Determinants of Earnings Quality:
The Role of the Corporate Information System

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December 10, 2013

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1. Introduction

How well accounting earnings convey information about the true economic performance underlying a company (i.e., earnings quality) is an important aspect of evaluating a company's performance and risk. Prior studies have investigated a variety of research questions relating to earnings quality. One strand of this literature has examined types of earnings management techniques companies employ (accruals/transactions based) (Bartov 1993; DeFond and Jiambalvo 1994), and when earnings management is most likely to occur (benchmark beating) (e.g., Degeorge, Patel, and Zeckhauser 1999; Bartov, Givoly, and Hayn 2002). Another strand of this literature has investigated the extent to which Generally Accepted Accounting Principles (GAAP) and their implementation guidelines constrain managers from biasing earnings (Barton and Simko 2002), and the role of key players (audit committees, external auditors, financial analysts) in monitoring management and improving earnings quality (e.g., Becker, DeFond, Jiambalvo, and Subramanyam 1998). Overall, the findings from the first strand indicate that managerial reporting choices, driven by managerial incentives (e.g., maximize compensation; benchmark beating), may adversely affect earnings quality. The findings from the second strand demonstrate that GAAP, external auditors, audit committees, and financial analysts constrain biased reporting, thereby contributing to earnings quality. The purpose of this study is to extend this second strand of the literature by examining the relation between the corporate information system (IS) quality and earnings quality. The IS quality may play an important role in limiting opportunistic managerial reporting choices, thereby improving earnings quality.

There are two primary ways in which the IS may enhance the quality of financial statement information in general and earnings quality in particular. First, the IS may be used to develop and manage the financial accounting system. The more sophisticated is the IS, the more reliable, timely, and accurate is the accounting information. For example, the IS may be used to perform three ways of revenues matching (invoices to customers, deliveries, and collections) and expenses matching (invoices from suppliers, shipments received, and payments), which may reduce accounting errors and limit management ability to time the recognition of revenues and cost of goods sold. Another example, computerized depreciation computations may also reduce errors, as well as management ability to fiddle with depreciation expense. In addition, the more sophisticated is the IS, the more the auditors rely on computer-aided audit techniques that result in an increased audit efficiency and quality. Hence, it is plausible that more sophisticated ISs make the oversight role of the board of directors and its audit committee, as well as that of the independent auditors easier to carry out, thereby contributing to earnings quality.

The second way the IS may be used to enhance the quality of financial statement information is by sifting through the company's internal computerized data in search of fraud indicators using data-mining and business intelligence software. Such software, which is widely available, can be added as a front end to an existing accounting or enterprise resource planning (ERP) system. The advantage of this approach is that unlike humans, the software is able to process the tremendous amount of volumes of data typically associated with business processes and identify complex interactions among many factors. However, many small- and medium-size companies may not have IT departments to develop and maintain the software needed to prevent/detect accounting errors and fraud, which may result in decreased earnings quality. In summary, the IS may be used to prevent and detect accounting errors and fraud. This discussion leads us to hypothesize that, ceteris paribus, earnings quality is increasing in the quality of the IS. Providing evidence in support of this hypothesis, however, may be a formidable task because of two difficulties: the calibration of IS quality and the interferences coming from other data.

The primary challenge underlying our research design concerns the identification of a proxy for the quality of a corporate IS, our test variable. Prior research has developed a variety of methodologies to assess it. For example, to examine the relation between productivity growth and IS, Berdnt and Morrison (1995) employed annual two-digit manufacturing data provided by the U.S. Bureau of Labor Statistics, while Brynjolfsson and Hitt (1996) used firm-level data from surveys. However, industry-level data do not allow for a cross-firm comparison within an industry, and survey data are not audited and are typically limited to large firms from a small number of industries, which casts doubt on the reliability and generalizability of the findings. Given these weaknesses, we develop a new measure for a corporate's IS quality; our measure is based on the annual pay of the chief information officer (CIO) relative to other officers on the company's top five paid officers list. This measure is appealing for two reasons. First, it indicates the firm's commitment to invest in information technology (IT) and thus the quality of the IS.[1] Second, it is taken from a firm's proxy statement and available in a machine readable form for a relatively large number of firms.

Our analysis also requires a proxy for earnings quality, our dependent variable. Along the lines of prior research, we use two types of proxies. The first is computed based on financial statement information, and concerns the absolute value of discretionary accruals; the higher is the absolute value of discretionary accruals the lower is the earnings quality. The second proxy concerns earnings response coefficients (ERCs), the slope coefficient from the returns / earnings regression. This proxy reflects investor perceptions of firms' earnings quality.

To test our hypothesis, we perform two types of regression analyses, the Ordinary Least Squares (OLS) and the Two-Stage Least Squares (2SLS), on two samples: the earnings management (EM) sample, where the dependent variables are based on discretionary accruals, and the ERC sample, where the dependent variables are the ERCs. Our samples span an 11-year period, 2001 – 2011, and

[1] Two primary reasons for investing in IT are: (1) to increase operating efficiency, and (2) to provide information for internal control, budgeting, accounting, etc. We assert that even if the primary reason for investing in IT for a particular firm is to increase operational efficiency, once the investment in IT is made, the firm will use the IS also for other purposes including accounting and internal control over financial reporting (the processes and safeguards a company has put in place over financial reporting).

their size ranges between 16,066 observations (EM sample and OLS regression) and 4,717 observations (ERC sample and 2SLS regression).

Briefly, our primary finding indicates that the quality of the IS and earnings quality are positively related, as the higher is the quality of the IS the higher is the earnings quality, even after controlling for a multitude of variables demonstrated by prior research to explain earnings quality. This result is robust to the estimation procedure employed, OLS, or 2SLS that addresses the concern that an endogeneity problem may underlie our finding. It is also robust to the definition of the dependent variable, as it is observed in both EM and ERC samples.

We contribute to the earnings quality literature by being the first to demonstrate that the quality of the IS (partially) explains the cross sectional variation in earnings quality. This finding will help financial statement users—outsiders (investors, financial analysts, and external auditors) and insiders (audit committees)—in assessing a firm's earnings quality. It also offers a way to improve earnings quality, i.e., investing in IT.

The next section outlines our methodology and defines the variables used in the analysis. Section 3 describes the data, and Section 4 reports the empirical results. The final section, Section 5, summarizes our main findings and conclusions.

2. Methodology and variable definition

To test our hypothesis that the earnings quality is increasing in the quality of the IS, we estimate the following model using OLS:

$$\mathbf{ErnQua_i = a_0 + a_1*INFSYS_i + \sum_j a_j*Controls_{i,j}} + \varepsilon_i \qquad (1)$$

Where the dependent variable, $ErnQua_i$, is the earnings quality of the *ith* firm-year, $INFSYS_i$ is the IS quality of the *ith* firm-year, and $Controls_{i,j}$ is a set of *j* control variables. In terms of equation (1), our hypothesis suggests $a_1 > 0$, that is, ceteris paribus the higher is the IS quality of a firm, the higher is its earnings quality. All three variables are defined in more detail below and in Appendix A.

2.1 Dependent Variables

Along the lines of prior research, we use two alternative approaches to measure earnings quality. The first is based on discretionary accruals, and the second on ERCs. These two approaches complement each other: while the first is based on accounting data and reflects accounting researchers' perception of the earnings quality, the other relies on both accounting and market data and mirrors investors' perception of the earnings quality.

The first approach to estimate earnings quality involves two alternative proxies for discretionary accruals that are commonly employed in the accounting literature. The first is the Absolute Discretionary Accruals estimated using the Cross Sectional Modified Jones Model as described in Dechow, Sloan, and Sweeney (1995):

$$\frac{Tot.\ Accr_{i,t}}{Total\ Assets_{i,t-1}} = \beta_{1t}\frac{1}{Total\ Assets_{i,t-1}} + \beta_2\frac{\Delta REV_{i,t}}{Total\ Assets_{i,t-1}} + \beta_3\frac{PPE_{i,t}}{Total\ Assets_{i,t-1}} + \varepsilon_{i,t} \qquad \mathbf{(2)}$$

Where, for fiscal year *t* and firm *i*:

- *Tot. Accr* represents Total Accruals, defined as: $Tot.\ Accr_{it} = EBXI_{it} - CFO_{i,t,}$, where

EBXI represents Earnings before Extraordinary Items and Discontinued Operations, and CFO is the Operating Cash Flow taken from the statement of cash flows;

- $Assets_{t-1}$ represents Total Assets in year t-1;
- ΔREV_{it} is the change in revenues from the preceding year;
- PPE_{it} is the gross value of property, plant and equipment in year t.

The coefficient estimates from equation (2) are used to estimate the firm-specific normal accrual level ($Norm.Accr_{i,t}$), as follows:

$$Norm.Accr_{i,t} = \widehat{\beta_{1,t}} \frac{1}{Total\ Assets_{1,t-1}} + \widehat{\beta_2} \frac{(\Delta REV_{i,t} - \Delta AR_{i,t})}{Total\ Assets_{1,t-1}} + \widehat{\beta_3} \frac{PPE_{1,t}}{Total\ Assets_{1,t-1}} \quad \mathbf{(3)}$$

Where, ΔAR_{it} is the change in accounts receivable from the preceding year. Following the methodology used in previous literature, we estimate the industry-specific regression using the change in reported revenues, implicitly assuming no discretionary choices with respect to revenue recognition. However, when computing the normal level of accruals, we adjust reported revenues of sample firms for the change in accounts receivable to capture any potential accounting discretion arising from credit sales.

Our measure of discretionary accruals is then the difference between Total Accruals and Fitted Normal Accruals, defined as:

$$\text{Modified Jones} = \frac{Tot.Accr._{i,t}}{Total\ Assets_{i,t-1}} - \frac{Norm.Accr_{i,t}}{Total\ Assets_{i,t-1}} \quad \mathbf{(4)}$$

The second earnings quality metric of the first approach is the Absolute Discretionary Accruals estimated using the DeFond and Park (2001) model, wherein the abnormal working capital accrual (AWCA) is estimated separately for each firm-year observation, as follows:

$$AWCA_{i,t} = WC_{i,t} - [(WC_{i,t-1} / S_{i,t-1}) \text{ x } S_{i,t}] \quad \mathbf{(5)}$$

Where:

- $AWCA_t$ = abnormal working capital accrual in year t;
- WC_t = Non-cash working capital accruals in year t, computed as:

  (Current assets – cash and short term investment) – (current liabilities – short-term debt);

- WC_{t-1} = working capital at the end of year t-1;
- S_t = sales in year t; and
- S_{t-1} = sales in year t-1.

Our second approach to estimate earnings quality concerns a company's ERC. The ERC is based on the slope coefficient obtained from regressing cumulative abnormal returns (CARs) around earnings announcement dates on the earnings surprises, where the estimation period spans 20 rolling quarters ending at the beginning of the event year, namely ending with the last earnings announcement of the previous year. Next, we rank all ERCs, and then subtract 1 from each rank and divide the difference by *n-1* (*n* = number of sample observations) so that the ERC varies between 0 and 1. The resulting ERC measure is the dependent variable based on the second approach.

Cumulative abnormal returns are estimated as the sum of the abnormal returns of firm *i* in the three-day window surrounding its earnings announcement. More formally:

$$CAR(-1,1)_{iq} = \sum_{k=t-1}^{t+1}(R_{ik} - ER_{ik}) \quad (6)$$

Where, R_{ik} is the stock-return of firm i in day k, and ER_{ik} is derived from the market model (see e.g., Francis et al. 2005).[2]

The earnings surprises are computed as the difference between actual quarterly EPS and analysts' quarterly EPS forecast, scaled by the company's stock price two trading days before the quarterly earnings announcement. We define the quarterly earnings surprise as the most recent mean analyst earnings forecast before the earnings announcement, as reported by I/B/E/S.[3]

[2] Along the lines of prior work (e.g., Skinner and Sloan 2002), the market model's estimation period spans 64 trading days, -65, -2, where day 0 is the date of quarterly earnings announcement.

