MANDATORY AUDIT FIRM ROTATION: AN INTERNATIONAL INVESTIGATION

Scott Bronson  
*The University of Kansas*

Kathleen Harris  
*The University of Houston*

Scott Whisenant  
*The University of Kansas*

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*Corresponding author:
Scott Whisenant, Ph.D.
Associate Professor
University of Kansas
KU School of Business
Capitol Federal Hall
1654 Naismith Dr., #4173
Lawrence, Kansas 66045
785-864-7577
office phone: 785-864-7577

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Abstract
This study investigates whether mandatory audit firm rotation rules (MAFR) are associated with changes in the quality of audit markets; most especially, the amount of unexpected opportunistic discretion in earnings before and after adoption of firm rotation rules. Consistent with previous studies, we argue that, ceteris paribus, the more allowed discretion in earnings, the lower the audit quality. Using available data from countries that have adopted firm rotation rules, we first investigate the debonding effect of a firm rotation policy (i.e., the enhancing of auditor independence in audit markets). The data indicate that less earnings management, less managing to earnings targets, and more timely loss recognition is evident in the post-rotation years than in the pre-rotation years. These results provide empirical evidence of the benefits of adopting rotation rules. We then investigate the allowed discretion in the years before and after auditor changes in audit markets that have adopted rotation rules (the low client-specific knowledge effect) and find evidence of lower audit quality in both years. This finding stands in stark contrast to the empirical evidence from voluntary audit changes using U.S. data (DeFond and Subramanyam 1998) and from mandatory changes using Belgian data (Vanstraelen 2000). These results highlight the importance (e.g., to audit market regulators) of considering ways to mitigate the erosion of audit quality during the transition to new auditors under firm rotation rules such as the use of detailed handover files between predecessor and successor audit firms or two auditor involvement in years of initial audits (i.e., “four eyes concept”). We note that, depending on the statistic investigated, the benefit to audit quality (of adopting rotation rules) appears to be larger by a factor of at least two (in some cases higher) than the costs of audit quality erosion at the forced rotation audit engagements. Finally, we report descriptive statistics that global audit firm concentration levels decreased following the adoption of audit firm rotation rules.

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1. Introduction

DeAngelo (1981) defines audit quality as the probability that the auditor will discover material financial statements misstatements (competence) and report these material errors (independence) through proposed audit adjustments or modified audit reports. Mandatory audit firm rotation (MAFR) has been suggested as one possible approach to improve audit quality. MAFR typically gains attention in the wake of corporate scandals or audit failures when public confidence in audit markets decline (see, e.g, McLaren 1958; Seidman 1967; Corporate Accountability Research Group 1976; Hoyle 1978; Imhoff 2003).\(^1\)

Proponents of MAFR argue that the benefits include providing a fresh look at financial statements, breaking the economic bond that threatens auditor objectivity, and increasing competition in audit markets. Supporters of these rules argue that each of these benefits could lead to improved audit quality in the audit market (e.g., see Ryan et al. 2001). Opponents of mandatory firm rotation rules, however, argue that firm rotation policies could result in audit firms being less effective monitors of the opportunistic actions of managers due to the loss of client-specific knowledge.

In this study, we offer archival-based empirical evidence from the audit markets of three different countries (Italy, South Korea, and Brazil) that have adopted firm rotation rules. We investigate whether firm rotation rules affect audit quality by using earnings management proxies that measure different types of allowed discretion in reported earnings (Lang, Raedy, and Yetman 2003; Leuz, Nanda, and Wysocki 2003; Ball and Shivakumar 2005, 2006; Lang, Raedy, and

\(^1\) Mandatory audit firm rotation is defined in The Sarbanes-Oxley (SOX) Act of 2002 (Section 207) as the imposition of a limit on the period of years during which an audit firm may be the auditor of record.
Wilson 2006). DeFond and Zhang (2014, 276), in a survey of audit markets literature offer the following suggestion about audit quality proxies, concluding that “...that no single category paints a complete picture of audit quality” and suggesting that “...when possible, researchers use multiple proxies from different categories to take advantage of their strengths and attenuate their weaknesses.” Following this guidance, our research design employs multiple proxies for audit quality. Given that the earnings management proxies used in our study focus on a range of potential discretion in earnings (e.g., earnings smoothing, timely loss recognition and small positive earnings targets), our conclusions are less likely to result from either accounting policy choices or solely due to the variation in financial reporting quality. We mitigate the effects of changes in incentives on the production of earnings by including controls for factors that prior research shows to be associated with voluntary accounting decisions (e.g., growth, leverage, and the need to access the capital markets) in our construction of the accounting quality metrics. In sum, instead of focusing on one audit quality proxy, we believe that findings based on different audit quality proxies are more likely to result from decisions over which management has and is allowed discretion.

The goal of our study is to investigate whether the enactment of audit firm rotation rules are associated with changes in market-wide audit quality. If threats to auditor independence (e.g., freedom from pressure to retain a client) produce more effective monitoring of opportunistic discretion in earnings, we expect improvements in audit quality following the enactment of firm rotation rules to manifest as less earnings smoothing, less management toward targets, and more timely loss recognition. On the other hand, forced auditor turnover may lead to less effective audits because of a loss of client-specific knowledge. If the loss of client-specific knowledge
erodes the quality of audit markets, we would expect to see audit quality proxies erode following enactment of rotation rules. We also investigate whether the discretion in earnings in the year before and after auditor switches indicates any changes to audit quality. This research question is of particular interest as forced audit firm changes occur after the adoption of rotation rules.

We find evidence of less earnings management and more timely loss recognition in the mandatory rotation years as compared with voluntary rotation years. Specifically, observations in the mandatory firm rotation years have a higher variance of the change in net income, have less negative correlation between accruals and cash flows, manage less to an earnings target of small profits, and have a higher frequency of large negative net income. These findings suggest an increase, on average, in audit quality after the enactment of firm rotation rules.

We then assess whether the discretion is different from the expected discretion in the year before and after auditor changes in periods following the effective dates of the rotation rules. We find evidence of lower audit quality in both years. This finding highlights the importance to regulators of considering ways to mitigate potential audit problems around the transition points that occur under firm rotation rules (e.g., additional regulatory oversight in both years, the use of

2 In a related study using only South Korean data, Kwon, Lim, and Simnett (2014) investigate audit quality (measured by discretionary accruals) following the enactment of audit firm rotation rules in South Korea. They find no difference in discretionary accruals on a dummy variable indicating years after adoption of audit firm rotation rules using sample evidence from 2000 to 2009. However, this result is likely to be unsatisfying attempt to understand how such regulations affect audit quality. Although discretionary accruals are an often used proxy for audit quality, we argue similarly to others (e.g., DeFond and Zhang 2014) that reliance on discretionary accruals, which are subject to large measurement error and potential biases, is unlikely to give a complete picture of the affect of audit market regulations on audit quality. Studies of the effects on audit quality in Italy (e.g., Cameran, Prencipe, and Trombetta 2012, and Cameran, Francis, Marra, and Pettinichio 2015) also question whether audit quality is improved in a mandatory audit firm rotation setting. Since we do not have data on Italy prior to the adoption of mandatory audit firm rules (nor do the previously cited studies), we include Italy in our analysis to add sample evidence on the impact of audit quality at transition points under a mandatory audit firm rotation setting (i.e., year nine and the first year opined on my the successor audit firm under MAFR).
detailed handover files between predecessor and successor audit firms, or a “four-eyes principle” in which two audit firms are involved at varying levels in the years of initial audits).

The remainder of the paper is organized as follows. In Section 2, we review prior literature and develop our two main hypotheses. In Section 3, we describe our research design. In Section 4, we present the results of empirical analysis. In Section 5, we present our conclusions and discuss potential avenues for related research.

2. Literature review and hypothesis development

The push for mandatory audit firm rotation

In 2002, following several highly publicized U.S. accounting scandals (e.g., Waste Management, Computer Associates, Xerox, Enron, Adelphia, Global Crossing, Tyco, and WorldCom), the U.S. Congress considered various changes to the regulation of both audit and capital markets. Large accounting scandals are not unique to the U.S. (e.g., Lernout & Hauspie in Belgium; OneTel in Australia; Parmalat in Italy; Vivendi in France; Banco Nacional in Brazil; Bank of Credit and Commerce International in the U.K.; National Kidney Foundation in Singapore; Royal Ahold in the Netherlands; Anglo Irish Bank in Ireland; Satyam Computer Services in India; Olympus in Japan). Thus, the debate on whether audit firms should rotate following a finite number of audit engagements is still active at a global level.

Unlike in the U.S., the home of so many corporate scandals, some countries have adopted firm rotation rules (e.g., Italy enacted a nine-year rotation rule in 1975; Spain enacted a nine-year

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3 The Sarbanes-Oxley Act of 2002 (Section 207) required the General Accountability Office (GAO) to investigate the potential effects of mandatory audit firm rotation. However, in July 2013, the U.S. Congress passed the “Audit Integrity and Job Protection Act,” effectively ending the evaluation of the merits of audit firm rotation in that country.
rotation rule in 1989; Brazil enacted a five-year rotation rule in 1999; South Korea enacted a six- 
year rotation rule in 2003; Austria enacted a six-year rotation rule in 2004, and both Singapore 
and Canada enacted rotation rules for domestic banks). In 2014, the European Union (EU) 
introduced in 2014 a new EU regulatory framework for statutory audits that includes a 10-year 
audit firm rotation for all public interest entities (PIEs) with some transition arrangements 
(Article 41, EU Laws). The reasons for enacting MAFR in these countries include improving 
audit quality, strengthening auditor independence, and/or increasing competition in audit 
markets.

