficients and are based on standard errors that are clustered by firm and year in specifications excluding firm fixed effects. We decile rank *MgrlAbility* and *AQ*, by industry-year. Intercept is included, but not tabulated.
See Table 1, Panel C for variable definitions.

managers can improve the estimation quality of accruals, but the resulting accruals quality still falls below that of a firm with closer-to-average associations between accruals and cash flows.

Although Ball and Shivakumar (2006) focus on the effect of economic losses, Wysocki (2009) notes that a number of different innate factors affect the relation between accruals and cash. Thus, rather than focusing solely on differences in current-period cash flows, we investigate a broader range of firm characteristics. In Panel A of Table 7 we examine the correlation between working capital accruals and current-period cash from operations for each quintile rank of the "innate" firm characteristics from Francis et al. (2004), such as firm size, losses, and operating volatility, as well

TABLE 7

Accruals, Cash Flows, and Firm Characteristics

Panel A: Correlation between Working Capital Accruals and Current-Period Cash Flows within Innate Quintiles

	Innate Characteristic Quintiles =					
Innate Characteristic	**1**	**2**	**3**	**4**	**5**	**Difference**
FirmSize						
corr(ΔWC_t, CFO_t)	0.09***	−0.22***	−0.28***	−0.33***	−0.36***	−0.45
SalesVolatility						
corr(ΔWC_t, CFO_t)	−0.05***	−0.08***	−0.09***	−0.09***	0.06***	0.11
CashFlowVolatility						
corr(ΔWC_t, CFO_t)	−0.11***	−0.13***	−0.17***	−0.15***	0.03***	0.14
OperCycle						
corr(ΔWC_t, CFO_t)	0.00	−0.09***	−0.12***	−0.09***	0.07***	0.07
Loss%						
corr(ΔWC_t, CFO_t)	−0.57***	−0.50***	−0.21***	−0.07***	0.03***	0.60
Loss% Before SI						
corr(ΔWC_t, CFO_t)	−0.52***	−0.50***	−0.19***	−0.08***	0.04**	0.56
Negative CFO%						
corr(ΔWC_t, CFO_t)	−0.32***	−0.30***	−0.28***	−0.06***	0.11***	0.42

Panel B: The Mean Coefficients from Regressions of Working Capital Accruals on Cash Flows, Change in Revenue, and PPE Estimated by Industry and *Loss%* Quintile

	Loss% Quintile =					
	1	**2**	**3**	**4**	**5**	**Traditional: Estimated by Industry-Year**
	Fewer Losses			**More Losses**		
CFO_{t-1}	0.15*	0.22***	0.06	0.21***	0.18***	0.24***
CFO	−0.56***	−0.58***	−0.44***	−0.42***	−0.30***	−0.38***
CFO_{t+1}	0.16***	0.11***	0.02	0.12***	0.12***	0.15***
ΔRev	0.04	0.10***	0.10***	0.10***	0.10***	0.09***
PPE	0.02	0.00	−0.01	−0.03***	−0.01	−0.02***
Intercept	0.03**	0.04***	0.03***	0.02***	0.00	0.01***
R^2	66%	58%	52%	44%	37%	45%

(continued on next page)

as losses before special items (Dechow and Ge 2006) and negative cash flows (Ball and Shivakumar 2006).[25]

Of these innate firm characteristics, the proportion of losses from year t–4 to year t has the starkest difference in correlations across quintiles. In Panel A of Table 7, the correlation between operating cash flows and accruals varies from −0.57 among firms with the fewest losses to 0.03 among firms with the most losses. The range across quintiles also varies widely, with ranges of 0.56

[25] We examine five years of cash flows, analogous to our loss proportion measure.

