DOES MANDATORY AUDIT FIRM ROTATION ENHANCE AUDITOR INDEPENDENCE? EVIDENCE FROM SPAIN*

Authors: Emiliano Ruiz-Barbadillo (University of Cádiz, Spain)

Nieves Gómez-Aguilar (University of Cádiz, Spain)

Nieves Carrera (Instituto de Empresa Business School, Spain)

ABSTRACT

In this study, we document evidence on the impact of mandatory rotation of audit firms on auditor independence using Spanish archival data. Rotation of audit firms every nine years was mandatory in Spain from 1988-1995. Although the rule was never enforced, the Spanish context provides a unique setting to examine the effects that mandatory audit firm rotation has on auditor's behavior. We examine audit reports for a sample of financially stressed companies from 1991-2000 to compare auditors' reporting behavior in a regime with rotation (mandatory rotation period: 1991–1994) and one without rotation (post-mandatory rotation period: 1995–2000). We find no evidence to suggest that a mandatory rotation requirement is associated with a higher likelihood of issuing going-concern opinions. We test two competing hypotheses concerning the impact of mandatory rotation on the likelihood of auditors' issuing going-concern modified audit opinions. Our results suggest that auditors' incentives to protect their reputation positively impact on the likelihood of issuing going-concern opinions, while auditors' incentives to retain existing clients did not impact on their decisions in both the mandatory rotation and post-mandatory rotation periods. Overall, our results provide empirical support for the arguments put forward by opponents of mandatory rotation.

INTRODUCTION

The objective of this paper is to examine the impact of mandatory audit firm rotation on auditor independence.[1] Motivation for this study comes from: (1) the interest of regulators and legislators in many countries regarding mandatory auditor rotation as a mechanism for strengthening auditor independence (e.g., US General Accounting Office [GAO] 2003; GAO 2004; UK Final Report of the Coordinating Group on Accounting and Auditing Issues [CGAAI] 2003); and (2) the need for empirical research on the effects of such a policy (Dopuch et al. 2001; DeFond and Francis 2005).[2]

The mandatory rotation of auditors has been a subject of debate by practitioners (AICPA's Cohen Commission 1978), academicians (Geiger and Raghunandan 2002) and regulatory bodies (GAO 2003). Subsequent to the collapses of Enron and WorldCom, legislators and regulators across the board were compelled to discuss the adoption of a policy of mandatory rotation (GAO 2003; CGAAI 2003). In fact, in the US, there were calls for the immediate implementation of mandatory rotation of audit firms, although (as had occurred previously − see the US Senate's Metcalf Subcommittee 1976; AICPA 1992; GAO 1996), these provisions were rejected. Nevertheless, the Sarbanes-Oxley Act of 2002 (US House of Representatives 2002) mandated the US Comptroller General to conduct a study of the potential effects of mandatory rotation. The US GAO undertook the study of the effects of this policy (GAO 2003, 2004) and concluded that audit firm rotation "may not be the most efficient way to strengthen auditor independence and improve audit quality" (GAO 2003, 2). However, the GAO left open the possibility of revisiting mandatory audit firm requirements, if deemed necessary (Nagy 2005).[3] Countries such as Brazil, India, Italy, Singapore, and

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[1] Hereafter we use the terms 'rotation' and 'auditor rotation' to mean the 'rotation of audit firms' unless stated otherwise.

[2] As noted by DeFond and Francis (2005, 6): "Because there is a realistic concern that mandatory audit firm rotation may yet be proposed by the SEC, we encourage more research in this area".

[3] Similarly, in the UK, the CGAAI analyzed the case for mandatory rotation of audit firms. The final report did not recommend its implementation (Final Report of the CGAAI, 29 January 2003). Recently, rotation has been

South Korea have adopted rotation policies on the grounds that they may reduce threats to auditor independence by avoiding long-term relationships between auditors and their clients (see e.g., GAO 2003).

The issue of mandatory audit firm rotation has been an area of interest in the auditing literature for quite some time (for reviews, Catanach and Walker 1999; Gietzmann and Sen 2002; Cameran et al. 2005). On the one hand, it is suggested that the auditor's economic dependence on existing clients and managers' influence over the reappointment of the incumbent auditor might affect auditor reporting behavior (DeFond et al. 2002). Thus, a limit on the time horizon for an audit engagement could improve audit quality by reducing the auditor's incentives to issue biased reports as well as decreasing managements' ability to influence the auditor's decisions. On the other hand, it is argued that rotation is unnecessary because market-based incentives, such as loss of reputation and litigation costs, dominate the expected benefits from compromising auditor independence (AICPA 1992, 1997; DeFond et al. 2002; Geiger and Raghunandan 2002).

While there is a sizeable amount of literature supporting and rejecting the implementation of mandatory rotation, direct tests of this policy have been limited as it is "difficult to obtain empirical evidence on the costs and benefits of a proposed regulation prior to its implementation" (Dopuch et al. 2001, 94).[4] An evaluation of the rotation rule is, nevertheless, possible in countries that have adopted a mandatory audit firm rotation policy.

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discussed and rejected in other countries, including Canada and Ireland. In Canada, the Standing Senate Committee on Banking, Trade, and Commerce concluded: "We do not … support a requirement for rotation of the audit firm, since in our view valuable company-specific experience would be lost" (2003, 21). In Ireland, the Review Group on Auditing concluded that "the introduction of mandatory auditor rotation could undermine the effectiveness of audits" (2000, 188). In Greece, rotation of audit firms was mandatory, but the requirement was removed in 1994 (Arruñada and Paz-Ares 1997).

[4] We are not aware of any empirical study using archival data to examine the impact of mandatory audit firm rotation on auditors' reporting behavior. However, various studies have analyzed audit quality in settings with similar features to those operating under mandatory rotation. Chung (2004) studied the impact of limitations of the length of the auditor–client relationship through auditor designation requirements for Korean listed firms. Nagy (2005) analyzed the compulsory forced change of audit firms caused by the disappearance of Arthur Andersen. Other authors have focused on the effects of audit partner rotation (see Hamilton et al. 2005; Chi et al. 2005).

One such country is Spain, where the mandatory rotation rule was in force from 1988 until 1995. The 1988 Spanish Audit Law established a system where an auditor's appointment could last for no less than three and no longer than nine years (Audit Law, art. 8.4).[5] At the end of the appointment period, the audit firm had to be replaced, and reappointment could not be sought for another three years. The first audit contracts were signed in 1988, with mandatory rotation being a requirement for all audit engagements. The rotation rule was removed in March 1995 by means of a provision included in the Limited Liability Companies Act 1995 (*Ley de Sociedades de Responsabilidad Limitada 1995*). After its removal, auditees could renew an audit contract on a yearly basis once the initial contract expired (for more details, see Carrera et al. 2007).

The change in the regulatory environment—from a regime with mandatory rotation to one without—provides a unique setting to analyze the regulatory effectiveness of audit firm rotation. For seven years (1988–1994 inclusive), auditors' economic incentives and reporting decisions were conditioned by, and subject to, the existence of mandatory rotation. That mandatory rotation was removed before any audit firm was actually required to leave a client does not limit the contribution of our research. On the contrary, a rule intended to enhance auditor independence is expected to influence auditors' reporting behavior during the engagement period.