[3] Since I/B/E/S reports the date in which the mean has been computed, it was possible to determine whether this date was before or after the earnings announcement date and avoid taking values computed after earnings have been released. In the latter case we used the estimate of the month before.

2.2 Test Variables

We assert that the CIO pay relative to other officers indicates the firm's commitment to invest in information technology (IT) and thus the quality of its IS. The executive is identified as CIO if his title in the proxy statement is: chief information officer, chief technology officer, or chief software officer. We employ three alternative proxies for IS quality based on the relative CIO pay. The first variable, CIO_Presence, is a dummy variable equal to one if the CIO is present in the top five paid executives list as per the proxy statement (SEC Form *DEF14A*) and 0 otherwise.[4] The second and third variables, *Comp_Dist* and *Comp_Dist_all*, measure the CIO pay relative to the other four top paid executives. *Comp_Dist* is defined as the sum of Base Salary, Cash Bonus and Other Cash Compensation received by the CIO during the year, scaled by the average compensation received by the other four top-paid executives of the firm, and *Comp_Dist_all* is defined as Base Salary, Cash Bonus, Other Compensation in cash, and the dollar value of Stork Awards and Stock Options Awards.

2.3 Control Variables

In our models we included the following control variables:

- ***ACC_FIL*** is a dummy variable equal to 1 if the firm is an Accelerated Filer; 0 otherwise. Accelerated filers have to provide more information on internal controls to the market and, as a consequence, will pose more attention to the definition of their internal control systems (Doyle, Ge, and McVay 2007a; Ashbaugh-Skaife, Collins, and Kinney 2007). Since there is a positive association between internal control quality and various earnings quality proxies, accelerated filers are expected to report a lower level of earnings manipulation.

- ***BIG*** identifies whether or not the auditor is a Big 4 auditing firm. Assuming that a Big 4 firm

[4] Publicly traded companies are required to file a proxy statement with the U.S. Securities and Exchange Commission (SEC) in advance of the annual meeting when soliciting shareholder votes.

delivers audits of higher quality (Becker et al. 1998; Francis, Lafond, Olsson, and Schipper 2004), we expect this variable to be negatively correlated with earnings management.

- ***CEODUAL*** is a dummy variable taking the value of 1 if the Chairman and the CEO are the same person; 0 otherwise. The double role played by the CEO is considered to be a threat to board independence and board's monitoring ability (Jensen 1993). Thus, we expect the variable to be positively correlated with earnings manipulation.

- ***CFO*** is the Operating Cash Flow (computed as OANCF – XIDOC, where OANCF is the Compustat Code for Net Cash Flow from Operating Activities, while XIDOC is the Compustat Code for Extraordinary Items and Discontinuous Operations) scaled by lagged Total Assets. This variable is included to control for errors in the measurement of abnormal accruals (Peasnell, Pope, and Young 2005).

- ***FIN*** is a dummy variable equal to 1 if the firm issued stock or debt during the year; 0 otherwise. Previous studies have demonstrated that firms issuing stocks or debt have incentives to manipulate earnings to gain better conditions on the market (DuCharme, Malatesta, and Sefcik 2004; Liu, Ning, and Davidson 2010; Shivakumar 2000; Teoh, Rao, and Wong 1998a). We therefore expect this variable to be positively correlated with earnings management.

- ***ICW*** is a dummy variable taking value of 1 if the firm reported Internal Control Weaknesses during the year; 0 otherwise. This variable is included as firms reporting internal control weaknesses have greater chances of successfully manage earnings (Ashbaugh-Skaife et al. 2007).

- ***LEV*** is defined as financial liabilities over total assets. It is included as firms with higher leverage have higher incentives to manipulate earnings in order to report better results and, in this manner, reduce the current and future cost of borrowing (Healy and Wahlen 1999). Thus, we expect the variable to be positively correlated with earnings management.

- ***LOSS*** is a dummy variable equal to 1 if the firm reported a loss on *t-1*; 0 otherwise. It is included as firms have been found to try avoiding losses through earnings manipulation (Burgstahler and Dichev 1997).

- ***MA*** takes value of 1 if the firm engaged in a merger or an acquisition during the year; 0 otherwise. We included this variable because firms involved in these activities may have incentives to inflate earnings (Louis 2004)

- ***MB*** is computed as the firm's market value over its book value. It is included to control for the possibility that firms with high growth opportunities are more likely to try avoiding negative earnings surprises through earnings management (Skinner et al. 2002).

- ***REST*** is a dummy variable equal to 1 if the firm restated its financial statements during the year; 0 otherwise. We included this variable as there is a positive correlation between restatements and earnings manipulation (Richardson, Tuna, and Wu 2003).

- ***ROA*** is measured as Net income over Average Total Assets. It controls for firm's performance, because firms performing better have a lower incentive to manipulate earnings (see, e.g., Healy and Wahlen 1999; Fields, Lys, and Vincent 2001).

- ***SIZE*** is computed as the natural logarithm of the market value of the firm. It controls for political cost concerns (Watts and Zimmerman 1986).

2.4 Instrumental Variables

It is possible that earnings quality causes IS quality rather than IS quality causes earnings quality. This "reverse" causation may occur if, for example, companies with higher earnings quality choose to invest more in IT to improve operational efficiency. This possibility raises concerns because reverse causation implies that the IS quality variable (an explanatory variable) is correlated with the error term in Equation (1). In this situation, an OLS regression generally produces biased and inconsistent estimates. However, if an instrumental variable (IV) is available, consistent estimates may still be obtained.

An instrumental variable does not itself belong to the explanatory equation, but is correlated with the endogenous explanatory variables, conditional on the other covariates, and is uncorrelated with the error term in the explanatory equation (as the instrumental variable cannot suffer from the same problem as the original explanatory variable). Thus, in addition to estimating Equation (1) using OLS, we also instrument the IS quality variable by using 2SLS to test our hypothesis.

In identifying our instruments, we consider past literature from a wide range of fields. In addition, we require that each variable pass the tests for instrument validity as in Stock and Yogo (2005) and Cameron and Trivedi (2009). The following five instrumental variables were selected:

- ***IND* (industry):** Information technology usage may vary across industries (Devaraj and Kohli 2003) as found in a stream of research on differences in technology usage (Straub, Limayem, and Karahanna 1995; Szajna 1996; Taylor and Todd 1995). We use Fama & French 12 industry specification to code industries. As financial and utilities are excluded from the sample, we end-up with 10 industry dummies, 9 of which are included as instruments.
- ***GDW*** (**goodwill**): one usage of a firm's IS concerns internal integration, i.e., the usage of the IS by the firm to facilitate information sharing and coordinate work activities within the organization. It thus follows that IS plays an increasingly important role in more structured and complex firms (Grover, Teng, and Fiedler 1993), and that companies with more complex corporate structures are likely to use IS to a larger extent. Since *GDW*, defined as Goodwill

scaled by Total Assets, arises in mergers/acquisitions, it is likely to be positively related to the structural complexity underlying a firm and thus to its usage of IS. In suggesting that post-acquisition strategy decisions are to be made centrally, Gerpott (1994) stresses the importance of initiating information integration programs in order to additionally improve cooperation between acquired and original sites. Consequently, we expect *GDW* to be positively associated with our test variables.

- ***INT*** **(intangible assets excluding GWD scaled by total assets):** like **GDW**, we expect **INT** to have a positive association with our test variables. We separate **GDW** from other intangible assets because **GDW** is less verifiable and more subject to information asymmetry.
- ***R&D*** (**research and development cost scaled by sales**): modern information and communication technologies served to connect dispersed R&D activities (Howells 1990). Moreover, Gerpott (1994) suggests that post-acquisition strategy decisions are to be made centrally, and stresses the importance of initiating information integration programs in order to additionally improve R&D cooperation between acquired and original sites. We thus expect our instrument R&D to be positively associated with our test variables.
- ***AGE*** (**of the firm**): major technological change—like the IT revolution— destroys older firms. It does so by making machines, workers, and managers obsolete (Hobjin and Jovanovic 2001). Moreover, new companies will introduce more "state of the art" IT systems. Thus, we expect our instrument ***AGE*** to be negatively correlated to our test variables.

3. Data

Our initial sample contains all firms in the *Execucomp* database with data on top executive compensation during the 11-year period, 2001 - 2011. Since the database provides information at an individual-executive level, we first combined all information at the firm level. As Panel A of

Table 1 shows, our initial *Execucomp* sample contains 22,811 firm-year observations from 2,644 unique firms. In our initial sample, 2,447 or 9.85 percent (2,447 / 22,811) firm-year observations and 781 or 29.54 percent (781 / 2,644) unique firms show a CIO as a top remunerated executive. Next, we intersect the top executive compensation data with financial data from the *Compustat North America Fundamentals Annual* database. Following previous literature on accounting quality, we drop firms in the Finance and Utilities Sectors (*as defined by Fama & French 12 Industries classification*) because of the peculiarities in their accounting requirements and because these industries are regulated, reducing the sample size by 4,801 observations (473 firms). We then require that each firm-year observation has all the data we include in our models as controls. This requirement leads to an additional loss of 1,417 observations (118 firms), resulting in a sample of 16,593 (2,053) firm-years (unique firms), of which 1,911 (632) firm-years (unique firms) have CIO as a top remunerated executive.

Our tests involve two types of dependent variables; one is based on earnings management (EM) metrics and the other on earnings response coefficients (ERCs). For the earnings management analysis, each observation must have all data necessary to compute the earnings management metrics. As Panel B of Table 1 shows, this requirement results in a loss of 527 (43) firm-years (unique firms), leading to an OLS sample of 16,066 firm-years and 2,010 unique firms. Next, to estimate our model using 2SLS, we further restrict our sample to data availability of the selected instrumental variables. This leads to a final sample for the 2SLS regression using earnings management metrics as dependent variables of 9,429 (1,295) firm-years (unique firms).

Panel C of Table 1 reports the effect of the sample selection procedure on the ERC sample size. The need to estimate ERCs generates a loss of 9,116 (1,138) observations (unique firms), leading to an OLS sample of 7,477 firm-year observations and 915 unique firms. Additional loss of data is generated by the lack of data availability for the instrumental variables, which leads to a final sample of 4,717 firm-year observations (634 unique firms) for the 2SLS sample.

Place Table 1 about here

Table 2 shows the distribution of CIO Presence (separately for the EM and ERC samples) across years (in Panel A), by Industry (in Panel B), and the persistence of CIO presence in a given company across years (Panels C and D), that is, the number of years a CIO appears among the top five executives for a given firm.

Place Table 2 about here

Table 2, Panel A, shows that the distribution of CIO presence is stable across time. For example, for the EM sample the number of observations ranges between 82 (in 2001) and 153 (in 2009) for the 2SLS analysis and between 161 (in 2007) and 204 (in 2009) for the OLS analysis. The distribution of CIO presence by industry presented in Panel B of Table 2 indicates that all 10 Fama & French industries are represented in the sample. While there is little evidence of industry clustering, the Business Equipment industry has the largest presence with slightly more than 40 percent in the 2SLS and 36 percent in the OLS sample. We thus repeated the analysis that follows excluding the Business Equipment Category (namely, SIC codes 3570, 3571, 3572, 3576, 3577, 3578) for a total loss of 405 observations and 77 CIOs, and obtained qualitatively similar results (not tabulated for parsimony). Finally, Panel C and Panel D of Table 2 report the number of years CIO appears among the top five paid executives for a given firm in, respectively, the EM and the ERC Samples.[5] Clearly, there is a substantial variation with respect to this variable across all samples. For example, in the EM sample, OLS regression (Panel C), 336 CIOs appear in the list of

[5] It should be noticed that the number reported indicate CIO presence during the entire sample period and, not necessarily, presence in consecutive years (e.g. 2004, 2007 and 2009 presence of CIO in firm A as top executive will count 3, in our table).

top five paid executives in three of our 11 sample years and only 32 appear 8 years. Similarly, for the ERC sample, OLS regression (Panel D), 171 CIOs appear in the list of top five paid executives in three of our 11 sample years and only 33 appear 11 years.