TABLE 7 (continued)

Panel C: The Mean Coefficients from Regressions of Working Capital Accruals on Cash Flows, Change in Revenue, and *PPE* Estimated by Industry and *Loss%* Adjusted for *SI* Quintile

	***Loss%* before *SI* Quintile =**					
	1	**2**	**3**	**4**	**5**	**Traditional: Estimated by Industry-Year**
	Fewer Losses				**More Losses**	
CFO_{t-1}	0.22***	0.19***	0.13***	0.18***	0.16***	0.24***
CFO	−0.63***	−0.55***	−0.50***	−0.43***	−0.22***	−0.38***
CFO_{t+1}	0.15***	0.10***	0.08***	0.13***	0.11***	0.15***
ΔRev	0.08***	0.06***	0.11***	0.10***	0.09***	0.09***
PPE	0.03**	−0.01	0.00	−0.03***	0.00	−0.02***
Intercept	0.03***	0.04***	0.02***	0.02***	−0.01	0.01***
R^2	62%	55%	53%	45%	36%	45%

Panel D: The Mean Coefficients from Regressions of Working Capital Accruals on Cash Flows, Change in Revenue and *PPE* Estimated by Industry and *Negative CFO%* Quintile

	***Negative CFO%* Quintile =**					
	1	**2**	**3**	**4**	**5**	**Traditional: Estimated by Industry-Year**
	Positive *CFO*				**Negative *CFO***	
CFO_{t-1}	0.18***	0.22***	0.19***	0.16***	0.21***	0.24***
CFO	−0.53***	−0.49***	−0.53***	−0.45***	−0.25***	−0.38***
CFO_{t+1}	0.18***	0.13***	0.17***	0.12***	0.14***	0.15***
ΔRev	−0.09	0.08***	0.10***	0.11***	0.09***	0.09***
PPE	0.01	0.00	−0.01	−0.02*	−0.03*	−0.02***
Intercept	0.02***	0.02***	0.02*	0.02***	0.03***	0.01***
R^2	50%	43%	54%	49%	37%	45%

*, **, *** Denote a Fama-MacBeth p-value of less than 0.10, 0.05, and 0.01, respectively.
Year indicator variables are included in models estimated by industry and innate firm characteristic rank, but coefficients are not tabulated.
See Table 1, Panel C for variable definitions.

for the proportion of losses before special items, −0.45 for firm size, and 0.42 for the proportion of negative cash flows. In subsequent analyses discussed below, we exclude firm size as a partitioning variable for two reasons. First, the variation in firm size is driven almost entirely by the smallest size quintile, while the other partitioning variables have more monotonic changes in the association between accruals and cash flows. Second, in our setting, we are concerned with systematic biases in the accruals quality measure that are associated with managerial ability, but from Table 2, managerial ability and firm size are not associated.[26]

For three partitioning variables (*Loss%*, *Loss% Before SI*, and *Negative CFO%*), we re-estimate Equation (6) and allow the coefficients on each of the variables to vary by each of these quintiles, i.e., to vary with the magnitude of the negative relation between accruals and cash flows

[26] Results are not affected by our treatment of firm size. Untabulated results are similar if we exclude the smallest size quintile from our sample, and are also similar *within* the smallest size quintile.

as measured by the quintile rank of the firm's fundamentals. Thus, we estimate a modification of Equation (6):

$$\Delta WC_t = \alpha_0 + \alpha_1 CFO_{t-1} + \alpha_2 CFO_t + \alpha_3 CFO_{t+1} + \alpha_4 \Delta REV_t + \alpha_5 PPE_t + Year\ Indicators + \varepsilon_t. \quad (8)$$

We estimate Equation (8) by the various quintiles and industry, and include year fixed effects. As illustrated in Panel B of Table 7, allowing the coefficients on the independent variables to vary with *Loss%* results in large differences across the estimations. For example, the mean R^2 falls from 66 percent in the group with the fewest losses to 37 percent in the group with the most losses. With particular reference to the preceding measurement error, the coefficient on current-period cash flows varies from a mean of −0.56 to a mean of −0.30, while the traditional estimation procedure restricts the mean coefficient to be approximately −0.38.[27]

Results are similar for the proportion of losses before special items, with the coefficient on current-year operating cash flows ranging from −0.63 to −0.22. Finally, the coefficients on current-period operating cash flows range from −0.53 to −0.25 across negative cash flows quintiles.

We next explore the extent to which these modifications are associated with (1) other measures of earnings quality and (2) managerial ability. The $ModifiedAQ_{Loss\%}$ accruals quality measure appears to be more correlated with our other measures of earnings quality than the traditional Dechow and Dichev accruals quality measure. For example, while *AQ* is not correlated with restatements, $ModifiedAQ_{Loss\%}$ is negatively correlated with restatements, as we would expect. Of particular interest for our study, $ModifiedAQ_{Loss\%}$ is positively associated with managerial ability, in contrast to the traditional model of accruals quality that exhibits a negative association with managerial ability.

