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Do auditors mitigate earnings management during economic crisis?

Nuria Reguera-Alvarado[*], Pilar de Fuentes, Joaquina Laffarga

Department of Accounting and Financial Economics, University of Seville, Seville, Spain

A B S T R A C T

This paper addresses earnings management from an international perspective. This study particularly analyzes whether external auditing reduces earnings managements and, if so, whether this relationship is affected by the economic crisis. The study employs a cross-country approach. The sample has 3,830 observations from listed firms from the United States, the United Kingdom, Japan, Italy, France and Spain during the period 2005–2009. Panel data are used to verify the research hypotheses. The findings show that external auditing is an important mechanism to minimize earnings management. In this sense, the Big Four and auditor specialization helped to reduce earnings managements during the economic crisis. Moreover, long audit tenure does not contribute to mitigating discretionary accruals. The study includes implications for academia, practitioners, and policymakers. It provides the literature with complementary evidence on the external auditing and earnings management relationship and how this is influenced by the economic crisis. The article benefits practitioners and policymakers by highlighting the most important characteristics of audit firms related to the mitigation of earnings managements. In addition, this study considers the recent economic crisis as an important economic factor. Given that the crisis affected most countries around the world and caused structural changes within companies, information about the consequences of the crisis and how to deal with them is an important empirical question.

Intervención de los auditores en la gestión de resultados durante la crisis económica

R E S U M E N

Este artículo aborda la gestión del resultado desde una perspectiva internacional. Concretamente, el estudio analiza si la auditoría externa reduce la gestión del resultado y, si fuera así, si esto se vio afectado por la crisis económica. Para ello se ha utilizado una muestra formada compuesta 3,830 observaciones de empresas cotizadas en Estados Unidos, El Reino Unido, Japón, Italia, Francia y España durante el período 2005-2009. Los resultados muestran que la auditoría externa es un mecanismo de gran repercusión para minimizar la gestión del resultado. En este sentido, las cuatro mayores empresas auditoras y la especialización del auditor ayudaron a reducir la gestión de beneficios durante la crisis económica. Asimismo, un mayor número de años auditando a un determinado cliente consigue que la firma de auditoría no mitigue la gestión del resultado. El estudio incluye implicaciones para académicos, profesionales, y gestores políticos. Se ofrece evidencia complementaria para la literatura sobre auditoría externa y gestión del resultado y cómo se ve influenciada ésta por la crisis económica. El artículo resulta interesante desde el punto de vista de los profesionales y gestores políticos porque resalta las características más importantes de las empresas auditoras relativas a la mitigación de la gestión del resultado. Asimismo, el estudio considera la reciente crisis económica como un importante factor económico. Dado que la crisis afectó a la mayoría de los países y causó cambios a nivel estructural dentro de las empresas, la información acerca de las consecuencias de la crisis y como tratar con ella ha sido considerada una cuestión importante desde el punto de vista empírico.

* Corresponding author.
E-mail address: nreguera@us.es (N. Reguera-Alvarado).

Introduction

As one of the main factors that triggers firm performance misrepresentation (Dichev et al., 2013), earnings management affects the decision-making process of all firm stakeholders, including investors, regulators, and analysts (Krishnan, 2003a). Accordingly, prior research has analyzed earnings management from different views, such as corporate governance (Garcia-Meca and Sanchez-Ballesta, 2009), capital markets (Capalbo, et al., 2014), and the institutional framework (Leuz et al., 2003; Doupnik, 2008). Recent research has also examined the auditor's role as a mechanism to reduce earnings management (Kim et al, 2003; Chen et al., 2008; Gul, Fung, and Jaggi 2009; Boone, Khurana, and Raman 2010; Choi et al., 2010; Ahsen, 2011). Previous studies find that earnings management is affected by auditor size (e.g., DeAngelo, 1981; Francis and Yu, 2009; Choi et al., 2010; Ahsen, 2011) and auditor specialization (e.g., Lim and Tan, 2008; Carson, 2009; Gul et al., 2009; Cahan et al., 2011; Capalbo, et al. 2014).