We contribute to the auditing literature by providing empirical evidence on the impact of mandatory rotation on auditor independence, using the auditor's propensity to issue going concern audit opinions as a surrogate measure of auditor independence. Specifically, we test the impact of rotation on such auditor reporting decisions by comparing the mandatory rotation period (1991-1994) to the post-mandatory rotation period (1995-2000). Using established research methodology, we analyze the relationship between auditor reporting

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[5] The Spanish Audit Law was enacted in 1988 in response to the Company Law Directives of the European Economic Union. For the first time, medium and large firms were legally required to audit their financial statements.

behavior and auditor independence for a sample of financially distressed companies (see e.g., Francis and Krishnan 1999; Carcello and Neal 2000; Geiger and Rama 2003).[6] The underlying assumption for our analysis is that a greater likelihood of auditors issuing a going-concern modified opinion to distressed companies is indicative of greater auditor independence (e.g., DeFond et al. 2002).

The auditing literature has analyzed the economic tradeoff faced by an auditor when assessing the going-concern assumption in some detail (Krishnan and Krishnan 1996; Louwers 1998; Reynolds and Francis 2001). On the one hand, the auditor faces the risk of losing a client when issuing a qualification (*economic dependence effect*), while failing to qualify the company's accounts exposes the auditor to a risk of reputation loss (*reputation protection effect*). It is noteworthy that the prior empirical evidence has consistently provided evidence that auditor incentives are contingent on the legal regimes in which they operate (DeFond and Francis 2005). Assuming that rotation influences auditor reporting behavior by modifying auditor incentives and bolstering the possibility of independent action, we would expect to see different results in Spain when comparing the mandatory and post-mandatory rotation periods (Johnson et al. 2002; Carcello and Nagy 2004). We conduct empirical analysis to examine if the respective tradeoffs between the auditor's economic dependence on existing clients and the incentives to protect the auditor's reputation in the rotation and post-mandatory rotation periods bore witness to distinctive levels of audit reporting (and by association, auditor independence).

Using a sample of 1,326 financially distressed Spanish companies during the period 1991–2000, we find no evidence to suggest that a mandatory rotation requirement is associated with a higher propensity for auditors to issue a qualified audit opinion. Our

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[6] The auditing literature has devoted considerable attention to auditor decisions in the evaluation of the going-concern status of companies because it is one of the most difficult and complex decisions faced by an auditor (Louwers 1998). Various academic studies have examined the relationship between auditor decisions and auditor independence in dealing with financially distressed companies (Craswell et al. 2002; DeFond et al. 2002; Geiger and Rama 2003).

analysis finds no significant association between the auditor's level of economic dependence and the likelihood of issuing a going concern report in both the mandatory rotation and post-mandatory rotation periods. We do, however, find a positive association between the auditors' incentives to protect their reputation and the likelihood of issuing going-concern opinions, regardless of the existence of a mandatory rotation regime. Such positive association is stronger in the post-mandatory rotation period. Overall, our results are consistent with the concerns voiced by those opposing the implementation of mandatory audit firm rotation. Sensitivity analysis confirms that the results are robust across different sub-samples and alternative models specification, thereby providing further support to our findings.

The remainder of the paper is organized as follows. The next section discusses the possible effects of mandatory auditor firm rotation on auditor independence and develops our hypotheses. We then describe the sample data and methodology. Following this, we present the results and robustness tests. The final section discusses the study's implications and limitations.

BACKGROUND AND HYPOTHESES

Arguments Supporting Mandatory Audit Firm Rotation

Auditor independence may be adversely affected by long-term client relationships and the desire to retain a client (GAO 2003). Previous research demonstrates that a company is more likely to retain its auditor when the auditor gives the company a clean opinion, compared with situations where there is disagreement between the auditor and its client (Antle and Nalebuff 1991). That is, managers have incentives to dismiss the auditor in order to avoid a qualified audit opinion. Under such a scenario, auditors face the threat of dismissal if they seek to provide a qualified opinion (Krishnan 1994; Geiger et al. 1998). Thus, if the auditor perceives the client as the source of a perpetual annuity (Carcello and Nagy 2004), the economic interest of incumbent auditors in their clients (*economic dependence)* may serve to

increase management's ability to influence auditor reporting decisions. As suggested by Gietzmann and Sen (2002), auditors who are capable of being indefinitely reappointed can become very concerned about maintaining their existing client base, making them more susceptible, *ceteris paribus,* to collude with management.

Mandatory rotation has been advocated as one measure to overcome this collusion problem (Deis and Giroux 1992; Copley and Doucet 1993). Prior studies note that when audit firm rotation is fixed, auditor independence is less likely to be threatened because management cannot re-engage the incumbent auditor indefinitely (Copley and Doucet 1993). As the value of the individual quasi-rents associated with each client is lower, auditors have fewer incentives to give biased opinions in response to management pressure. Dopuch et al. (2001), in an experimental study, found that auditors in a regime with rotation requirements were less willing to issue biased reports than those in a regime without mandated rotation – suggesting that a mandatory rotation policy could be a mechanism to enhance auditor independence. In other words, the impact of the *economic dependence effect* is such that a higher likelihood of auditor reporting on clients' (going-concern) problems can be expected in a regime with mandatory rotation than in a regime without rotation. Accordingly, our first hypothesis of interest is:

> **H**ROTATION PROPONENTS**:** An auditor's propensity to issue a going-concern modified audit opinion to stressed companies is higher in the mandatory rotation period than in the post-mandatory rotation period due to the *economic dependence effect.*

Arguments against Mandatory Audit Firm Rotation

Opponents of mandatory rotation argue that the audit market provides strong economic and institutional incentives for auditor independence, making mandated rotation unnecessary.[7]

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[7] The audit profession has strongly opposed the introduction of mandatory rotation. Using cost–benefit analysis, the profession argues that there are doubts about whether the potential benefits derived from mandatory rotation overcome the associated transaction costs (AICPA 1978, 1992). The rotation rule is not costless

Under such a setting, the reputation effect is believed to have a major impact on auditor independence, and therefore, on audit quality (DeAngelo 1981; Reynolds and Francis 2001; DeFond et al. 2002). An auditor reputation for performing high-quality audits is positively associated with the ability to earn higher fees and attract clients (Craswell et al. 1995). Accordingly, the loss of reputation caused by the public disclosure of an audit failure can impose significant costs on auditors as it may significantly reduce the present value of future revenue streams from both audit and non-audit services (Krishnan and Krishnan 1996). As such, the desire to protect reputation motivates auditors to maintain their independence because, in the event of an audit failure following a perceived lack of independence, they risk losing future quasi-rents (AICPA 1992). It could, thus, be argued that in relatively well-developed audit markets, the reputation effect associated with the potential loss of future business is sufficiently strong to prevent the risk of collusion between auditor and client, making the provision of rotation rules unnecessary.[8]

Mandatory rotation may undermine auditor independence as periodic audit firm rotation restricts the auditor's ability to build reputation (Arruñada and Paz-Ares 1997). Accordingly, due to the *reputation protection effect,* the auditor's propensity to issue qualified going-concern opinions can be expected to be lower in the mandatory rotation period compared to the post-mandatory rotation period. Our second hypothesis is:

> **H**ROTATION OPPONENTS**:** An auditor's propensity to issuing a going-concern modified audit opinions to stressed companies is lower in the mandatory rotation period than in the post-mandatory rotation period due to the *reputation protection effect.*

because it leads to startup costs being incurred periodically. As a result, under mandatory audit firm rotation, audit costs tend to increase and audit fees are higher (Arruñada and Paz-Ares 1997).

[8] In addition, rotation may decrease audit quality as a result of the disruption of the ongoing relationship between the auditor and the auditee. Previous research has shown that audit quality is lower in the early years of the auditor-client relationship because the auditor is unfamiliar with the client's business, industry, and accounting policies (Carcello and Nagy 2004). Recent studies have provided empirical evidence on the higher frequency of audit failures when auditors perform their first and second audits (Geiger and Raghunandan 2002; Carcello and Nagy 2004).