The correlations for $ModifiedAQ_{SI\_Loss\%}$ are similar to those of $ModifiedAQ_{Loss\%}$, which is not surprising as these two measures are correlated at 0.92. Our third modification, $ModifiedAQ_{Neg\_CFO\%}$, does not appear to be as strongly associated with the other measures of earnings quality. Like the traditional measure, it is not associated with restatements, and the association with earnings persistence is the same as the traditional measure. Finally, the association with managerial ability is not significant.

We explore the relation between the modified measures of accruals quality and managerial ability more formally in Table 8.[28] In five of the six estimations, we find that managerial ability is positively associated with accruals quality, consistent with the relations with restatements, earnings persistence, and bad debt expense. Thus, it appears that the counter-intuitive result in our Table 6 and in Francis et al. (2008) reflects measurement error in the Dechow and Dichev accruals quality measure. In sum, we find that higher ability managers report lower accruals quality errors relative to industry-peers with similar operating environments.

V. ADDITIONAL ANALYSES

In this section we discuss three sets of results aimed at corroborating the conclusions from our main analyses. First, we explore the robustness of our results to alternative measures of managerial ability. Second, we investigate whether earnings quality increases when a new CFO of superior

[27] All coefficients are the mean coefficient across estimations; for the traditional model, regressions are estimated by industry and year; for the modified model, regressions are estimated by industry and *Loss%* quintile, and we include year fixed effects. Estimating the modified model by industry, *Loss%* quintile, and year results in a severe loss of observations.

[28] Because we condition on losses in our estimation of two of the modifications, we do not include losses as a control variable.

ability is hired. Third, we investigate the sensitivity of our results to the inclusion of additional control variables in our models.

Alternative Managerial Ability Measures

Our main managerial ability measure, the MA-Score, is the managerial efficiency metric developed by Demerjian et al. (2012). In this section we investigate historical returns, following Fee and Hadlock (2003), and media citations, following Francis et al. (2008); definitions are provided in Panel C of Table 1.[29] We begin by examining the correlations among the variables (see Table 2). Managerial ability and historical returns are correlated at 0.23, consistent with these two variables measuring different aspects of "ability," while there is a *negative* correlation between media citations and ability and no relation between media citations and historical returns. Consistent with historical returns and media citations containing a large firm component, they are correlated with firm size at 0.22 and 0.52, respectively, based on Spearman correlation coefficients, while managerial ability is not correlated with firm size. Interestingly, both ability and historical returns are negatively correlated with losses and positively correlated with future earnings; however, these associations do not extend to media citations. Generally, the correlations suggest that historical returns and the MA-Score have the expected associations with perceptions of managerial ability.

To examine the association between earnings quality and managerial ability, we consider a composite measure of total earnings quality, which is the sum of (1) the rank of one modified accruals quality measure ($ModifiedAQ_{Loss\%}$), (2) the rank of firm-specific earnings persistence, and (3) $-1 \times Restate$.[30] Thus, the variable ranges from a low of -1 to a high of 2. In Table 9, we consider the associations between total earnings quality and each of the three ability measures.[31] For the MA-Score, more able managers have higher total earnings quality, as was the case with the individual components. Next, we find that the greater the historical returns, the greater total earnings quality, consistent with our hypothesis. Untabulated results indicate that our inferences remain unchanged if we use historical returns as an alternate ability measure in each of our tests in the paper. However, as previously noted, the MA-Score allows us to better separate the manager from the firm.

Media citations, however, are negatively associated with earnings quality. Perhaps media interest increases as restatements and other negative earnings-related items occur. One difficulty in comparing results across measures is that media citations are available only for a small subset of our sample; thus, we next consider all three measures simultaneously for the reduced sample. The coefficient on *Media Citations* remains negative and significant, while the coefficients on *Historical Ret* and *MgrlAbility* remain positive and significant in the reduced sample.