On the other hand, business cycles have a fundamental impact on firms' reporting quality and market perception of reported earnings (Jiang, et al., 2015). Johnson (1999) shows that the quality of financial information is sensitive to business cycles. Indeed, the macroeconomic context largely determines earnings management (Kousenidis et al., 2013; Quinglu, 2005; Lin and Shih, 2003) as relevant changes in the economic environment represent an incentive for it (Filip and Rattourner, 2014). Nonetheless, although the literature highlights the prominent role of environmental factors, including the recent global financial crisis in accounting reliability across countries (Huang et al., 2013; Dedman and Kausar, 2012; Davis-Friday et al., 2006; Leuz et al., 2003; Garcia-Lara et al., 2005), to the best of the authors' knowledge, no prior studies examine the role that the economic crisis plays in the relationship between earnings management and auditor quality. Therefore, the recent crisis offers a unique opportunity to study the effect of business cycles on earnings management. In this context, we wonder whether the global economic crisis has modified the managerial incentives for manager earnings, and what the role of audit firms has been. These schemes are in line with Essen et al. (2013), who support the argument that firm good governance prescriptions designed to assure managerial oversight do not hold in a financial crisis.

Accordingly, this paper's main objective is to analyze the effect of some audit characteristics, proxies for audit quality, on earnings management by considering the impact of the economic crisis on this relationship. As such, we consider three main auditing attributes: (i) auditor firm size, (ii) auditor tenure, and (iii) auditor specialization. We employ an international sample of 989 listed firms from six developed countries (the United States, the United Kingdom, Japan, Italy, France, and Spain) during the period 2005–2009. This time period includes both crisis and non-crisis years. Our results are robust for various models and are scientifically and economically relevant across different economic, social, and institutional environments. By selecting this variety of countries, our study is in line with the current trend that suggests the need and opportunity for cross-country accounting research projects and strengthens the international dimension of the findings (Gordon, et al., 2013). Regarding the measure of earnings management, Francis et al. (2004) and Dechow et al. (2010) show that financial reporting quality can be measured through various indicators such as, among others, persistence, discretionary accruals, smoothness, timeliness, loss avoidance and investor responsiveness. This study, therefore, uses discretionary accruals as a proxy of earnings management.

Our results emphasize the important effect of the crisis on earnings management. We find that the economic crisis led to an increase in earnings management and reversed the profile of most earnings management firms. We also find that the audit quality does not only improve the quality of earnings but also plays a more relevant role during the crisis.

This study contributes to the existing literature on earnings management in two ways. First, we address the impact of the economic crisis on discretionary accruals. To the best of our knowledge, this study is one of the few that adopts an international point of view. Second, auditor industry specialization continues to attract considerable attention in the literature (e.g., Lim and Tan, 2008; Carson 2009; Gul et al., 2009; Cahan et al., 2011). This study adds to the literature on industry expertise and specialization, which is increasingly more important to auditor clients.80 percent of industry companies consider these factors to be important when choosing an auditor (GAO 2003, 2008).

The remainder of the paper proceeds as follows. Section 2 provides an overview of the most recent studies on earnings management in relation to audit quality, and the hypothesis development. Section 3 describes the data and the method. Section 4 summarizes the main empirical results. Section 5 concludes with a summary of the findings and the main contributions of the study.

Theoretical background and research hypotheses

Recent research has investigated the determinants and consequences of earnings management. However, these studies commonly focus on the individual incentives of managers and pay little attention to the firm's macroeconomic environment . As a result, previous research does not determine whether a good or bad economic environment affects earnings management because the decision to engage in earnings management is based on investors' perspectives. Iatridis (2010) suggests four situations in which earnings management is used: (i) to transfer earnings from "good" years to "bad" years; (ii) to postpone income recognition to reduce the tax burden; (iii) to reveal positive results, correlated with the trend of postponing negative results; and (iv) to increase the current or future compensation of managers by using discretionary accounting policies to benefit from stock options or bonus schemes.