Audit quality and auditor independence

The auditing literature also describes how a variation can occur in audit quality, which
DeAngelo (1981) defines as “the market-assessed joint probability that a given auditor will both 
(a) discover a breach in the client’s accounting system and (b) report the breach.” Stated 
differently, audit quality is a function of (1) audit firm competence and (2) the level of actual 
threats to auditor independence. Variation in the ability to detect material omissions or 
missstatements in the client’s financial statements represents variation in the level of competency 
of the audit firm, whereas variation in the probability that the auditor reveals material omissions 
or misstatements represents auditor independence problems. 

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4 The specific mandatory firm rotation transition rules in Article 41 of the Regulation can be found at http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2014.158.01.0077.01.ENG. The rules 
are based on the length of the existing statutory auditor/client relationship as of June 16, 2014.

5 The importance of independence and objectivity has also been recognized by the accounting profession. 
Article IV of the AICPA Code of Professional Conduct specifically states that a “member should maintain 
objectivity and be free of conflicts of interest in discharging professional responsibilities” (AICPA 1994). 
In order to accomplish this objective, the AICPA recommended audit partner rotation (AICPA 1978). 
Although this recommendation can be viewed as a lessor form of MAFR, it is motivated by the same 
perceived threat to auditor independence.
omission or misstatement, an improvement in either competence or independence should lead to an improvement in audit quality, whereas an erosion of either could lead to lower audit quality.

The level of real and perceived threats to auditor independence, however, are also important to the debate on mandatory audit firm rotation. Even if no real effects on audit quality occur following firm rotation, users may perceive the audit firm to be a more objective monitor under a firm rotation setting. In fact, prior research supports the supposition that investors and managers react to and price audits that have higher perceived quality. For example, Titman and Trueman (1986) and Datar, Feltham, and Hughes (1991) provide models in which the value of an initial public offering is shown to be an increasing function of perceived audit quality. Extant research also provides evidence of capital market consequences when the perception of audit quality is compromised by a possible reduction in independence (see, e.g., Francis and Ke 2006; Frankel, Johnson, and Nelson 2002). Hence, as Philip A. Laskawy, Chairman of Ernst & Young, stated in the public hearings before the Senate Subcommittee on Securities Committee on Banking, Housing and Urban Affairs, “the appearance of independence is perhaps as important as is actual independence” (quoted in Levitt 2000). 6

The findings from both experimental and analytical studies also provide support for an association between rotation rules and improved audit quality. Farmer, Rittenberg, and

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6 In the U.S., the SEC requires auditors under its jurisdiction to be independent in both fact and appearance (Rule 201 (b)). Also, the U.S. Supreme Court has emphasized the importance of the connection between investor confidence and the appearance of auditor independence: “The SEC requires the filing of audited financial statements in order to obviate the fear of loss from reliance on inaccurate information, thereby encouraging public investment in the Nation’s industries. It is therefore not enough that financial statements be accurate; the public must also perceive them as being accurate. Public faith in the reliability of a corporation’s financial statements depends upon the public perception of the outside auditor as an independent professional. If investors were to view the auditor as an advocate for the corporate client, the value of the audit function itself might well be lost.” (United States v. Arthur Young and Co., 465 U.S. 805, 819 n.15 (1984)).
Trompeter (1987) find that practicing auditors at different ranks on audit engagements are more likely to agree with the financial reporting preferences of clients when the risk of losing the engagement is high. They also find the threat of losing the client influences staff and seniors more than managers and partners. This evidence is particularly troubling because staff and senior level auditors perform a majority of the work on audit engagements. Dopuch, King, and Schwartz (2001) find in an experimental setting that mandated audit firm rotation leads to less bias in audit reports. Likewise, Lu and Sivaramakrishnan (2009), using an analytical setting, find that mandatory audit firm rotation decreases overstatements and increases understatements, which implies increased reporting conservatism.

Audit firm tenure

Johnson and Lys (1990) find that auditors obtain competitive advantages via specialization and that clients lose the resulting benefits if they change auditors. Other studies document that short audit firm tenure, by affecting the client-specific knowledge of an auditor, can lead to an erosion of audit quality and can be associated with increased litigation risk to audit firms. For example, Geiger and Raghunandan (2002) find that auditors are more likely to issue a clean report prior to a bankruptcy filing in the early years of auditor tenure. Other studies find similar negative consequences to audit markets in the early stages of audit engagements. Carcello and Nagy (2004) find that fraudulent financial reporting is more likely during the early years of auditors’ tenure than during the later years. Additionally, St. Pierre and Anderson (1984) find that audit errors and lawsuits against auditors occur more frequently during the early years of an auditor-client relationship. Taken together, these results suggest that the greater number of initial audits generated by mandatory firm rotation have the potential to erode audit quality through
reduced client-specific knowledge. A limitation of generalizing the results of these studies to a MAFR setting (that is acknowledged by most of the authors) is that the results from a voluntary change setting many not extend to a mandatory firm rotation setting.

Studies also link longer audit tenure to improvements in audit quality. Johnson, Khurana, and Reynolds (2002) and Myers, Myers, and Omer (2003), for instance, conclude that longer audit firm tenure constrains extreme discretion in accruals, while Mansi, Maxwell, and Miller (2004) find that longer audit firm tenure is associated with lower cost of debt. Bamber and Iyer (2007), using a field-based analysis, demonstrate that longer audit firm tenure mitigates acquiescence to the client’s preferences. Carey and Simnett (2006) investigate the association between audit quality and long audit partner tenure in Australia using three measures of audit quality: (1) the auditor’s propensity to issue a going-concern audit opinion for distressed companies; (2) the direction and amount of abnormal working capital accruals; and (3) just beating (missing) earnings benchmarks. While their study provides evidence that long tenure partners are less likely to issue a going-concern opinion and offers some evidence of just beating (missing) earnings benchmarks (i.e., consistent with deterioration in audit quality associated with long audit partner tenure), the study finds no evidence of an association between long audit tenure and abnormal working capital accruals. The findings from the literature on both short and long auditor tenure form the basic argument of firm rotation opponents that the potential costs might outweigh the benefits.

Related empirical evidence is offered from a context in which audit partner rotation, but not audit firm, is required. Such a mandate has been adopted in several countries in an effort to improve auditor independence (e.g., the United States, the United Kingdom, Taiwan, and
Australia). Hamilton, Ruddock, Stokes and Taylor (2005) capitalize on the disclosures of audit partner rotation in Australia and show that audit partner changes are associated with lower (signed) discretionary accruals. More specifically, in a study using Big 5 audit partner changes, they find that positive (but not negative) discretionary accruals are significantly lower at the time of partner rotation, which implies that partner rotation is associated with lower discretion in reported earnings. Chi and Huang (2007) also examine the effect of mandatory audit partner rotation on audit quality from the viewpoint of learning experience. Using the level of discretionary accruals as a proxy for audit quality, they find indications that client-specific knowledge is associated with higher earnings quality, but (perhaps more importantly) that excessive familiarity impairs audit quality. However, Chi, Huang, Liao, and Xie (2009) fail to identify any real or perceived differences in audit quality associated with a five-year audit partner rotation in Taiwan. In the discussion of Chi et al. (2009), Bamber and Bamber (2009) offers a possible explanation for the (failure to reject the null) findings. They suggest that audit partner rotation is likely to yield “second-order effects relative to the effects of audit firm rotation.”

In sum, if audit firm rotation produces some of the effect on audit quality that partner rotation appears to have, the findings of these studies offer some guidance on the potential benefits. Also, although the literature does document the importance of client-specific knowledge in detecting material misstatements in the financial statements, this evidence is based on voluntary rather than mandatory auditor changes. In a MAFR setting, auditors and clients can anticipate when changes will occur, while this is not necessarily the case in a non-MAFR setting. It is also generally acknowledged that the learning curve for client-specific knowledge flattens out after several years. Hence, an important issue to address is how policies might be in place or proposed that
can mitigate these effects, in an effort to retain the potential benefits (if any) of firm rotation rules (e.g., handover files between predecessor and successor audit firms or the “four-eyes principle” of using multiple auditors in years of initial audits).

Our research design is summarized as follows. First, proponents of firm rotation rules contend that an economic bond between clients and auditors strengthens as auditors view the relationship as a long-term contract and (it is argued) lose objectivity in periodic audit engagements because of the long-term perspective of continuous audit engagements. Thus, the first goal of our study is to investigate whether audit quality changes after the passage of regulations requiring that companies implement MAFR. We term this as the debonding hypothesis, which is a test of whether audit quality improves following the adoption of rotation rules by lowering (and ultimately removing) the economic bond to clients. The second goal of our study are tests we term the rolling-off and the low client-specific knowledge hypotheses. Firm rotation opponents argue that the most obvious impact of rotation rules is the short-term erosion of audit quality caused by an increasing the number of new auditor-client engagements.

Hypotheses

Because the goal of this study is to investigate the effects on audit markets of rotation rules in countries that have adopted various forms of rotation rules, we use international data to investigate whether audit quality is affected (either improved or eroded) by the enactment of rotation rules in audit markets. The maintained hypothesis is that the audit/earnings quality

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7. GAO (2003) reports an average tenure of Fortune 1000 public companies in the U.S. is 22 years, and indicates that approximately 10 percent of those companies had the same auditing firm for more than 50 years. The report notes that both numbers would have been much higher had the dissolution of Arthur Andersen not caused a substantial number of auditor changes.
metrics employed in the study are reasonable proxies for the various methods by which corporate insiders exercise discretion to manage reported earnings. Consistent with prior literature, we argue that, *ceteris paribus*, more (less) evidence of discretion in earnings implies lower (higher) audit quality.

**H1: Debonding hypothesis**

Our first hypothesis addresses the firm rotation proponent argument that rotation cycles will lead audit firms to view their monitoring role more objectively because periodic audit firm rotation removes the possibility of the audit becoming a long-term relationship. This argument assumes that a potential threat to auditor independence occurs as the client-auditor relationship increases to a level at which the audit engagement team (broadly defined) views the relationship as a long-term contract. As the audit engagement team members become increasingly concerned about the stream of future profits, professional skepticism or professional judgments about the design of audit programs or evaluations of audit evidence may erode or become biased (often termed economic bonding).