CFO-Specific Analysis

Although our results are similar using historical returns, both the MA-Score and historical returns likely contain a firm-specific element. To better control for the effect of the firm, we next consider how earnings quality changes across different CFO regimes. We first explore whether there are CFO fixed effects, following Dyreng et al. (2010) and others. We then explore whether the CFO's ability at his/her initial firm is associated with the accruals quality at the subsequent firm. Together, these analyses provide evidence on the CFO-specific effect on accruals quality.

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[29] Following our examination of these alternate measures, we also examine manager fixed effects.

[30] We exclude the bad debt expense error as it severely limits the available observations.

[31] Untabulated results are similar when we consider the individual components of total earnings quality, with the exception that the relation between historical returns and firm-specific earnings persistence is not significant. As with the results reported in Table 8, we exclude *Loss%* as a control variable because it is used to calculate $ModifiedAQ_{Loss\%}$. Results are similar if we include *Loss%* as an additional control variable.

TABLE 8
Modified Accruals Quality and Managerial Ability

$$\begin{aligned} \textit{Modified Accruals Quality}_{t+1,t+4} = {} & \alpha_0 + \boldsymbol{\alpha_1 MgrlAbility_t} + \alpha_2 FirmSize_t + \alpha_3 SalesVolatility_{t-4,t} \\ & + \alpha_4 CashFlowVolatility_{t-4,t} + \alpha_5 OperCycle_{t-4,t} \\ & + \alpha_6 NationalAuditor_t + \alpha_7 \Delta SalesGrowth_t \\ & + \alpha_8 AbnormalReturn_t + \varepsilon_{t+1,t+4}. \end{aligned}$$

		Dependent Variable =					
	Pred.	***Modified AQ$_{Loss\%}$***		***Modified AQ$_{SI_Loss\%}$***		***Modified AQ$_{NegCFO\%}$***	
MgrlAbility	+	0.06***	0.03***	0.05***	0.02***	0.03***	0.01
		6.53	*4.05*	*5.55*	*3.70*	*3.26*	*1.28*
FirmSize	+	0.04***	0.02***	0.04***	0.02***	0.04***	0.02***
		23.57	*8.93*	*22.44*	*9.14*	*21.69*	*9.99*
SalesVolatility	−	−0.16***	0.05***	−0.15***	0.06***	−0.15***	0.07***
		−9.35	*4.74*	*−9.23*	*5.71*	*−8.02*	*6.06*
CashFlowVolatility	−	−0.61***	0.11***	−0.59***	0.11***	−0.59***	0.14***
		−10.95	*3.39*	*−10.24*	*3.71*	*−9.85*	*4.45*
OperCycle	−	0.00	−0.01	0.00	0.00	−0.01	−0.01*
		1.14	*−0.54*	*−0.06*	*−0.96*	*−1.17*	*−1.85*
NationalAuditor	+	0.01	0.02**	0.01	0.02***	0.02**	0.03***
		1.44	*2.88*	*1.42*	*2.63*	*2.22*	*4.58*
Δ*SalesGrowth*	?	0.00	0.00	0.00	0.00	0.00	0.01
		−0.85	*−0.06*	*−0.92*	*−0.33*	*−0.94*	*0.43*
AbnormalReturn	?	0.02***	0.003*	0.02***	0.01**	0.02***	0.01**
		4.42	*1.76*	*4.85*	*2.25*	*4.03*	*2.26*
Total Observations		28,119		28,119		28,119	
R^2		19.06%	9.35%	19.14%	8.72%	19.98%	9.14%
Firm Fixed Effects		Excluded	Included	Excluded	Included	Excluded	Included

*, **, *** Denote a two-tailed p-value of less than 0.10, 0.05, and 0.01, respectively.
This table reports the results from the OLS regression of modified accruals quality on managerial ability and controls for innate firm characteristics. t-statistics are presented in italics below the coefficients and are based on standard errors that are clustered by firm and year in specifications excluding firm fixed effects. We decile rank *MgrlAbility* and the *AQ* modifications, by industry-year. Intercept is included, but not tabulated.
See Table 1, Panel C for variable definitions.

