MANAGERIAL ABILITY AND EARNINGS QUALITY: AN INTERNATIONAL ANALYSIS

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Abstract: In this paper, we use an international setting to examine an unresolved issue in the literature on the relation between managerial ability and earnings quality. We also examine whether the strength of a country's investor protection system impacts this relation. Using multiple measures of earnings quality and managerial ability, we report that earnings quality is negatively associated with managerial ability. We also find that a strong system of investor protection mitigates this negative relation. Overall, our study adds to the literature on the impact of managerial characteristics on financial reporting decisions.

Keywords: Managerial ability, Data Envelopment Analysis, Earnings quality, Legal environment, Real earnings management

1. Introduction

In this paper, we use a cross-country setting to examine the relation between managerial ability and earnings quality.[1] Prior research based on U.S. firms provides mixed evidence on this relation. One set of papers finds a negative relation between managerial ability and earnings quality. Francis et al. (2008) show that more reputed CEOs report poorer earnings quality. Malmendier and Tate (2009) document that superstar CEOs are more likely to inflate reported performance via earnings management and attribute this result to pressure to meet the market's expectation of "superstar performance". These results are consistent with the view that the pressure on high ability managers to consistently report good performance leads to low quality financial reporting. An alternative interpretation for these findings is that firms with poor earnings quality require the superior talents of more reputed CEOs (Francis et al. 2008). In contrast to prior research, Demerjian et al. (2012a, 2012b), use a new measure of managerial ability drawn from Data Envelopment Analysis (DEA) and provide evidence suggesting that more able managers report high quality earnings because they have the skill to synthesize corporate information into reliable forward looking estimates, as reflected in accrual decisions.

Our cross-country study provides a powerful setting to examine the relation between managerial ability and earnings quality because there is greater heterogeneity across countries than within countries in variables that determine earnings quality, such as legal systems (Dechow et al. 2010). LaFond (2008) calls for international evidence on the relation between managerial ability and earnings quality and also questions whether managers' real decisions or accounting choices drive the association between CEO ability and earnings quality. We therefore also examine the relation between managerial ability and real earnings management, which involves

[1] Prior research defines a manager's reputation as the market's perception of her ability (Fama 1980; Milbourn 2003). We use the terms managerial ability and managerial reputation interchangeably throughout the paper.

changing the timing or structuring of operations, investments, or financing transaction (Zang 2012). Our study thus provides a more comprehensive assessment of the relation between managerial ability and earnings quality than in extant research.

To test the relation between managerial ability and earnings quality, as well as the interactive effect of a country's investor protection mechanisms on this relation, we use Demerjian et al.'s (2012a) modified DEA scores, as well as industry-adjusted stock returns, and various measures of return on assets to proxy for managerial ability. For measures of earnings quality, we use accruals quality (Dechow and Dichev 2002; Francis et al. 2005), abnormal accruals (Dechow et al. 1995), earnings smoothness (Leuz et al. 2003; Lang et al. 2012), and real earnings management (Roychowdhury 2006; Cohen and Zarowin 2010). For the strength of a country's investor protection, we use the sum of the three indices from La Porta et al. (2006): disclosure index, legal liability standard index, and public enforcement index.

Using a large sample drawn from 44 countries for the sample period of 1998-2008, we find that high ability managers are more likely to engage in aggressive financial reporting. More specifically, we find that more able managers are associated with lower accruals quality, higher unsigned abnormal accruals, more earnings smoothness, and greater real earnings management activities.[2] The negative relation between managerial ability and earnings quality weakens as the strength of the legal environment increases, with few exceptions. The findings suggest that high ability managers' opportunistic earnings management is less likely to occur in countries with a strong legal environment, consistent with the view that a country's legal system provides a credible disciplinary mechanism. We also separately test the relation between managerial ability and accrual quality for U.S. firms and find that managerial ability increases accrual quality for

[2] In addition to accrual quality, Demerjian et al. (2012b) also use restatements and bad debt expense as measures of earnings quality. These latter variables are not available on international datasets, however, and are thus not used in our study.

U.S. firms, consistent with the result in Demerjian et al. (2012b). This result for U.S. firms is consistent with our argument that strong investor protection (e.g., in the U.S.) plays an effective disciplinary role in curbing managers' rent extraction behavior. Our results are also robust to other measures of earnings quality (e.g., loss avoidance) and managerial ability.

We contribute to the current literature in several ways. First, using a large sample of international data, we document that there is a negative relation between managerial ability and earnings quality. Thus, we shed light on the debate surrounding the benefits and costs of managerial ability by showing that high ability managers decrease the transparency of corporate financial reporting (Francis et al. 2008; Malmendier and Tate 2009; Demerjian et al. 2012b). To the best of our knowledge, this is the first study that examines the effect of managerial ability on earnings quality in an international setting. Second, we add to a growing body of accounting research that a country's legal environment is a key determinant of earnings quality by providing evidence that a country's legal environment affects the relation between managerial ability and earnings quality (Leuz et al. 2003; Haw et al. 2004). We also improve our understanding of the effect of managerial ability on earnings quality by showing that higher ability managers engage in more real earnings management activities. Our findings also indicate that a country's legal environment is not effective in deterring high ability managers' use of real earnings management.

The rest of the paper proceeds as follows. Section 2 provides a review of the relevant literature and develops testable hypotheses. In Section 3, we describe our research design and data. Section 4 presents summary statistics and main empirical findings. Section 5 contains results from robustness tests and Section 6 summarizes and concludes the study.

2. Related literature and hypotheses

Managerial ability and earnings quality

Recent studies have documented that individual managers matter for a wide range of corporate decisions. Bertrand and Schoar (2003) track top managers across different firms over time and find that manager fixed effects (i.e., management style) are associated with corporate investment and finance decisions. By quantifying the impact of management style on corporate decisions, their study has substantially changed the way that we view corporate decisions in the financial economics literature, which had previously ignored the characteristics of individual managers. Using the management fixed effects approach of Bertrand and Schoar (2003), several studies document the effect of individual managers on firms' financial reporting practices. Ge et al. (2011) show that individual CFOs influence accounting choices, such as discretionary accruals, off-balance sheet activities, and earnings smoothness. Bamber et al. (2010) and Dyreng et al. (2010) find that individual managers play an important role in firms' voluntary financial disclosure choices and tax avoidance.

Although this stream of literature provides important evidence about the role of individual managers in corporate decisions, including financial reporting choices, the fixed effects approach has some limitations. First, the measure is limited to firms for which information about managers is available (e.g., from Execucomp) and for which there is at least one managerial change. Thus, it is difficult to use this approach for a large sample such as for firms that are not followed by Execucomp or for firms in an international setting. Moreover, analyses using fixed effects do not provide a general ordinal ranking of managerial ability because the coefficient of the fixed effect is defined only for a specific dimension (Demerjian et al. 2012a). For example, while Ge et al. (2011) provide evidence that individual managers impact

accounting choices, they do not address the impact of managerial ability on cross sectional variation in earnings quality.

Another line of literature uses other proxies of managerial ability or reputation to examine the effect of managers on financial reporting practices. Using the number of media citations of CEOs, Francis et al. (2008) find that more reputed CEOs are associated with lower quality earnings. Specifically, they find that firms with more reputed managers report higher levels of unsigned absolute abnormal accruals and lower quality accruals. They conclude that firms with poor earnings quality hire more reputed CEOs because the characteristics of such firms require the superior skills and talents of reputed CEOs (i.e., CEOs are matched to the firm). Malmendier and Tate (2009) find that award-winning CEOs (i.e., superstar CEOs) underperform non-award-winning CEOs and extract more compensation from the firm. They also find that superstar CEOs are more likely to manage earnings subsequent to winning an award. More importantly, underperformance and rent-seeking behavior, such as earnings management by superstar CEOs, occurs only in firms with poor corporate governance. Their findings are consistent with the notion that more highly reputed CEOs are more likely to engage in rent-seeking behavior. For example, managers may worsen earnings quality by manipulating accruals to meet earnings targets.

Demerjian et al. (2012b) use a new measure of managerial ability based on DEA to assess the relation between managerial ability and earnings quality. They show that more able managers report better quality accounting, consistent with superior managers being more knowledgeable about their business and thus using better judgment to estimate accruals. Specifically, Demerjian et al. (2012b) find that more able managers report higher earnings persistence and accrual quality, and are associated with lower errors in the bad debt provision and fewer restatements. Using both

media citations and DEA, Baik et al. (2011) find that high ability CEOs are more like to issue earnings forecasts, and that these forecasts are more accurate and that the stock market is more responsive to their forecasts.

Although several papers have examined the relation between CEOs and earnings quality, there is little evidence on the channels through which managers potentially affect earnings quality (La Fond 2008). One important channel through which managers can affect earnings quality is real decisions, such as engaging in mergers and acquisitions or offering generous credit terms to customers. A second channel is managers' discretionary accounting choices, such as accrual estimations. Most papers have focused on the second channel and have not examined the first channel (i.e., real decisions). We fill this void by assessing the relation between managerial ability and real activities management.