METHOD

Model Specification

To assess the impact of mandatory audit firm rotation on auditor reporting behavior, we examine the going-concern audit opinions for the mandatory rotation period and the post-mandatory rotation period. We test our hypotheses using the following logistic regression model:

$$GCO = a_0 + a_1 \times ROTATION + a_2 \times INFLUENCE + a_3 \times REPUTATION +$$
$$+ a_4 \times INFLUENCE^* ROTATION + a_5 \times REPUTATION *ROTATION +$$
$$+ a_6 \times PROBFAIL + a_7 \times LOSS + a_8 \times LEVERAGE + a_9 \times SIZE +$$
$$+ a_{10} \times SPECIALIZA TION + a_{11} \times FIRM\text{-}AGE + \varepsilon$$

(1)

The dependent variable *GCO* captures the existence of a going-concern opinion. The variables of interest are: (1) a time dummy variable that distinguishes the mandatory rotation period from the post-mandatory rotation period (*ROTATION*); (2) a variable representing the economic dependence on a particular client (*INFLUENCE*); (3) a variable capturing the impact of reputation (*REPUTATION*); and (4) two interaction variables (*INFLUENCE*ROTATION* and *REPUTATION*ROTATION*). Based on prior research (Reynolds and Francis 2001; Vanstraelen 2002; Gaermynck and Willekens 2003), the control variables included in the model are: (1) the probability of bankruptcy; (2) the existence of losses; (3) leverage; and (4) client size. We also include two additional control factors: (5) audit firm specialization; and (6) the age of the company. Table 1 provides a description of the variables and the predicted relationship in terms of the likelihood of issuing a going-concern opinion. We present the rationale for including these variables below.

---------- Table 1 to appear about here ----------

Dependent Variable

The dependent variable *GCO* is coded 1 when a going-concern uncertainty is disclosed in the audit report and 0 otherwise. To identify going-concern uncertainties we paid close

attention to the nature of the explanatory paragraphs in the audit reports. If these paragraphs mentioned going concerns, and/or expressed doubts regarding the ability of the company to continue in existence, and/or comprised a going-concern disclaimer, then the dependent variable was coded as 1.

Experimental Variables

The binary variable for identifying the time periods with and without mandatory rotation is *ROTATION*. This variable takes on the value 1 for the years 1991–1994 inclusive (mandatory rotation period) and 0 otherwise (post-mandatory rotation period). If, as suggested by proponents of mandatory rotation, the rule is effective in enhancing auditor independence, we would expect a significant and positive association between *ROTATION* and the likelihood of issuing a going-concern modified audit opinion. Conversely, following the arguments put forward by those against rotation, we would expect no association or negative association between *ROTATION* and the likelihood of issuing a going-concern opinion.

INFLUENCE captures an auditor's economic dependence on a particular client. Prior research has argued that when fees from a particular client represent a significant proportion of the auditor's overall revenues, the auditor's power is weakened due to the fear of losing the engagement (DeAngelo 1981; Reynolds and Francis 2001). This is particularly true when there are going-concern uncertainties because the issuance of a going-concern qualification leads to a greater incidence of auditor switching (Krishnan 1994; Geiger et al. 1998). Hence, auditors may compromise their independence by issuing an unqualified opinion in the presence of severe financial distress in return for retaining the quasi-rents from a client in cases where the client represents a large proportion of the auditor's total client base. This situation may exist even with average-sized clients because it appears that auditors would rather retain existing clients than attempt to obtain new clients (Behn et al. 2001). The *INFLUENCE* variable was calculated as the natural log of client sales divided by the sum of

the log of sales of all of the auditor's clients.[9] We expect a negative association between the variable *INFLUENCE* and the likelihood of issuing a going-concern modified opinion –since the higher the economic dependence on a particular client, the more likely the auditor reporting decision is to be affected by client-imposed pressures.[10]

The interaction of *INFLUENCE* and *ROTATION* (*INFLUENCE*ROTATION*) captures whether the auditor's economic dependence has a similar effect on the propensity to issue a going-concern opinion in the rotation period compared to the post-mandatory rotation period. In the absence of rotation, client audit fees may be viewed in the form of a perpetual annuity (Carcello and Nagy 2004), with a higher cost of losing a client than in a case where the maximum length of the audit engagement is fixed. As suggested by the proponents of rotation, the higher the rents the auditor expects to receive over the life of the auditor–auditee relationship, the more likely the auditor is to compromise his/her independence. This leads us to conjecture that in the post-mandatory rotation period, the auditor's economic dependence would be higher, and therefore, the auditor would be more reluctant to issue modified opinions. We expect a positive association between the interaction variable *INFLUENCE*ROTATION* and the likelihood of issuing a going-concern modified opinion.

Prior research indicates that the large international audit firms have a reputation advantage and may provide a higher quality audit (Dopuch and Simunic 1982; Francis and Wilson 1988). Although the loss of reputational capital has significant costs regardless of the size of the audit firm, prior literature has suggested that large audit firms have more to lose if

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[9] Audit fees paid by a particular client would be a better proxy for economic dependence. Unfortunately, in Spain data on audit fees are not available for the period under investigation. As in previous research, we use the ratio of the natural log of a particular client sales divided by the sum of the log of all clients' sales of the auditor as our proxy for a client's relative importance in the auditor's portfolio (Chung and Kallapur 2003). Although we acknowledge that sales is a crude proxy for audit fees, we rely on previous research, which has suggested that client size is an important determinant of audit fees (Simunic 1980).

[10] In the context of going-concern uncertainties, prior research has produce mixed results. Krishnan and Krishnan (1996) found that the lower the client's position in an auditor's size distribution, the more likely the auditor will issue a qualified opinion if the company deserves qualification. Similarly, Louwers (1998) found that the propensity to issue a going-concern opinion is negatively affected by the client's importance to the auditor. Conversely, Reynolds and Francis (2001) found that larger clients (for whom auditors presumably have greater fee dependence) are more likely to receive a going-concern opinion.

their reputation is damaged than small and medium-sized audit firms (DeAngelo 1981; Raghunandan and Rama 1999). First, large firm auditors have more clients, and therefore more quasi-rents to lose, if their reputation is diminished. As quasi-rents may be lost if the quality of an audit is discovered to be lower than expected, brand names serve as collateral against opportunistic behavior by auditors. Second, large firm auditors face greater costs than small or medium-sized firms if allegations of audit failure arise. This is because of the following two reasons: (1) the financial media give greater publicity to alleged malfeasance by a large audit firm, making the consequent loss of reputation much bigger[11] and (2) given their "deeper pockets", large audit firms are more likely to be sued (Raghunandan and Rama 1999). These arguments lead us to use Big 6[12] membership as a proxy for auditors' reputation (variable *REPUTATION*).[13] The variable takes a value of 1 if the auditor is a Big 6 firm and 0 otherwise. Overall, we expect a positive association between the variable *REPUTATION* and the probability of issuing a going-concern modified audit opinion.

The interaction between the variable *REPUTATION* and the time variable *ROTATION* (*REPUTATION*ROTATION*) captures if auditor incentives to maintain reputation changed from the rotation period to the post-mandatory rotation period. An auditor's reputation for performing high-quality audits is positively associated with his/her ability to maintain and attract new clients. A mandatory rotation requirement gives auditors less opportunity to strengthen client relationships and build a reputation for consistent audit quality. Accordingly,

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[11] The potential damages from the discovery of a situation where the quality of the audit was lower than expected is illustrated by the case of Arthur Andersen. Before Andersen was convicted for obstruction of justice on 15 June 2002, many commentators wondered whether it could survive its involvement in the Enron scandal and the consequent damage to its reputation (Business Week, "Can Andersen Survive?" 28 January 2002).