We identify 195 CFOs who switch employment among firms covered by ExecuComp, which identifies the CFOs, and are able to estimate CFO fixed effects for 62 of these executives across 158 firms. In untabulated results, we estimate the following:

$$TotalEarnQuality2_{i,t} = \alpha_0 + \Sigma_t \alpha_t YEAR_t + \Sigma_i \alpha_i FIRM_t + \Sigma_m \alpha_m MANAGER_m + \varepsilon_{i,t}. \quad (9)$$

TotalEarnQuality2 is defined as *TotalEarnQuality* except that we measure accruals quality as the decile rank within industry year of the *annual* accrual error from the modified accruals model in Equation (8), estimated by historical loss proportion (*ModifiedAQ$_{Loss\%Ann}$*).[32] This approach better

[32] Both Jones et al. (2008) and Dechow and Dichev (2002) use the absolute value of the annual residual from the Dechow and Dichev model as a measure of accruals quality.

TABLE 9

Earnings Quality and Alternative Proxies for Managerial Ability

$$TotalEarnQuality_{t+1,t+4} = \alpha_0 + \boldsymbol{\alpha_1 MgrlAbility_t} + \alpha_2 FirmSize_t + \alpha_3 SalesVolatility_{t-4,t} + \alpha_4 CashFlowVolatility_{t-4,t} + \alpha_5 OperCycle_{t-4,t} + \alpha_6 NationalAuditor_t + \alpha_7 \Delta SalesGrowth_t + \alpha_8 AbnormalReturn_t + \varepsilon_{t+1,t+4}.$$

		Dependent Variable =			
	Pred.	***TotalEarnQuality***			
MgrlAbility	+	0.44***			0.38***
		6.07			*2.58*
Historical Ret	+		0.69***		0.83***
			12.29		*5.94*
Media Citations	+			−0.42***	−0.28*
				2.76	*−1.78*
FirmSize	+	0.08***	0.06***	0.08**	0.07*
		5.64	*3.72*	*2.23*	*1.92*
SalesVolatility	−	−0.49***	−0.73***	−0.66**	−0.87***
		−4.77	*−4.93*	*−2.19*	*−2.52*
CashFlowVolatility	−	−1.57***	−1.56***	−2.15***	−2.45***
		5.99	*−4.42*	*−2.55*	*−2.56*
OperCycle	−	−0.04	−0.07	−0.07	−0.07
		−1.29	*−1.86*	*−1.06*	*−1.01*
NationalAuditor	+	0.19***	0.04	0.33	0.06
		3.08	*0.56*	*1.13*	*0.22*
ΔSalesGrowth	?	−0.01*	−0.03*	0.01	0.04
		−1.65	*−1.75*	*0.21*	*0.65*
AbnormalReturn	?	0.09***	0.04*	0.17***	0.09**
		5.29	*1.82*	*4.53*	*2.19*
Total Observations		13,157	9,673	3,770	3,348
Pseudo R^2		0.80%	1.09%	0.40%	0.88%

*, **, *** Denote a two-tailed p-value of less than 0.10, 0.05, and 0.01, respectively.

This table reports the results from the ordered logistic regression of total earnings quality (*TotalEarnQuality*) on managerial ability and controls. *TotalEarnQuality* is the sum of three earnings quality variables: (1) the rank of estimation accruals quality ($ModifiedAQ_{Loss\%}$), (2) the rank of firm-specific earnings persistence, and (3) $-1 \times Restate$. Thus, the variable ranges from a low of −1 to a high of 2. We decile rank *MgrlAbility*, *Historical Ret*, and *Media Citations* by industry-year. The sample size is reduced for specifications including *Media Citations* as this variable is limited to ExecuComp firms from 1995–2005. Intercept is included, but not tabulated. Z-statistics are presented in italics below the coefficients and are based on standard errors that are clustered by firm. We find similar results when we cluster by year.

See Table 1, Panel C for variable definitions.

matches specific managers with the years they managed the firm. The average manager fixed effect increases by 1.92 when moving from the lowest to the highest quartile of manager fixed effects. For comparison purposes, the average firm fixed effect increases by 2.25 when moving from the lowest to the highest quartile of firm fixed effects. Although fixed effects are quantifiable only for

CFOs switching firms within our sample, clearly manager-specific effects are economically significant.[33]