The effect of a country's legal environment on earnings quality

Several studies examine the effect of country-level characteristics on accounting choices and their interactive effect with other disciplinary mechanism. Cross-country studies have methodological advantages for understanding earnings quality because there is greater heterogeneity across countries than within countries in determinant variables such as legal systems (Dechow et al. 2010). Leuz et al. (2003) develop a country-level earnings management measure based on earnings smoothness, abnormal accruals, and small loss avoidance and find that strong investor rights and legal enforcement are associated with less earnings management. Similarly, Haw et al. (2004) find that earnings management (i.e., unsigned abnormal accruals) arising from the disparity between cash flow rights and control rights of controlling shareholders is lower in countries with strong investor protection. These studies suggest that a strong legal

environment limits insiders' incentive and ability to seek private benefits, thereby increasing earnings quality.

While prior research documents that a country's strong institutions deter accrual-based earnings management (e.g., abnormal accruals, earnings smoothness), it is still unclear whether legal institutions are also effective in curbing manipulation of real activities because real earnings management is less subject to outside monitoring. Managers can use real earnings management as a substitute to accrual-based earnings management (Roychowdhury 2006; Zang 2012). In particular, Cohen et al. (2008) find that firms switched from accrual-based to real earnings management methods after the passage of Sarbanes Oxley Act (SOX), which strengthened the regulations on financial reporting. Consistent with this finding in the U.S., Choi et al. (2011) find that the intensity of real earnings management increases as a country's legal regime strengthens.

Hypotheses

Prior research using U.S. firms provides mixed evidence on the relation between managerial ability and earnings quality. Malmendier and Tate (2009) suggest that the pressure on high ability managers to consistently report good performance leads to opportunistic reporting behavior. In particular, their finding that earnings management by superstar CEOs is more pronounced for firms with poor corporate governance supports the rent-seeking view. However, a negative relation between managerial ability and earnings quality can also be explained by a matching explanation. Francis et al. (2008) suggest that firms likely select CEOs with specific characteristics based on a firm's needs. Boards of directors in firms with poor earnings quality are likely to hire more reputed CEOs because their firms' business models and operating environment require highly skilled managers, thereby resulting in a negative association between

managerial ability and earnings quality. On the other hand, Demerjian et al. (2012b) suggest that more able managers report high quality earnings because their superior knowledge enables them to synthesize corporate information into reliable forward looking estimates (Demerjian et al. 2012b).

Although Demerjian et al. (2012b) demonstrate that more able managers are better at estimating accruals, these findings do not necessarily extend to other dimensions of financial reporting choices, such as earnings management. Demerjian et al. (2012b) also note that more able managers might be better able to manage earnings *successfully*. For example, more able managers would accelerate sales only if they expect sufficient sales in the next period to cover the accelerated sales, thereby avoiding large accruals reversals and restatement (Demerjian et al. 2012b, 8). In that case, more able and more knowledgeable managers can engage in more aggressive financial reporting without it being discovered.

In sum, the question of whether earnings quality varies cross sectionally with managerial ability is still an open empirical question, particularly in non-U.S. markets. The preceding discussion leads to the following hypothesis, stated in the null form.

H1: There is no relation between managerial ability and earnings quality.

We are also interested in examining whether a country's legal system affects the relation between managerial ability and earnings quality. This research question particularly helps us to examine whether the rent extraction view can explain the relation between managerial ability and earnings quality. As a country's strong legal environment makes managers' opportunistic rent-seeking behavior more risky and costly, more able managers' incentives and opportunities to manage earnings are expected to be substantially limited in countries with strong investor protection (Haw et al. 2004). This line of reasoning is closely related to the finding in

Malmendier and Tate (2009) that superstar CEOs' opportunistic behavior is more pronounced for firms with weak corporate governance. While Malmendier and Tate (2009) examine the effect of firm-level corporate governance using the index in Gompers et al. (2003), we expect that the country-level legal environment also plays a substantial governance role.

Francis et al. (2008) try to distinguish between the rent extraction and matching stories by investigating whether the relation is more pronounced in firms with weak governance, proxied by high CEO power. However, they fail to find a significantly different result for firms with greater CEO power and conclude that the findings are inconsistent with the rent extraction view. On the other hand, Malmendier and Tate (2009) find evidence that firm-level governance plays a role in limiting superstar CEOs' opportunistic behavior. Taken together, mixed evidence in prior research on the relation between managerial ability and earnings quality and the role of governance might be due to low variation in firm-level corporate governance because prior research uses samples drawn only from the U.S., which is generally characterized as having strong governance mechanisms. In this study, we use an international setting, which is likely to have greater variation in country-level governance (i.e., investor protection), thereby providing a more powerful test of the relation between earnings quality and managerial ability (Dechow et al. 2010).

DeFond and Hung (2004) show that a country's legal environment has an impact on CEOs' behavior. Specifically, they find that strong law enforcement institutions are associated with high CEO turnover-performance sensitivity, suggesting that a country's strong legal enforcement plays an important governance role. This finding has two different implications for the relation between managerial ability and earnings quality. On one hand, in countries with strong investor protection and thus high CEO turnover-performance sensitivity, highly reputed

managers are faced with more pressure to report better performance and therefore have more incentives than lower ability managers to inflate reported performance via earnings management to avoid being removed from their position. On the other hand, strong investor protection can function to discipline managers' opportunistic behavior. We seek to provide evidence on whether the legal environment influences the relation between managerial ability and earnings quality. We state our second hypothesis in the null form, as follows:

> **H2: The quality of a country's legal system does not affect the relation between managerial ability and earnings quality.**

3. Research design and data

Managerial ability measures

To measure managerial ability for each firm, we employ the two-step method developed by Demerjian et al. (2012a). As a first step, Demerjian et al. (2012a) use DEA to estimate firm efficiency. DEA is a nonparametric method that uses multiple inputs and outputs to measure the relative efficiency of decision making units (DMUs). DEA creates an efficient frontier of observed production points from linear programming to maximize a ratio of outputs to inputs. DMUs located at the frontier are those generating maximum output levels for given input levels (i.e., efficient), while DMUs below the frontier are inefficient units. DEA assigns a value of one to the most efficient DMUs and a value of less than one to inefficient DMUs, with the efficiency score for inefficient units being interpreted as the distance from the frontier (See Cooper, Seiford, and Tone (2000) for more information). The DEA score represents how efficiently the firm utilizes available resources to maximize outputs (Baik et al. 2012). Since the estimated efficiency scores from DEA can be attributable to both the firm and the manager, Demerjian et al. (2012a) modify the DEA scores by purging them of key firm-specific characteristics. More specifically, firm efficiency scores are regressed on firm characteristics such as firm size and market share,

and the resulting residual is the measure of managerial ability, our variable of interest. In validity checks of their measures, Demerjian et al. (2012a) show that the measure dominates other alternative measures of managerial ability such as manager fixed effects and media citations.

To estimate the DEA scores, we use sales revenue as our sole output variable and three input variables: (i) net property, plant and equipment (PP&E), (ii) cost of goods sold (COGS), and (iii) selling, general, and administrative costs (SG&A).[3] We estimate the DEA scores by Fama-French industry groups after pooling all of the countries in our sample. Then we estimate the following Tobit regression model by industry to obtain our measure of managerial ability.[4] We provide definitions of the variables in the Appendix.

$$\begin{aligned} Firm\ \ efficiency\ \ _t = \\ \beta_0 + \beta_1 Ln(Total\ \ assets\ \ )_t + \beta_2 Market\ \ shares\ \ _t + \beta_3 Positive\ \ \ free\ \ cash\ flows\ \ _t + \beta_4 Ln(Age)_t + \\ \beta_5 Foreign\ \ currency\ \ indicator\ \ _t + Year\ \ indicators\ \ \ + \varepsilon_t \end{aligned} \quad (1)$$

The dependent variable in equation (1) is firm efficiency estimated from DEA, and control variables are designed to capture firm-level characteristics that can affect firm efficiency. The residual from equation (1) is the main measure of managerial ability. Following Demerjian et al. (2012b), we decile rank the residual by year and industry to create our main measure of managerial ability.

[3] Due to data availability for our international setting, we do not use the four other input variables used in Demerjian et al. (2012a): i) capitalized operating leases, (ii) capitalized research and development (R&D) costs, (iii) purchased goodwill, and (iv) other intangibles. A choice of a small set of input and output variables is supported by Thanassoulis et al. (1987), who argue that "…the larger the number of inputs and outputs in relation to the number of units being assessed, the less discriminatory the method appears to be." Thus, the number of inputs and outputs included in a DEA measure should be as small as possible, subject to their reflecting adequately the function performed by the units being assessed. In a similar vein, Spottiswoode (2000) recommends a small set of input and output variables. See section 5 for the related discussion.

[4] Demerjian et al. (2012a) also include a variable for business segment concentration. We do not include this variable because segment information is not available for international data.

Earnings quality measures

We use a comprehensive set of earnings quality measures: accrual quality, abnormal accruals, and earnings smoothness. Our first measure of earnings quality is accrual quality based on Dechow and Dichev (2002). Accrual quality is measured by the extent to which working capital accruals map into past, present, and future cash flows. Therefore, we can test whether accruals estimated by better managers are more (or less) likely to be realized as cash flows. Following McNichols (2002), we also include the change in sales and the level of PP&E in the model. We estimate the following model by Fama-French industry and year.

$$\Delta W\ C_t = \beta_0 + \beta_1 CFO_{t-1} + \beta_2 CFO_t + \beta_3 CFO_{t+1} + \beta_4 \Delta SALE_t + \beta_5 PPE_t + \varepsilon_t \quad (2)$$

The residual from the model is an inverse measure of accrual quality. Consistent with prior literature (Francis et al. 2005; Francis et al. 2008; Demerjian et al. 2012b), accrual quality (*AQ*) is defined as the standard deviation of the residuals over rolling four-year periods t+1 to t+4. Note that larger values of *AQ* represent poorer quality accruals.