[12] These firms used to be known collectively as the Big 8, then Big 6, Big 5 and now the Big 4 (Deloitte, Ernst & Young, KPMG, and PricewaterhouseCoopers). However, during our research period (1991–2000), the Spanish audit market was dominated by the Big 6 firms: the current Big 4 plus Arthur Andersen and Coopers & Lybrand. Accordingly, we refer to the Big 6 rather than the Big 4 when discussing Spanish results.

[13] Although this variable has been used as a proxy for auditors' reputation (see DeFond 1992), it can be problematic, as it does not capture the differences among Big firms; neither does it differentiate among the reputations of small and medium-sized auditing firms. To test if our results are affected by the use of this proxy we replace the Big 6 versus non-Big 6 variable with an alternative measure. Under the assumption that reputation is highly correlated with audit quality, we use the ratio of sales of the clients of an auditor divided by the sales of all companies in the total audit market as a proxy for reputation (Francis and Wilson 1988). None of the results described later in the paper is sensitive to this alternative specification.

we expect the reputational effect to be lower in the mandatory rotation period than in the post-rotation period. We predict a negative association between the propensity to issue a going-concern opinion and the interaction term *REPUTATION*ROTATION.*

Control Variables

We also incorporate a number of variables that the extant literature has shown to be associated with the presence of going-concern modified audit opinions. Three variables (*PROBFAIL, LOSS,* and *LEVERAGE*) measure the financial condition of each company. Prior research has shown that auditors issue going-concern opinions more often when the financial statements indicate severe financial distress (Reynolds and Francis 2001). We captured financial distress (*PROBFAIL*) using Zmijewski's (1984) financial condition score (Carcello and Neal 2000; DeFond et al. 2002).[14] We expect companies with a higher value of *PROBFAIL* to have a higher likelihood of receiving a going-concern opinion.

Auditors are more likely to issue a going-concern modified opinion when companies report accounting losses (Reynolds and Francis 2001; DeFond et al. 2002). Because companies with multiple-year losses are more likely to fail, we define the variable *LOSS* as a dummy variable indicating a loss in current and prior years. We expect a positive association between the *LOSS* variable and the likelihood of receiving a going-concern opinion.

A firm's default status has been found to be a powerful predictor of a going-concern opinion. Chen and Churn (1992) found that covenant violations are positively associated with receiving a going-concern opinion. Firms close to violation are also more likely to have

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[14] To obtain the variable *PROBFAIL,* we calculate the fitted probability of failure, *p,* as follows: $\hat{p} = 1 - F(-x\hat{\beta})$, where F is the standard normal cumulative distribution function, and the fitted values of the index $x\beta$ are obtained using data on Spanish firms for the vector of variables proposed by Zmijewski (1984) and by assuming that the coefficients given in Zmijewski (1984) are valid. Although the use of Zmijewski's (1984) model has some limitations (e.g., it was developed under a different time period) we rely on the coefficients provided by this model because (1) a generally accepted model has not been established for Spanish companies, and (2) it has been widely used in research related to going-concern opinions (e.g., Carcello and Nagy 2004). To test whether our results are sensitive to the use of this proxy for financial distress, we estimate a model wherein the *PROBFAIL* variable was replaced by individual ratios (return on assets, financial leverage and liquidity). None of the results were sensitive to the alternative specification of the variable.

higher leverage (DeFond et al. 2002). Thus, we introduce the variable *LEVERAGE* to capture the proximity to covenant violations. *LEVERAGE* is measured by the ratio of total debt to total assets. We expect a positive relationship between the probability of the firm receiving a going-concern modified audit opinion and the level of leverage.

Several other control variables are included in the model as well. The *SIZE* variable captures the effect of auditee size on the probability of receiving a going-concern opinion. Prior studies offer mixed evidence regarding the relationship between *SIZE* and going-concern opinions. On the one hand, it has been found that auditors are more likely to issue going-concern opinions to smaller clients. Larger firms generally have more negotiating power in the event of financial distress, and are commensurately more likely to avoid bankruptcy (Reynolds and Francis 2001; DeFond et al. 2002). However, Craswell et al. (2002) argued that the costs associated with litigation when a large client fails provide an incentive for auditors to be more conservative in their opinion. As with other European countries (see Vanstraelen 2002; Gaeremynck and Willekens 2003), the Spanish environment is characterized by a low level of litigation against auditors (Ruiz-Barbadillo et al. 2000). Thus, we expect a negative relationship between *SIZE* and the dependent variable. *SIZE* was calculated as the natural log of the auditee's total assets (measured in thousands of Ptas).

We control for the differences in auditing firms' abilities to predict financial distress. Specialization in a particular industry enables auditors to gain critical knowledge about the business and the economics of the industry, and these are utilized to evaluate companies' financial positions (Casterella et al. 2004). Biggs et al. (1993) showed that auditor industry specialization is a determinant of an auditor's ability to detect going-concern problems. Thus, identification of financial distress will be easier for a specialized auditor with a deeper knowledge about the client's industry. *Ceteris paribus,* a specialized auditor will have a higher likelihood of issuing a going-concern opinion than will a non-specialized auditor.

Audit firm specialization is measured, for each audit firm, by their clients' sales in a particular industry divided by total sales in the industry. Each industry is defined according to the two-digit Spanish Standard Industry Classification (SIC). Following earlier research (Craswell et al. 1995), specialist auditors are distinguished on the basis of attainment of a threshold level of market share within the market. A threshold of 10% market share was required to designate a specific audit firm as an industry specialist[15] (Defond 1992; Craswell et al. 1995). The *SPECIALIZATION* variable takes a value of 1 when the market share in the specified market exceeds 10% (specialist auditors) and 0 otherwise.

Finally, a variable measuring the age of the client was included in the model. As noted by Rosman et al. (1999), the characteristics of startup companies often differ greatly from mature companies. As younger firms fail more often than older firms, the stage of organizational development may significantly affect the probability of companies receiving a going-concern opinion (Carcello and Neal 2000). The *FIRM-AGE* variable was defined as the age of the company in the sample year.

Sample Selection

The analysis is conducted using a sample of companies extracted from the database of the Spanish Securities and Exchange Commission (*Comisión Nacional del Mercado de Valores*, CNMV) during the period 1991–2000. The database contains audited financial information and the audit reports of all companies issuing shares on the Madrid Stock Exchange. The database includes 4,817 audited company years for the period 1991–2000. Following prior research (e.g., Geiger et al. 2005), financial services and insurance companies were excluded from the sample because their financial ratios differ significantly from those in the non-financial sector, which could potentially generate misleading results. Companies already in liquidation were excluded because there is no doubt concerning their going-concern

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[15] Given the arbitrary nature of the 10% rule we used various cutoffs for auditor specialization (more than 15%; more than 20%). We obtained similar results.

problems and so the audit reports provide little additional information to potential users. Following this procedure, our sample was reduced to 3,119 observations.

Consistent with prior studies, we analyze a sample of financially distressed firms (e.g., Carcello and Neal 2000).[16] Specifically, we include only those companies for which auditors might reasonably be expected to issue a going-concern modified report given their level of financial distress[17]. As in previous studies (e.g. Geiger and Raghunandan 2002), we classify a company as financially stressed if it exhibited at least one of the following financial stress signals: (1) negative working capital; (2) negative retained earnings; and (3) a bottom-line loss. These variables are considered to be contrary factors in Spanish accounting guidelines (ICAC 1991). In addition, we monitored the existence of other factors that could potentially mitigate problems with financial distress. When there are mitigating factors, the auditor may feel justified in not qualifying the audit report, even if there are going-concern problems. Using a methodology similar to that of Reynolds and Francis (2001), we examined the subsequent fiscal year's financial statements to identify important sales of assets or the issuance of new debt or equity. These mitigating factors may affect the auditor's reporting decision. Accordingly, companies that exhibited either or both of these factors were excluded from the sample. The final sample was composed of 1,326 financially stressed-company years, including 90 going-concern opinions of which 33 were first-time going-concern modified audit opinions.