We next investigate if the CFO's score from his/her initial firm is associated with accruals quality at the subsequent firm. We expect firms that hire a more efficient CFO to experience an improvement in their earnings quality, and firms that hire a less efficient CFO to experience a decline in their earnings quality. Thus, using the sample of the 195 CFOs examined above who switched across our sample firms, we identify 116 with sufficient information to estimate the following:

$$\begin{aligned}\Delta ModifiedAQ_{Loss\%Ann} = {} & \alpha_0 + \boldsymbol{\alpha_1 \Delta MgrlAbility} + \alpha_2 \Delta FirmSize + \alpha_3 \Delta SalesVolatilty \\ & + \alpha_4 \Delta CashFlowVolatility + \alpha_5 \Delta OperCycle + \alpha_6 \Delta SalesGrowth_t \\ & + \alpha_7 \Delta AbnormalReturn_t + \varepsilon,\end{aligned} \tag{10}$$

where the change in earnings quality, as well as the change in each of the control variables, is measured from year $Variable_{c+1} - Variable_{c-1}$, where c is the year in which the CFO changed.[34] Thus, a positive value of $\Delta ModifiedAQ_{Loss\%Ann}$ signifies an improvement in earnings quality following the new CFO appointment.[35] The change in managerial ability reflects the difference between the newly appointed CFO's score from his or her prior firm and the departing CFO's score from the current firm, $MgrlAbility_{j,b,c-1} - MgrlAbility_{i,a,c-1}$, where manager b was hired by firm i and was previously employed by firm j. A positive value of $\Delta MgrlAbility$ signifies that the incoming manager is deemed more efficient than the outgoing manager. Thus, we expect α_1 to be positive**.** Table 10 reports the expected positive and significant coefficient on $\Delta MgrlAbility$. Finding that the association between ability and earnings quality spans firms helps to alleviate the general concern that the documented associations are attributable to the firm, rather than the manager.

Additional Control Variables

We consider two infrastructure-related control variables that have been shown to be associated with earnings quality: governance (Klein 2002) and internal control quality (Doyle et al. 2007). We measure governance with the percentage of independent board members, obtained from IRRC from 1996–2007, ranked by year and industry (*PctInd*), and proxy for internal control quality with the disclosure of material weaknesses in internal control (*ICW*). We obtain internal control data from Doyle et al. (2007) for 2002–2004 and from Audit Analytics from 2005–2007.[36] We find qualitatively similar results to those reported when models include these two additional controls.

We also explore the sensitivity of our results to using abnormal performance variables other than the change in sales growth. When we replace the change in sales growth with the level of sales growth and with historical three-year average change in sales growth, we find results similar to those reported.

VI. CONCLUSION

We examine the relation between managerial ability and earnings quality. While empirical literature in the area of earnings quality has largely focused on firm-specific characteristics, such as

[33] Untabulated results indicate that the MA-Score is also positively correlated with the CFO-specific fixed effects.

[34] We exclude *Loss%* as a control variable because it is used to identify $ModifiedAQ_{Loss\%}$. Results are similar if we include *Loss%* as an additional control variable.

[35] As with the prior analysis, we use the annual accrual error, the absolute value of the error term from Equation (8), for this analysis to better match the accruals quality with the specific manager in place at that time.

[36] The Doyle et al. (2007) data are available at: http://faculty.washington.edu/geweili/ICdata.html. We end the analysis in 2007 because of limitations in our board independence data.

TABLE 10

Change in Accruals Quality and Change in Managerial Ability

$$\Delta ModifiedAQ_{Loss\%Ann} = \alpha_0 + \boldsymbol{\alpha_1 \Delta MgrlAbility} + \alpha_2 \Delta FirmSize + \alpha_3 \Delta SalesVolatilty + \alpha_4 \Delta CashFlowVolatility + \alpha_5 \Delta OperCycle + \alpha_6 \Delta SalesGrowth + \alpha_7 \Delta AbnormalReturn + \varepsilon.$$

	Pred.	Dependent Variable = $\Delta ModifiedAQ_{Loss\%Ann}$
ΔMgrlAbility	+	0.04**
		1.98
ΔFirmSize	+	0.00
		0.49
ΔSalesVolatility	−	−0.02
		−0.77
ΔCashFlowVolatility	−	−0.02
		−0.19
ΔOperCycle	−	0.01
		0.39
ΔSalesGrowth	?	0.02***
		2.60
ΔAbnormalReturn	?	−0.01**
		−2.40
Total Observations		123
R^2		10.55%

, * Denote a two-tailed p-value of less than 0.05 and 0.01, respectively.