Our second measure of earnings quality is the absolute value of abnormal accruals based on the modified Jones model (Dechow et al. 1995). Absolute values of abnormal accruals are widely used to test for earnings management in cross-country studies (Haw et al. 2004; Francis and Wang 2008; Dechow et al. 2010). We estimate the cross-sectional version of the Jones model by Fama-French industry and year to obtain abnormal accruals. To control for firm performance, we include return on assets (ROA) as an additional variable in the model (Kothari et al. 2005). *ABAA* is defined as the three-year moving sum of unsigned abnormal accruals over t+1 to t+3. The use of the three-year moving sum enables us to capture multi-year effects of earnings management, which closely reflect an underlying policy to manage earnings (Hutton et al. 2009).

The third measure of earnings quality is the degree of earnings smoothness. Leuz et al. (2003) suggest that earnings smoothing is associated with greater opacity because using accruals to smooth fluctuations in underlying cash flows suggests earnings management. While several studies of U.S. firms document that smoother earnings are associated with more informative earnings (Tucker and Zarowin 2006; Dechow et al. 2010), in a cross-country study, smoothness is used to proxy for the degree of earnings management and is associated with lower earnings quality (Leuz et al. 2003; Dechow et al. 2010). Our measure of earnings smoothness (*SMTH*) is defined as the standard deviation of earnings divided by the standard deviation of cash flows from operations, where earnings and cash flows are scaled by average total assets (Leuz et al. 2003; Lang et al. 2012). The standard deviations are calculated over at least three of the five years (t to t+4). The intuition is that earnings will be smoother (i.e., earnings are less volatile) than cash flows from operations if firms use accruals to manage earnings. We multiply the earnings smoothing measure (*SMTH*) by negative one so that larger values represent more earning smoothing and thus poor earnings quality.

In addition to the three measures of earnings quality discussed above, we also use an aggregate measure of earnings quality to address our research questions. The use of a composite index also alleviates the concern on measurement errors in each variable. The composite index of earnings quality (*CompIndex*) is the common factor identified by factor analysis on the three measures of earnings quality: *AQ*, *ABAA*, and *SMTH*. *CompIndex* represents the various dimensions of accrual-related earnings quality influenced by managers' accounting choices.

Empirical models

To test our first hypothesis on the relation between managerial ability and earnings quality, we estimate the following regression (Francis et al. 2008; Demerjian et al 2012b).

$$
\begin{aligned}
&Earnings\ \ Quality_{t+n} = \\
&\alpha_0 + \alpha_1 Managerial\ \ ability_t + \alpha_2 Strong\ \ investor\ \ protection + \alpha_3 Ln(Total\ \ assets)_t + \\
&\alpha_4 Sales\ \ volatility_t + \alpha_5 Cash\ flow\ \ volatility_t + \alpha_6 Operating\ \ cycle_t + \alpha_7 Loss\ \%_t + \\
&\alpha_8 Sales\ \ growth_t + \alpha_9 Abnormal\ \ return_t + \alpha_{10} GDP_t + \alpha_{11} GDP\ Growth_t + \alpha_{12} FDI_t + \\
&\alpha_{13} Inflation_t + \alpha_{14} Equity\ market_t + Year\ \ and\ industry\ \ Indicators + \varepsilon_t
\end{aligned}
\tag{3}
$$

Earnings quality$_{t+n}$ is either accrual quality (*AQ*), absolute value of abnormal accruals (*ABAA*), earnings smoothness (*SMTH*), or an aggregated measure of earnings quality (*CompIndex*). *Managerial ability* is the decile rank by industry and year of managerial ability based on the residual from equation (1). Consistent with the literature on managerial ability and earnings quality (Francis et al. 2008; Demerjian et al. 2012b), we examine the relation between managerial ability at time t and earnings quality in the future (t+n) to address concerns about the direction of causality.

We also include other control variables used in prior studies to capture several fundamental features of the firm's operating environment and business strategy. Following Dechow and Dichev (2002), we control for firm size, sales volatility, cash flow volatility, operating cycle, and the frequency of reporting losses. We further control for sales growth and abnormal stock return during the year, following Demerjian et al. (2012b). To control for country-level factors correlated with earnings quality, we include an investor protection variable (see details below), the level of per capita GDP, GDP growth, the ratio of foreign direct investment (FDI) to GDP, the annual rate of inflation, and the ratio of equity market capitalization to GDP (Jayaraman 2012). We present detailed definitions of the control variables in the Appendix.

The following model tests the second hypothesis about whether the relation between managerial ability and earnings quality is a function of a country's legal environment.

$$
\begin{aligned}
&Earnings\ \ Quality_{t+n} = \\
&\alpha_0 + \alpha_1 Managerial\ \ ability_t + \alpha_2 Managerial\ \ ability_t \times Strong\ \ investor\ \ protection_t + \\
&\alpha_3 Strong\ \ investor\ \ protection_t + \alpha_4 Ln(Total\ \ assets)_t + \alpha_5 Sales\ \ volatility_t + \\
&\alpha_6 Cash\ flow\ \ volatility_t + \alpha_7 Operating\ \ cycle_t + \alpha_8 Loss\ \%_t + \alpha_9 Sales\ \ growth_t + \\
&\alpha_{10} Abnormal\ \ return_t + \alpha_{11} GDP_t + \alpha_{12} GDP\ Growth_t + \alpha_{13} FDI_t + \alpha_{14} Inflation_t + \\
&\alpha_{15} Equity\ \ market_t + Year\ \ and\ \ industry\ \ Indicators + \varepsilon_t
\end{aligned}
\tag{4}
$$

Strong investor protection is an indicator variable equal to one for countries with strong investor protection institutions, as reflected in the strength of securities laws and regulations (e.g., securities laws) from La Porta et al. (2006). As securities laws and regulations, such as the Securities Act of 1933 in the U.S., set disclosure requirements and legal standards, strong securities laws provide greater investor protection and deter managers' incentives and opportunities to manage earnings (La Porta et al. 2006; Francis and Wang 2008). Specifically, we measure *Securities laws* as the sum of the three indices from La Porta et al. (2006): disclosure index, the legal liability standard index, and the public enforcement index. Each index is based on answers to a questionnaire about each country's securities laws and regulations and has a continuous value between 0 and 1. The disclosure index measures the extent of prospectus disclosure requirements, such as information on the compensation of directors and inside ownership. The legal liability standard measures the procedural difficulty of recovering losses from the issuer, investment banks, and auditors. The public enforcement index measures the level of public enforcement by a government agency supervising stock exchanges (e.g., Securities and Exchange Commission in the U.S.) such as attributes, rule-making power, and investigative powers of the main government agency. La Porta et al. (2006, 22) show that their measures based on securities laws are stronger than other country-level legal measures, such as an anti-director rights index based on corporate laws. As a combined measure of these three indexes, *Securities laws* has a value between 0 and 3 and captures a country's legal environment

and investor protection, which can affect managers' decisions about earnings quality. We classify countries that fall above the median of *Securities laws* as having strong investor protection and assign a value of one for *Strong investor protection*, and zero otherwise.

In equation (4), the effect of the country's investor protection on the relation between managerial ability and earnings quality is captured by the coefficient on the interaction between *Managerial ability* and *Strong investor protection*.

Data

Panel A of Table 1 describes the sample selection procedure to estimate firm efficiency using DEA. Our initial sample includes firm-years listed on the Compustat Global and North America for the years 1998-2008, after excluding financial services and utilities firms. To estimate the firm efficiency scores, we require non-missing input and output variables and exclude firm-year observations with sales less than $1million U.S. We retain only firm-year observations which use the cost of sales format when presenting income statements (Compustat XPF variable ISMOD=1) because other formats, such as the purchase of production format (ISMOD=2), do not provide a separate figure for cost of goods sold, which is one of our three input variables used to estimate firm efficiency.[5] We also exclude observations from countries with less than 100 observations and observations in countries for which country-level variables from La Porta et al. (1998; 2006) and World Development Indicators database are not available. The final sample for the DEA estimation is 164,368 observations from 44 countries between 1998 and 2008.

We report the number of firm-year observations for each of the 44 countries in Panel B of Table 1. About 30% of the observations are from the United States (n=50,980), followed by

[5] For example, all observation in Compustat using the purchase of production format (ISMOD=2) report a zero value for cost of goods sold.

Japan (n=28,732), and the United Kingdom (n=11,753). The mean values of firm efficiency and managerial ability (raw value) for each country are also reported. With respect to the mean firm efficiency, New Zealand (0.296) and Finland (0.229) are top-ranked, whereas Columbia (0.105) and Peru (0.100) are at the bottom. The simple average of firm efficiency from 44 countries is 0.167. Turning to the mean of managerial ability, New Zealand (0.094) and South Africa (0.054) are among the highest, while Jordan (-0.062) and Peru (-0.062) are at the bottom. As the number of observations for the analyses with three earnings quality metrics varies due to data availability for each measure, Columns (5)-(7) of Panel B report the number of observations for each of the three analyses. The number of observations for the *AQ* and *ABAA* analyses are 60,494 and 74,892, respectively, while the number of observations for the *SMTH* analysis is 89,650.