RESULTS

Descriptive Statistics and Univariate Tests

Table 2 provides descriptive data about the sample.

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[16] Carcello and Neal (2000) suggested that auditors' reporting discretion declines when a company has filed for bankruptcy. For this reason, it is important to use a sample of distressed companies in going-concern settings when analyzing auditor independence.

[17] Wilkerson (1987) suggested that, when investigating qualification decisions, it is important to collect experimental and control samples of companies in which the overall degrees of economic uncertainty associated with such companies are similar. If this is not done, any differences may be related to differences in economic uncertainties, rather than in auditors' decision making (Hopwood et al. 1994).

---------- Table 2 to appear about here ----------

Table 3 shows the correlations between the experimental and control variables. Only six correlations between the experimental and control variables are significant (p < .01). The correlation matrix suggests that multicollinearity problems do not exist.

---------- Table 3 to appear about here ----------

Table 4 reports the breakdown of the sample by the type of audit opinion (going-concern modified audit reports versus other audit opinions). Table 4 shows that 90 companies (companies/year) received a going-concern modified opinion and 1,236 companies (companies/year) received a going-concern opinion. The tests indicate that the variables *PROBFAIL* and *LOSS* are significantly different for both groups. In particular, auditors issue more going-concern modified opinions to companies that have a higher probability of failure and have experienced losses in the last two years.

---------- Table 4 to appear about here ----------

Table 5 provides descriptive data for the sample of firms partitioned into two time periods: the period with mandatory rotation (1991–1994), and the post-mandatory rotation period (1995–2000). The means for *PROBFAIL*, *LOSS*, and *LEVERAGE* are higher for the mandatory rotation period than for the post-mandatory rotation period. Therefore, the sub-sample for the rotation period includes more financially stressed companies than the sub-sample for the post-mandatory rotation period. For the experimental variables, only *REPUTATION* is significantly different between the two time periods.

---------- Table 5 to appear about here ----------

Table 6 shows the results of univariate tests comparing the relative frequency of going-concern modified opinions for the mandatory rotation period and the post-mandatory rotation period (Panel A, for the full sample; Panel B, reduced sample including only first-time modified opinions). The results reveal that auditors issued more qualified audit opinions in the

post-rotation period compared to the rotation period, even though the companies in the sub-sample of the rotation period showed higher indicators of financial distress (see Table 5).

---------- Table 6 to appear about here ----------

Multivariate Results

Results from the multivariate logistic regression are presented in Table 7. Panel A provides the results for the main effects model (Model 1) and for the model with interactions (Model 2). Model 1 is significant (Chi-square = 165.329, p <.000). The Hosmer–Lemeshow goodness-of-fit statistic is 7.395 (p = .328), which provides evidence of the model's goodness-of-fit.[18] Model 2 is also significant (Chi-square = 168.683, p < .000) and the Hosmer–Lemeshow statistic (6.231, p = 0.375) indicates a good fit for the model.

---------- Table 7 to appear about here ----------

The coefficient of the *ROTATION* variable in the main effects model (Model 1, Table 7) is negative and significant (p = .031) indicating that, *ceteris paribus*, the probability of auditors issuing a going-concern audit opinion to stressed companies is lower in the mandatory rotation period compared to the post-mandatory rotation period. Two reasons may explain the negative coefficient of *ROTATION*. Firstly, over time auditors develop an in-depth knowledge of the client that is crucial for an effective audit (Petty and Cuganesan 1996; Geiger and Raghunandan 2002).[19] Secondly, previous research has suggested that an auditor's dependence on clients is higher during the initial year(s) of engagement because he/she needs

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[18] We use the Hosmer–Lemeshow goodness-of-fit statistic to assess model fit. The test computes the estimated probability of receiving a going-concern opinion for each company on the basis of the model, ranks them into 10 equal groups of ascending going-concern opinions, and then statistically evaluates the observed and estimated expected frequencies in each tenth under a Chi-square distribution. A significant Hosmer–Lemeshow test suggests differences between the observed and expected frequencies in the groups and a lack of model fit (Hosmer and Lemeshow 2000). Conversely, an insignificant statistic (p > .05) indicates no significant differences between observed and predicted going-concern opinions suggesting good model fit.

[19] In our sample, the average tenure in the post-mandatory rotation period is 6.31 years while in the rotation period it is 2.68 years. The *ROTATION* variable may capture the impact of the length of the engagement. To further analyze this, we replace the *ROTATION* variable with a continuous variable for tenure (length of the engagement, in years). We reestimate the main effects model removing the *ROTATION* variable. The results indicate that the tenure variable is positive and significant.

to recoup the start-up costs of the engagement[20], which, in turn, may make them more vulnerable to threats of dismissal by new clients (e.g., Dye 1991).

In the main effects model, the coefficient for *INFLUENCE* (p > .10) is not significant, which indicates that auditor reporting decision is unaffected by the relative weight of a client in an auditor's portfolio of clients. The coefficient for *REPUTATION* is positive and significant (p < .01), which indicates that a high reputation auditor is more likely to issue a going-concern opinion than an auditor with a lower reputation. This result suggests that reputational capital gives Spanish auditors an incentive to render unbiased reports.

To test our hypotheses, our primary variables of interest are *INFLUENCE*ROTATION* and *REPUTATION*ROTATION*. These interaction terms capture the changes in auditor incentives between the two time periods (see Model 2, Panel A, Table 7). The coefficients of the *INFLUENCE* variable and the interaction term between auditor economic dependence and time period (*INFLUENCE*ROTATION*) are not statistically significant (p > .10). This result suggests that auditor reporting behavior is unaffected by the relative influence of a particular client on an auditor's portfolio of clients, regardless of the existence of a mandatory rotation regime. The effect of reputation in the post-rotation period is given by the positive and significant coefficient of the *REPUTATION* variable (a_3= 1.446; p = .003). The coefficient for *REPUTATION*ROTATION* is negative and statistically significant (p = .023). For the rotation period, the effect of reputation is captured by the sum of the coefficients of *REPUTATION* (a_3 = 1.446) and *REPUTATION*ROTATION* (a_5 = -1.025). According to our results, the impact of *REPUTATION* is higher in the post-mandatory rotation period (1.446) than in the

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[20] These start-up costs may be viewed as sunk costs. The traditional economic argument is that sunk costs can never be recovered, and therefore are irrelevant to subsequent rational behavior. Accordingly, there is no inherent auditor independence problem arising from audit start-up costs since they have no effect on auditor independence. Research on prospect theory, however, has provided evidence showing that sunk costs *do* significantly affect subsequent rational decision making (Arkes and Blumer 1985). Simon and Francis (1988) applied prospect theory to a price-cutting context suggesting that "the auditor might overvalue the magnitude and certainty of future "normal" audit fees and underestimate losses related to independence impairment" (Simon and Francis 1988, 267).

mandatory rotation period (1.446-1.025 = 0.421). This suggests that reputation concerns lead the auditor to more conservative reporting, and consequently, the issuance of more going-concern audit opinions in the post-mandatory rotation period compared to the mandatory rotation period. This finding is consistent with the argument that auditor incentives to maintain reputation are undermined by mandatory rotation policies.

With regard to the control variables, the coefficients for *PROBFAIL* and *LOSS* were positive and significant in both models (p = .000). The variables *LEVERAGE, SIZE, SPECIALIZATION,* and *FIRM-AGE* were not statistically significant.