Long auditor tenure can also lead to a “familiarity threat” in which auditors tend to anticipate audit evidence (based on their prior work) instead of adopting rigorous and innovative evidence gathering processes. Arthur Andersen auditors on the Enron engagement offer an example of how familiarity can erode professional skepticism and audit judgment. The audit engagement team had permanent office space at Enron headquarters and dressed business-casual like their Enron colleagues. They shared in office birthday celebrations, lunchtime parties in a nearby park, and weekend fund-raisers for charities. They even went on Enron employees ski trips. “[P]eople just thought they were Enron employees,” says Kevin Jolly, a former Enron employee who worked in the accounting department. “They walked and talked the same way … It was like Arthur Andersen had people on the inside … the lines become very fuzzy.” The article notes that the hiring between Andersen and Enron worked both ways. In 1993, when Andersen took over Enron’s internal audit operation, 40 people moved from Enron’s payroll to Andersen. Also in the early 1990s Enron’s Thomas Chambers, the energy trader’s vice president of internal audit, left Enron to run the Andersen group.

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8 Arthur Andersen auditors on the Enron engagement offer an example of how familiarity can erode professional skepticism and audit judgment. The audit engagement team had permanent office space at Enron headquarters and dressed business-casual like their Enron colleagues. They shared in office birthday celebrations, lunchtime parties in a nearby park, and weekend fund-raisers for charities. They even went on Enron employees ski trips. “[P]eople just thought they were Enron employees,” says Kevin Jolly, a former Enron employee who worked in the accounting department. “They walked and talked the same way … It was like Arthur Andersen had people on the inside … the lines become very fuzzy.” The article notes that the hiring between Andersen and Enron worked both ways. In 1993, when Andersen took over Enron’s internal audit operation, 40 people moved from Enron’s payroll to Andersen. Also in the early 1990s Enron’s Thomas Chambers, the energy trader’s vice president of internal audit, left Enron to run the Andersen group.
problem for many years. For example, almost a half century ago, in their book entitled *The Philosophy of Auditing*, authors Robert K. Mautz and Hussein A. Sharaf issued the following warning about auditors:

> [T]he greatest threat to his independence is a slow, gradual, almost casual erosion of this honest disinterestedness—the auditor in charge must constantly remind his assistants of the importance and operational meaning of independence.

We term the first hypothesis test as a test of the *debonding hypothesis*, which most argue is the primary motivation for enactment of MAFR. To identify the different manifestations of earnings management, we focus on the effect of adopting firm rotation rules on earnings smoothing, managing earnings to report positive earnings (when in fact a loss would have been reported), and timely loss recognition. We expect firm rotation-based earnings to be less managed, driven by greater auditor independence.

For the earnings management metrics employed in our study, we follow the assumptions of prior research that firms with less earnings smoothing, fewer instances of hitting earnings targets, and greater incidence of large losses are indicative of higher audit/earnings quality (Lang, Raedy, and Yetman 2003; Leuz, Nanda, and Wysocki 2003; Ball and Shivakumar 2005, 2006; Lang, Raedy, and Wilson 2006). We state our *debonding hypothesis* (in null form):

**H1:** Enactment of mandatory audit firm rotation regulations is *not* associated with changes in audit quality following the enactment of the regulations.

**H2: Tests of audit quality around auditor changes following adoption of rotation rules**

Opponents of MAFR argue that the benefits of the learning experience from repeat audit engagements with the same client will, on average, erode audit quality in a MAFR setting.

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However, this argument is too often supported by empirical evidence on early tenure audit quality from voluntary auditor change sample evidence. Moreover, the original line of research on the effects of auditor tenure focuses on audit failures (AICPA 1978, 1987; Geiger and Raghunandan 2002; Carcello and Nagy 2004). For example, Geiger and Raghunandan (2002) and Carcello and Nagy (2004) show that audit failures (defined as failure to issue a going-concern opinion to soon-to-be bankrupt clients and firms subject to SEC enforcement actions, respectively) are more likely in the early years of an audit engagement. If audit firm changes in a voluntary change setting are not random (as could be easily argued), the results of early tenure audit problems could be due to factors other than low client-specific knowledge. Casterella and Johnston (2013) offer an interesting and informative analysis of this point. They show that if one separates the auditor change literature into two subsets (voluntary vs mandatory audit firm change settings), the results found in the mandatory settings are much more supportive of mandatory firm rotation than based on the voluntary audit firm change evidence.

Two related lines research have examined the relation between initial audits and audit quality. In the first, DeFond and Subramanyam (1998) show that discretionary accruals are income-decreasing during the last year with the predecessor auditor and generally insignificant during the first year with the successor. In the second, Whisenant and Willenborg (2016) find no evidence that initial audit discounting practices are associated with lower audit quality in either the first or second year of new audit engagements. This competing evidence motivates our second hypothesis, which is designed to assess whether auditor changes following enactment of rotation rules are associated with changes in audit quality.
In a related line of research to our tests of audit quality in the period before a required change in auditors, Vanstraelen (2000) investigates the impact of renewable long-term audit mandates on audit quality. She finds that long-term auditor client relationships significantly increase the likelihood of an unqualified opinion (i.e., lower audit quality) except when the long-term audit mandate is in its last year (when audit quality appears to be enhanced). She concludes that findings could be in favor of mandatory audit firm rotation to maintain the value of an audit for the external users.

We separate the second hypothesis into two parts. We investigate the audit quality in audit engagements before and after auditor changes in audit markets with firm rotation rules. Hypothesis 2a is an investigation of how an audit firm performs its monitoring role in the last year of an audit engagement (with an expectation of a terminal date). We term this hypothesis as the rolling-off hypothesis stated as follows (in full form):

**H2a:** The enactment of MAFR is not associated with changes in audit quality in the year before required auditor changes.

On the other hand, hypothesis 2b is an investigation of the arguments of firm rotation opponents that audit quality will suffer during initial audits under firm rotation rules due to low client-specific knowledge and that clients could use this opportunity to exercise greater discretion in reported earnings. We term this hypothesis as the low client-specific knowledge hypothesis stated as follows:

**H2b:** The enactment of MAFR is not associated with changes in audit quality in the first year after required auditor changes.

In summary, tests of H1 will provide empirical evidence on the debonding hypothesis suggested by firm rotation proponents (i.e., limited auditor tenure reduces the bonding effects
that result from continued audit engagements with no terminal period in sight). According to this perspective, the debonding effect of MAFR should lead to, on average, an improvement in audit quality in audit markets adopting auditor rotation rules. Hypotheses 2a and 2b, on the other hand, are designed to provide empirical evidence on the consequence of rotation rules; that is, changes in audit quality at the end and beginning of rotation cycles.

3. Research Design

Mandatory rotation and audit quality

Our research design incorporates data from Italy, Brazil, and South Korea. By using international data from multiple countries to examine whether firm rotation rules affect audit quality, we avoid potential biases from the use of one country to test the effects of firm rotation rules on audit quality. The ability of a global research design to offer more reliable empirical evidence on audit firm rotation’s effect on audit quality is also suggested by the inconsistency of the extant empirical findings from single country designs (see, e.g., Chung 2004; Kim, Min, and Yi 2004; Bae, Rho, and Ro 2007; Cameron, Prencipe, and Trombetta 2008; Said and Khasharmeh 2014).⁹

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⁹ A complete reconciliation of the findings from country-specific studies is beyond the scope of the present study. Instead, a comparison of some of the sample evidence shows the inconsistencies. For example, Chung (2004) and Kim, Min, and Yi (2004) examine the impact of limiting auditor tenure on earnings and audit quality using a sample of “designated” (i.e., high-risk) companies in which regulatory forced audit firm rotation occurred. The results suggest that limiting the length of the auditor-client relationship results in enhanced auditor independence and provides auditors with greater incentives to resist management pressures. In contrast, Cameron, Prencipe, and Trombetta (2008) state use Italian data and conclude that MAFR does no improve audit quality. Said and Khasharmeh (2014), however, survey auditors and find that approximately 46 percent of the respondents believe that mandatory audit firm rotation would enhance auditor independence and should be implemented.
Measures of audit quality

Because audit quality is unobservable in any study of how characteristics of audit markets might affect audit quality, empirical studies on audit quality typically use output-based proxies that are expected to capture audit quality (likely with different levels of error). Inconsistencies in the literature on the effects of firm rotation rules in different countries could thus be explained by the use of highly contextual earnings management technologies in the research designs. Likewise, because it is difficult to specify ex ante which techniques firms will use to obscure firm performance, we follow prior research by adopting an array of reported earnings measures used in prior research international studies to capture earnings management (Leuz, Nanda, and Wysocki 2003; Barth, Landsman, and Lang 2008). Our goal is to incorporate various proxies of audit quality into the research design to provide a more complete picture of the effects of MAFR on audit markets.

We construct our audit quality proxies using data available in Compustat Global.10 We operationalize accounting quality using earnings management and timely loss recognition metrics. Consistent with the predictions in prior research, we predict that firms with higher audit quality exhibit less earnings management and more timely loss recognition.11

10 Some measures require calculation of accruals and cash flows. Computing accruals using the balance sheet method is typical in international accounting research (e.g., Bhattacharya, Daouk, and Welker 2003; Land and Lang 2002; Leuz, Nanda, and Wysocki 2003) as statement of cash flow disclosures may not be available across the sample period for all countries. However, Hribar and Collins (2002) show that a measure of accruals derived from balance sheet data contains significant measurement error, especially when firms are involved in mergers and divestitures. Therefore, we only use observations for which cash flows from operations are available using the statement of cash flow method.