4. Empirical results

Descriptive statistics

Table 2 provides descriptive statistics for the variables used in the regression analyses. The mean (median) value of firm efficiency is 0.156 (0.109). The mean of managerial ability is -0.001 and its standard deviation is 0.093. Turning to the measures of earnings quality, the mean of *AQ* and *ABAA* is 0.054 and 0.179, respectively, while the mean of *SMTH* is -1.480. *Securities laws* has a mean value of 1.64.

Estimation of managerial ability

Panel A of Table 3 reports results from the estimation of equation (1), which regresses firm efficiency on various firm characteristics to purge it of firm-level attributes. We present the average coefficients across 42 industries and t-values by Fama and MacBeth (1973) in the table. The coefficients on *Ln(Total assets)* and *Ln(Age)* are significantly negative. This suggests that smaller and younger firms tend to be more efficient when firms are compared to each other across countries. On the other hand, higher market share and positive free cash flows are

associated with higher efficiency, while operational complexity, proxied by an indicator for foreign operations, is associated with lower efficiency. These findings are consistent with prior research.

To test the validity of our managerial ability measure estimated from international data, we examine the correlations between several ability measures commonly used in prior research (e.g., Rajgopal et al. 2006; Francis et al. 2008; Baik et al. 2011). We report these correlations in panel B of Table 3. We use four measures as alternative ability measures: historical industry-adjusted stock returns, historical industry-adjusted ROA, current ROA, and firm size.[6] Consistent with prior research (Demerjian et al. 2012a), our measure of managerial ability is positively related to all of the alternative measures of ability. However, the correlations are relatively low (e.g., the correlation with historical return is 0.08), suggesting that our ability measure captures overlapping but different information compared to alternative ability measures.

Results for accrual quality

Table 4 reports the regression results of accrual quality (*AQ*) on managerial ability. In Column (1), when *Managerial ability* is included with other control variables but without its interaction with *Strong investor protection*, the coefficient on *Managerial ability* is significantly positive, suggesting that more able managers tend to report poorer quality accruals. This result is consistent with the finding in Francis et al. (2008). The coefficient on *Strong investor protection* is significantly negative, consistent with the literature that a strong legal institution is related to better earnings quality (e.g., Leuz et al., 2003).

[6] In the validity test of managerial ability measure based on DEA, Demerjian et al. (2012a) use five alternative measures for managerial ability: historical return, historical ROA, CEO cash compensation, CEO tenure, and the number of media mentions. Due to data constraints for international settings, we are not able to use CEO compensation, CEO tenure, and media mentions.

Turning to the firm-level control variables, the coefficients on *Ln(Total assets)* and *abnormal return* are significantly negative, while the coefficients on *sales volatility*, *cash flow volatility*, *operating cycle*, and *Loss%* are significantly positive. These results are consistent with prior research (Francis et al. 2008; Demerjian et al. 2012b).

In Column (2), we include an interaction between *Managerial ability* and *Strong investor protection*. The coefficient on the interaction is significantly negative, suggesting that opportunistic behavior by superior managers is mitigated by a strong country-level legal environment. As a result, the relation between managerial ability and earnings quality depends on the strength of legal environment of the country. In countries with weak investor protection (i.e., *Strong investor protection* = 0), the effect of *Managerial ability* is 0.008 and highly significant, suggesting that more able managers report poor accrual quality. On the other hand, in countries with strong investor protection (i.e., *Strong investor protection* = 1), the effect of *Managerial ability* is only 0.002 (=0.008+(-0.006), p-value = 0.09), indicating that managers' incentives and opportunity to manage earnings is limited by a strong legal environment.

It is possible that managerial ability has a differential impact on the portion of earnings quality attributable to fundamental features of the firm's operating environment (i.e., innate) and the portion attributable managements' judgment and estimates (i.e., discretionary). To examine this possibility, we decompose *AQ* into an innate component and a discretionary component, following Francis et al. (2005).[7] Specifically, *AQ* is regressed on several firm characteristics: *Ln(Total assets*), *sales volatility*, *cash flow volatility*, *operating cycle*, and *Loss%.* The fitted value is the innate component of accrual quality (*AQ_innate*), which represents the quality of the accrual system related to the firm's fundamental performance, and the residual value represents

[7] As we include several firm-specific factors that are related to innate firm characteristics in the equation, we interpret the coefficient on *Managerial ability* in Table 4 as capturing the impact of managerial ability on the discretionary portion of earnings quality (Francis et al. 2008, 116).

the discretionary component (*AQ_discretionary*), which captures the manager's discretionary accounting choices. In the untabulated results using *AQ_innate* or *AQ_discretionary* as a dependent variable, we find that the coefficients on *Managerial ability* are significantly positive for either case. The coefficient on the interaction between managerial ability and strong investor protection is significantly negative when *AQ_discretionary* is used as the dependent variable, but it is insignificant when *AQ_innate* is used. This finding further supports the argument that a country's strong legal environment limits a manager's opportunistic behavior through discretionary accounting choices.

Using firm-year observations from the U.S., Demerjian et al. (2012b) suggest that the relation between managerial ability and accrual quality is sensitive to how the accrual quality variable is measured. Specifically, they find that better managers seem to report poor quality accruals when the standard approach is used to measure accrual quality (Dechow and Dichev 2002; Francis et al. 2005). However, when they modify the accrual quality measure to incorporate the different relation between accruals and cash flows across different firm characteristics (e.g., the frequency of losses), their results suggest that better managers report *better* accrual quality. To check whether this alternative measurement of accrual quality affects our findings, we follow Demerjian et al. (2012b) and estimate equation (2) by the quintile based on the proportion of losses from year t-4 to year t (*Loss%*) and by industry after including year-fixed effects. We then re-estimate models (3) and (4) (from Table 4) and find results (untabulated) similar to those reported in Table 4.

Results for the absolute value of abnormal accruals

We present results for the absolute value of abnormal accruals in Table 5. In Column (1), the coefficient on *Managerial ability* is significantly positive, indicating that managers with high

ability are more likely to report a greater magnitude of abnormal accruals, suggesting poor earnings quality. This is consistent with prior research that more reputed managers use more earnings management to extract rents from the company (Francis et al. 2008; Malmendier and Tate 2009). The coefficient on *Strong investor protection* is significantly negative, consistent with previous research that strong legal environment is associated with lower level of abnormal accruals (e.g., Haw et al. 2004). In Column (2), the interaction between *Managerial ability* and *Strong investor protection* is significantly negative, suggesting that managers' aggressive accounting is mitigated by a strong legal environment. The effect of *Managerial ability* in countries with weak investor protection is 0.036, which is 20% (26%) of the mean (standard deviation) of absolute value of abnormal accruals (*ABAA*). However, in countries with strong investor protection, the effect of *Managerial ability* drops by more than half (from 0.036 to 0.016). The results on other controls are generally consistent with prior research (Francis et al. 2008).

Results for earnings smoothness

Table 6 presents the results for earnings smoothness. The coefficient on Managerial ability is significantly positive in Column (1), indicating that superior managers are likely to report smoother earnings compared to actual firm performance. The strength of securities laws does not seem to significantly affect the degree of earnings smoothness, however, as evidenced by insignificant coefficient on *Strong investor protection* in Column (1). This weak role of investor protection may reflect the fact that that earnings smoothness is less controversial and thus less likely to be subject to outside investor monitoring, similar to real earnings management. When the interaction variable is included in Column (2), the managerial ability variable is still significant but the interaction term is not significant. Overall the results confirm that more able

managers are more likely to manage earnings by smoothing earnings, but also indicate no role for investor protection mechanisms in limiting such behavior.

Results for composite index of earnings quality

We report regression results using the composite index of earnings quality (*CompIndex*) in Table 7. *CompIndex* is the common factor of the three measures of earnings quality: *AQ, ABAA*, and *SMTH*. Consistent with the results reported in Tables 4 to 6, the coefficient on *Managerial ability* is significantly positive and its interaction with *Strong investor protection* is significantly negative. We also create an alternative measure of aggregate earnings quality measure as the sum of the decile rank of *AQ*, *ABAA*, and *SMTH* by industry and year. Results (untabulated) using this measure are very similar to those reported in Table 7. Overall, the empirical results based on several earnings quality measures strongly support our main findings that more able managers are likely to manage earnings and that strong country-level investor protection curbs this behavior.

Alternative measures of managerial ability

We use industry-adjusted historical stock returns and industry-adjusted historical ROA as alternative measures of managerial ability (e.g., Rajgopal et al. 2006; Demerjian et al. 2012b) and report the regression results using the composite index of earnings quality in Table 8. Consistent with the results in Table 7, the coefficients on *Historical returns* and *Historical ROA* are positive and the coefficients on the interaction with *Strong investor protection* are significantly negative in Columns (1) and (2). The results confirm our main findings that more able managers report lower earnings quality.