Place Table 3 about here

Table 3 reports descriptive statistics for all variables used in the analyses. Panel A reports for each of our two samples (OLS and 2SLS) the means of the three dependent variables used in the study: the DeFond and Park measure, the Modified Jones measure, and ERC, separately for the subsamples of firm-years for which the CIO was and was not one of the top five remunerated executives in the firm. When the test is performed on the OLS sample, only the mean ERC is different across the two subsamples: in particular, CIO firm-years show a higher ERC compared to the non-CIO sample, suggesting that earnings are considered to be more reliable when the CIO is among the top five executives. DeFond and Park and Modified Jones measures are significantly lower in the CIO group for the 2SLS sample, suggesting that the quality of earnings is significantly higher when Information Technology investment in the company is higher.[6]

Panel B of Table 3 shows significant differences between the CIO and non-CIO firms for the control and instrumental variables in the earnings management sample (for both the OLS and 2SLS subsamples). Generally, CIO firm-years tend to be smaller, have lower leverage, restatement frequency, and market-to-book ratios, higher probability of having suffered a loss in year t-1, and more frequent M&A activities. The four instruments used in the 2SLS analysis show significant differences among the CIO and non-CIO subsamples, indicating that they can be used as predictors

[6] We replicated the analyses with sample median and results are qualitatively unchanged.

for CIO presence. In particular, CIO companies seem to be younger, have higher level of goodwill, intangible assets other than goodwill and R&D activity.

Table 3, Panel C shows significant differences between the CIO and non-CIO subsamples for the control variables used in the ERC Sample (for both the OLS and 2SLS subsamples). The results are largely similar to what reported above for the earnings management sample: CIO firm-years have lower leverage, market-to-book ratios, and are smaller. In addition, CIO firms show higher probability of incurring a loss in year t-1, and more frequent M&A activities. As before, the four instruments used in the 2SLS show significant differences between the CIO and non-CIO subsamples.[7] Finally, the primary takeaway from Panel D of Table 4, which presents data on the CIO remuneration, is that the CIO appears in the top five paid executives list infrequently: only approximately 12 percent of the time in the OLS subsample and 14 percent of the time in the 2SLS subsample.

4. Empirical Results

4.1 OLS Analysis

Our first set of tests estimate Equation (1) using OLS. The dependent variable, one of our three alternative measures of earnings quality, is regressed on our test variable, a measure of IS quality, and the 13 control variables discusses above. Our hypothesis is that earnings quality and IS quality are positively related. Tables 4, 5 and 6 report the results. In all three tables, the dependent variables are defined as either: (1) abnormal working capital accruals (DeFond and Park, 2001), (2) discretionary accruals derived from the cross sectional Jones model, or (3) a company's ERC. The definition of the IS quality, our test variable, differs across the three tables, however. In Table 4 our measure for IS quality is a dummy variable equal to 1 if the CIO is among the top five paid

[7] We replicated the analyses with sample median and results are qualitatively unchanged.

executives and 0 otherwise. Since the higher the accruals the lower the earnings quality, we expect the coefficient on our test variable, *CIO_Presence*, to be negative. Conversely, we expect the coefficient on *CIO_Presence* to be positive when ERC is used as the proxy for earnings quality because ERC and earnings quality are positively related.

The results in Table 4 are mixed. The coefficients on *CIO_Presence* are as expected significantly negative, -0.030 (p-value = 0.017) and significantly positive, 0.022 (p-value = 0.029) when the dependent variable is, respectively, abnormal working capital accruals and ERCs, but only marginally significantly negative, -0.022 (p-value = 0.063), when the dependent variable is derived based on the Jones model. One possible explanation for the mixed results, which will be explored later, is that the estimates are biased due to an endogeneity problem.

In addition, the results for certain control variables such as *LEV*, financial liabilities over total assets, *LOSS*, a dummy variable equal to 1 if the firm reported a loss in year *t-1* and 0 otherwise, and *MA*, a dummy variable equal to 1 if the firm took part in a merger or an acquisition during year *t* and 0 otherwise, are all significant in the predicted direction. The results for other control variables, however, such as *SIZE*, the natural logarithm of the market capitalization of the firm and *BIG*, a dummy variable equal to 1 if the auditor is a Big 4 and 0 otherwise, are mixed.

In Tables 5 and 6, the test variables are defined, respectively, as the sum of Base Salary, Cash Bonus, and Other Cash Compensation received by the CIO during the year, scaled by the average compensation received by the other four top executives (*Comp_dist*), and as the sum of Base Salary, Cash Bonus, Other Compensation, dollar value of Stock and Options awards received by the CIO during the year, scaled by the average compensation received by the other four top executives (*Comp_dist_all*). The results in these two tables are weaker. Specifically, in Table 5 the coefficients on *Comp_dist* are only marginally significant, -0.042 (p-value = 0.070) and 0.027 (p-value = 0.070) when the dependent variable is derived based on the Jones model and ERC, respectively. When the dependent variable is abnormal working capital accruals (DeFond and Park 2001) the coefficient on *Comp_dist* is negative and significant, -0.056 (p-value = 0.021). In Table 6, all three coefficients have the predicted signs, but the coefficient is insignificant when the dependent variable is derived from the Jones model, marginally significant, -0.044 (p-value = 0.079), when the dependent variable is abnormal working capital accruals, and significant when ERC is used, 0.031 (p-value = 0.046). One reason for the weak and mixed results across the three tables may be that the coefficients are biased due to endogeneity problem. To address this concern, we next perform 2SLS analyses.

4.2 2SLS Analysis

Tables 7, 8, and 9 report the results from estimating Equation (1) using 2SLS. The first step is to generate a proxy that will be correlated with our test variable but uncorrelated with the error term in Equation (1). This is obtained by first regressing the test variable on our four instrumental variables and the set of the control variables. Next, in the second step we substitute our test variable with its proxy obtained in the first step, and then estimate the resulting Equation (1) using OLS. Panel A of each Table reports the results from the first step and panel B from the second step. As before, our measure for IS quality, our test variable, differs across the three tables. In Table 7 the IS quality is *CIO_Presence*, in Table 8 *Comp_dist*, and in Table 9 *Comp_dist_all*. Consider the results in Table 7 first. Panel A reports the results from the first step for the EM and the ERC samples separately. All our five instruments, *IND*, AGE, *GDW, INT and R&D*, passed the tests for weak instruments. This suggests our instruments' selection is successful.

Panel B reports the results from estimating Equation (1) after substituting our test variable, *CIO_Presence*, with the proxy derived in the first step. The coefficients on the variable of interest, the instrumented *CIO_Presence*, are as expected both significantly negative, -0.167 (p-value = 0.006) and -0.150 (p-value = 0.011) when the dependent variable is derived, respectively, based on the DeFond and Park approach and the Jones model. When the dependent variable is the ERC, the coefficient on the instrumented *CIO_Presence* is as expected positive and highly significant, 0.213 (p-value = 0.000). Thus, a comparison of the results in Table 4 (OLS) and Table 7 (2SLS) indicates that the use of the 2SLS procedure yields stronger and consistent results supporting our hypothesis that the IS quality and earnings quality are positively related. The results for the control variables, however, which are fairly similar to those presented in Table 4, are mixed.

Panel B of Table 8 reports the results from the 2SLS when the test variable is *Comp_dist*. The results show that similar to Panel B of Table 7, all three coefficients of our test variables are significant in the predicted direction. Specifically, as expected the coefficients on *Comp_dist* are significantly negative, -0.213 (p-value = 0.013) when the dependent variable is derived based on the DeFond and Park approach, and -0.216 (p-value = 0.009) when the dependent variable is derived based on the Jones model, and significantly positive, 0.263 (p-value = 0.001) when the dependent variable is the ERC. The results for the control variables are somewhat stronger than those in Table 7 in that six control variables are generally significant: *SIZE*, *LOSS*, *MB*, BIG, *MA, CEODUAL.* Finally, Table 9 reports the results from the 2SLS when the test variable is *Comp_dist_all*. The results in both Panels A and B are generally similar to those in Table 7 and 8. Overall the results in Tables 7, 8, and 9 support our hypothesis that higher quality IS leads to higher quality earnings quality.

4.3 Supplementary Analysis

Finally, we perform two types of supplementary analysis (results not tabulated for parsimony).

First, if investment in IS translates into higher earnings quality, the frequency of restatements should be decreasing in IS investment. In an effort to cast more light on the relation between IS quality and earnings quality, we investigate the relation between investment in IS and the probability of accounting restatement. To that end, we introduce two new variables: *Rest_Persist*, a variable measuring accounting restatements, calculated as the sum of restatements for the company in our sample period scaled by the number of years in our sample period, and a new variable to proxy for the IS quality, *CIO_Persist*, calculated as the sum of CIO presence for the company in our sample period scaled by the number of years in our sample period.[8] We regress *Rest_Persist* on *CIO_Persist* and control variables. The results are consistent with our prior findings in that the new IS quality metric is significantly negative. That is, higher IS quality is associated with lower frequency of restatements.

Our second supplementary analysis concerns assessing the sensitivity of our findings to model specification. While we consider a variety of control variables and alternative model specifications, we further assess the possibility that our main results are driven by a failure to fully control for differences between our two types of sample firms. To that end, we alternatively select our sample by using a nearest neighbor propensity score matching procedure. We matched firms reporting the CIO compensation (treated) with firms not reporting it (untreated) but otherwise similar in terms of variables that influence the level of earnings manipulation. In particular, we match on: ROA, LEV, LOSS, MB, FIN, BIG, CFO, and CEODUAL. We further limited the matching procedure by imposing that each "untreated" firm cannot be considered more than once and that each firm reporting the CIO at least in one year cannot be used as control. The procedure provided us with a

[8] We also use two additional proxies for IS quality to check the robustness of our results. CIO_Mean and CIO-75th are dummy variables assuming a value of 1 if the CIO has been listed as a top remunerated executive a number of times greater than the mean, and the 75th percentile of the sample, 0 otherwise, respectively. The results for all three alternative proxies are similar.

final sample of 1,972 observations (986 with CIO presence and 986 matched firms) for the EM samples, and 1,326 observations (663 with CIO presence and 663 matched firms) for the ERC sample. The results from this supplementary analysis were qualitatively similar to those reported in Tables 7-9. This increases confidence that our results are not driven by a model misspecification.

5. Conclusion

Earnings ability to convey information about true, rather than cosmetic, company economic performance (i.e., earnings quality) is considered to be a key issue in the accounting literature to properly assess a company's performance and related risks.

Existing literature on earnings quality has mainly investigate techniques companies employ to manipulate quality of earnings (accruals/transactions based) (Bartov 1993; DeFond and Jiambalvo 1994), and when such practices are most likely to occur (benchmark beating) (e.g., Degeorge, Patel, and Zeckhauser 1999; Bartov, Givoly, and Hayn 2002). Moreover, determinants of earnings quality have also been analyzed. Researchers have focused on the ability of GAAP implementation and enforcement in constraining managers from biasing earnings (Barton and Simko 2002), and the role of key players (audit committees, external auditors, financial analysts) in monitoring management and improving earnings quality (e.g., Becker, DeFond, Jiambalvo, and Subramanyam 1998). This study is aimed at extending current research on earnings quality determinants building on the relation between the corporate information system (IS) quality and earnings quality. In fact, the IS quality may play an important role in limiting opportunistic managerial reporting choices, thereby improving earnings quality.