11 Plausible reasons also exist for making the opposite prediction: accounting quality can be affected by managerial discretion to reveal private information about the firm (Watts and Zimmerman 1986) or non-opportunistic error in estimating accruals. These joint effects are reflected in the metrics. It is worth noting, however, that we expect discretionary accounting choices used opportunistically by managers for purposes
Smoothing reported operating earnings

Managers smooth income to reduce the variability of reported earnings by managing accruals in an effort to conceal a firm’s real economic performance (Leuz, Nanda, and Wysocki 2003). We use the variance of the change in net income, the variance of the change in cash flows from operations, and the correlation between accruals and cash flows as proxies for managers’ ability to smooth earnings. In the tests of differences in smoothing proxies, we interpret a higher variance in the change in net income and less negative correlation between accruals and cash flows as evidence of lower earnings management and thus higher audit quality.

Discretion in reported earnings to avoid losses

Burgstahler and Dichev (1997) demonstrate a relatively smooth, single-peaked, bell-shaped frequency distribution of earnings except in the area of zero earnings. That is, earnings slightly less than zero occur much less often than would be expected given the smoothness of the remaining distribution, whereas earnings slightly greater than zero occur much more frequently than expected. This pattern suggests that managers, recognizing that small losses can be hidden but large losses cannot, are managing earnings. Burgstahler and Dichev (1997) also show that managers of U.S. firms use their accounting discretion to avoid reporting decreases in small

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other than revealing private information about a firm to have a greater effect on audit quality (e.g., see Kinney and Martin 1994).

12 In selecting our correlation tests, we note that Pearson’s correlation coefficient is a parametric statistic best employed in empirical tests when normality assumptions can be made about the underlying distributions, and less reliable when those assumptions are unlikely to be supported in sample data. We therefore use a non-parametric correlation measure (i.e., Spearman’s rank correlation coefficient) because we do not believe that it is appropriate to rely on normality assumptions about the probability distribution of the variables. Although less statistically powerful than parametric methods if the assumptions underlying the latter are met, Spearman’s rank correlation coefficient are less likely to give distorted results when there are departures from normality.
earnings. Therefore, we use small positive net income (\(SPOS\)), an indicator variable equal to one if net income scaled by total assets is between 0 and 0.01, as a proxy for allowed discretion in reported earnings (Lang, Raedy, and Yetman 2003).

**Discretion in reported earnings (timely loss recognition)**

Ball, Kothari, and Robin (2000); Lang, Raedy, and Yetman (2003); Leuz, Nanda, and Wysocki (2003); Ball and Shivakumar (2005, 2006); and Lang, Raedy, and Wilson (2006) suggest that one characteristic of higher quality earnings is that large losses are recognized as they occur. This characteristic is closely related to earnings smoothing in that if earnings are smoothed, large losses should be relatively rare. For example, Ball and Shivakumar (2005, 2006) show that timely loss recognition, which is consistent with higher earnings quality, attenuates the negative correlation between accruals and current period cash flow. We therefore use large negative net income (\(LNEG\)), equal to one for observations for which annual net income scaled by total assets is less than \(-0.20\) and zero otherwise, as our indicator variable for timely loss recognition.

**Discretion in reported earnings (discretionary accruals)**

In addition to management minimizing fluctuations in firm performance, managers can use their reporting discretion to conceal their firm’s economic performance. Hence, accrual-based measures used as proxies for audit quality have become an accepted measure of the degree of earnings management and earnings quality in the accounting literature (Healy and Wahlen 1999; Dechow and Dichev 2002). When audit quality is high, auditors constrain management’s opportunistic income-increasing or opportunistic income-decreasing accruals, resulting in reported earnings that are of high quality (Myers, Myers and Omer 2003).
Discretionary accruals are also often used in audit markets literature to investigate how an audit firm’s monitoring role can impact its litigation risk on audit engagements. Prior literature also provides evidence that income overstatements affect both the frequency and likelihood of an auditor being sued by investors (Lys and Watts 1994; St. Pierre and Anderson 1984). We estimate the firm-level measure of audit quality using a traditional estimation technique for discretionary accrual proxies that calculates the expected values of accruals based on all observations in an industry for each year using one country’s data.

**Tests for H1 (Debonding Hypothesis)**

We operationalize the degree of auditor enforcement of GAAP (i.e., level of audit quality) at the firm-level using different measures of firm-level proxies for audit quality (Lang, Raedy, and Yetman 2003; Lang, Raedy, and Wilson 2006; Barth, Landsman, and Lang 2008).

**Earnings smoothing measures**

Following prior literature (Barth, Landsman, and Lang 2008; Leuz, Nanda, and Wysocki 2003; Lang, Raedy, and Yetman 2003), we assume that firms with less earnings smoothing exhibit more earnings variability. Hence, the first measure of earnings smoothing, variability of net income ($\Delta NI$ where $NI$ equals $IB + XI + DO$ using Compustat Global mnemonics), is the variability of the change in net income scaled by total assets ($AT$).\(^{13}\) Because changes in net income are likely to be sensitive to other factors unrelated to the audit rotation rules, we measure variability of the change in net income($\Delta NI$) as the variance of the residuals from a regression of

\(^{13}\) Unlike the North American database, the Compustat Global database does not report net income (or loss) after subtracting extraordinary items (XI) and discontinued operations (DO). Our measure of net income or loss is a constructed measure (Compustat Global mnemonics $IB + XI + DO$). Our conclusions are qualitatively similar if we use income before extraordinary items (IB) as the income measure.
the change in net income on variables identified in prior research as controls for these factors (Ashbaugh 2001; Pagano, Roell, and Zechner 2002; Lang, Raedy, and Yetman 2003; Tarca 2004; Lang, Raedy, and Wilson 2006; Barth, Landsman, and Lang 2008).

Previous research also suggests that the incentive to manipulate earnings upward is reduced for large corporations assumed to be more politically sensitive because the increased scrutiny and relatively higher levels of monitoring by various stakeholder groups raises the likelihood of any earnings management being detected (Watts and Zimmerman 1978; Zmijewski and Hagerman 1981). Put simply, higher monitoring levels reduce the incentives to manipulate earnings. We therefore use total revenues \((SIZE)\) from the current fiscal year as a control variable for the level of political costs.\(^{15}\) We also include proxies for growth \((GROWTH)\), the issuance of new equity \((EISSUE)\), and new debt \((DISSUE)\) to control for the resulting to manipulate earnings. To proxy for the incentive effects to manipulate earnings as debt covenant slack decreases, we use the debt-to-equity ratio \((LEV)\). We also include asset turnover \((ATO)\), which is expected to offer managers greater ability to manipulate earnings, and two control variables shown to be associated with accounting quality metrics, cash from operations \((CFO)\) and larger audit firms \((BIG)\).

To incorporate our controls into our estimate of earnings smoothing, we first pool the pre- and post-adoption rotation observations and estimate a regression of the change in annual net

\(^{14}\) We base our inferences on the variance of residuals from equation (1) and assume that inclusion of the control variables effectively results in a measure of variability of change in net income that is unrelated to the controls. An alternative and more direct approach is to first compute variability of change in net income, and then use it as the dependent variable in equation (1). In our setting, however, this approach is not feasible because estimating the variability of change in net income requires a sufficient time series of firm-specific data.

\(^{15}\) We include additional size proxies (e.g., market value of equity, total assets, number of employees, and number of shareholders, and lagged values of each size proxy) as alternative controls for the variation in political costs. The conclusions are not qualitatively different.
income (scaled by total assets) on the control variables.\textsuperscript{16} We then use the residuals from that regression to compute our measure of earnings variability. Our estimation of the variability of the change in net income is given in equation (1). The variable of interest is the \textit{variability of }\(\Delta NI(\Delta Np)\) or the variance of the residuals from estimating equation (1).

\[
\Delta NI_{it} = b_0 + b_1 SIZE_{i,t-1} + b_2 GROWTH_{it} + b_3 EISSUE_{it} + b_4 LEV_{it} + b_5 DISSUE_{it} + b_6 ATO_{it} + b_7 CFO_{it} + b_8 BIG_{it} + e_{it}, \tag{1}
\]

\(NI\) = net income (where \(NI = IB + XI + DO\) using Compustat Global mnemonics) at year \(t\) divided by total assets (AT) at year \(t\).
\(\Delta NI\) = one-year change in NI at year \(t\) divided by total assets (AT) at year \(t\)...
\(SIZE\) = natural logarithm of total revenue (Compustat Global mnemonic SALE, to which we add the value of 1) at year \(t\).
\(GROWTH\) = one-year growth rate in total revenues at year \(t\) (\(\Delta SALE\)).
\(EISSUE\) = a categorical variable equal to one if sale of common and preferred stock (SSTK, a financing activity of the statement of cash flows) at year \(t\) is greater than 10 percent of total assets (AT) at year \(t\); zero otherwise.
\(LEV\) = total liabilities (LT) divided by end of year equity book value (SEQ) at year \(t\).
\(DISSUE\) = one-year growth rate in total liabilities at year \(t\) (\(\Delta LT\)).
\(ATO\) = total revenues (SALE) at year \(t\) divided by total assets (AT) year \(t\).
\(CFO\) = cash flow from operating activities (OANCF) at year \(t\) divided total assets (AT) at year \(t\).
\(BIG\) = an indicator variable that equals 1 if audited by a global audit firm in year \(t\), 0 otherwise. Global audit firms during our sample period include Arthur Andersen, Coopers & Lybrand (Coopers & Lybrand merged with Price Waterhouse on July 1, 1998), Ernst & Young, Deloitte & Touche, KPMG, PricewaterhouseCoopers, Binder, Dijker, Otte (known as BDO Seidman in North America), and Grant Thornton.