Our empirical analysis lends support that auditor incentives to protect reputation were higher in the post-mandatory rotation period compared to the rotation period while auditor reporting behavior was not affected by economic dependence. These results allow us to reject H_{ROTATION PROPONENTS} and accept H_{ROTATION OPPONENTS,} at the conventional levels of statistical significance. Our findings are consistent with the position of those against mandatory rotation: audit market mechanisms such as reputation concerns create more incentives for independence than regulatory mechanisms such as mandatory rotation of audit firms**.**

To examine whether sample composition drive our results, we replicate our analysis for a sub-sample of first-time going-concern opinions (see Panel B, Table 7). Since prior research has found that auditors issue going-concern opinions more often when prior opinions have disclosed going-concern problems (Reynolds and Francis 2001), it is important to assess whether persistence patterns in audit reporting might have affected our results. The results of this reduced sample are similar to those presented in Panel A, demonstrating the lack of any persistence effect and providing further support that our results are not driven by the sample selection.

Lastly, to test whether the cross-sectional results suffer from unobserved heterogeneity bias, we estimate a fixed-effects conditional logit model (Balgati 2001).[21] The results reported in Panel C of Table 7 (Models 5 and 6) show that the fit of the fixed effects model and the signs and significance of the coefficients are similar to the standard logit model (Panel A, Table 7). Thus, we conclude that the cross-section results do not suffer from a significant heterogeneity problem.

SENSITIVITY ANALYSES

We performed a number of additional analyses (results generally not tabulated) to test the robustness of our results. First, we reran the model including all firms (3,119 observations), not just financially distressed companies. The results were insensitive to the different samples, with the *REPUTATION* variable positive and significant at the 5% level and *ROTATION* and *REPUTATION*ROTATION* variables negative and significant at the 5% level. The variables *INFLUENCE* and *INFLUENCE*ROTATION* were not significant.

Prior evidence from the Spanish audit market suggests that companies use auditor switching to avoid receiving qualified audit reports (Gómez-Aguilar and Ruiz-Barbadillo 2003). We removed the voluntary changes of auditors from the sample (45 auditor changes) to avoid the possible effects of these observations in our results. We found that *ROTATION*, *REPUTATION,* and *REPUTATION*ROTATION* variables were significant at the 5% level. Similar to our results in Table 7, *INFLUENCE* and *INFLUENCE*ROTATION* were not statistically significant (p = .321 and p = .225, respectively).

The largest and smallest companies may have a disproportionate effect on the auditor's economic dependence. To ensure that our results were not being driven by these companies,

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[21] As it is likely that heterogeneity in individual behavior will depend on unobserved individual characteristics, the use of cross-section data runs a risk of omitted variable bias in the estimated coefficients. Given the characteristics of our sample, it is reasonable to expect that the probability of receiving a going-concern audit opinion may differ markedly between firms due to unobservable firm-specific traits. The use of panel data allows us to control for unobserved firms' characteristics, which reflects persistent heterogeneity among firms.

we excluded the top 3% (or largest) companies in the sample and the bottom 3% (based on companies' sales). The results remain essentially the same as those reported in Table 7: *INFLUENCE* and *INFLUENCE*ROTATION* were not significant, the *REPUTATION* variable was positive and significant at the 5% level, while the *ROTATION* and *REPUTATION*ROTATION* variables were negative and significant.

We also considered the possibility that our results were affected by differences in the economic environment between the two time periods, namely, 1991–1994 and 1995–2000. Using a research design developed by Francis and Krishnan (2002) (see also Geiger et al. 2005), we determined whether any changes in the issuance of going-concern opinions could be explained by changes in the client characteristics between the two time periods. The change in the probability of issuing a going-concern opinion may occur for two reasons: (1) the auditor adopted a more conservative reporting policy in the post-mandatory rotation period (auditor strategy); and/or (2) the clients were more financially distressed in the post-mandatory rotation period (clientele risk characteristics).[22] To analyze which of these factors explained the change in probabilities, we estimated the model in Equation (1) separately for each time period[23]. The results were used to calculate the change in the average probability of receiving a going-concern opinion between the two periods owing to: (1) changes in auditor strategy when the client risk characteristics are fixed at post-mandatory rotation period levels; and (2) changes in the client risk characteristics when auditor reporting strategy is fixed at mandatory rotation period levels.[24] Then, using t-statistics, we tested whether the changes in

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[22] Thus, the probability of issuing a going-concern modified opinion depends on a vector of client risk characteristics (X) and the weights (β) placed by the auditor on each characteristic, representing the auditor reporting strategy for a given level of client risk. The probability of issuing a qualified opinion for client i in period t is given by: $P(GCO=1) = F(X_{it}, B_t)$, where $F(\cdot)$ denotes the distribution function of a logistic variable.

[23] The interaction variables were omitted in these regressions.

[24] Formally, the change in the predicted probability of a going-concern modified opinion (ΔP) from the mandatory rotation period to the post-mandatory rotation period is $\Delta P = P(X_{post\text{-}rotation}, \beta_{post\text{-}rotation}) - P(X_{rotation}, \beta_{rotation})$. Including $P(X_{post\text{-}rotation}, \beta_{rotation})$ in the former equation, the change in the probability of receiving a qualified report can be decomposed as follows: $\Delta P = [P(X_{post\text{-}rotation}, \beta_{post\text{-}rotation}) - P(X_{post\text{-}rotation}, \beta_{rotation})] + [P(X_{post\text{-}rotation}, \beta_{rotation}) - P(X_{rotation}, \beta_{rotation})]$. Using the results obtained in our model, we calculate the average probabilities required to construct the change in the average probabilities.

the probabilities resulting from the two components were significantly different from zero. The results are presented in Table 8.

---------- Table 8 to appear about here ----------

We find that the overall going-concern reporting rate increased significantly by 1.29% (t = 2.485, p = .021) from the mandatory rotation period to the post-mandatory rotation period. This increase was caused by a significant decline in financial distress characteristics (−1.1%; t = 2.467, p = .024) and a significant increase in the conservative reporting strategies of auditors (2.39%; t = 3.232, p = .000). In particular, increased auditor conservatism accounts for 185% (2.39/1.29) of the increased likelihood of issuing a going-concern opinion in the post-mandatory rotation period. This empirical evidence shows that auditors adopted a more conservative reporting strategy in the post-mandatory rotation period. This contradicts arguments put forward by proponents of mandatory rotation policies and reinforces the argument that the reputation damage associated with audit failures provides strong incentives for independence.

Finally, we tested the sensitivity of our results to the period cutoff date. Previous research (see Geiger and Raghunandan 2001; Geiger et al. 2005) underscores the importance of transition periods when examining issues related to auditor reporting behavior. The legislative process to remove mandatory rotation took place from November 1994 to March 1995. As we cannot control for the extent to which auditors were able to anticipate the regulatory change, and considering that auditor reporting behavior was not expected to change immediately following the abolition of rotation, we removed the observations of the "transition period" (1994 and 1995) from our sample.[25] The results are similar to those reported in Table 7.

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[25] In this case, *ROTATION* variable takes the value 1 if year = 1991, 1992, 1993; 0 otherwise.

SUMMARY AND CONCLUSIONS

Regulators and legislators in many countries have discussed mandatory auditor rotation as a mechanism for strengthening auditor independence (e.g., GAO 2003, 2004; CGAAI 2003). The proponents of mandatory rotation argue that a limit on the time horizon for an audit engagement could improve audit quality by reducing auditors' incentives to issue biased reports as well as decreasing managements' ability to influence the auditor's decisions (e.g., Copley and Doucet 1993; Petty and Cuganesan 1996). In contrast, those against mandatory rotation suggest that rotation is unnecessary because market-based incentives dominate the expected benefits from compromising auditor independence (e.g. AICPA 1992, 1997; Johnson et al. 2002).