Main means through which the IS may be able to boost the quality of financial reporting in general and earnings quality in particular are: *(i)* the use of IS to develop and manage the financial reporting system leading to a larger reliability, timeliness, and accuracy the accounting information system will rely on; (ii) the use of ah-hoc sophisticated software to more effectively detect earnings manipulations and fraud indicators. This has led us to believe that, ceteris paribus, earnings quality is increasing in the quality of the IS.

To properly capture IS levels we develop new measures for corporate's IS quality. Our measures, aimed at assessing company's commitment to invest in information technology (IT), and thus the quality of the IS, are based on the annual pay of the chief information officer (CIO) relative to other officers on the company's top five paid officers list. On earnings quality, along the lines of prior research, we use two accounting based earnings quality measures (absolute value of discretionary accruals asper Defond and Park (2001) and Dechow et al. (1995); and a proxy able to reflect investor perceptions of firms' earnings quality (Earnings Response Coefficients - ERC).

We test our hypothesis with two types of regression analyses, the Ordinary Least Squares (OLS) and the Two-Stage Least Squares (2SLS), address potential endogeneity issues.

Our finding show that the quality of the IS and earnings quality work on the "*same track*". The higher is the quality of the IS the higher is the earnings quality, even after controlling for a multitude of variables demonstrated by prior research to explain earnings quality. This result is robust to the estimation procedure employed, OLS, or 2SLS, and to the definition of the dependent variable, as it is observed in both EM and ERC samples.

Our contribution to the literature is twofold. We first contribute to the earnings quality literature by being first in demonstrating a positive association between IS and earnings quality. In fact our results show that quality of the IS (partially) explains the cross sectional variation in earnings quality. Our finding will help financial statement users—outsiders (investors, financial analysts, and external auditors) and insiders (audit committees)— in assessing a firm's earnings quality. It also offers a way to improve earnings quality, i.e., investing in IT. On a different angle, our work might help regulators in their attempt in enhancing the overall financial reporting quality. Over the past decades several changes in regulation have occurred to respond to accounting failures and scandals, however the IS was only “marginally” considered as one possible way out for improvements. Actually, in this paper we show that enhancing ISs investments levels, in turn, might effectively lead to an improvement in accounting quality, and indirectly foster market efficiency.

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Table 1: Sample Selection process: Sample period 2001 - 2011

The initial Sample for Panels B&C (Table 1 Panel A) has been downloaded from Execucomp and includes data on top executives compensations during the period 2001-2011. Since the database provides information at an individual-executive level, we first combined all information at the firm level. At this point, we matched compensation and financial data (from Compustat). Finally, we dropped observations within the Finance and Utilities sectors. In Panel B and Panel C we show the sample selection process for Earnings Management (EM) sample and Earnings Response Coefficient (ERC) sample, respectively.

Panel A: Initial Sample for Panels B&C

	Unique Firms			**Observations**		
	Non CIO	**CIO**	**Total**	**Non CIO**	**CIO**	**Total**
Initial Total Sample from Execucomp	1,863	781	2,644	20,364	2,447	22,811
Finance and Utilities Sectors	(369)	(104)	(473)	(4,452)	(349)	(4,801)
Missing Data for Control Variables	(73)	(45)	(118)	(1,230)	(187)	(1,417)
Initial Sample for Panels B&C	**1,421**	**632**	**2,053**	**14,682**	**1,911**	**16,593**

Panel B: Earnings Management Sample

	Unique Firms			**Observations**		
	Non CIO	**CIO**	**Total**	**Non CIO**	**CIO**	**Total**
Entire Population	**1,421**	**632**	**2,053**	**14,682**	**1,911**	**16,593**
Missing Data for EM Metrics	(31)	(12)	(43)	(491)	(36)	(527)
EM Sample OLS regression	**1,390**	**620**	**2,010**	**14,191**	**1,875**	**16,066**
Missing data for Instrumental Variables	(544)	(171)	(715)	(6,105)	(532)	(6,637)
EM Sample 2SLS regression	**846**	**449**	**1,295**	**8,086**	**1,343**	**9,429**

Panel C: Earnings Response Coefficient Sample

	Unique Firms			**Observations**		
	Non CIO	**CIO**	**Total**	**Non CIO**	**CIO**	**Total**
Entire Population	**1,421**	**632**	**2,053**	**14,682**	**1,911**	**16,593**
Missing Data for ERC Metrics	(846)	(351)	(1,138)	(8,049)	(1,067)	(9,116)
ERC Sample OLS regression	**634**	**281**	**915**	**6,633**	**844**	**7,477**
Missing data for Instrumental Variables	(222)	(59)	(281)	(2,579)	(181)	(2,760)
ERC Sample 2SLS regression	**412**	**222**	**634**	**4,054**	**663**	**4,717**

Table 2: CIO Distribution

Panels A & B report the distribution of CIO Presence by fiscal year (Panel A) and industry (Panel B) for both EM and ERC samples. Panels C & D report the number of times CIO appears among the top five most remunerated executives for a specific firm. However, for Panel C and D, the table does not imply that a CIO was within the top remunerated executives for a consecutive number of years. Instead, it means that during the timeframe considered the CIO was among the top remunerated executives in the specified number of years (e.g. in 244 cases the CIO of a specific firm was within the top 5 remunerated executives for four not necessarily consecutive years).

Panel A: Distribution of CIO Presence by Fiscal Year

	EM Sample				ERC Sample			
	OLS		2SLS		OLS		2SLS	
Year	**# Obs.**	**Percent**	**# Obs.**	**Percent**	**# Obs.**	**Percent**	**# Obs.**	**Percent**
2001	167	8.91	82	6.11	60	7.11	31	4.68
2002	167	8.91	126	9.38	62	7.35	51	7.69
2003	169	9.01	122	9.08	59	6.99	46	6.94
2004	158	8.43	111	8.27	69	8.18	52	7.84
2005	148	7.89	110	8.19	66	7.82	54	8.14
2006	145	7.73	105	7.82	71	8.41	56	8.45
2007	161	8.59	121	9.01	74	8.77	62	9.35
2008	171	9.12	125	9.31	85	10.07	71	10.71
2009	204	10.88	153	11.39	97	11.49	80	12.07
2010	190	10.13	141	10.50	101	11.97	78	11.76
2011	195	10.40	147	10.95	100	11.85	82	12.36
TOTAL	**1,875**	**100%**	**1,343**	**100%**	**844**	**100.00%**	**663**	**100.00%**

Panel B: Distribution of CIO Presence by Industry (Fama & French 12)

	EM Sample				ERC Sample			
	OLS		2SLS		OLS		2SLS	
Industry	**Obs.**	**%**	**Obs.**	**%**	**Obs.**	**%**	**Obs.**	**%**
Consumer Nondurable	55	2.93	16	1.19	25	2.96	9	1.37
Consumer Durable	69	3.68	64	4.77	36	4.27	35	5.28
Manufacturing	252	13.44	224	16.68	131	15.52	120	18.10
Energy, Oil, & Gas	61	3.25	14	1.04	18	2.13	5	0.75
Chemicals & Allied Prod	52	2.77	49	3.65	21	2.49	18	2.72
Business Equipment	665	35.47	557	41.47	303	35.90	283	42.68
Telephone & TV	151	8.05	89	6.63	74	8.77	49	7.39
Wholesale & Retail	241	12.85	147	10.95	109	12.91	75	11.31
Health, Medical & Equipment	147	7.84	119	8.86	60	7.11	51	7.69
Other	182	9.71	64	4.77	67	7.94	18	2.71
TOTAL	**1,875**	**100%**	**1,343**	**100%**	**844**	**100%**	**663**	**100%**

Panel C: CIO presence across years – EM Sample

	OLS Regression				2SLS Regression		
Number of	# Obs.	Percent	Cum.	Number of	# Obs.	Percent	Cum.
11 years	66	3.52	100	11 years	33	2.46	100
10 years	90	4.80	96.48	10 years	70	5.21	97.54
9 years	72	3.84	91.68	9 years	81	6.03	92.33
8 years	32	1.71	87.84	8 years	8	0.60	86.30
7 years	189	10.08	86.13	7 years	112	8.34	85.70
6 years	156	8.32	76.05	6 years	120	8.94	77.36
5 years	215	11.47	67.73	5 years	155	11.54	68.43
4 years	252	13.44	56.27	4 years	160	11.91	56.89
3 years	336	17.92	42.83	3 years	258	19.21	44.97
2 years	290	15.47	24.91	2 years	220	16.38	25.76
1 year	177	9.44	9.44	1 year	126	9.38	9.38
TOTAL	**1,875**	**100%**		**TOTAL**	**1,343**	**100%**	

Panel D: CIO presence across years – ERC Sample

	OLS Regression				2SLS Regression		
Number of	# Obs.	Percent	Cum.	Number of	# Obs.	Percent	Cum.
11 years	33	3.91	100.00	11 years	31	4.68	100.00
10 years	40	4.74	96.09	10 years	34	5.13	95.32
9 years	27	3.20	91.35	9 years	27	4.07	90.20
8 years	40	4.74	88.15	8 years	33	4.98	86.12
7 years	35	4.15	83.41	7 years	28	4.22	81.15
6 years	90	10.66	79.27	6 years	61	9.20	76.92
5 years	115	13.63	68.60	5 years	93	14.03	67.72
4 years	80	9.48	54.98	4 years	52	7.84	53.70
3 years	171	20.26	45.50	3 years	142	21.42	45.85
2 years	134	15.88	25.24	2 years	104	15.69	24.43
1 year	79	9.36	9.36	1 year	58	8.75	8.75
TOTAL	**844**	**100.00%**		**TOTAL**	**663**	**100.00%**	

Table 3: Descriptive Statistics

Panel A: Univariate Results

DeFond and Park represents the absolute value of Discretionary Accruals computed as suggested by DeFond and Park (2001). ***Modified Jones*** is the level of absolute Discretionary Accruals, computed according to Kothari, Leone, and Wasley (2005). ***ERC*** represents the Earnings Response Coefficient computed regressing the Cumulative Abnormal Return around the Earnings Announcement date (three days window) on Earnings Surprises, measured as the difference between actual quarterly EPS and estimated quarterly EPS, scaled by stock price two days before quarterly earnings announcements. The estimation period spans 20 rolling quarters ending at the beginning of the event year.

Variable	Mean – OLS Sample			Mean – 2SLS Sample		
	CIO	Non	Diff[9]	CIO	Non	Diff[10]
DeFond & Park	0.034	0.036	0.002	0.035	0.038	0.003***
Modified Jones	0.035	0.036	0.001	0.036	0.038	0.002**
ERC	0.531	0.509	-0.022*	0.529	0.530	-0.001

[9] Diff has been computed as Non-CIO mean minus CIO mean.
[10] Diff has been computed as Non-CIO mean minus CIO mean.