5. Additional tests

Real earnings management

Managers can manipulate real activities to meet earnings targets by changing the timing and scale of real activities, which often leads to suboptimal business decisions (Roychowdhury 2006; Cohen and Zarowin 2010). Recent studies document that managers use real earnings management and accrual-based earnings management as substitutes to manage earnings (Cohen et al. 2008; Zang 2012). Thus, examining real earnings management in addition to accrual-based measures provides a more complete picture of how more able managers use different tools to manage earnings. In particular, by examining operating decisions of managers, we answer LaFond's (2008) call for research to identify channels through which managerial ability affects earnings quality. Our measure of real earnings management (*REM*) is defined as the three-year moving sum of real earnings management measures over t+1 to t+3, where the real earnings management measure is based on abnormal cash flows from operations, abnormal production costs, and abnormal discretionary expenses (Roychowdhury 2006; Cohen and Zarowin 2010), as detailed in the Appendix.

Table 9 reports the regression results of real earnings management (*REM*) on managerial ability. In Column (1), the coefficient on *Managerial ability* is significantly positive, indicating that more able managers are more likely to manipulate real transactions. The coefficient on *Strong investor protection* in Column (1) is not significant, indicating that strong securities laws are not effective in curbing real earnings management. When *Strong investor protection* is interacted with *Managerial ability* in Column (2), the coefficient on the interaction is negative but insignificant (t-stat = -0.94). This result can be interpreted at least in two ways. First, as discussed in Column (1), it is possible that securities regulations and laws are not effective in

deterring real earnings manipulations because real earnings management is less subject to outside monitoring. Second, in countries with a strong legal environment, managers may exert more effort in real earnings management relative to accrual-based earnings management because managers find it more costly to engage in accrual-based earnings management when they face strong legal institutions (Cohen et al. 2008; Choi et al. 2011). In sum, the results strongly suggest that more able managers engage in real earnings management in addition to accrual-based earnings management.

Loss avoidance

As an alternative measure of earnings quality, we use loss avoidance to examine whether managerial ability affects the likelihood of reporting a loss (Burgstahler and Dichev 1997; Leuz et al. 2003; Francis and Wang 2008). A higher frequency of loss avoidance implies lower earnings quality because it suggests that managers manipulated earnings to avoid the negative capital market implications of a loss. We define an indicator variable (*LOSS*), which is 1 if a firm reports negative earnings in year t+1, and 0 otherwise. We perform a logistic regression with *LOSS* as a dependent variable. The result (untabulated) shows that the coefficient on *Managerial ability* is significantly negative, implying that more able managers are less likely to report a loss. However, the results for the role of investor protection are not consistent with our prediction. The interaction between *Managerial ability* and *Strong investor protection* is negative and significant at the 10% level, suggesting that more able managers exert more effort to avoid losses in countries with strong legal institutions. Taken together, we find consistent results that more able managers manage earnings to avoid reporting a loss but evidence on the moderating role of strong investor protection on the relation between managerial ability and loss avoidance seems to be limited.

Alternative measure of abnormal accruals

While the cross-sectional Jones (1990) model is widely used to distinguish between normal and abnormal accruals, it may not work well with international data because the number of industry observations per country is small, requiring that all countries be pooled into one industry group per year. As an alternative way to estimate abnormal accruals, we employ a linear expectation model used in Francis and Wang (2008), in which a firm's own prior year accruals are used as an expectation benchmark. More specifically, we derive predicted accruals from the following equation.

$$Predicted\ \ accruals_{\ t} = \left\{\left[SALE_{\ t} \times \frac{Current\ \ accruals_{\ t-1}}{Sales_{\ t-1}}\right] - \left[Gross\ \ PPE_{t} \times \frac{Depreciation_{\ t-1}}{Gross\ \ PPE_{t-1}}\right]\right\} / Average\ \ Total\ \ Assets \quad (5)$$

Abnormal accruals are the difference between a firm's actual total accruals and predicted accruals from equation (5). Similar to *ABAA*, *ABAA_firm* is defined as the three-year moving sum of unsigned abnormal accruals over t+1 to t+3. The correlation between *ABAA* and *ABAA_firm* is 0.65 and the results (untabulated) using *ABAA_firm* are qualitatively similar to those using *ABAA*, negating the concern about potential measurement errors associated with estimating abnormal accruals for international data.

Alternative measure of investor protection

We perform a sensitivity test (untabulated) after replacing our indicator variable for investor protection with a continuous variable. We find that the tenor of results does not change. We also use the strength of a country's legal enforcement institutions (*Legal enforcement*) as an alternative measure of investor protection. Following Leuz et al. (2003), this measure is the mean score of three legal variables used in La Porta et al. (1998): the efficiency of the judicial system, an assessment of rule of law, and a corruption index. The index ranges from 0 to 10, with higher

scores representing stronger legal enforcement. Again, countries are classified as having strong investor protection if the country's *Legal enforcement* is above the median of sample countries. The results (untabulated) based on a country's legal enforcement are very similar to those reported in our tables. Specifically, the coefficients on *Managerial ability* are significantly positive and the coefficients on the interaction between *Managerial ability* and *Strong investor protection* are significantly negative, except one case in which real earnings management (*REM*) is used as the dependent variable. Overall, the results suggest that our findings are robust to various measures investor protection.

U.S. Observations

To check whether the main findings are driven by observations from the U.S., which accounts for 31% of our sample (see Panel B of Table 1), we exclude the observations from the U.S. and re-estimate all the regressions. Untabulated results are qualitatively similar to the results previously reported, except that the coefficient on managerial ability in the *ABAA* regression is not significant and the results for the interaction of managerial ability and investor protection tend to be weaker.

To compare our results with those in previous U.S.-based studies that use earnings quality proxies similar to the ones that we use (i.e., Francis et al. 2008; Demerjian et al. 2012b), we re-estimate regressions using only U.S. firms. Demerjian et al. (2012b) and Francis et al. (2008) both use Dechow and Dichev's (2002) measure of accrual quality and Francis et al. (2008) also use the absolute value of abnormal accruals as measures of earnings quality. For the accrual quality analysis, we find that results are consistent with Demerjian et al. (2012b) when we use modified AQ, as suggested by Demerjian et al. (2012b). For the analysis of abnormal accruals, the results (untabulated) using only U.S. firms are generally similar to the main results using 44

countries, consistent with Francis et al. (2008). These mixed findings for the U.S. in previous research and in our study are consistent with our argument that strong investor protection of U.S. plays an effective disciplinary role in curbing managers' rent extraction behavior, thus making it difficult to detect a significant relation between managerial ability and earnings in the U.S setting.

Alternative input variable choice to estimate DEA firm efficiency

In the estimation of the DEA scores to derive the measure of managerial ability, Demerjian et al. (2012a) use seven input variables, including four additional variables: (i) capitalized operating leases, (ii) capitalized research and development (R&D) costs, (iii) purchased goodwill, and (iv) other intangibles. Due to data constraints in our international setting, we use three input variables, as previously described, to estimate the DEA scores.[8] As an alternative way to choose the input variables, we include total intangible assets as an additional input variable and estimate the DEA scores using four input variables.[9] The Pearson correlation between the DEA scores using three inputs and four inputs is 0.92, and the results (untabulated) are all very similar to those previously reported.

6. Summary and conclusions

This paper uses a large sample of firm-level data across 44 countries to examine the relation between managerial ability and earnings quality, as well as the interactive effect of a country's legal system on this relation. While high ability managers form accurate judgments and estimates to report higher quality earnings (Demerjian et al 2012b), they are also likely to be distracted by their reputation and act in opportunistic ways to maintain their reputation via earnings management (Malmendier and Tate 2009). It is also possible that more able managers

[8] For example, operating lease schedule variables used to capitalize operating leases are not available for all non-U.S. firms. Capitalized R&D is also limited because different countries use different way to account for R&D costs (e.g., many countries capitalize development costs).

[9] When the intangible assets variable is missing, we coded it zero. 30% of the sample firms have zero for intangible assets.

are matched to firms with poor earnings quality because those firms require the superior skills (Francis et al. 2008). Using a comprehensive set of earnings quality measures (i.e. accrual quality, abnormal accruals, earnings smoothness, and real earnings management), we find evidence consistent with the rent extraction view. We report that more able managers are associated with lower accrual quality, higher abnormal accruals, more earnings smoothing, and greater real earnings management. More importantly, we find that the quality of the legal institutions in a country decreases the negative effect of managerial ability on our measures of earnings quality. However, we do not find such evidence for real earnings management. This evidence implies that a country's legal system produces credible disciplinary mechanisms to constrain higher ability managers from engaging in opportunistic financial reporting. Overall, our findings suggest that managerial ability impacts accounting quality and this effect on accounting quality is a function of the quality of a country's legal institutions.

Our empirical findings are subject to several caveats. First, it is difficult to measure earnings quality, in particular in the international setting. Although we try to address this issue by employing several alternative measures of earnings quality, our findings depend on our ability to appropriately capture earnings quality. Also, there are other dimensions of earnings quality that are not examined in our study. We leave this for future research. Second, our measure of managerial ability has limitations; it is affected by the choice of input and output variables and by the choice of firm-level attributes in the second-stage estimation (Demerjian et al. 2011a). In addition, the managerial ability measure used in our study is for the entire management team, while decisions on earnings quality can be more closely related to CFOs. Third, we are unable to control for all country-level factors that may influence our findings. Although we attempt to

address this issue by including several country-level variables, we acknowledge that our results should be interpreted with caution.