We pool sample years from South Korea and Brazil (because both countries include observations in the pre- and post-adoption years) and estimate regressions for the pre- and post-adoption years. We only have post-adoption data for Italy. In this comparison, we compute the difference in the

\textsuperscript{16} Continuous variables in all of our analyses are winsorized at the 1st and 99th percentiles to control for outliers.
variability of $\Delta NI$ ($\Delta NP$) between the pre- and post-adoption samples as the difference in the residual variances for pre- and post-adoption observations after estimating equation (1).

The second smoothing measure is based on the variability of the change in cash flows, $\Delta CFO^o$. We define operating cash flows using statement of cash flow disclosures. As with $\Delta NI$, $\Delta CFO$ is expected to be sensitive to various factors that are, in part, unattributable to the financial reporting system. Therefore, following Barth, Landsman, and Lang (2008) and Lang Raedy, and Yetman (2003), we measure the variability of cash flows from operations ($\Delta CFO^o$) using the variance of residuals from a regression of the change in cash flows from operations on variables identified in prior research as controls for these factors as in equation (1). We then obtain a measure of variability of $\Delta CFO^o$ by estimating an equation similar to equation (1), but with $\Delta CFO$ as the dependent variable:

$$
\Delta CFO_{it} = b_0 + b_1 SIZE_{i,t-1} + b_2 GROWTH_{it} + b_3 EISSUE_{it} + b_4 LEV_{it} + b_5 DISSUE_{it} + b_6 ATO_{it} + b_7 CFO_{it} + b_8 BIG_{it} + u_{it},
$$

(2)

As with equation (1), we pool all sample observations from South Korea and Brazil for the pre- and post-adoption periods. The variability of $\Delta CFO^o$ is the variance of the residuals from equation (2). We estimate equation (2) as a benchmark for interpreting the variability of $\Delta NI$ from Equation (1).

Another measure of interest to us that proxies for audit quality is the correlation between accruals and cash flows, which serves as a proxy for each country’s audit quality by year. Earnings smoothing efforts are represented by the correlation between changes in accounting accruals and changes in operating cash flows. The motivation for the measure is that it should capture the extent to which firms use their accounting discretion and to conceal the firm’s
economic performance (Leuz, Nanda, and Wysocki 2003). A negative correlation is a natural result of accrual accounting (Dechow 1994). However, large magnitudes of this correlation indicate efforts to smooth reported earnings that do not reflect a firm’s underlying economic performance (Skinner and Myers 1999). We compute the accrual and operating cash flow components of earnings in equation (1) and (2) and calculate the correlation over the pooled set of firms before and after adoption of firm rotation rules (i.e., for the observations of South Korea and Brazil data). We then compare the correlations of the residuals from equations (3) and (4) while controlling for the effects of the known determinants of cash flows, $CF$, and accruals, $ACC$, where $ACC$ is defined as $NI$ minus $CF$. Equations (3) and (4) are estimated as:

$$CF^{vit} = b_0 + b_1 SIZE + b_2 GROWTH_{it} + b_3 EISSUE_{it} + b_4 LEV_{it} + b_5 DISSUE_{it} + b_6 ATO_{it} + b_7 BIG_{it} + v_{it},$$  \hspace{1cm} (3)$$

$$ACC^{vit} = b_0 + b_1 SIZE + b_2 GROWTH_{it} + b_3 EISSUE_{it} + b_4 LEV_{it} + b_5 DISSUE_{it} + b_6 ATO_{it} + b_7 BIG_{it} + w_{it},$$  \hspace{1cm} (4)$$

Compared with the analysis using the first two measures of earnings smoothing, this calculation represents a more direct approach to capturing the smoothing effect of accruals. Because it is well documented that the accrual process results in a negative correlation between accruals and cash flows, the question of interest here is the magnitude of the negative correlation. According to Myers and Skinner (2002) and Land and Lang (2002), ceteris paribus, a more negative correlation suggests earnings smoothing because managers respond to poor cash flow outcomes by increasing accruals.
Managing earnings toward targets

The fourth measure of audit quality estimates the extent to which firms manage earnings to avoid reporting losses. Following the prior literature on discretion in reporting earnings to avoid losses (Burgstahler and Dichev 1997; Barth Landsman, and Lang 2008), we measure the extent to which firms manage earnings to avoid reporting earnings losses as the existence of small profits. That is, we are interested in small profits ($SPOS$), an indicator variable that equals one if net income scaled by total assets is between 0 and 0.01, and zero otherwise (Lang, Raedy, and Yetman 2003).

If firm rotation rules improve audit quality, the data would indicate that audit clients manage earnings toward small positive amounts less frequently after adoption of the rotation rules. We use a logistic regression to model the outcome variable (rotation adoption) and translate the predicted log odds into predicted probability values under rotation regimes. To compare audit quality of firm rotation versus non-rotation periods, we pool observations from all sample years and estimate the following logistic regression:

\[
MAFR(0,1)_{it} = b_0 + b_1 SIZE_{it-1} + b_2 GROWTH_{it} + b_3 EISSUE_{it} + b_4 LEV_{it} + b_5 DISSUE_{it} + b_6 ATO_{it} + b_7 CFO_{it} + b_8 BIG_{it} + b_9 SPOS_{it} + u_{it}
\]

(5)

\[
SPOS = \text{an indicator variable that equals one if net income scaled by total assets is between 0 and 0.01.}
\]

In this part of the analysis, $MAFR(0,1)$ is an indicator variable that equals one for observations in the post-adoption period and zero otherwise. In modeling the outcome of rotation regimes (i.e., mandatory audit firm rotation or $MAFR=1$), a negative coefficient on $SPOS$ would indicate that rotation firms manage earnings toward small positive amounts less frequently (higher audit
quality) than non-rotation firms. Conversely, a positive coefficient on SPOS would indicate that the rotation firms manage earnings to avoid reporting earnings losses more than do non-rotation observations (lower audit quality). Because the SPOS coefficient reflects the incremental effects after controlling for other factors that affect financial reporting outcomes, we base our inferences on the estimated coefficient on SPOS from equation (5) rather than directly comparing the magnitude of small positive income from rotation to non-rotation.

**Timely loss recognition**

The final measure of audit quality is the extent to which firms manage earnings implied by the magnitudes of timely loss recognition after rotation adoption compared to the periods before adoption. If rotation rules improve audit quality, then firms would report large losses more frequently after rotation implementation or relative to a non-rotation regime. To compare rotation firms in the pre- and post-adoption periods, we pool all sample observations and estimate the following equation:

$$MAFR(0,1)_{it} = b_0 + b_1 SIZE_{i,t-1} + b_2 GROWTH_{it} + b_3 EISSUE_{it} + b_4 LEV_{it} + b_5 DISSUE_{it} + b_6 ATO_{it} + b_7 CFO_{it} + b_8 BIG_{it} + b_9 LNEG_{it} + v_{it},$$  \hspace{1cm} (6)

$LNEG = \text{is an indicator variable that equals one for observations for which annual net income scaled by total assets is less than } -0.20, \text{ and zero otherwise.}$

For equation (6), $MAFR(0,1)$ is an indicator variable that equals one for observations in the post-adoption period and zero otherwise. In modeling the outcome of rotation regimes (i.e., $MAFR=1$), a positive (negative) coefficient on $LNEG$ indicates that rotation firms recognize large losses more (less) frequently than non-rotation firms.
Tests for H2 *(rolling off and low client-knowledge hypotheses)*

For H2, we are interested in audit quality changes at the company level in contrast to H1 in which we are interested in audit quality at the audit market level. We measure the extent to which insiders exercise discretion in reporting earnings using abnormal accruals, defining total accruals \( TOT\_ACC \) as net income before extraordinary items less cash flows from operations, scaled by total assets. In our approach, we estimate the model as if changes in accounts receivable arise from earnings management (Dechow, Sloan, and Sweeney 1995).

Consistent with prior discretionary accrual research, we exclude firm-year observations that have insufficient data to compute total accruals or are missing the variables needed to estimate the model. We also exclude all firm-year observations having fewer than 20 observations in any two-digit SIC code in any given year except for Italy. As done in Kothari, Leone, and Wasley (2005), we estimate the discretionary accrual models cross-sectionally each year using all firm-year observations in the same two-digit SIC code for each country. The data for Italy are estimated cross-sectionally each year without industry controls.

\[
TOT\_ACC_{it} = \alpha + \beta_1 \left(1 / ASSETS_{it}\right) + \beta_2 \left(\Delta SALES_{it} - \Delta AR_{it}\right) + \beta_3 \left(PPE_{it}\right) + ERROR_{it} \quad (7)
\]

We use firm-specific errors \( ERROR \) from the annual cross-sectional regression model in equation (7) as a proxy for abnormal accruals, using the following variables:

\[
\begin{align*}
TOT\_ACC &= \text{net income before extraordinary items less cash flows from operations, scaled by lagged total assets.} \\
AB\_ACC &= \text{the residual from a regression predicting non-discretionary accruals as calculated in Kothari, Leone, and Wasley (2005). AB\_ACC is the residual from this regression performed over separate industry-year groupings when industries are based on 2-digit SIC codes with at least 20 observations per year.} \\
ASSETS &= \text{total assets (Compustat Global mnemonics are shown parenthetically, for example AT).}
\end{align*}
\]
\[ SALES = \text{total revenue (SALE)}. \]
\[ AR = \text{accounts receivable (RECT)}. \]
\[ PPE = \text{gross property, plant and equipment (PPEGT)}. \]

We also consider an alternative specification of discretionary accrual estimation from Ball and Shivakumar (2006), whose incorporation of proxies for gains and losses substantially increases the explanatory power of accruals models.