Panel B: Control Variable Earnings Management Sample - OLS and 2SLS Regression

ACC_FIL is a dummy variable equal to 1 if the firm is an Accelerated Filer, 0 otherwise. ***BIG*** is a dummy variable equal to one if the auditor is a Big4, 0 otherwise. ***CEODUAL*** is a dummy variable assuming a value of 1 if the Chairman and the CEO are the same person, 0 otherwise. **CFO** is computed as operating cash flow on Total Assets. ***FIN*** is a dummy variable assuming the value of one if the firm issued debt or stocks during the year, 0 otherwise. ***ICW*** is a dummy variable equal to 1 if the firm reported internal control weaknesses, 0 otherwise. ***LEV*** is financial liabilities over total assets. ***LOSS*** is a dummy variable assuming the value of one if the firm reported a negative Net Income last year, zero otherwise. ***MA*** is a dummy variable equal to one if the firm engages in a merger or an acquisition during the year, 0 otherwise. ***MB*** is defined as the market capitalization of the firm on its book value. ***REST*** is a dummy variable assuming a value of 1 if the firm restated its financial statements during the year, 0 otherwise. ***ROA*** is equal to Net Income on Lagged Total Assets. ***SIZE*** is the natural logarithm of the market capitalization of the firm. ***AGE*** is the age of the firm, as proxied by the number of years the firm has been available on Compustat. ***GDW*** is obtain scaling the Goodwill on Total Assets. ***INT*** is the value of Intangible Assets, net of goodwill, scaled by Total Assets. ***R&D*** is computed as Research and Development Expenses on Total Assets.

Variables	Mean – OLS (# 16,066)			Mean – 2SLS (# 9,429)		
	CIO	Non	Diff[11]	CIO	Non	Diff[12]
ACC_FIL	0.534	0.541	0.007	0.554	0.557	0.003
BIG	0.917	0.920	0.003	0.916	0.920	0.004
CEODUAL	0.119	0.128	0.009	0.127	0.127	0.000
CFO	0.113	0.115	-0.002	0.110	0.113	0.003
FIN	0.974	0.970	-0.004	0.974	0.975	0.001
ICW	0.025	0.026	0.001	0.031	0.030	0.001
LEV	0.172	0.222	0.050***	0.158	0.192	0.034***
LOSS	0.252	0.202	-0.050***	0.267	0.212	-0.055***
MA	0.206	0.180	-0.026***	0.208	0.189	-0.019*
MB	2.805	2.789	-0.016	2.846	2.978	0.32*
REST	0.050	0.058	0.008*	0.051	0.055	0.004
ROA	0.037	0.045	0.007***	0.033	0.045	0.012***
SIZE	7.191	7.383	0.192***	7.123	7.187	0.063*
AGE (Instrument)				29.11	31.18	2.07***
GDW (Instrument)				0.157	0.144	-0.013***
INT (Instrument)				0.049	0.052	0.003*
R&D (Instrument)				0.094	0.074	-0.020***

[11] Differences has been computed as Non-CIO mean minus CIO mean.
[12] Differences has been computed as Non-CIO mean minus CIO mean.

Panel C: Control Variable ERC Sample - OLS and 2SLS Regression

ACC_FIL is a dummy variable equal to 1 if the firm is an Accelerated Filer, 0 otherwise. ***BIG*** is a dummy variable equal to one if the auditor is a Big4, 0 otherwise. ***CEODUAL*** is a dummy variable assuming a value of 1 if the Chairman and the CEO are the same person, 0 otherwise. **CFO** is computed as operating cash flow on Total Assets. ***FIN*** is a dummy variable assuming the value of one if the firm issued debt or stocks during the year, 0 otherwise. ***ICW*** is a dummy variable equal to 1 if the firm reported internal control weaknesses, 0 otherwise. ***LEV*** is financial liabilities over total assets. ***LOSS*** is a dummy variable assuming the value of one if the firm reported a negative Net Income last year, zero otherwise. ***MA*** is a dummy variable equal to one if the firm engages in a merger or an acquisition during the year, 0 otherwise. ***MB*** is defined as the market capitalization of the firm on its book value. ***REST*** is a dummy variable assuming a value of 1 if the firm restated its financial statements during the year, 0 otherwise. ***ROA*** is equal to Net Income on Lagged Total Assets. ***SIZE*** is the natural logarithm of the market capitalization of the firm. ***AGE*** is the age of the firm, as proxied by the number of years the firm has been available on Compustat. ***GDW*** is obtain scaling the Goodwill on Total Assets. ***INT*** is the value of Intangible Assets, net of goodwill, scaled by Total Assets. ***R&D*** is computed as Research and Development Expenses on Total Assets.

Variables	Mean – OLS (# 7,477)			Mean – 2SLS (# 4,717)		
	CIO	Non	Diff[13]	CIO	Non	Diff[14]
ACC_FIL	0.629	0.619	-0.010	0.638	0.614	-0.024
BIG	0.931	0.934	-0.003	0.932	0.929	-0.003
CEODUAL	0.150	0.164	0.014	0.154	0.159	0.005
CFO	0.118	0.120	0.002	0.118	0.122	0.004
FIN	0.983	0.979	-0.004	0.983	0.985	0.002
ICW	0.021	0.021	0.000	0.026	0.023	-0.003
LEV	0.165	0.208	0.043***	0.151	0.178	0.027***
LOSS	0.192	0.163	-0.029**	0.207	0.170	-0.037**
MA	0.200	0.171	-0.027**	0.205	0.187	-0.018
MB	2.861	2.973	0.112	2.833	3.241	0.409***
REST	0.062	0.072	0.010	0.063	0.065	0.002
ROA	0.050	0.058	0.008**	0.048	0.600	0.012***
SIZE	7.539	7.636	0.097**	7.452	7.462	0.004
AGE (Instrument)				32.982	34.000	1.018*
GDW (Instrument)				0.154	0.142	-0.011**
INT (Instrument)				0.051	0.051	0.000
R&D (Instrument)				0.103	0.083	-0.020***

[13] Differences has been computed as Non-CIO mean minus CIO mean.
[14] Differences has been computed as Non-CIO mean minus CIO mean.

Panel D: Remuneration Variables - EM

CIO_Presence is a dummy variable equal to 1 if the CIO is present as one of the top five executives, as per DEF14A, 0 otherwise. ***Comp_Dist*** is the sum of Base Salary, Cash Bonus, and Other Compensation received by the CIO during the year, scaled by the average compensation received by the other four top executives. ***Comp_Dist_All*** is the sum of Base Salary, Cash Bonus, Other Compensation, Stork Awarded ($) and Options Awarded ($) received by the CIO during the year, scaled by the average compensation received by the other four top executives.

OLS sample	# Obs.	Mean	St. Deviation	Q1	Median	Q3
CIO_Presence	16,066	0.117	0.230	0	0	0
Comp_Dist[15]	1,875	0.641	0.230	0.484	0.631	0.797
Comp_Dist_All[5]	1,875	0.598	0.236	0.433	0.575	0.753
2SLS Sample						
CIO_Presence	9,429	0.142	0.350	0	0	0
Comp_Dist[5]	1,343	0.657	0.231	0.504	0.648	0.820
Comp_Dist_All[5]	1,343	0.615	0.236	0.456	0.592	0.778

Remuneration Variables - ERC

OLS Sample	# Obs.	Mean	St. Deviation	Q1	Median	Q3
CIO_Presence	7,477	0.113	0.347	0	0	0
Comp_Dist[5]	844	0.653	0.225	0.486	0.644	0.807
Comp_Dist_All[5]	844	0.604	0.226	0.444	0.576	0.750
2SLS sample						
CIO_Presence	4,717	0.141	0.348	0	0	0
Comp_Dist[5]	663	0.664	0.224	0.504	0.656	0.819
Comp_Dist_All[5]	663	0.616	0.224	0.463	0.591	0.774

[15] While in our analysis we use the Natural Logarithm of (1 + the compensation measure under consideration), reported values are the CIO cash compensation and CIO total compensation expressed in thousands of dollars, and the ration between CIO cash and total compensation and the average cash and total compensation for the other four top executives.

Table 4: OLS Analysis - Earnings Management, ERC, and CIO Presence

Table 4 presents results from the OLS regression of earnings quality, as measured by absolute discretionary accruals, versus our variable of interest (***CIO_Presence***, a dummy equal to 1 if the CIO was among the 5 top remunerated executives, 0 otherwise) and the exogenous control variables selected. The dependent variables ***DeFond and Park*** and ***Jones Modified*** represent the absolute value of Discretionary Accruals, computed according to, respectively, DeFond and Park and Jones. The dependent variable ***ERC*** represents the Earnings Response Coefficient computed regressing the Cumulative Abnormal Return around the Earnings Announcement date (three days window) on Earnings Surprises, measured as the difference between actual quarterly EPS and estimated quarterly EPS, scaled by stock price two days before quarterly earnings announcements. The estimation period spans 20 rolling quarters ending at the beginning of the event year. Controls include ***ACC_FIL*** is a dummy variable equal to 1 if the firm is an Accelerated Filer, 0 otherwise. ***BIG*** is a dummy variable equal to one if the auditor is a Big4, 0 otherwise. ***CEODUAL*** is a dummy variable assuming a value of 1 if the Chairman and the CEO are the same person, 0 otherwise. **CFO** is computed as operating cash flow on Total Assets. ***FIN*** is a dummy variable assuming the value of one if the firm issued debt or stocks during the year, 0 otherwise. ***ICW*** is a dummy variable equal to 1 if the firm reported internal control weaknesses, 0 otherwise. ***LEV*** is financial liabilities over total assets. ***LOSS*** is a dummy variable assuming the value of one if the firm reported a negative Net Income last year, zero otherwise. ***MA*** is a dummy variable equal to one if the firm engages in a merger or an acquisition during the year, 0 otherwise. ***MB*** is defined as the market capitalization of the firm on its book value. ***REST*** is a dummy variable assuming a value of 1 if the firm restated its financial statements during the year, 0 otherwise. ***ROA*** is equal to Net Income on Lagged Total Assets. ***SIZE*** is the natural logarithm of the market capitalization of the firm. All continuous variables are winsorized at a 1% level. The p-value (in parentheses below the coefficient estimates) are based on robust standard errors and ***, **, and * indicate significance at the 1%, 5%, and 10% levels, correspondingly.

OLS Regression	Expected Sign	Dep. Var.		Expected Sign	Dep. Var.
		DeFond & Park *Coefficient* *(P-value)*	Jones Modified *Coefficient* *(P-value)*		ERC *Coefficient* *(P-value)*
Test Variable					
CIO_Presence	-	**-0.030****	**-0.022***	+	**0.022****
		(0.017)	**(0.063)**		**(0.029)**
Control Variables					
ACC_FIL	-	-0.030**	-0.019	?	0.001
		(0.030)	(0.163)		(0.941)
BIG	-	-0.003	-0.021	+	0.023*
		(0.893)	(0.311)		(0.084)
CEODUAL	+	-0.003	-0.005	-	0.015
		(0.793)	(0.687)		(0.255)
CFO	-	0.384***	0.234***	+	0.109**
		(0.000)	(0.004)		(0.030)
FIN	+	0.066***	0.039*	?	-0.003
		(0.002)	(0.095)		(0.885)
ICW	+	0.017	0.003	-	-0.025
		(0.445)	(0.888)		(0.280)
LEV	+	0.122***	0.099**	-	-0.068**
		(0.002)	(0.012)		(0.001)
LOSS	+	0.029**	0.047***	-	-0.065***
		(0.020)	(0.000)		(0.000)
MA	+	0.058***	0.066***	?	0.017**
		(0.000)	(0.000)		(0.047)

MB	+	0.002	0.004**	?	0.006***
		(0.228)	(0.021)		(0.000)
REST	+	0.004	0.001	-	0.018
		(0.766)	(0.968)		(0.175)
ROA	-	-0.005	0.031	+	0.214***
		(0.947)	(0.664)		(0.000)
SIZE	-	-0.043***	-0.028**	+	0.001
		(0.000)	(0.016)		(0.766)
Intercept		0.580***	0.528***		0.441***
		(0.000)	(0.000)		(0.000)
Firm and Year Controls		Included	Included		Only Year
Num. Observations		16,066	16,066		7,477
R Squared		0.094	0.118		0.049