This table presents the OLS regression of changes in accruals quality on changes in managerial ability and changes in control variables. t-statistics are presented in italics below the coefficients. As our measure of managerial ability, we examine an annual version of the modified accruals quality measure examined in Table 8 (*Modified* $AQ_{Loss\%}$). The change in earnings quality, as well as the change in each of the control variables, is measured from year $Variable_{c+1} - Variable_{c-1}$, where *c* is the year in which the CFO changed. Thus, a positive value of $\Delta ModifiedAQ_{Loss\%Ann}$ signifies an improvement in earnings quality following the new CFO appointment. The change in managerial ability reflects the difference between the newly appointed CFO's score from his or her prior firm and the departing CFO's score from the current firm (i.e., $MgrlAbility_{j,b,c-1} - MgrlAbility_{i,a,c-1}$, where manager *b* was hired by firm *i* and was previously employed by firm *j*). A positive value of Δ*MgrlAbility* signifies that the incoming manager is deemed more efficient than the outgoing manager. We do not include Δ*NationalAuditor* as a control variable due to lack of variation. Intercept is included, but not tabulated.

See Table 1, Panel C for variable definitions.

firm size and board independence (Dechow and Dichev 2002; Klein 2002), we investigate manager-specific effects using the MA-Score, a measure of managerial ability developed in Demerjian et al. (2012). Our study is in the vein of Bertrand and Schoar (2003), who find that managers have an effect on firm choices such as acquisitions or research and development expenditures, and Francis et al. (2008), who find that earnings quality appears to vary with CEO reputation. Using the four alternative earnings quality measures of restatements, earnings persistence, error in the bad debt provision, and modified accruals quality, we find that more able managers report higher quality earnings.

Our study contributes to the earnings quality and managerial ability literatures. We document a positive association between managerial ability and earnings quality. We find that higher quality managers are associated with higher quality earnings. This finding is consistent with the premise that the more capable the manager, the better able he or she is to estimate accruals, and it suggests that firms can improve their earnings quality by employing higher ability managers. We also contribute to the earnings quality literature by offering a modification of the Dechow and Dichev accruals quality measure that more effectively partitions accruals quality from firms' underlying earnings processes.

Our study's first limitation is that our evidence relies on proxies for both managerial ability and earnings quality. Although we attempt to control for correlated variables such as economic shocks, the possibility of correlated omitted variables remains. Second, the ability score we examine is for the entire management team, while our focus in on the effect of CFOs and their delegates. We mitigate this concern to some extent by documenting economically significant CFO fixed effects on earnings quality—a methodology that does not rely on a specific managerial ability measure. We further corroborate our analysis by tracking CFOs across firms and documenting that hiring a higher ability CFO is associated with an improvement in the firm's earnings quality. Finally, our focus is on accrual estimation, and as such we abstract away from the decision to manage earnings. Future researchers might explore the association between managerial ability and earnings management, and similarly, the inter-relations between ability and infrastructure choices that have been shown to improve earnings quality, such as governance and internal control quality.

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APPENDIX A
ESTIMATION OF TOTAL FIRM EFFICIENCY
(Demerjian et al. 2012)

Our main measure of managerial ability, the MA-Score, is the metric developed by Demerjian et al. (2012), using data envelopment analysis (DEA), a nonlinear optimization program that calculates unit-specific relative efficiency. The program is as follows:

$$\max_{v,u}\theta = \frac{\sum_{i=1}^{s} u_i y_{ik}}{\sum_{j=1}^{m} v_j x_{jk}}. \tag{A1}$$

Subject to:

$$\frac{\sum_{i=1}^{s} u_i y_{ik}}{\sum_{j=1}^{m} v_j x_{jk}} \leq 1 \ \ (k = 1, \ldots, n); \tag{A2}$$

$$v_1, v_2, \ldots, v_m \geq 0; \tag{A3}$$

$$u_1, u_2, \ldots, u_s \geq 0. \tag{A4}$$

DEA measures the efficiency of a single unit, here firm k, relative to a set of comparable firms. The objective function measures efficiency as the weighted outputs scaled by the weighted inputs. There are s outputs and m inputs, indexed by i and j, respectively. The quantities of each output i and input j for firm k are y_{ik} and x_{jk}, respectively. The optimization program maximizes (A1) by selecting the weights on each output (u_i) and input (v_j). The vectors of weights on the outputs (u) and inputs (v) are termed implicit weights. Efficiency is based on the level of the weighted outputs to the level of the weighted inputs. The most efficient firms have the highest level of outputs for a fixed level of inputs (or equivalently, the lowest level of inputs for a fixed level of outputs). DEA calculates a unique set of implicit weights for each firm k.