Following the literature on auditor changes (DeFond and Subramanyam 1998), we investigate the allowed discretion in accruals for auditor changes after the adoption of MAFR. The discretion of interest to us is the amount in the year before \((\text{rolling off hypothesis})\) and after \((\text{low client-specific knowledge hypothesis})\) auditor changes. For example, the maximum number of years an audit firm can audit in Italy is nine years since 1975, however, the rules allow for a three-year basis, renewable two times (the so-called “3+3+3” rule). As such, we are interested in the audit quality in the last allowed year of the audit engagement (year nine, or \(YEAR_{t,1}\)) and the first year of the successor audit firm \(YEAR_t\). Those two years of interest are defined as:

\[ YEAR_{t,1} = \text{the last audited set of financial statements on which the predecessor audit firm issued an opinion.} \]
\[ YEAR_t = \text{the first audited set of financial statements on which the successor audit firm issued an opinion.} \]

4. Empirical analysis

Data

We conduct the empirical analysis using available data from South Korea, Brazil and Italy obtained from the Compustat Global database.\(^{17}\) As previously discussed, these three countries

\(^{17}\) Although other countries have adopted rotation rules (e.g., Bangladesh, China for state owned companies, India for banks, Indonesia, Pakistan for listed companies, Singapore for banks, Thailand for listed companies), sufficient data from other countries were not available to yield reliable results.
are used because each has broadly adopted rotation rules. Because Italy adopted a nine-year audit firm rotation policy in 1975, all available data for Italy are post-MAFR. Because South Korea adopted a six-year rotation policy in 2003 and Brazil enacted a five-year policy in 1999, both countries have available data from both pre- and post-adoPTION of rotation rule periods to test the debonding hypothesis.

To begin the study, we obtained auditor names from the Compustat Global database for the three countries. For two of the three countries (Brazil and South Korea), however, the data were unreliable because of missing or erroneous coding of auditor names. To address this issue for the Brazilian observations, we collected information on auditing firms from the Brazilian Securities Commission (CVM) database, which has annual filings in Portuguese. We used translation software to confirm auditor identification for these observations. The data on South Korean auditor identifications posed an even greater problem. Because of affiliations with domestic firms, Compustat Global codes almost all observations of South Korean auditor names with the “other” code. To address this data problem, we examined corporate filings on South Korean stock exchanges to identify the auditor names for the sample of firms having available financial statement data in Compustat Global. Similar to the CVM, the South Korean stock exchanges provide annual reports in Korean language. The language translation software was far less

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18 The Italian law allows for an appointment term of three years, renewable two times, for a maximum of nine years. The cooling-off period was set at five years, but was later reduced to three years in 1998.

19 It is worth noting the a few countries adopted mandatory rotation rule and then decided to suspend the policies (e.g., Canada, Spain, and Austria). A review of the reasons stated include the lack of cost-effectiveness, increased cost, and/or having achieved the objective of increased competition for audit services. Similarly, South Korea ended the policy in 2011 when it adopted International Financial Reporting Standards. Our discussions with Korean regulators suggest that rotation rules were suspended because of concerns that the adoption of IFRS and rotation rules could be problematic for some companies and audit firms.
reliable for converting Korean to English. Therefore, we used two individuals fluent in Korean and English languages to obtain the auditor names, types of audit opinions, and other data needed in the study. Differences in coding were reconciled by a third individual and one of the authors to ensure accuracy. The important auditor identifications are for the firm-years after adopting MAFR rotation rules. When observations from the three countries could not be identified, we drop those observations.

**Descriptive statistics**

Table 1 shows the countries included in the tests for Hypothesis 1 and 2. Two countries offer 19,295 (South Korea) and 2,089 (Brazil) observations, respectively, to test Hypothesis 1. For Hypothesis 2, we are interested in forced auditor changes by an audit firm rotation policy. Table 1 also shows those observations with available data from the three countries offer 1,008 (South Korea), 312 (Brazil), and 74 (Italy), respectively, to test Hypothesis 2. Because of data availability limitation in our global financial statement database, the examination of rotation enactment on audit quality is based solely on data from Brazil and South Korea. Italy adopted mandatory auditor rotation in 1975, which predates the beginning of data in Compustat Global. South Korea enacted mandatory audit firm rotation in 2003 and Brazil adopted rotation rules in 1999.\(^{20}\) Table 2 shows that our sample comprises a range of industries, however, durable manufacturing, computers, finance, insurance and real estate, or other services represent a large

\(^{20}\) In South Korea, the adoption of audit firm rotation rules was passed in 2003 with mandatory enactment in 2006. Some companies voluntarily adopted (and stated as a reason for an auditor change) mandatory audit firm rotation rules before 2006. Our results are qualitatively similar if we begin the firm rotation period in 2006 instead of 2003.
proportion of the sample. The distribution of industries looks fairly similar comparing the pre- and post adoption samples.

Table 3 presents descriptive statistics relating to the variables used in our tests of Hypothesis 1. The table demonstrates that post-MAFR observations have fewer incidents of small positive earnings and more incidents of large negative earnings than do pre-MAFR observations. Although these descriptive statistics do not control for other factors, they suggest that post-MAFR observations are less likely than pre-MAFR to manage earnings towards a target and more likely to recognize losses in a timely manner based on univariate comparisons. In terms of control variables, post-MAFR observations show less leverage scaled by assets, lower size, less equity issuance, more new debt issuance, and lower levels of asset turnover than pre-MAFR observations. Interestingly, the post-MAFR use of Global Six audit firms is lower than the pre-MAFR sample.

Results of H1 (debonding effect)

Table 4 presents the results of comparing the accounting quality for non-rotation and rotation observations in the pre- and post-adoption periods, respectively. The table reveals that observations in the post-adoption periods generally evidence less earnings management and more timely loss recognition than the observations in the pre-adoption period. The first finding related to earnings management, reported in Panel A, indicates that rotation observations exhibit a significantly higher variability of change in net income, $\Delta NI$, 0.2500 versus 0.0385. The higher variance of net income in post-adoption periods relative to pre-adoption periods is statistically
different using parametric tests of variance homogeneity (Folded F test) at \( p < 0.01 \). The second earnings smoothing metric is the differences in the variances of cash flows. We make no prediction on the expectations for this variable. The test is included as a benchmark to the previous test. Although the variance in changes in cash flows increases for the post-adoption period relative to the pre-adoption period, the increase for the variance of changes in net income is greater than an order of magnitude difference in the increase in the variance of changes in cash flows. The results indicate that the smoother earnings stream observed for the pre-adoption rotation sample can be attributed more to earnings than cash flows.

Tests of the correlation between \( ACC \) and \( CF \) before and after adoption of MAFR indicate that earnings are less likely to be managed after adoption. Although a negative correlation is expected, larger magnitudes of this correlation indicate, however, efforts to smooth reported earnings that do not reflect a firm’s underlying economic performance (Skinner and Myers 1999). The tests on both Spearman and Pearson correlation coefficients are consistent with greater discretion (larger negative correlation coefficients) in the periods before adopting MAFR. In sum, the results on several earnings smoothing metrics show evidence that post-MAFR observations exhibit less smoothing of earnings compared with pre-MAFR observations.

\[ \text{---} \]

21 Although the order of magnitude of the residual variances is similar to that in Lang, Raedy, and Wilson (2006) and Barth, Landsman, and Lang (2008), the variances are not directly comparable between the three studies because our change in net income regression does not include the same control variables (due to data limitations). Recognizing omitted correlated variables (relative to Barth, Landsman, and Lang 2008) pose a potential problems when such control variables are not specified in two-stage regression designs such as ours, we note the our sample of firms are essentially firm-specific controls across the pre- and post-adoption groups. As such, it is unlikely that the differences in our models would systematically bias our results. Additionally, one of the excluded controls previously documented in the literature (a cross-listing indicator variable) is, by construction, not an important determinant since cross-listed companies are generally not subject to (domestic) mandatory auditor rotation rules.
The final two tests of Hypothesis 1, reported in Panel B and Panel C of Table 4, respectively, assess changes in managing earnings towards an earnings target and changes in timely loss recognition after the adoption of rotation rules. In the test of changes in managing earnings towards an earnings target, the coefficient on $SPOS (-0.4725)$ is reliably negative, suggesting that pre-MAFR observations report small positive earnings more frequently than do post-MAFR. The last finding reported in Table 4 is a test of differences in timely loss recognition in the pre-versus post-adoption periods. The significantly positive coefficient on $LNEG (2.1331)$ indicates that, incremental to the effects associated with the included control variables, post-MAFR observations recognize large losses more frequently than pre-MAFR observations. This finding suggests that, relative to post-MAFR observations, pre-MAFR observations smooth earnings by delaying the effects of large negative outcomes. That is, the findings also indicates higher audit quality in the sample after the adoption of audit firm rotation rules.

Results of H2 (rolling off effect, low-knowledge effect)

To test Hypothesis 2, we follow DeFond and Subramanyam (1998) and investigate the allowed discretion in the year before and after auditor changes. We estimate expected accrual models by country, year, and industry–requiring at least 20 observations in each 2-digit SIC industry.$^{22}$ The resulting sample sizes are smaller than those used to test H1 because observations are lost in the data requirements for estimating expected accruals and because our test are focused on forced (by MAFR rules) audit firm changes.

$^{22}$ The sample sizes in Italy are relatively small so the expected accrual regressions are not estimated by industry. We delete all auditor change observations in which the predecessor auditor is Arthur Andersen in years 2000 to 2002 and drop any observation in post-MAFR sample for which audit firm tenure exceeds the maximum allowed by rotation rules. Such observations are likely to represent cross-listed companies (in some cases exempt from firm rotation policies) or bad data.
The number of auditor changes in our sample, given the available data and auditor names that can be reliably used to identify changes, include 1,008 observations for South Korea, 312 for Brazil, and 74 for Italy. After calculating expected accruals using two different methods (Jones 1991; Ball and Shivakumar 2005), we present the results in Table 5. The table shows the mean and median levels and changes in discretionary accruals for each measure together with \( p \)-values for two-tailed tests. The first row of this table reports that the mean and median levels given by both estimation methods for the discretionary accruals obtained in the year before an auditor change. These median levels are tested using a nonparametric test based on Wilcoxon signed-ranks that requires no assumptions about the distribution of the discretionary accruals. Tests of normality (Kolmogorov-Smirnov and Shapiro-Wilk) are rejected for the distribution of discretionary accruals shown in Table 5, indicating the results based on these the nonparametric tests are more reliable tests of whether the resulting discretionary accruals deviate from zero than the results of parametric tests. In sum, the evidence, although not overwhelming, suggests that audit quality is lower in the year before an auditor change in rotation periods.