Table 5: OLS Analysis - Earnings Management, ERC, and Cash Compensation distance

Table 5 presents the OLS regression of earnings quality (as measured by absolute discretionary accruals) versus our variable of interest, ***Comp_dist*** (the sum of Base Salary, Cash Bonus, and Other Compensation received by the CIO during the year, scaled by the average compensation received by the other four top executives) and a set of control variables. The dependent variables ***DeFond and Park*** and ***Jones Modified*** represent the absolute value of Discretionary Accruals, computed according to, respectively, DeFond and Park and Kothari. The dependent variable ***ERC*** represents the Earnings Response Coefficient computed regressing the Cumulative Abnormal Return around the Earnings Announcement date (three days window) on Earnings Surprises, measured as the difference between actual quarterly EPS and estimated quarterly EPS, scaled by stock price two days before quarterly earnings announcements. The estimation period spans 20 rolling quarters ending at the beginning of the event year. ***ACC_FIL*** is a dummy variable equal to 1 if the firm is an Accelerated Filer, 0 otherwise. ***BIG*** is a dummy variable equal to one if the auditor is a Big4, 0 otherwise. ***CEODUAL*** is a dummy variable assuming a value of 1 if the Chairman and the CEO are the same person, 0 otherwise. **CFO** is computed as operating cash flow on Total Assets. ***FIN*** is a dummy variable assuming the value of one if the firm issued debt or stocks during the year, 0 otherwise. ***ICW*** is a dummy variable equal to 1 if the firm reported internal control weaknesses, 0 otherwise. ***LEV*** is financial liabilities over total assets. ***LOSS*** is a dummy variable assuming the value of one if the firm reported a negative Net Income last year, zero otherwise. ***MA*** is a dummy variable equal to one if the firm engages in a merger or an acquisition during the year, 0 otherwise. ***MB*** is defined as the market capitalization of the firm on its book value. ***REST*** is a dummy variable assuming a value of 1 if the firm restated its financial statements during the year, 0 otherwise. ***ROA*** is equal to Net Income on Lagged Total Assets. ***SIZE*** is the natural logarithm of the market capitalization of the firm. All continuous variables are winsorized at a 1% level. The p-value (in parentheses below the coefficient estimates) are based on robust standard errors and ***, **, and * indicate significance at the 1%, 5%, and 10% levels, correspondingly.

OLS Regression	Expected Sign	Dep. Var		Expected Sign	Dep. Var.
		DeFond & Park *Coefficient* *(P-value)*	Jones Modified *Coefficient* *(P-value)*		*ERC* *Coefficient* (P-value)
Test Variable					
Comp_Dist	**-**	**-0.056****	**-0.042***	+	**0.027***
		(0.021)	**(0.070)**		**(0.070)**
Control Variables					
ACC_FIL	-	-0.030**	-0.019	?	0.001
		(0.029)	(0.161)		(0.927)
BIG	-	-0.003	-0.021	+	0.023*
		(0.890)	(0.310)		(0.082)
CEODUAL	+	-0.003	-0.005	-	0.015
		(0.781)	(0.680)		(0.253)
CFO	-	0.385***	0.234**	+	0.108**
		(0.000)	(0.004)		(0.030)
FIN	+	0.066**	0.039*	?	-0.003
		(0.002)	(0.095)		(0.880)
ICW	+	0.017	0.003	-	-0.025
		(0.446)	(0.889)		(0.280)
LEV	+	0.122**	0.099**	-	-0.069***
		(0.002)	(0.012)		(0.001)
LOSS	+	0.029**	0.047***	-	-0.065***
		(0.021)	(0.000)		(0.000)
MA	+	0.058***	0.066***	?	0.017**

		(0.000)	(0.000)		(0.047)
MB	+	0.002	0.004**	?	0.006***
		(0.227)	(0.021)		(0.000)
REST	+	0.004	0.000	-	0.017
		(0.769)	(0.969)		(0.178)
ROA	-	-0.005	0.031	+	0.213***
		(0.945)	(0.664)		(0.000)
SIZE	-	-0.043***	-0.029**	+	0.001
		(0.000)	(0.016)		(0.730)
Intercept		0.580***	0.528***		0.441***
		(0.000)	(0.000)		(0.000)
Firm and Year Controls		Included	Included		Only Year
Num. Observations		16,066	16,066		7,477
R Squared		0.095	0.119		0.049

Table 6: OLS Analysis - Earnings Management, ERC, and Total Compensation distance

Table 6 presents the OLS regression of earnings quality (as measured by absolute discretionary accruals) versus our variable of interest, ***Comp_dist_all*** (the sum of Base Salary, Cash Bonus, Other Compensation, Stork Awarded ($) and Options Awarded ($) received by the CIO during the year, scaled by the average compensation received by the other four top executives) and a set of exogenous control variables selected. The dependent variables ***DeFond and Park*** and ***Jones Modified*** represent the absolute value of Discretionary Accruals, computed according to, respectively, DeFond and Park and Kothari. The dependent variable ***ERC*** represents the Earnings Response Coefficient computed regressing the Cumulative Abnormal Return around the Earnings Announcement date (three days window) on Earnings Surprises, measured as the difference between actual quarterly EPS and estimated quarterly EPS, scaled by stock price two days before quarterly earnings announcements. The estimation period spans 20 rolling quarters ending at the beginning of the event year. ***ACC_FIL*** is a dummy variable equal to 1 if the firm is an Accelerated Filer, 0 otherwise. ***BIG*** is a dummy variable equal to one if the auditor is a Big4, 0 otherwise. ***CEODUAL*** is a dummy variable assuming a value of 1 if the Chairman and the CEO are the same person, 0 otherwise. **CFO** is computed as operating cash flow on Total Assets. ***FIN*** is a dummy variable assuming the value of one if the firm issued debt or stocks during the year, 0 otherwise. ***ICW*** is a dummy variable equal to 1 if the firm reported internal control weaknesses, 0 otherwise. ***LEV*** is financial liabilities over total assets. ***LOSS*** is a dummy variable assuming the value of one if the firm reported a negative Net Income last year, zero otherwise. ***MA*** is a dummy variable equal to one if the firm engages in a merger or an acquisition during the year, 0 otherwise. ***MB*** is defined as the market capitalization of the firm on its book value. ***REST*** is a dummy variable assuming a value of 1 if the firm restated its financial statements during the year, 0 otherwise. ***ROA*** is equal to Net Income on Lagged Total Assets. ***SIZE*** is the natural logarithm of the market capitalization of the firm. All continuous variables are winsorized at a 1% level. The p-value (in parentheses below the coefficient estimates) are based on robust standard errors and ***, **, and * indicate significance at the 1%, 5%, and 10% levels, correspondingly.

OLS Regression	Expected Sign	Dep. Variables		Expected Sign	Dep. Var.
		DeFond & Park *Coefficient* *(P-value)*	*Jones* Modified *Coefficient* *(P-value)*		*ERC* *Coefficient* *(P-value)*
Test Variable					
Comp_Dist_All	**-**	**-0.044***	**-0.034**	+	**0.031****
		(0.079)	**(0.165)**		**(0.046)**
Control Variables					
ACC_FIL	-	-0.030**	-0.019	?	0.001
		(0.030)	(0.162)		(0.923)
BIG	-	-0.003	-0.021	+	0.023*
		(0.884)	(0.308)		(0.080)
CEODUAL	+	-0.003	-0.005	-	0.015
		(0.781)	(0.679)		(0.257)
CFO	-	0.384***	0.234**	+	0.108**
		(0.000)	(0.004)		(0.030)
FIN	+	0.066**	0.039*	?	-0.004
		(0.002)	(0.095)		(0.878)
ICW	+	0.017	0.003	-	-0.025
		(0.442)	(0.885)		(0.280)
LEV	+	0.122**	0.099**	-	-0.069***
		(0.002)	(0.012)		(0.001)
LOSS	+	0.029**	0.047***	-	-0.065***
		(0.021)	(0.000)		(0.000)

MA	+	0.058***	0.066***	?	0.017**
		(0.000)	(0.000)		(0.047)
MB	+	0.002	0.004**	?	0.006***
		(0.223)	(0.021)		(0.000)
REST	+	0.003	0.000	-	0.018
		(0.779)	(0.977)		(0.176)
ROA	-	-0.005	0.031	+	0.213***
		(0.945)	(0.664)		(0.000)
SIZE	-	-0.043***	-0.029**	+	0.001
		(0.000)	(0.016)		(0.726)
Intercept		0.580***	0.528***		0.440***
		(0.000)	(0.000)		(0.000)
Firm and Year Controls		Included	Included		Only Year
Num. Observations		16,066	16,066		7,477
R Squared		0.095	0.119		0.049

Table 7: 2SLS Analysis - Earnings Management, ERC, and CIO Presence

Panel A of Table 7 presents the first stage regression of ***CIO_Presence (***a dummy equal to 1 if the CIO was among the 5 top remunerated executives, 0 otherwise) on the instrumental variables (***IND***, the industry in which the firm operates, as measured by Fama and French 12 industries classification; ***AGE***, namely the age of the firm, as proxied by the number of years the firm has been available on Compustat; ***GDW***, the Goodwill scaled by Total Assets; ***INT***, the value of Intangible Assets, net of Goodwill, scaled by Total Assets; ***R&D***, that is Research and Development Expenses scaled by Total Assets) and the exogenous control variables included in the second stage regression. Controls include the following variables. ***ACC_FIL*** is a dummy variable equal to 1 if the firm is an Accelerated Filer, 0 otherwise. ***BIG*** is a dummy variable equal to one if the auditor is a Big4, 0 otherwise. ***CEODUAL*** is a dummy variable assuming a value of 1 if the Chairman and the CEO are the same person, 0 otherwise. **CFO** is computed as operating cash flow on Total Assets. ***FIN*** is a dummy variable assuming the value of one if the firm issued debt or stocks during the year, 0 otherwise. ***ICW*** is a dummy variable equal to 1 if the firm reported internal control weaknesses, 0 otherwise. ***LEV*** is financial liabilities over total assets. ***LOSS*** is a dummy variable assuming the value of one if the firm reported a negative Net Income last year, zero otherwise. ***MA*** is a dummy variable equal to one if the firm engages in a merger or an acquisition during the year, 0 otherwise. ***MB*** is defined as the market capitalization of the firm on its book value. ***REST*** is a dummy variable assuming a value of 1 if the firm restated its financial statements during the year, 0 otherwise. ***ROA*** is equal to Net Income on Lagged Total Assets. ***SIZE*** is the natural logarithm of the market capitalization of the firm. The dependent variables for the second state regression are ***DeFond and Park, Jones Modified,*** and ***ERC. DeFond and Park*** and ***Jones Modified*** represent the absolute value of Discretionary Accruals, computed according to, respectively, DeFond and Park and Kothari. ***ERC*** represents the Earnings Response Coefficient computed regressing the Cumulative Abnormal Return around the Earnings Announcement date (three days window) on Earnings Surprises, measured as the difference between actual quarterly EPS and estimated quarterly EPS, scaled by stock price two days before quarterly earnings announcements. The estimation period spans 20 rolling quarters ending at the beginning of the event year. All continuous variables are winsorized at a 1% level. The p-value (in parentheses below the coefficient estimates) are based on robust standard errors and ***, **, and * indicate significance at the 1%, 5%, and 10% levels, correspondingly.