We contribute to the extant literature by providing, to the best of our knowledge, the first archival evidence on the impact of mandatory audit firm rotation on auditor independence. The Spanish audit market operated under a regime of mandatory audit firm rotation during the period 1988–1994. This rule was abolished in 1995. We find no evidence to support the hypothesis that the likelihood of issuing going-concern opinions was higher in the mandatory rotation period. On the contrary, our results indicate that auditor incentives to protect reputation are associated with a higher likelihood of issuing going-concern modified audit reports in the post-mandatory rotation period, while the potential benefits attributed to rotation, such as a reduction of auditor's economic dependence, are not apparent. These findings are consistent with prior studies suggesting that mandatory rotation may have adverse effects on audit quality (Geiger and Raghunandan 2002; Myers et al. 2003; Jackson et al. 2007).

Ours results have a number of policy implications. First, our empirical evidence suggests that mandatory rotation not only fails to enhance auditor independence, but may in fact harm independence. We find that reputation concerns create incentives for independence.

Such incentives appear to have a greater impact on auditors' reporting behavior in a regime without mandatory rotation than in a regime with rotation of audit firms. Second, market-based incentives may be more effective in safeguarding auditor independence than regulatory measures such as rotation. In particular, we found that incentives to protect reputation appear to influence auditors reporting decisions to a greater extent than the existence of the rotation rule itself. Thus, our results do not support suggestions that audit firm rotation is necessary to enhance auditor independence, and therefore, audit quality. On the contrary, our findings are consistent with the position that the market provides incentives for auditor independence and do support the arguments of those opposed to the mandatory rotation of audit firms.

This study is subject to a number of limitations. First, our results may be affected by other potential going-concern determinants. Although we employed several control variables, other factors such as management plans (Behn et al. 2001) and audit committee composition (Carcello and Neal 2000) may be correlated with the issuance of going-concern opinions. Furthermore, we used proxy variables for auditors' incentives that may not reflect the true nature of auditors' trade-offs when assessing whether or not to qualify an audit report. Although such proxies have been consistently used in previous research, other variables, such as audit and non-audit fees received by the audit firm from a particular client, may provide additional insights into the relationship between auditor economic dependence and auditor reporting decisions. Finally, our study investigated the rotation rule in a particular setting (the Spanish audit market) during a particular time period (1991–2000). An interesting area for future research would be to determine if our results are observed in other settings, such as Brazil or Italy where auditor changes are mandatory.

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TABLE 1
Variable Definitions and Expected Signs

Variable	Definition	Type	Expected Sign
GCO (dependent variable)	= 1 if audit opinion is going-concern modified; 0 otherwise.	Binary	
ROTATION	= 1 if year is 1991, 1992, 1993, 1994; 0 otherwise.	Binary	?
INFLUENCE	= total sales of a client of auditor X divided by total sales of all clients of auditor X.	Continuous	-
*INFLUENCE*ROTATION*	= total sales of a client of auditor X divided by total sales of all clients of auditor X if the year is 1995, 1996, 1997, 1998, 1999, or 2000; 0 otherwise.	Continuous	+
REPUTATION	= 1 if Big 6 auditor; 0 otherwise.	Binary	+
*REPUTATION*ROTATION*	= 1 if company is audited by a Big 6 firm and the year is 1991, 1992, 1993 or 1994; 0 otherwise.	Binary	-
PROBFAIL	= probability of failure calculated using Zmijewski's (1984) coefficients.	Continuous	+
LOSS	= 1 if reported loss in either of past two years; 0 otherwise.	Binary	+
LEVERAGE	= total debt divided by total assets.	Continuous	+
SIZE	= natural log of total assets (in thousands of Pts).	Continuous	-
SPECIALIZATION	= 1 if the market share of the auditor in the specified market is greater than 10%; 0 otherwise.	Binary	+
FIRM AGE	= number of years since firm start-up.	Continuous	-

TABLE 2
Descriptive Statistics (n = 1,326 firms)

Variable	**Mean**	**Std. Dev.**	**Minimum**	**Maximum**
INFLUENCE	0.22	0.31	0.00	1.00
REPUTATION	0.62	0.48	0.00	1.00
PROBFAIL	0.20	0.30	0.00	1.00
LOSS	0.70	0.46	0.00	1.00
LEVERAGE	0.58	0.27	0.00	0.84
SIZE	7.05	0.98	4.30	9.70
SPECIALIZATION	0.46	0.50	0.00	1.00
FIRM AGE	39.31	24.19	0.00	111

INFLUENCE	= total sales of a client of auditor X divided by total sales of all clients of auditor X;
REPUTATION	= 1 if Big 6 auditor; 0 otherwise;
PROBFAIL	= probability of failure calculated using Zmijewski's (1984) coefficients;
LOSS	= 1 if reported loss in either of past two years; 0 otherwise;
LEVERAGE	= total debt divided by total assets;
SIZE	= natural log of total assets (in thousands of Pts);
SPECIALIZATION	= 1 if the market-share of auditor in the specified market is superior to 10%, 0 otherwise; and
FIRM AGE	= number of years passed from the startup of the firm.

TABLE 3
Correlation Matrix

Variables	INFLUENCE	REPUTATION	PROBFAIL	LOSS	LEVERAGE	SIZE	SPECIALIZATION	FIRM AGE
INFLUENCE	1.000	–0.166*	–0.068	0.011	–0.016	0.035	–0.047	–0.101
REPUTATION		1.000	0.099	–0.121	0.022	0.205*	0.114*	0.078
PROBFAIL			1.000	0.081*	0.073*	–0.024	–0.019	0.023
LOSS				1.000	0.018	0.231*	–0.036	–0.023
LEVERAGE					1.000	0.014	0.030	–0.005
SIZE						1.000	0.038	0.022
SPECIALIZATION							1.000	0.014
FIRM AGE								1.000

Indicates p < .05

INFLUENCE	= total sales of a client of auditor X divided by total sales of all clients of auditor X;
REPUTATION	= 1 if Big 6 auditor; 0 otherwise;
PROBFAIL	= probability of failure calculated using Zmijewski's (1984) coefficients;
LOSS	= 1 if reported loss in any of past two years, 0 otherwise;
LEVERAGE	= total debt divided by total assets;
SIZE	= natural log of total assets (in thousands of Pts);
SPECIALIZATION	= 1 if the market-share of auditor in the specified market is superior to 10%, 0 otherwise; and
FIRM AGE	= number of years passed from the startup of the firm.

TABLE 4
Univariate Tests for Qualified Audit Reports

Variables	Qualified Going Concern (n = 90) Mean	Not Qualified (n = 1,236) Mean	Z/X^2 (*p*-value)
INFLUENCE	0.19	0.22	1.093 (p = .275)
REPUTATION	0.78	0.61	10.135 (p = .001)
PROBFAIL	0.56	0.17	9.003 (p = .000)
LOSS	1.00	0.68	6.395 (p = .000)
LEVERAGE	0.66	0.58	1.327 (p = .112)
SIZE	6.99	7.06	0.597 (p = .551)
SPECIALIZATION	0.45	0.46	0.019 (p = .890)
FIRM AGE	41.79	39.18	1.005 (p = .315)

INFLUENCE	= total sales of a client of auditor X divided by total sales of all clients of auditor X;
REPUTATION	= 1 if Big 6 auditor; 0 otherwise;
PROBFAIL	= probability of failure calculated using Zmijewski's (1984) coefficients;
LOSS	= 1 if reported loss in any of past two years, 0 otherwise;
LEVERAGE	= total debt divided by total assets;
SIZE	= natural log of total assets (in thousands of Pts);
SPECIALIZATION	= 1 if the market-share of auditor in the specified market is superior to 10%, 0 otherwise; and
FIRM AGE	= number of years passed from the startup of the firm.