The results shown in the second row of Table 5 are for tests of differences between discretionary accruals in the last year audited by predecessor auditors and those in the first year of the successor auditor. We find that the mean and median levels of changes in discretionary accruals obtained from both the Jones (1991) and the Ball and Shivakumar (2006) models are insignificantly different from zero.

The third row shows the results for the proxies for allowed discretion in the first year audited by successor audit firms in rotation periods. As reported in the first row of Table 5 (for the predecessor’s last year), the evidence, albeit again not overwhelming, indicates that audit quality
is lower in the year after an auditor change in firm rotation periods. When the level of allowed
discretion (in median values) is compared with the levels of scaled accruals (not tabulated), the
evidence suggests that approximately 25 percent of realized accruals are allowed opportunistic
discretion. The median values of discretionary accruals, particularly in initial audits, also range
from ½ to one percent of total assets. Because it would be difficult to argue that such levels
could not be considered economically meaningful, the evidence from the more powerful of the
two statistical tests used suggests that the last year (rolling off hypothesis) audited by the
predecessor auditor and the first year (client knowledge hypothesis) audited by the successor
auditor are associated with more allowed discretion.

**Supplemental Tests**

*Alternative earnings measure*

Unlike the North American database, the Compustat Global database does not report net
income (or loss) after subtracting extraordinary items (XI) and discontinued operations (DO).
The measure of net income or loss, therefore, is a constructed measure (Compustat Global
mnemonics IB + XI + DO). Nonetheless, the conclusions are qualitatively similar if we use
income before extraordinary items (IB) as the income measure used throughout the analysis.

*Use of alternative models to estimate expected accruals*

Kothari, Leone, and Wasley (2005) demonstrate that tests of discretionary accruals that use a
performance-matched approach are better specified than those using a linear regression-based
approach (i.e., an inclusion of ROA in the estimation of expected accruals). They therefore
suggest the use of performance matching, where matching is on the basis of a firm’s return on
assets and industry membership, to produce better expectations on accruals. Our conclusions are
robust both to this approach and to the use of the Jones (1991) model of discretionary accruals in place of the modified-Jones model.

*Minimum number of observations used in industry-year regressions*

When estimating expected accruals models, researchers typically require a minimum number of observations per industry and year to achieve consistency in the parameter estimates from OLS regressions. Ideally, the minimum number should approach at least 30 observations per year and industry; however, in our case, using this minimum number results in a sample size that is considerably smaller than that used in the main tests for Hypothesis 2. Nonetheless, our conclusions are robust to a minimum number of 30 observations per year and industry.

*Falsification test*

To test the validity of our results, we also ran a *placebo* test where we choose the midpoint of the pre-MAFR samples for South Korea and Brazil and test whether audit quality is improved in this pseudo post-MAFR. The idea behind this test is that if our model were incorrectly specified or due simply to time, it would identify improved audit quality regardless of the adoption of MAFR rules. The falsification results do not indicate any significant improvement in audit quality in the pseudo post-MAFR period compared to the pseudo pre-MAFR period. We note that the sample sizes are smaller for this test compared with our main test.

5. **CONCLUSIONS**

Our results indicate that the audit markets in which mandatory audit firm rotation rules have been enacted are of higher quality following the adoption of these rules. We find that firms in audit markets after adoption of rotation rules exhibit less earnings smoothing, less managing of earnings towards a target of small positive earnings, and more timely recognition of losses.
Although we include research design features to mitigate the effects of changes in incentives and the economic environment in the post-MAFR periods compared with the pre-MAFR periods, we cannot be sure that our findings are attributable to adoption of rotation rules. However, we note that our firms in the rotation audit markets are effectively their own firm-specific controls and we use various proxies for earnings management. Relying on these research design choices to enhance the reliability of our findings, we conclude that the adoption of mandatory auditor rotation rules improves audit quality by reducing the incidence of earnings smoothing, by decreasing the reporting of small profits, and by increasing the reporting of large losses.

Because rotation rules (by construction) are likely to increase the level of audit firm changes in audit markets adopting rotation rules, we also investigate audit quality changes around those transition points (the years before and after auditor changes). Our results show not only lower audit quality but also appear to be economically important levels of allowed discretion in both the year before and the year after an auditor change.

We conclude that the evidence is convincing that audit quality improves in audit markets after the adoption of rotation rules, but that there is also notable erosion of audit quality around forced auditor changes. These findings suggest that, as often discussed in the debate of rotation rules, any adoption of rotation rules warrants careful consideration of ways to mitigate the erosion of audit quality when making the transition to new auditors under rotation rules.

One notable limitation of our study is that we did not address some other potential costs to rotation rules. It is possible, for example, that rotation rules will increase the overall costs of audits in audit markets when they are adopted because of an increase in costly initial audits. Nonetheless, given the level of audit fees to firm values reported in some studies (e.g., less than 1
percent of market values as reported in Whisenant and Willenborg 2016) and the relative costs of audit failures (e.g., Waste Management’s loss of $6 billion in market capitalization when revelations of irregularities in accounting were disclosed in 1998), the argument that changes in audit fees is an important consideration seems difficult to support on that basis alone. Our research design also left unaddressed other important benefits of rotation rules including increased levels of competition, enhanced perceived auditor independence by stakeholders to corporations, and lower levels of audit concentration. Although our descriptive statistics show in our sample that global audit firm concentration levels decreased from 58 to 52 percent following the adoption of rotation rules, we leave those important and unaddressed research questions to future research.
REFERENCES


### TABLE 1
COUNTRIES ADOPTING MANDATORY AUDIT FIRM ROTATION (MAFR)
Panel A: Countries in main tests

<table>
<thead>
<tr>
<th>Countries</th>
<th>H1 (debonding) pre-MAFR no. of obs.</th>
<th>H1 (debonding) post-MAFR no. of obs.</th>
<th>H2 (rolling off, client knowledge)</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Korea²</td>
<td>11,035</td>
<td>9,843</td>
<td>1,008</td>
</tr>
<tr>
<td>Brazil³</td>
<td>472</td>
<td>2,447</td>
<td>312</td>
</tr>
<tr>
<td>Italy³</td>
<td>n/a</td>
<td>2,601</td>
<td>74</td>
</tr>
</tbody>
</table>

This table denotes the mandatory audit firm rotation (MAFR) countries that will be included in the tests of hypotheses H1 and H2. Financial accounting information are obtained from the May 2016 update of the Compustat Global Database. For the three countries, Compustat Global Database has financial data beginning in 1990. Sample of firms by year in pre- and post-adoption of mandatory audit firm rotation (MAFR) rules.

² Brazil adopted rotation rules in 1999
³ South Korea adopted audit firm rotation rules in 2003
⁴ Italy adopted rotation rules in 1975, predating the start of available financial statement data. Due to data availability limitations in the database, Italy, which has required mandatory audit firm rotation since 1975, only has available data for the post-adoption period (H2 only).
TABLE 2
DESCRIPTIVE STATISTICS: INDUSTRY ANALYSIS FOR H1 and H2

<table>
<thead>
<tr>
<th>Industry</th>
<th>pre-MAFR</th>
<th></th>
<th>post-MAFR</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Mining &amp; Construction</td>
<td>647</td>
<td>5.6%</td>
<td>619</td>
<td>4.2%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>685</td>
<td>6.0%</td>
<td>650</td>
<td>4.4%</td>
</tr>
<tr>
<td>Textiles &amp; Printing</td>
<td>1,255</td>
<td>10.9%</td>
<td>1,467</td>
<td>9.9%</td>
</tr>
<tr>
<td>Chemicals</td>
<td>889</td>
<td>7.7%</td>
<td>898</td>
<td>6.0%</td>
</tr>
<tr>
<td>Pharmaceuticals</td>
<td>690</td>
<td>6.0%</td>
<td>626</td>
<td>4.2%</td>
</tr>
<tr>
<td>Extractive</td>
<td>101</td>
<td>0.9%</td>
<td>158</td>
<td>1.1%</td>
</tr>
<tr>
<td>Durable Manufacturers</td>
<td>4,410</td>
<td>38.3%</td>
<td>5,419</td>
<td>36.4%</td>
</tr>
<tr>
<td>Computers</td>
<td>1,379</td>
<td>12.0%</td>
<td>2,380</td>
<td>16.0%</td>
</tr>
<tr>
<td>Transportation</td>
<td>398</td>
<td>3.5%</td>
<td>970</td>
<td>6.5%</td>
</tr>
<tr>
<td>Utilities</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Retail</td>
<td>526</td>
<td>4.6%</td>
<td>749</td>
<td>5.0%</td>
</tr>
<tr>
<td>Financial Services</td>
<td>0</td>
<td>0.0%</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Services</td>
<td>434</td>
<td>3.8%</td>
<td>757</td>
<td>5.1%</td>
</tr>
<tr>
<td>Unclassified</td>
<td>93</td>
<td>0.8%</td>
<td>198</td>
<td>1.3%</td>
</tr>
<tr>
<td>Totals</td>
<td>11,507</td>
<td>100.0%</td>
<td>14,891</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

This table denotes the industry distribution for the mandatory audit firm rotation (MAFR) countries that will be included in the tests of hypotheses H1 and H2. Financial accounting information are obtained from the May 2016 update of the Compustat Global Database. Sample of firms by year in pre- and post-adoption of mandatory audit firm rotation (MAFR) rules.