Appendix
Definitions of variables

Variable	Definition
Firm efficiency	Firm efficiency based on Data Envelopment Analysis (DEA) using three inputs and one output • Inputs: net PP&E (PPENT) at the beginning of the fiscal year, cost of goods sold (COGS), and selling, general, and administrative expenses (XSGA). • Output: revenues (SALE)
Managerial ability	The decile rank (by industry and year) of managerial efficiency (the residual from equation (1)) to have a value between 0 and 1.
Ln(Total assets)	The natural log of the firm's asset (AT) at the end of year t in US dollar
Market shares	The percentage of revenues (SALE) by the firm in Fama-French industry in year t
Positive free cash flows	An indicator variable that equals one when a firm has non-negative free cash flows (OANCF-CAPX)
Ln(Age)	The natural log of the number of years since the firm was first covered by Compustat or the natural log of the number of years since the year of the firm's initial public offering (IPODATE), whichever is greater
Foreign currency indicator	An indicator variable that equals one when a firm reports a non-zero value for foreign currency adjustment (FCA) in year t
Historical returns	Five-year historical value-weighted industry-adjusted stock returns over t-4 to t
Historical ROA	Five-year historical average of industry-adjusted ROA over t-4 to t, where ROA is net income (IB) scaled by average total assets (AT))
Sales volatility	Standard deviation of sales (SALE) scaled by average total assets (AT), over at least three of the last five years (t-4, t)
Cash flow volatility	Standard deviation of operating cash flows (OANCF) scaled by average total assets (AT), over at least three of the last five years (t-4, t)
Operating cycle	The natural log of the length of the firm's operating cycle: (Sale/360)/(average account receivable (RECT))+ (COGS/360)/(average Inventory (INVT)) and is averaged over at least three of the last five years (t-4, t)
Loss%	The percentage of years reporting losses in net income over at least three of the last five years (t-4,t)
Sales growth	The one-year change in sales growth defined as current year's sales growth ($\Delta Sales_t/Sales_{t-1}$) less prior year's sales growth ($\Delta Sales_{t-1}/Sales_{t-2}$)
Abnormal return	One-year market adjusted buy and hold return for fiscal year t, where market-returns are value weighted

AQ

Accrual quality as defined as the standard deviation of the residual over t+1 to t+4, where the residual is estimated from the following equation by industry and year.

$$\Delta WC_t = \beta_0 + \beta_1 CFO_{t-1} + \beta_2 CFO_t + \beta_3 CFO_{t+1} + \beta_4 \Delta SALE_t + \beta_5 PPE_t + \varepsilon_t$$

ΔWC is changes in working capital scaled by average total assets, where working capital is Δaccount receivables (RECT)+ Δinventory (INVT)- Δaccount payable (AP) - Δtax payable (TXP)+ Δother current asset (ACO) - Δother current liabilities. CFO is cash flows from operation (OANCF), ΔSALE is changes in sales (SALE) scaled by average total assets, PPE is gross PP&E (PPEGT) scaled by average total assets

AQ_innate (AQ_discretionary)

Innate (discretionary) component of accrual quality as defined as the predicted value (the residual value) of the following annual regression

$$AQ_t = \beta_0 + \beta_1 Ln(Total\ assets)_t + \beta_2 LOSS\%_t + \beta_3 Sales\ volatility_t + \beta_4 Operating\ cycle_t + \varepsilon_t$$

ABAA

Three-year moving sum of unsigned abnormal accruals over t+1 to t+3, where absolute value of abnormal accruals is based on the modified Jones model, augmented with return on assets (Dechow et al. 1995; Kothari et al. 2005)

ABAA_firm

Three-year moving sum of unsigned abnormal accruals over t+1 to t+3, where absolute value of abnormal accruals is based on Francis and Wang (2008). Specifically, abnormal accrual is the difference between actual accruals and predicted accruals, where predicted accruals are calculated from the following equation.

$$Predicted\ accruals_t = \left\{\left[SALE_t \times \frac{Current\ accruals_{t-1}}{Sales_{t-1}}\right] - \left[Gross\ PPE_t \times \frac{Depreciation_{t-1}}{Gross\ PPE_{t-1}}\right]\right\} / Avg\ Total\ Assets$$

SMTH

SMTH is the standard deviation of earnings divided by the standard deviation of cash flows from operations where earnings and cash flows are scaled by average total assets. The standard deviations are calculated over at least three of the five years (t to t+4). For easier interpretation, *SMTH* is multiplied by negative one.

REM	Three-year moving sum of real earnings management measures over t+1 to t+3, where real earnings management measure is based on abnormal cash flow from operation (CFO), abnormal production costs, and abnormal discretionary expenses. Specifically, abnormal CFO (production costs and discretionary expenses) is the difference between actual CFO (production costs and discretionary expenses) and estimated normal level from the following equations. $\frac{CFO_t}{Avg\ Total\ Assets} = k_1 \frac{1}{Avg\ Total\ Assets} + k_2 \frac{Sales_t}{Avg\ Total\ Assets} + k_3 \frac{\Delta Sales_t}{Avg\ Total\ Assets} + \varepsilon_t$ $\frac{PROD_t}{Avg\ Total\ Assets} = k_1 \frac{1}{Avg\ Total\ Assets} + k_2 \frac{Sales_t}{Avg\ Total\ Assets} + k_3 \frac{\Delta Sales_t}{Avg\ Total\ Assets} + k_4 \frac{\Delta Sales_{t-1}}{Avg\ Total\ Assets} + \varepsilon_t$ $\frac{DISX_t}{Avg\ Total\ Assets} = k_1 \frac{1}{Avg\ Total\ Assets} + k_2 \frac{Sales_{t-1}}{Avg\ Total\ Assets} + \varepsilon_t$ Where PROD is production costs defined as the sum of cost of goods sold and changes in inventory; DISX is discretionary expenses, which is the sum of advertising expenses, R&D expenses, and SG&A. To obtain aggregate measure of real earnings management (*REM*), abnormal CFO (multiplied by negative one), abnormal production costs, and abnormal discretionary expenses (multiplied by negative one) are summed.
CompIndex	*CompIndex* is the common factor identified by factor analysis on the three measures of earnings quality: *AQ, ABAA*, and *SMTH*.
Strong investor protection	*Strong investor protection* is based on *Securities laws,* which represent the strength of securities laws and regulations measured as the sum of the disclosure index, the liability standard index, and the public enforcement index from La Porta et al. (2006). We classify countries that fall above the median of *Securities laws* as having strong investor protection and assign one for *Strong investor protection*, and zero otherwise.
GDP	Natural log of per capital GDP (current US dollar) from World Development Indicators (WDI) database of the World Bank
GDP growth	GDP growth (annual %) from WDI
FDI	Foreign direct investment, net flow (% of GDP) from WDI
Inflation	Annual Inflation, GDP deflator (annual %) from WDI
Equity market	Equity market capitalization of listed companies (% of GDP) from WDI

Compustat XPF names are presented in the parentheses.

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TABLE 1

Sample selection reconciliation and descriptive statistics

Panel A. Sample selection reconciliation

	Number of Firm-Year Observations
Firm-year observations between 1998 and 2008 from Compustat Global and North America	324,200
Less observations for financial firms and utilities firms	(42,105)
Less observations with missing input and output variables to estimate the DEA scores	(67,809)
Less observations for which income statement format is not the cost of sales format (ISMOD=1)	(14,482)
Less observations with sales less than 1 million in US dollars	(7,632)
Less observations in countries with less than 100 observations and observations in countries for which country-level variables from La Porta et al. (1998, 2006) and World Development Indicators database are not available	(27,804)
Final sample for the DEA estimation in 44 countries	164,368

Table 1 (Cont'd)

Panel B. Descriptive statistics for firm efficiency and managerial ability by country

Country	No. of observations in the DEA estimation	Percentage	The mean of firm efficiency	The mean of managerial ability (raw value)	No. of observations in the accrual quality (*AQ*) analysis	No. of observations in the abnormal accruals (*ABAA*) analysis	No. of observations in the earnings smoothness (*SMTH*) analysis
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Argentina	464	0.3%	0.138	-0.041	105	131	228
Australia	4,866	3.0%	0.171	0.023	1,264	1,701	2,356
Austria	367	0.2%	0.212	0.013	62	95	120
Belgium	498	0.3%	0.182	0.010	75	130	153
Brazil	2,262	1.4%	0.161	-0.020	129	164	263
Canada	5,261	3.2%	0.140	-0.007	1,414	1,837	2,324
Chile	1,014	0.6%	0.117	-0.040	504	599	627
Colombia	169	0.1%	0.105	-0.051	39	46	70
Denmark	785	0.5%	0.156	-0.006	237	291	330
Egypt	135	0.1%	0.155	0.014	49	62	72
Finland	557	0.3%	0.229	0.028	103	161	193
France	3,027	1.8%	0.199	0.038	468	783	1,021
Germany	3,609	2.2%	0.190	0.022	843	1,179	1,417
Greece	1,278	0.8%	0.128	-0.037	223	298	467
Hong Kong	5,293	3.2%	0.163	-0.003	1,778	2,310	3,048
India	11,134	6.8%	0.184	-0.008	1,149	1,883	3,031
Indonesia	2,140	1.3%	0.168	-0.009	1,122	1,328	1,518
Ireland	475	0.3%	0.119	-0.009	196	231	279
Israel	1,078	0.7%	0.161	0.002	423	506	634
Italy	844	0.5%	0.194	0.013	21	116	182
Japan	28,732	17.5%	0.125	-0.014	14,290	16,830	17,988
Jordan	462	0.3%	0.142	-0.062	16	20	142
Malaysia	4,514	2.7%	0.139	-0.038	1,595	2,059	2,408
Mexico	814	0.5%	0.164	0.002	231	307	356
Netherlands	827	0.5%	0.156	0.016	281	353	394