Panel A: First Stage Regression

2SLS: First Stage Regression	Expected Sign	CIO_*Presence* - EM *Coefficient* *(P-value)*	CIO_*Presence* - ERC *Coefficient* *(P-value)*
Instruments			
IND		Included	Included
AGE	+	-0.000	0.001*
		(0.706)	(0.089)
GDW	+	0.026	-0.074
		(0.418)	(0.114)
INT	?	-0.155***	0.007
		(0.004)	(0.939)
R&D	+	0.079**	0.125**
		(0.032)	(0.022)
Predetermined Variables			
ACC_FIL		0.003	-0.001
		(0.884)	(0.944)
BIG		-0.005	0.002
		(0.757)	(0.941)
CEODUAL		0.019	0.023

	(0.154)	(0.249)
CFO	0.071	0.026
	(0.201)	(0.760)
FIN	0.001	-0.017
	(0.961)	(0.676)
ICW	0.003	0.008
	(0.884)	(0.832)
LEV	-0.102***	-0.079**
	(0.000)	(0.046)
LOSS	0.038***	0.019
	(0.004)	(0.326)
MA	0.002	-0.002
	(0.824)	(0.906)
MB	-0.001	-0.003
	(0.240)	(0.170)
REST	-0.006	-0.003
	(0.716)	(0.895)
ROA	-0.043	-0.024
	(0.465)	(0.807)
SIZE	0.008***	0.011**
	(0.007)	(0.014)
Intercept	0.585***	-0.075
	(0.000)	(0.361)
Year Controls	Included	Included
Num. Observations	9,429	4,717
Adj. R-squared	0.037	0.042

Panel B: Second Stage Regression

2SLS: Second Stage Regression	Expected Sign	Dep. Variables: *DeFond* & Park Coefficient *(P-value)*	Dep. Variables: *Jones* Modified *Coefficient (P-value)*	Expected Sign	Dep. Var.: *ERC Coefficient (P-value)*
Test Variable					
Instrumented CIO_Presence	**-**	**-0.167***** **(0.006)**	**-0.150**** **(0.011)**	+	**0.213***** **(0.000)**
Predetermined Variables					
ACC_FIL	-	-0.034*** (0.009)	-0.012 (0.327)	?	0.003 (0.824)
BIG	-	-0.075*** (0.000)	-0.053*** (0.002)	+	0.011 (0.502)
CEODUAL	+	-0.033** (0.030)	-0.036** (0.016)	-	-0.003 (0.872)
CFO	-	-0.060 (0.503)	-0.011 (0.902)	+	0.314*** (0.000)
FIN	+	-0.048 (0.106)	-0.048 (0.100)	?	0.006 (0.851)
ICW	+	0.044* (0.091)	0.043* (0.093)	-	-0.020 (0.466)
LEV	+	0.051 (0.107)	0.017 (0.555)	-	0.007 (0.791)
LOSS	+	0.068*** (0.000)	0.091*** (0.000)	-	-0.061*** (0.000)
MA	+	0.026** (0.015)	0.043*** (0.000)	?	0.020* (0.080)
MB	+	0.007*** (0.000)	0.008*** (0.000)	?	0.004** (0.011)
REST	+	-0.008 (0.634)	-0.007 (0.671)	-	0.022 (0.204)
ROA	-	-0.093 (0.301)	0.007 (0.936)	+	0.199*** (0.003)
SIZE	-	-0.048*** (0.000)	-0.048*** (0.000)	+	0.004 (0.145)
Intercept		0.764*** (0.000)	0.716*** (0.000)		0.396*** (0.000)
Firm and Year Controls		Included	Included		Only Year
Num. Observations		9,429	9,429		4,717
Wald Chi2		548.99	642.58		344.32

Table 8: 2SLS Analysis - Earnings Management, ERC, and Cash Compensation distance

Panel A of Table 8 presents the first stage regression of ***Comp_Dist (***the sum of Base Salary, Cash Bonus, and Other Compensation received by the CIO during the year, scaled by the average compensation received by the other four top executives) on the instrumental variables (***IND***, the industry in which the firm operates, as measured by Fama and French 12 industries classification; ***AGE***, namely the age of the firm, as proxied by the number of years the firm has been available on Compustat; ***GDW***, the Goodwill scaled by Total Assets; ***INT***, the value of Intangible Assets, net of Goodwill, scaled by Total Assets; ***R&D***, that is Research and Development Expenses scaled by Total Assets) and the exogenous control variables included in the second stage regression. Controls include the following variables. ***ACC_FIL*** is a dummy variable equal to 1 if the firm is an Accelerated Filer, 0 otherwise. ***BIG*** is a dummy variable equal to one if the auditor is a Big4, 0 otherwise. ***CEODUAL*** is a dummy variable assuming a value of 1 if the Chairman and the CEO are the same person, 0 otherwise. **CFO** is computed as operating cash flow on Total Assets. ***FIN*** is a dummy variable assuming the value of one if the firm issued debt or stocks during the year, 0 otherwise. ***ICW*** is a dummy variable equal to 1 if the firm reported internal control weaknesses, 0 otherwise. ***LEV*** is financial liabilities over total assets. ***LOSS*** is a dummy variable assuming the value of one if the firm reported a negative Net Income last year, zero otherwise. ***MA*** is a dummy variable equal to one if the firm engages in a merger or an acquisition during the year, 0 otherwise. ***MB*** is defined as the market capitalization of the firm on its book value. ***REST*** is a dummy variable assuming a value of 1 if the firm restated its financial statements during the year, 0 otherwise. ***ROA*** is equal to Net Income on Lagged Total Assets. ***SIZE*** is the natural logarithm of the market capitalization of the firm. The dependent variables for the second state regression are ***DeFond and Park, Jones Modified,*** and ***ERC. DeFond and & Park*** and ***Jones Modified*** represent the absolute value of Discretionary Accruals, computed according to, respectively, DeFond and Park and Kothari. ***ERC*** represents the Earnings Response Coefficient computed regressing the Cumulative Abnormal Return around the Earnings Announcement date (three days window) on Earnings Surprises, measured as the difference between actual quarterly EPS and estimated quarterly EPS, scaled by stock price two days before quarterly earnings announcements. The estimation period spans 20 rolling quarters ending at the beginning of the event year. All continuous variables are winsorized at a 1% level. The p-value (in parentheses below the coefficient estimates) are based on robust standard errors and ***, **, and * indicate significance at the 1%, 5%, and 10% levels, correspondingly.

Panel A: First Stage Regression

2SLS: First Stage Regression	Expected Sign	*Comp_Dist*- EM *Coefficient* *(P-value)*	*Comp_Dist*- ERC *Coefficient* *(P-value)*
Instruments			
IND		Included	Included
AGE	+	-0.000	0.000
		(0.329)	(0.108)
GDW	+	0.010	-0.057*
		(0.660)	(0.074)
INT	?	-0.110***	-0.013
		(0.004)	(0.837)
R&D	+	0.079***	0.120***
		(0.003)	(0.002)
Predetermined Variables			
ACC_FIL		-0.014*	-0.010
		(0.069)	(0.342)
BIG		-0.004	-0.009
		(0.693)	(0.560)
CEODUAL		0.008	0.016
		(0.367)	(0.216)

CFO	0.060	0.044
	(0.130)	(0.488)
FIN	-0.001	-0.004
	(0.945)	(0.881)
ICW	0.004	0.005
	(0.824)	(0.848)
LEV	-0.057***	-0.041
	(0.000)	(0.142)
LOSS	0.014	0.002
	(0.133)	(0.910)
MA	0.002	0.002
	(0.730)	(0.882)
MB	-0.001	-0.002*
	(0.465)	(0.094)
REST	0.001	0.002
	(0.938)	(0.921)
ROA	-0.038	-0.024
	(0.381)	(0.738)
SIZE	0.002	0.004
	(0.394)	(0.222)
Intercept	0.451***	0.012
	(0.000)	(0.839)
Year Controls	Included	Included
Num. Observations	9,429	4,717
Adj. R-squared	0.040	0.048

Panel B: Second Stage Regression

2SLS: Second Stage Regression	Expected Sign	Dep. Var. *DeFond* & Park *Coefficient* (P-value)	Dep. Var. Jones *Modified Coefficient* (P-value)	Expected Sign	Dep. Var. *ERC Coefficient* (P-*value*)
Test Variable					
Instrumented Comp_Dist	**-**	**-0.213****	**-0.216*****	+	**0.263*****
		(0.013)	**(0.009)**		**(0.001)**
Predetermined Variables					
ACC_FIL	-	-0.035***	-0.014	?	0.005
		(0.007)	(0.267)		(0.667)
BIG	-	-0.075***	-0.053***	+	0.014
		(0.000)	(0.003)		(0.402)
CEODUAL	+	-0.035**	-0.037**	-	-0.003
		(0.024)	(0.013)		(0.874)
CFO	-	-0.059	-0.009	+	0.309***
		(0.507)	(0.921)		(0.000)
FIN	+	-0.048	-0.048	?	0.002
		(0.105)	(0.102)		(0.937)
ICW	+	0.044*	0.043*	-	-0.020
		(0.090)	(0.091)		(0.480)
LEV	+	0.055*	0.019	-	0.001
		(0.077)	(0.513)		(0.975)
LOSS	+	0.066***	0.089***	-	-0.058***
		(0.000)	(0.000)		(0.000)
MA	+	0.026**	0.044***	?	0.019*
		(0.015)	(0.000)		(0.082)
MB	+	0.007***	0.008***	?	0.004**
		(0.000)	(0.000)		(0.013)
REST	+	-0.007	-0.006	-	0.021
		(0.683)	(0.721)		(0.220)
ROA	-	-0.094	0.004	+	0.200***
		(0.297)	(0.965)		(0.003)
SIZE	-	-0.050***	-0.049***	+	0.006**
		(0.000)	(0.000)		(0.050)
Intercept		0.775***	0.729***		0.387***
		(0.000)	(0.000)		(0.000)
Firm and Year Controls		Included	Included		Only Year
Num. Observations		9,429	9,429		4,717
Wald Chi2		550.31	644.35		346.67

Table 9: 2SLS Analysis - Earnings Management, ERC, and Total Compensation distance

Panel A of Table 9 presents the first stage regression of ***Comp_dist_all*** (the sum of Base Salary, Cash Bonus, Other Compensation, Stork Awarded ($) and Options Awarded ($) received by the CIO during the year, scaled by the average compensation received by the other four top executive) on the instrumental variables (***IND***, the industry in which the firm operates, as measured by Fama and French 12 industries classification; ***AGE***, namely the age of the firm, as proxied by the number of years the firm has been available on Compustat; ***GDW***, the Goodwill scaled by Total Assets; ***INT***, the value of Intangible Assets, net of Goodwill, scaled by Total Assets; ***R&D***, that is Research and Development Expenses scaled by Total Assets) and the exogenous control variables included in the second stage regression. Controls include the following variables. ***ACC_FIL*** is a dummy variable equal to 1 if the firm is an Accelerated Filer, 0 otherwise. ***BIG*** is a dummy variable equal to one if the auditor is a Big4, 0 otherwise. ***CEODUAL*** is a dummy variable assuming a value of 1 if the Chairman and the CEO are the same person, 0 otherwise. **CFO** is computed as operating cash flow on Total Assets. ***FIN*** is a dummy variable assuming the value of one if the firm issued debt or stocks during the year, 0 otherwise. ***ICW*** is a dummy variable equal to 1 if the firm reported internal control weaknesses, 0 otherwise. ***LEV*** is financial liabilities over total assets. ***LOSS*** is a dummy variable assuming the value of one if the firm reported a negative Net Income last year, zero otherwise. ***MA*** is a dummy variable equal to one if the firm engages in a merger or an acquisition during the year, 0 otherwise. ***MB*** is defined as the market capitalization of the firm on its book value. ***REST*** is a dummy variable assuming a value of 1 if the firm restated its financial statements during the year, 0 otherwise. ***ROA*** is equal to Net Income on Lagged Total Assets. ***SIZE*** is the natural logarithm of the market capitalization of the firm. The dependent variables for the second state regression are ***DeFond and Park, Jones Modified,*** and ***ERC. DeFond and Park*** and ***Jones Modified*** represent the absolute value of Discretionary Accruals, computed according to, respectively, DeFond and Park and Kothari. ***ERC*** represents the Earnings Response Coefficient computed regressing the Cumulative Abnormal Return around the Earnings Announcement date (three days window) on Earnings Surprises, measured as the difference between actual quarterly EPS and estimated quarterly EPS, scaled by stock price two days before quarterly earnings announcements. The estimation period spans 20 rolling quarters ending at the beginning of the event year. All continuous variables are winsorized at a 1% level. The p-value (in parentheses below the coefficient estimates) are based on robust standard errors and ***, **, and * indicate significance at the 1%, 5%, and 10% levels, correspondingly.