Industry membership is determined by SIC classifications as follows: agriculture/food (0100-0999) mining & construction (1000-1999, excluding 1300-1399), food (0100-0999, 2000-2111), textiles & printing/publishing (2200-2799), chemicals (2800-2824, 2840-2899), pharmaceuticals (2830-2836), extractive (2900-2999, 1300-1399), durable manufacturers (3000-3999, excluding 3570-3579 and 3670-3679), computers (7370-7379, 3570-3579, 3670-3679), transportation (4000-4899), utilities (4900-4999), retail (5000-5999), financial services (6000-6999), services (7000-8999, excluding 7370-7379), and all others as unclassified.
### TABLE 3
DESCRIPTIVE STATISTICS RELATING TO VARIABLES: Hypothesis 1

<table>
<thead>
<tr>
<th>Test Variables</th>
<th>Pre-MAFR Mean</th>
<th>Pre-MAFR Median</th>
<th>Pre-MAFR Variance</th>
<th>Post-MAFR Mean</th>
<th>Post-MAFR Median</th>
<th>Post-MAFR Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANI</td>
<td>0.005</td>
<td>0.003</td>
<td>0.040</td>
<td>-0.014</td>
<td>0.003</td>
<td>0.263</td>
</tr>
<tr>
<td>ΔCFO</td>
<td>0.007</td>
<td>0.007</td>
<td>0.014</td>
<td>0.004</td>
<td>0.005</td>
<td>0.018</td>
</tr>
<tr>
<td>SPOS</td>
<td>0.126</td>
<td>-</td>
<td>-</td>
<td>0.072</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>LNEG</td>
<td>0.032</td>
<td>-</td>
<td>-</td>
<td>0.108</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>LEV</td>
<td>0.606</td>
<td>0.615</td>
<td>0.058</td>
<td>0.497</td>
<td>0.473</td>
<td>0.082</td>
</tr>
<tr>
<td>GROWTH</td>
<td>0.199</td>
<td>0.120</td>
<td>0.225</td>
<td>0.198</td>
<td>0.097</td>
<td>0.352</td>
</tr>
<tr>
<td>EISSUE</td>
<td>0.262</td>
<td>-</td>
<td>-</td>
<td>0.235</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>DISSUE</td>
<td>0.196</td>
<td>0.097</td>
<td>0.298</td>
<td>0.254</td>
<td>0.089</td>
<td>0.524</td>
</tr>
<tr>
<td>ATO</td>
<td>1.038</td>
<td>0.935</td>
<td>0.286</td>
<td>0.977</td>
<td>0.885</td>
<td>0.325</td>
</tr>
<tr>
<td>BIG</td>
<td>0.578</td>
<td>-</td>
<td>-</td>
<td>0.520</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

This table denotes the industry distribution for the mandatory audit firm rotation (MAFR) countries that will be included in the tests of hypotheses H1. Financial accounting information are obtained from the May 2016 update of the Compustat Global Database. Sample of firms by year in pre- and post-adoption of mandatory audit firm rotation (MAFR) rules.

### Variable Definitions

- $NI$ = the net income (where $NI = IB + XI + DO$ using Compustat Global mnemonics) at year $t$ scaled by end of year asset (AT)
- $ΔNI$ = the one-year change in $NI$ at year $t$ scaled by end of year asset (AT)
- $CFO$ = the cash flow from operations (OANCF) at year $t$ scaled by end of year asset (AT)
- $ΔCFO$ = the one-year change in $CFO$ at year $t$ scaled by end of year asset (AT)
- $SPOS$ = is an indicator set to 1 for observations for which net income ($NI$) scaled by end of year asset (AT) is between 0 and 0.01
- $NI$ = the net income (where $NI = IB + XI + DO$ using Compustat Global mnemonics) at year $t$ scaled by end of year asset (AT)
- $ΔNI$ = the one-year change in $NI$ at year $t$ scaled by end of year asset (AT)
- $CFO$ = the cash flow from operations (OANCF) at year $t$ scaled by end of year asset (AT)
- $ΔCFO$ = the one-year change in $CFO$ at year $t$ scaled by end of year asset (AT)
- $SPOS$ = is an indicator set to 1 for observations for which net income ($NI$) scaled by end of year asset (AT) is between 0 and 0.01
<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>LNEG</td>
<td>is an indicator set to 1 for observations for which net income (NI) scaled by end of year asset (AT) is less than $-0.20$</td>
</tr>
<tr>
<td>SIZE</td>
<td>the natural logarithm of total revenue (Compustat Global mnemonic SALE, to which we add the value of 1) at year t-1</td>
</tr>
<tr>
<td>GROWTH</td>
<td>one-year growth rate in total revenues at year t ($\Delta$SALE)</td>
</tr>
<tr>
<td>EISSUE</td>
<td>a categorical variable equal to one if sale of common and preferred stock (SSTK, a financing activity of the statement of cash flows) at year t is greater than 10 percent of total assets (AT) at year t; zero otherwise</td>
</tr>
<tr>
<td>LEV</td>
<td>total liabilities (LT) divided by end of year equity book value (SEQ) at year t</td>
</tr>
<tr>
<td>DISSUE</td>
<td>one-year growth rate in total liabilities at year t ($\Delta$LT)</td>
</tr>
<tr>
<td>ATO</td>
<td>total revenues (SALE) at year t divided by total assets (AT) year t</td>
</tr>
<tr>
<td>CFO</td>
<td>cash flow from operating activities (OANCF) at year t divided total assets (AT) at year t</td>
</tr>
<tr>
<td>BIG</td>
<td>an indicator variable that equals 1 if audited by a global audit firm in year t, 0 otherwise. Global audit firms during our sample period include Arthur Andersen, Coopers &amp; Lybrand (Coopers &amp; Lybrand merged with Price Waterhouse on July 1, 1998), Ernst &amp; Young, Deloitte &amp; Touche, KPMG, PricewaterhouseCoopers, Binder, Dijker, Otte (known as BDO Seidman in North America), and Grant Thornton</td>
</tr>
</tbody>
</table>
### TABLE 4
TESTS OF HYPOTHESIS 1 (DEBONDING EFFECT)
Comparison of Accounting Quality Metrics Before and After Adoption of MAFR Policies in South Korea and Brazil

<table>
<thead>
<tr>
<th>AQ Metric</th>
<th>Test</th>
<th>Pre-MAFR</th>
<th>Post-MAFR</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel A: Earnings Smoothing Metric</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variability of $\Delta NI$</td>
<td>Pre &lt; Post</td>
<td>0.0385</td>
<td>0.2500</td>
<td>0.2115**</td>
</tr>
<tr>
<td>Variability of $\Delta CFO$</td>
<td>Pre $\neq$ Post</td>
<td>0.0080</td>
<td>0.0117</td>
<td>0.0037*</td>
</tr>
<tr>
<td>Correlation of ACC and CF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spearman correlation coefficients</td>
<td>Pre &lt; Post</td>
<td>-0.5496</td>
<td>-0.3800</td>
<td>-0.1696**</td>
</tr>
<tr>
<td>Pearson correlation coefficients</td>
<td>Pre &lt; Post</td>
<td>-0.4911</td>
<td>-0.2278</td>
<td>-0.2633**</td>
</tr>
<tr>
<td>Panel B: Managing Earnings Toward Targets</td>
<td></td>
<td></td>
<td></td>
<td>Estimated Coefficient</td>
</tr>
<tr>
<td>Small Positive NI (SPOS)</td>
<td>negative</td>
<td></td>
<td></td>
<td>-0.4725**</td>
</tr>
<tr>
<td>Panel C: Timely Loss Recognition</td>
<td></td>
<td></td>
<td></td>
<td>positive</td>
</tr>
<tr>
<td>Large Negative NI (LNEG)</td>
<td></td>
<td></td>
<td></td>
<td>2.1331**</td>
</tr>
</tbody>
</table>

We define variability of $\Delta NI (\Delta CF)$ as the variance of residuals from a regression of the $\Delta NI (\Delta CF)$ on the control variables. The residuals are winsorized at the 1 percent level to control for outliers. Correlation of ACC and CF is between the residuals from the ACC and CF regressions; we compute both sets of residuals from a regression of each variable on the control variables. $\Delta NI, \Delta CF, ACC, and CF$ are defined in table 4.

We obtain tests of differences in variances from Folded F test. Nonparametric tests are performed on the remaining tests (Wilcoxon and Median Scores).

*, ** indicates significant difference between the pre- and post-adoption periods at the 0.05 and 0.01 levels (one-tailed), respectively.
Table 5
Tests of Hypothesis 2
Discretionary accruals in years before and after changing auditors in Post-MAFR periods

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Median</td>
</tr>
<tr>
<td>Year – 1</td>
<td>-0.004</td>
<td>0.006</td>
</tr>
<tr>
<td>(p-value)</td>
<td>(0.305)</td>
<td>(0.091)</td>
</tr>
<tr>
<td>Change from –1 to 0</td>
<td>-0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>(p-value)</td>
<td>(0.861)</td>
<td>(0.826)</td>
</tr>
<tr>
<td>Year 0</td>
<td>-0.001</td>
<td>0.007</td>
</tr>
<tr>
<td>(p-value)</td>
<td>(0.725)</td>
<td>(0.008)</td>
</tr>
</tbody>
</table>

Sample of firms with mandatory audit firm rotation rules (MAFR) in South Korea, Brazil, and Italy. MAFR rules were adopted in 1975 in Italy, 2003 in South Korea, and 1999 in Brazil. Tabulated statistics are from the years after passage of MAFR rules with available data for all three countries. 

p-values for the means are from two-tailed t-tests of the null hypothesis that the mean equals 0.

p-values for the medians are from two-tailed Wilcoxon sign rank tests of the null hypothesis that the central tendency equals 0.