New Zealand	454	0.3%	0.296	0.094	69	115	175
Nigeria	234	0.1%	0.151	-0.014	23	47	82
Norway	762	0.5%	0.176	0.033	69	131	196
Pakistan	1,066	0.6%	0.213	0.019	262	365	517
Peru	533	0.3%	0.100	-0.062	178	224	258
Philippines	622	0.4%	0.160	0.014	211	255	315
Portugal	222	0.1%	0.145	-0.021	41	64	88
Singapore	3,172	1.9%	0.157	-0.002	1,005	1,338	1,633
South Africa	1,603	1.0%	0.210	0.054	451	533	807
South Korea	4,105	2.5%	0.151	-0.025	1,947	2,310	2,598
Spain	429	0.3%	0.163	-0.004	15	74	90
Sri Lanka	351	0.2%	0.161	-0.034	52	76	104
Sweden	2,170	1.3%	0.195	0.019	600	724	891
Switzerland	1,135	0.7%	0.184	-0.006	357	464	534
Thailand	3,302	2.0%	0.146	-0.033	1,687	1,985	2,289
Turkey	754	0.5%	0.211	0.003	143	212	289
United Kingdom	11,753	7.2%	0.136	-0.002	4,050	4,924	6,735
United States	50,980	31.0%	0.162	0.008	22,700	27,615	32,387
Venezuela	116	0.1%	0.214	-0.050	17	16	41
Total	164,368	100%			60,494	74,892	89,650
Average	3,736		0.167	-0.004	1,375	1,702	2,038

Panel A of this table shows the sample selection procedure to estimate the DEA scores and managerial ability measure for the sample period of 1998-2008. Panel B shows the number of observations in each of 44 countries for the DEA estimation (Column 1) and for three earnings quality analyses (Columns 5-7). Columns (3) and (4) of Panel B present the mean value of firm efficiency and managerial ability by country.

TABLE 2
Descriptive statistics

Variable	N	Mean	Std. Dev.	Q1	Median	Q3
Firm efficiency	164,368	0.156	0.166	0.032	0.109	0.216
Managerial ability(raw)	164,368	-0.001	0.093	-0.043	-0.010	0.017
Ln(Total assets)	164,368	5.023	2.027	3.632	4.953	6.317
Market shares	164,368	0.003	0.013	0.000	0.000	0.001
Positive free cash flows	164,368	0.536	0.499	0.000	1.000	1.000
Ln(Age)	164,368	2.192	0.905	1.609	2.197	2.773
Foreign currency indicator	164,368	0.380	0.485	0.000	0.000	1.000
Historical return	113,826	-1.163	3.970	-2.386	-1.308	-0.346
Historical ROA	125,822	-0.029	0.158	-0.040	-0.001	0.038
AQ	79,251	0.054	0.050	0.022	0.038	0.067
AQ_innate	67,365	0.053	0.022	0.037	0.049	0.064
AQ_discretionary	67,365	0.000	0.042	-0.025	-0.010	0.012
ABAA	113,489	0.179	0.138	0.085	0.141	0.231
ABAA_firm	112,610	0.312	0.315	0.120	0.214	0.383
SMTH	143,126	-1.480	15.752	-1.490	-0.827	-0.442
REM	107,166	-0.322	1.626	-1.041	-0.239	0.471
CompIndex	59,448	-0.003	0.987	-0.695	-0.285	0.372
Sales volatility	127,251	0.204	0.236	0.067	0.127	0.247
Cash flow volatility	118,160	0.079	0.086	0.030	0.054	0.095
Operating cycle	125,584	4.804	0.731	4.416	4.869	5.246
Loss%	145,297	0.296	0.343	0.000	0.200	0.600
Sales growth	142,540	-0.098	1.169	-0.173	-0.014	0.116
Abnormal return	138,701	-0.087	0.756	-0.474	-0.184	0.111
Securities Law	44	1.645	0.477	1.307	1.546	1.981
GDP	482	9.170	1.411	8.073	9.794	10.342
GDP growth	482	3.463	3.160	1.879	3.579	5.164
FDI	477	4.103	5.404	1.225	2.623	4.716
Inflation	482	5.742	10.028	1.732	3.156	6.528
Equity market	480	83.092	77.739	33.121	60.341	107.408

This table reports descriptive statistics for the sample. See Appendix for the definitions of the variables.

TABLE 3
Panel A. Estimating managerial ability

		Dependent variable = Firm efficiency	
	Predicted sign	Average coefficient	t-statistic
Intercept		0.281***	(10.13)
Ln(Total assets)	+	-0.006***	(-3.44)
Market shares	+	0.775***	(4.91)
Positive free cash flows	+	0.029***	(5.98)
Ln(Age)	+	-0.016***	(-6.97)
Foreign currency indicator	-	-0.015***	(-3.83)
Year indicators		Included	

Panel B. Correlations between managerial ability measures

	Managerial ability	*Historical return*	*Historical ROA*	*ROA*	*Ln(Total assets)*
Firm efficiency	0.613***	0.060***	0.091***	0.130***	-0.036***
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001)
Managerial ability		0.081***	0.102***	0.139***	0.011***
		(<.0001)	(<.0001)	(<.0001)	(<.0001)
Historical return			0.152***	0.151***	0.025***
			(<.0001)	(<.0001)	(<.0001)
Historical ROA				0.767***	0.316***
				(<.0001)	(<.0001)
ROA					0.273***
					(<.0001)

Panel A presents the average coefficients from the Tobit estimation of equation (1) by 42 Fama-French industry. The t-statistics in parentheses are calculated based on the industry coefficients (Fama and MacBeth 1973). Panel B presents the Pearson correlation coefficients between *Firm efficiency*, *Managerial ability* based on the DEA estimation, and alternative measures of managerial ability. See Appendix for the definitions of the variables.

TABLE 4
Regression of accrual quality on managerial ability

	Dependent variable = Accrual quality (*AQ*)	
	(1)	(2)
Intercept	0.046***	0.043***
	(5.19)	(4.81)
Managerial ability	0.003***	0.008***
	(2.70)	(2.66)
Managerial ability × Strong investor protection		-0.006*
		(-1.84)
Strong investor protection	-0.008***	-0.006***
	(-8.19)	(-2.93)
Ln(Total assets)	-0.004***	-0.004***
	(-21.60)	(-21.59)
Sales volatility	0.024***	0.024***
	(12.45)	(12.42)
Cash flow volatility	0.105***	0.104***
	(14.87)	(14.87)
Operating cycle	0.007***	0.007***
	(11.80)	(11.83)
Loss%	0.024***	0.024***
	(19.94)	(19.90)
Sales growth	0.000	0.000
	(-0.05)	(-0.05)
Abnormal return	-0.001***	-0.001***
	(-4.83)	(-4.83)
GDP	-0.001***	-0.001**
	(-2.59)	(-2.53)
GDP growth	0.000*	0.000*
	(1.95)	(1.93)
FDI	0.000*	0.000*
	(1.73)	(1.69)
Inflation	0.000*	0.000**
	(1.86)	(1.96)
Equity market	0.000***	0.000***
	(5.59)	(5.62)
Industry and year indicators	Included	Included
Test (p-value) *Managerial ability+ Managerial ability × Strong investor protection*		(0.09)*
Adj. R^2	22.61%	22.63%
N	60,494	60,494

This table reports the regression results of accrual quality (*AQ*) on managerial ability and controls. *Managerial ability* is the decile rank by industry and year. The t-statistics in parentheses are based on standard errors clustered by firm. The sample is 60,494 observations for the period from 1998 to 2007 from 44 countries. All tests are two-tailed. The symbols *, ** and *** denote significance at the 0.1, 0.05 and 0.01 levels, respectively.