TABLE 5
Univariate Tests for Mandatory Rotation and Post-Mandatory Rotation Periods

Variables	Mandatory Rotation Period (1991–1994) n = 783 Mean	Post-Mandatory Rotation Period (1995–2000) n = 543 Mean	Z/X^2 (*p*-value)
INFLUENCE	0.23	0.21	0.919 (p = .358)
REPUTATION	0.59	0.66	6.968 (p = .000)
PROBFAIL	0.22	0.17	2.683 (p = .007)
LOSS	0.74	0.65	3.487 (p = .000)
LEVERAGE	0.63	0.51	0.480 (p = .262)
SIZE	6.94	7.20	6.291 (p = .000)
SPECIALIZATION	0.45	0.49	2.127 (p = .145)
FIRM AGE	38.31	40.75	0.221 (p = .518)

INFLUENCE = total sales of a client of auditor X divided by total sales of all clients of auditor X;
REPUTATION = 1 if Big 6 auditor; 0 otherwise;
PROBFAIL = probability of failure calculated using Zmijewski's (1984) coefficients;
LOSS = 1 if reported loss in any of past two years, 0 otherwise;
LEVERAGE = total debt divided by total assets;
SIZE = natural log of total assets (in thousands of Pts);
SPECIALIZATION = 1 if the market-share of auditor in the specified market is superior to 10%, 0 otherwise; and
FIRM AGE = number of years passed from the startup of the firm.

TABLE 6
Contingency Table Variables *GCO* and *ROTATION*

	Mandatory Rotation Period (1991–1994)	Post-mandatory Rotation Period (1995–2000)	TOTAL
Panel A: Full Sample			
Unqualified Opinion	734 (93.74%)	502 (92.44%)	1,236 (93.21%)
Qualified Opinion	49 (6.26%)	41 (7.56%)	90 (6.79%)
TOTAL	783 (100%)	543 (100%)	1,326 (100%)
Panel B: Reduced Sample*			
Unqualified Opinion	734 (97.61%)	502 (97.10%)	1,236 (97.40%)
Qualified Opinion	18 (2.39%)	15 (2.90%)	33 (2.60%)
TOTAL	752 (100%)	517 (100%)	1,269 (100%)

* Only first-time going-concern opinions are included

TABLE 7
Regression Results

GCO = ƒ (ROTATION, INFLUENCE, REPUTATION, INFLUENCE*ROTATION, REPUTATION*ROTATION, PROBFAIL, LOSS, LEVERAGE, SIZE, SPECIALIZATION, FIRM AGE)

PANEL A: Full Sample

Variables	Model 1: Main Effects Model Coefficient (*p*-value)	Model 2: Interaction Effects Model Coefficient (*p*-value)
ROTATION	-1.125 (.031)	-1.163 (.027)
INFLUENCE	-1.021 (.142)	-0.998 (.185)
REPUTATION	1.764 (.004)	1.446 (.003)
INFLUENCE*ROTATION	-	0.543 (.307)
REPUTATION*ROTATION	-	-1.025 (.023)
PROBFAIL	2.345 (.000)	2.375 (.000)
LOSS	2.882 (.000)	2.808 (.000)
LEVERAGE	-0.001 (.841)	-0.001 (.842)
SIZE	0.650 (.321)	0.584 (.272)
SPECIALIZATION	0.175 (.536)	0.185 (.512)
FIRM AGE	-0.001 (.881)	-0.001 (.890)
Constant	-2.960 (.000)	-2.342 (.000)
Number of Observations	1,326	1,326
Chi-Square (p-value)	165.329 (.000)	168.683 (.000)
Pseudo R^2	.30	.30

PANEL B: Reduced Sample*

Variables	Model 3: Main Effects Model Coefficient (*p*-value)	Model 4: Interaction Effects Model Coefficient (*p*-value)
ROTATION	-1.110 (.039)	-1.221 (.032)
INFLUENCE	-0.954 (.212)	-0.809 (.159)
REPUTATION	1.206 (.005)	1.268 (.001)
INFLUENCE*ROTATION	-	0.643 (.227)
REPUTATION*ROTATION	-	-1.131 (.025)
PROBFAIL	2.144 (.000)	2.410 (.000)
LOSS	2.432 (.000)	2.352 (.000)
LEVERAGE	-0.043 (.647)	-0.021 (.892)
SIZE	0.743 (.231)	0.621 (.156)
SPECIALIZATION	0.174 (.421)	0.275 (.395)
FIRM AGE	-0.004 (.660)	-0.004 (.637)
Constant	-2.262 (.034)	-1.836 (.045)
Number of Observations	1,269	1,269
Chi-Square (p-value)	66.130 (.000)	72.243 (.000)
Pseudo R^2	.24	.26

TABLE 7 (continued)

PANEL C: Fixed Effects (full sample)

Variables	Model 5: Main Effects Model Coefficient (*p*-value)	Model 6: Interaction Effects Model Coefficient (*p*-value)
ROTATION	-1.614 (.026)	-1.328 (.024)
INFLUENCE	-0.625 (.290)	-0.973 (.321)
REPUTATION	1.611 (.002)	1.793 (.001)
INFLUENCE*ROTATION	-	0.898 (.245)
REPUTATION*ROTATION	-	-1.178 (.021)
PROBFAIL	2.845 (.000)	2.509 (.000)
LOSS	2.381 (.000)	2.576 (.000)
LEVERAGE	-0.010 (.672)	-0.421 (.129)
SIZE	0.409 (.354)	0.359 (.417)
SPECIALIZATION	0.146 (.482)	0.194 (.312)
FIRM AGE	-0.070 (.792)	-0.076 (.815)
Constant	-2.318 (.000)	-2.254 (.000)
Number of Observations	1,326	1,326
Chi-Square (p-value)	178.193 (.001)	183.166 (.000)
Pseudo R^2	.31	.32

* Only first-time going-concern opinions are included

GCO	= 1 if audit opinion was modified for going concern, else 0;
ROTATION	= 1 if year is 1991, 1992, 1993, 1994; 0 otherwise;
INFLUENCE	= total sales of a client of auditor X divided by total sales of all clients of auditor X;
REPUTATION	= 1 if Big 6 auditor; 0 otherwise;
INFLUENCE*ROTATION	= total sales of a client of auditor X divided by total sales of all clients of auditor X if the year is 1991, 1992, 1993, 1994; 0 otherwise;
REPUTATION*ROTATION	= 1 if company is audited by a Big 6 and the year is 1991, 1992, 1993 or 1994; 0 otherwise;
PROBFAIL	= probability of failure calculated using Zmijewski's (1984) coefficients;
LOSS	= 1 if reported loss in any of past two years, 0 otherwise;
LEVERAGE	= total debt divided by total assets;
SIZE	= natural log of total assets (in thousands of Pts);
SPECIALIZATION	= 1 if the market-share of auditor in the specified market is superior to 10%, 0 otherwise; and
FIRM AGE	= number of years passed from the startup of the firm.

TABLE 8

Changes in Average Probabilities of Going-Concern Modified Audit Opinions in the Mandatory Rotation Period (1991-1994) and the Post-Mandatory Rotation Period (1995-2000)

Time period	Change in Probability of a Going-Concern Modified Opinion		Component Due to Change in Financial Distress Characteristics		Component Due to Change in Auditor Reporting Strategy	
	Change in average probability (%)	t-statistic (p-value)	Change in average probability (%)	t-statistic (p-value)	Change in average probability (%)	t-statistic (p-value)
Rotation vs. post-rotation period	1.29	2.485 (.021)	−1.1	2.467 (.024)	2.39	3.232 (.000)