Panel A: First Stage Regression

2SLS: First Stage Regression	Expected Sign	Comp_*Dist*_All - EM *Coefficient* *(P-value)*	Comp_*Dist*_All - ERC *Coefficient* *(P-value)*
Instruments			
IND		Included	Included
AGE	+	0.000	0.000
		(0.209)	(0.167)
GDW	+	0.011	-0.057*
		(0.598)	(0.058)
INT	?	-0.096***	0.009
		(0.009)	(0.876)
R&D	+	0.086***	0.123***
		(0.001)	(0.001)
Predetermined Variables			
ACC_FIL		-0.013*	-0.011
		(0.090)	(0.294)
BIG		-0.006	-0.013
		(0.590)	(0.402)
CEODUAL		0.008	0.019
		(0.356)	(0.127)

CFO	0.041	0.008
	(0.273)	(0.885)
FIN	0.002	-0.005
	(0.891)	(0.853)
ICW	0.010	0.002
	(0.511)	(0.920)
LEV	-0.051***	-0.036
	(0.001)	(0.165)
LOSS	0.014	0.001
	(0.116)	(0.966)
MA	0.001	0.003
	(0.842)	(0.743)
MB	-0.001	-0.002
	(0.521)	(0.168)
REST	-0.004	-0.002
	(0.704)	(0.859)
ROA	-0.019	0.002
	(0.638)	(0.978)
SIZE	0.002	0.004
	(0.393)	(0.209)
Intercept	0.490***	0.006
	(0.000)	(0.916)
Year Controls	Included	Included
Num. Observations	9,429	4,717
Adj. R-squared	0.040	0.048

Panel B: Second Stage Regression

2SLS: Second Stage Regression	Expected Sign	Dep. Var. *DeFond* & Park *Coefficient (P-value)*	Dep. Var. Jones *Modified Coefficient (P-value)*	Expected Sign	Dep. Var. *ERC Coefficient (P-value)*
Test Variable					
Instrumented Comp_Dist_All	**-**	**-0.200****	**-0.218*****	+	**0.246*****
		(0.023)	**(0.010)**		**(0.002)**
Predetermined Variables					
ACC_FIL	-	-0.034***	-0.013	?	0.005
		(0.008)	(0.280)		(0.679)
BIG	-	-0.076***	-0.054***	+	0.015
		(0.000)	(0.002)		(0.365)
CEODUAL	+	-0.035**	-0.037**	-	-0.003
		(0.024)	(0.013)		(0.852)
CFO	-	-0.064	-0.013	+	0.317***
		(0.475)	(0.887)		(0.000)
FIN	+	-0.048	-0.047	?	0.003
		(0.109)	(0.108)		(0.924)
ICW	+	0.046*	0.045*	-	-0.019
		(0.081)	(0.081)		(0.498)
LEV	+	0.058*	0.020	-	-0.003
		(0.063)	(0.482)		(0.921)
LOSS	+	0.065***	0.089***	-	-0.058***
		(0.000)	(0.000)		(0.000)
MA	+	0.025**	0.043***	?	0.019*
		(0.017)	(0.000)		(0.081)
MB	+	0.007***	0.008***	?	0.004**
		(0.000)	(0.000)		(0.016)
REST	+	-0.008	-0.007	-	0.021
		(0.640)	(0.673)		(0.194)
ROA	-	-0.089	0.007	+	0.191***
		(0.320)	(0.933)		(0.004)
SIZE	-	-0.050***	-0.050***	+	0.006**
		(0.000)	(0.000)		(0.046)
Intercept		0.768***	0.725***		0.392***
		(0.000)	(0.000)		(0.000)
Firm and Year Controls		Included	Included		Only Year
Num. Observations		9,429	9,429		4,717
Wald Chi2		550.33	644.13		350.19

Table 10 – Supplementary Analysis: CIO Persistence (with alternative specifications) impact on Restatement

Table 11 presents OLS regressions of ***Rest_Persist*** versus our variables of interest, on ***CIO_Persist, CIO_Mean, CIO_75th,*** and a set of exogenous control variables selected. The dependent variable ***Rest_Persist*** is the sum of restatements for the company in our sample period scaled by the number of years in our sample period. Test Variables are defined as follows: ***CIO_Persist*** is the sum of CIO presence for the company in our sample period scaled by the number of years in our sample period; ***CIO_Mean*** is a dummy variable assuming a value of 1 if the CIO has been listed as a top remunerated executive a number of times greater than the sample mean, 0 otherwise; ***CIO_75th*** is a dummy variable assuming a value of 1 if the CIO has been listed as a top remunerated executive a number of times greater than the 75th percentile of the sample, 0 otherwise. Controls include ***DeFond and Park***, a dummy variable equal to 1 if the firm reported abnormal discretionary accruals above the median, 0 otherwise. ***ACC_FIL*** is a dummy variable equal to 1 if the firm is an Accelerated Filer, 0 otherwise. ***BIG*** is a dummy variable equal to one if the auditor is a Big4, 0 otherwise. ***CEODUAL*** is a dummy variable assuming a value of 1 if the Chairman and the CEO are the same person, 0 otherwise. **CFO** is computed as operating cash flow on Total Assets. ***FIN*** is a dummy variable assuming the value of one if the firm issued debt or stocks during the year, 0 otherwise. ***ICW*** is a dummy variable equal to 1 if the firm reported internal control weaknesses, 0 otherwise. ***LEV*** is financial liabilities over total assets. ***LOSS*** is a dummy variable assuming the value of one if the firm reported a negative Net Income last year, zero otherwise. ***MA*** is a dummy variable equal to one if the firm engages in a merger or an acquisition during the year, 0 otherwise. ***MB*** is defined as the market capitalization of the firm on its book value. ***ROA*** is equal to Net Income on Lagged Total Assets. ***SIZE*** is the natural logarithm of the market capitalization of the firm. . All continuous variables are winsorized at a 1% level. The p-value (in parentheses below the coefficient estimates) are based on robust standard errors and ***, **, and * indicate significance at the 1%, 5%, and 10% levels, correspondingly.

	Dependent Variable		
	Rest_Persist	***Rest_Persist***	***Rest_Persist***
Test Variable			
CIO_Persist	**-0.030*** **		
	(0.000)		
CIO_Mean		**-0.013*** **	
		(0.000)	
CIO_75th			**-0.019*** **
			(0.000)
Predetermined Variables			
DeFond & Park	-0.002	-0.002	-0.002
	(0.348)	(0.342)	(0.345)
ACC_FIL	0.087***	0.087***	0.087***
	(0.000)	(0.000)	(0.000)
BIG	-0.005	-0.005	-0.005
	(0.231)	(0.170)	(0.169)
CEODUAL	0.017***	0.017***	0.017***
	(0.000)	(0.000)	(0.000)
CFO	0.006	0.006	0.005

	(0.678)	(0.686)	(0.733)
FIN	0.009	0.009	0.009
	(0.102)	(0.110)	(0.104)
ICW	0.095***	0.096***	0.095***
	(0.000)	(0.000)	(0.000)
LEV	0.008	0.010*	0.009
	(0.169)	(0.089)	(0.154)
LOSS	0.002	0.018	0.016
	(0.593)	(0.622)	(0.648)
MA	-0.012***	-0.012***	-0.012***
	(0.000)	(0.000)	(0.000)
MB	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)
ROA	-0.028*	-0.026*	-0.027*
	(0.079)	(0.096)	(0.089)
	(0.678)	(0.686)	(0.733)
Intercept	0.089***	0.089***	0.088***
	(0.000)	(0.000)	(0.000)
Year Fixed Effect	*Included*	*Included*	*Included*
Obs.	12,231	12,231	12,231
R^2	0.115	0.113	0.113

p-values in parentheses * p<.1, ** p<.05, *** p<.001St. errors are clustered at firm level.

Appendix A: Variables Description

Accrual-based Earnings Management Metrics	
Defond & Park	Absolute Discretionary Accruals estimated using the DeFond and Park (2001) model
Jones Modified	Absolute Discretionary Accruals estimated using the modified Jones Model (Dechow et al., 1995)
Test Variables	
CIO_Presence	Dummy variable equal to one if the CIO is present as one of the five top executives, as per DEF14A; 0 otherwise. The executive is identified as CIO if his title is: chief
Comp_Dist	The sum of Base salary, Cash Bonus and Other Compensation received by the CIO during the year, scaled by the average compensation received by the other top 4
Sensitivity Test Variable	
Comp_Dist_All	The sum of Base Salary, Cash Bonus, Other Compensation, Stock Awarded ($) and Options Awarded ($) received by the CIO during the year, scaled by the average compensation received by the other top 4 executives
Control Variables	
ACC_FIL	Dummy variable equal to 1 if the firm is an Accelerated Filer, 0 otherwise
AGE	The age of the Firm, as proxied by the number of years the firm has been available on Compustat
BIG	Dummy variable equal to 1 if the auditor is a Big 4, 0 otherwise
CEODUAL	Dummy variable assuming a value of 1 if the Chairman and the CEO are the same person, 0 otherwise
CFO	The Operating Cash Flow (computed as OANCF – XIDOC) on lagged Total Assets
FIN	Dummy variable equal to 1 if the firm issued stock or debt during the year, 0 otherwise
GDW	The Goodwill scaled by Total Assets
ICW	Dummy variable assuming a value of 1 if the firm reported Internal Control Weaknesses during the year, 0 otherwise
INT	Intangible Assets scaled by Total Assets
LEV	Financial Liabilities over Total Assets
LOSS	Dummy variable equal to 1 if the firm reported a loss on *t-1*, 0 otherwise
MA	Dummy variable equal to 1 if the firm took part to a merger or to an acquisition during the year, 0 otherwise
MB	Market capitalization of the firm on its book value
R&D	Research and Development Expenses on Sales
REST	Dummy variable equal to 1 if the firm restated its Financial Statements during the year, 0 otherwise
ROA	Net income on average Total Assets
SIZE	The natural logarithm of the market capitalization of the firm
Instrumental Variable	
AGE	Is the age of the firm proxied by the number of years the firm has been available on Compustat.
GDW	Is the Goodwill amount of a given firm scaled by Total Assets

R&D	Is the Research and Development Expenses of given firm scaled by Total Assets
IND	*IND*, the industry in which the firm operates
INT	Is the Value of Intangible Assets, net of Goodwill, scaled by Total Assets
Rest_Persist	Is a variable ranging from zero to one, calculated as the sum of restatements for the company in our sample period scaled by the number of years in our sample period.
CIO_Persist	Is a variable ranging from zero to one calculated as the sum of CIO presence for the company in our sample period scaled by the number of years in our sample period.
CIO_Mean	is a dummy variable assuming a value of 1 if the CIO has been listed as a top remunerated executive a number of times greater than the sample mean, 0 otherwise.
CIO_75th	is a dummy variable assuming a value of 1 if the CIO has been listed as a top remunerated executive a number of times greater than the 75^{th} percentile of the sample, 0 otherwise