TABLE 5
Regression of absolute value of abnormal accruals on managerial ability

	Dependent variable = Absolute value of abnormal accruals (*ABAA*)	
	(1)	(2)
Intercept	0.108***	0.098***
	(6.11)	(5.49)
Managerial ability	0.019***	0.036***
	(7.64)	(6.01)
Managerial ability × Strong investor protection		-0.020***
		(-3.10)
Strong investor protection	-0.011***	-0.001
	(-4.82)	(-0.20)
Ln(Total assets)	-0.011***	-0.011***
	(-25.28)	(-25.25)
Sales volatility	0.034***	0.034***
	(7.65)	(7.61)
Cash flow volatility	0.458***	0.458***
	(26.63)	(26.65)
Operating cycle	0.005***	0.005***
	(3.70)	(3.74)
Loss%	0.049***	0.049***
	(17.92)	(17.89)
Sales growth	0.000	0.000
	(0.45)	(0.46)
Abnormal return	0.001*	0.001*
	(1.80)	(1.82)
GDP	0.002**	0.003**
	(2.09)	(2.16)
GDP growth	0.004***	0.004***
	(7.55)	(7.46)
FDI	0.000	0.000
	(-1.56)	(-1.57)
Inflation	0.003***	0.003***
	(9.22)	(9.37)
Equity market	0.000***	0.000***
	(7.94)	(7.98)
Industry and year indicators	Included	Included
Test (p-value) *Managerial ability+ Managerial ability × Strong investor protection*		(0.00)***
Adj. R^2	24.04%	24.07%
N	74,892	74,892

This table reports the regression results of absolute value of abnormal accruals (*ABAA*) on managerial ability and controls. *Managerial ability* is the decile rank by industry and year. The t-statistics in parentheses are based on standard errors clustered by firm. The sample is 74,892 observations for the period from 1998 to 2008 from 44 countries. All tests are two-tailed. The symbols *, ** and *** denote significance at the 0.1, 0.05 and 0.01 levels, respectively.

TABLE 6
Regression of earnings smoothness on managerial ability

	Dependent variable = Earnings smoothness (*SMTH*)	
	(1)	(2)
Intercept	0.077	0.071
	(0.32)	(0.29)
Managerial ability	0.236***	0.245***
	(7.54)	(3.65)
Managerial ability × Strong investor protection		-0.012
		(-0.15)
Strong investor protection	-0.019	-0.013
	(-0.73)	(-0.27)
Ln(Total assets)	-0.066***	-0.066***
	(-10.02)	(-10.02)
Sales volatility	-0.195***	-0.195***
	(-3.87)	(-3.87)
Cash flow volatility	1.368***	1.368***
	(8.75)	(8.75)
Operating cycle	0.028*	0.028*
	(1.70)	(1.70)
Loss%	-1.385***	-1.385***
	(-32.73)	(-32.72)
Sales growth	0.045***	0.045***
	(4.69)	(4.69)
Abnormal return	0.084***	0.084***
	(9.78)	(9.78)
GDP	-0.097***	-0.097***
	(-6.71)	(-6.68)
GDP growth	0.008	0.008
	(1.26)	(1.26)
FDI	0.000	0.000
	(0.15)	(0.15)
Inflation	-0.051***	-0.051***
	(-13.32)	(-13.40)
Equity market	-0.002***	-0.002***
	(-7.82)	(-7.82)
Industry and year indicators	Included	Included
Test (p-value) *Managerial ability+ Managerial ability × Strong investor protection*		(0.00)***
Adj. R^2	8.58%	8.58%
N	89,650	89,650

This table reports the regression results of earnings smoothness (*SMTH*) on managerial ability and controls. *Managerial ability* is the decile rank by industry and year. The t-statistics in parentheses are based on standard errors clustered by firm. The sample is 89,650 observations for the period from 1998 to 2008 from 44 countries. All tests are two-tailed. The symbols *, ** and *** denote significance at the 0.1, 0.05 and 0.01 levels, respectively.

TABLE 7
Regression of aggregate earnings quality measures on managerial ability

	Dependent variable = Aggregate earnings quality (*CompIndex*)	
	(1)	(2)
Intercept	-0.594***	-0.667***
	(-3.44)	(-3.82)
Managerial ability	0.087***	0.210***
	(4.16)	(4.01)
Managerial ability × Strong investor protection		-0.147***
		(-2.60)
Strong investor protection	-0.161***	-0.087**
	(-8.29)	(-2.51)
Ln(Total assets)	-0.086***	-0.086***
	(-22.17)	(-22.16)
Sales volatility	0.446***	0.444***
	(11.96)	(11.92)
Cash flow volatility	2.927***	2.923***
	(21.52)	(21.52)
Operating cycle	0.095***	0.095***
	(8.64)	(8.70)
Loss%	0.656***	0.655***
	(27.42)	(27.39)
Sales growth	-0.012	-0.012
	(-1.63)	(-1.63)
Abnormal return	-0.015***	-0.015***
	(-2.69)	(-2.69)
GDP	0.005	0.006
	(0.48)	(0.56)
GDP growth	0.022***	0.022***
	(4.92)	(4.88)
FDI	-0.002	-0.002
	(-1.10)	(-1.14)
Inflation	0.025***	0.026***
	(9.47)	(9.61)
Equity market	0.001***	0.001***
	(9.47)	(9.61)
Industry and year indicators	Included	Included
Test (p-value) *Managerial ability+ Managerial ability × Strong investor protection*		(0.00)***
Adj. R^2	30.45%	30.20%
N	59,448	59,448

This table reports the regression results of aggregate earnings quality measures on managerial ability and controls. *CompIndex* is the sum of the decile rank of *AQ*, *ABAA*, and *SMTH* by industry and year. *Managerial ability* is the decile rank by industry and year. The t-statistics in parentheses are based on standard errors clustered by firm. The sample is 59,478 observations for the period from 1998 to 2007 from 44 countries. All tests are two-tailed. The symbols *, ** and *** denote significance at the 0.1, 0.05 and 0.01 levels, respectively.

TABLE 8
Regression of aggregate earnings quality measures on alternative managerial ability measure

	Dependent variable = *CompIndex*	
	(1)	(2)
Intercept	-0.808***	-0.654***
	(-4.34)	(-3.68)
Historical return	0.080*	
	(1.65)	
Historical return × Strong investor protection	-0.186***	
	(-3.58)	
Historical ROA		0.157***
		(2.64)
Historical ROA × Strong investor protection		-0.136**
		(-2.22)
Strong investor protection	-0.065*	-0.080*
	(-1.82)	(-1.87)
Ln(Total assets)	-0.076***	-0.082***
	(-19.33)	(-21.47)
Sales volatility	0.498***	0.467***
	(12.00)	(12.53)
Cash flow volatility	3.207***	2.983***
	(20.97)	(21.36)
Operating cycle	0.089***	0.094***
	(7.72)	(8.53)
Loss%	0.609***	0.670***
	(23.00)	(19.88)
Sales growth	-0.023***	-0.014*
	(-2.74)	(-1.88)
Abnormal return	-0.010*	-0.013**
	(-1.72)	(-2.43)
GDP	0.017	0.005
	(1.54)	(0.50)
GDP growth	0.025***	0.022***
	(5.05)	(4.77)
FDI	-0.002	-0.002
	(-1.09)	(-1.11)
Inflation	0.032***	0.025***
	(11.11)	(9.24)
Equity market	0.001***	0.001***
	(9.54)	(10.32)
Industry and year indicators	Included	Included
Test (p-value) *Managerial ability+ Managerial ability × Strong investor protection*	(0.00)***	(0.51)
Adj. R^2	30.96%	29.91%
N	52,773	59,154

This table reports the regression results of aggregate earnings quality measures on alternative managerial ability measure. *Historical return (ROA)* is the decile rank of Industry-adjusted historical stock returns (ROA) over t-4 to t. *CompIndex* is the sum of the decile rank of *AQ*, *ABAA*, and *SMTH* by industry and year. *Managerial ability* is the decile rank by industry and year. The t-statistics in parentheses are based on standard errors clustered by firm. The sample is 59,478 observations for the period from 1998 to 2007 from

44 countries. All tests are two-tailed. The symbols *, ** and *** denote significance at the 0.1, 0.05 and 0.01 levels, respectively.

TABLE 9
Regression of real earnings management on managerial ability

	Dependent variable = Real earnings management (*REM)*	
	(1)	(2)
Intercept	4.078***	4.031***
	(18.14)	(17.73)
Managerial ability	1.038***	1.120***
	(23.42)	(11.56)
Managerial ability × Strong investor protection		-0.102
		(-0.94)
Strong investor protection	-0.009	0.043
	(-0.24)	(0.67)
Ln(Total assets)	-0.011	-0.010
	(-1.41)	(-1.40)
Sales volatility	0.896***	0.895***
	(13.20)	(13.19)
Cash flow volatility	-2.705***	-2.705***
	(-13.01)	(-13.02)
Operating cycle	-0.315***	-0.315***
	(-14.59)	(-14.58)
Loss%	0.309***	0.308***
	(7.96)	(7.95)
Sales growth	-0.005	-0.005
	(-0.77)	(-0.76)
Abnormal return	-0.135***	-0.135***
	(-18.00)	(-18.00)
GDP	-0.320***	-0.320***
	(-21.18)	(-21.17)
GDP growth	-0.009*	-0.009*
	(-1.71)	(-1.75)
FDI	0.034***	0.034***
	(11.26)	(11.25)
Inflation	-0.064***	-0.064***
	(-15.80)	(-15.76)
Equity market	-0.001***	-0.001***
	(-6.17)	(-6.16)
Industry and year indicators	Included	Included
Test (p-value) *Managerial ability+ Managerial ability × Strong investor protection*		(0.00)**
Adj. R^2	12.47%	12.48%
N	80,070	80,070

This table reports the regression results of real earnings management (*REM*) on managerial ability and controls. *Managerial ability* is the decile rank by industry and year. The t-statistics in parentheses are based on standard errors clustered by firm. The sample is 80,070 observations for the period from 1998 to 2008 from 44 countries. All tests are two-tailed. The symbols *, ** and *** denote significance at the 0.1, 0.05 and 0.01 levels, respectively.