The first constraint, (A2), scales the implicit weights so that the most efficient firm (or firms) has (have) an efficiency value of 1. The optimal weights for each firm k are tested for all the other

comparable firms (1,. . .,n; $\neq k$). This calculates what the efficiency would be for each comparable firm under the implicit weights calculated in (A1) for firm k, allowing for the determination of relative efficiency. Constraints (A3) and (A4) require implicit weights to be non-negative, which prevents solutions calling for negative input levels.

Total firm efficiency is estimated using a single output and seven inputs. Total revenue ("SALE") is the output, as the principal objective of the firm is to produce sales. The most successful firms are those that produce the maximum sales at the lowest cost. The cost of producing the sales is captured by the seven inputs. The first five correspond to assets the company invests in that are expected to affect their revenue-generation. Demerjian et al. (2012) consider the beginning-of-period balance for each of these assets, since managers' past decisions regarding these assets are expected to affect current-period revenues.

1. Net Property, Plant, and Equipment (PP&E; "PPENT").
2. Capitalized Operating Leases. The discounted present value of the next five years of required operating lease payments (available in the firm's footnotes to the financial statements and on Compustat).[37] The inclusion of Net Operating Leases as an input increases the input comparability among firms that effectively have the same operations, but either lease or buy their revenue-generating equipment.
3. Net Research and Development (R&D). To calculate net R&D, which is not reported as an asset on the balance sheet, Demerjian et al. (2012) follow Lev and Sougiannis (1996), who use a five-year capitalization period of R&D expense ("XRD"), where the net value (net of amortization) is:

$$RD_{cap} = \sum_{t=-4}^{0} (1 + 0.2t) \times RD_{exp}.$$

   Thus, for example, R&D expenditures from five years back receive a weight of 0.2 (they were already amortized 80 percent), four years back receive a weight of 0.4 (amortized 60 percent), etc., with the prior year's R&D ($t = -1$) receiving full weight.
4. Purchased goodwill, reported on the balance sheet, which is the premium paid over the fair value of a business acquisition ("GDWL"). Goodwill generally reflects the value of the acquired intangible assets.
5. Other acquired and capitalized intangibles ("INTAN" less "GDWL"), also reported on the balance sheet, which includes items such as client lists, patent costs, and copyrights.

They also include two year t expenses, Cost of Goods Sold and Selling General and Administrative Expense, to account for the cost of inventory (Cost of Goods Sold) and sales generated from advertising and the quality of the sales force (advertising, training costs, and IT services are included in SG&A).

They estimate DEA efficiency by industry, based on Fama and French (1997), to increase the likelihood that the peer firms have similar business models and cost structures within the estimations. The resulting score ranges from 0–1, with 1 being the optimal output for a given mix of inputs.

Using DEA instead of traditional ratio analysis has several advantages. First, DEA allows the weightings on each of the inputs to vary, whereas traditional efficiency ratios restrict all weightings to be equal to 1. For example, within DEA, one dollar at historical cost, such as PP&E, can count

[37] Demerjian et al. (2012) use a discount rate of 10 percent per year. Data items for the five lease obligations are "MRC1–MRC5." They note that they would also like to discount the "thereafter" payments; however, this line item was not collected by Compustat for the bulk of the sample period. Note that capital leases are included in Net PP&E.

differently from one dollar at or near replacement cost, such as COGS, but both are weighted identically in a traditional efficiency ratio. Second, DEA compares each firm within an industry to the most efficient firm, whereas traditional efficiency analysis compares each firm to the mean or median firm. Demerjian et al. (2012) provide additional information, explicit comparisons of this score with a residual from an OLS regression, and a comparison of variable ratios, such as return on assets.