Although there is not much literature that considers the influence of the recent financial crisis on earnings management, some studies have investigated other crises, such as the Persian Gulf crisis of 1990 (Han and Wang, 1998), the Mexican crisis of 1994 (Davis-Friday and Gordon, 2005), and the Asian crisis of 1997 (Shrieves and Dahl, 2003), as exogenous shocks, and a few studies have considered the global economic crisis of 2008 (Lu, 2012; Habib et al, 2013; Filip and Raffournier, 2014). Upward earnings management should be higher during a period of economic crisis. Most firms are likely to have lower earnings, which can motivate managers to engage in income-increasing earnings management to compensate for the decrease in operational performance (Ahmad-Zaluki et al., 2011). In particular, managers of the firms most strongly affected by the crisis may manipulate earnings upward to avoid a large decline of the firm's stock price, which would negatively impact their compensation (Charitou et al., 2007). In addition, because debt covenants are based in part on earnings (Dichev and Skinner, 2002),

income-increasing manipulations can reduce the probability of violations (DeFond and Jiambalvo, 1994; Iatridis and Kadorinis, 2009; Saleh and Ahmed, 2005; Sweeney, 1994).

Conversely, some firms may have incentives to manage earnings downward during an economic crisis. For example, firms that must undertake debt restructuring due to debt covenant violation or failure to meet a debt repayment (Filip and Raffournier, 2014) may want to suppress earnings. DeAngelo et al. (1994) note that by reporting losses managers portray the firm as seriously troubled, which may be useful to extract concessions from employees who otherwise would doubt the existence and persistence of the firm's difficulties. The search for political advantage can also motivate the reduction of earnings as governments are likely to provide support to firms in financial distress due to an economic crisis (Peltzman, 1976).

The previous discussion suggests that periods of economic downturn are associated with a higher level of earnings management, although researchers do not agree on the sign of these manipulations. Nevertheless, crises are likely to be less favorable to earnings management than expansion periods. During crises, firms are subject to increased monitoring from auditors, creditors and other stakeholders, which can result in managers having less discretion to manage earnings (Chia et al., 2007). In line with agency theory (Jensen and Meckling, 1976), external auditing acts as a control tool that minimizes or eliminates managers' opportunistic practices, such as earnings management, to guarantee a reasonable level of reliability of the financial statements (Watts and Zimmerman, 1986). Chia et al. (2007) find that firms demand better audit services when more controls of accounting reporting exist, as is the case during an economic crisis.

Auditor competence and auditor independence are the central concepts of traditional research on audit quality (Gonthier-Besacier, et al., 2012). The auditing literature commonly attributes two roles to auditors through which they guarantee the quality of firms' financial statements (Kim et al., 2011; Cano and Sanchez, 2012). First, auditing helps to reduce asymmetric information problems and assures users of financial information that this information meets their requirements of reliability, integrity and quality (information role). Second, through a revision of the accounting information, auditors act to decrease the opportunistic behavior of managers and control shareholders. Consequently, auditing reduces the agency conflicts between these agents and their respective principals (monitoring role). This study focuses on the most studied auditing attributes in the literature: auditor firm size, auditor tenure, and auditor specialization.

Next, we develop a hypothesis for each of the auditing attributes (auditor size, auditor tenure, and auditor specialization) related to earnings management. In addition, because of the recent economic crisis affecting financial reporting, we consider its influence on the relationship between auditing attributes and earnings management.

Auditor firm size and earnings management

The auditing literature suggests that auditors have incentives to protect their reputation and mitigate expected litigation costs arising from audit failures (Houghton, et al. 2002; Boone et al., 2010; Cano, 2010). The importance of auditor independence stems from the need to give credibility to an organization's financial reports (Rifaat and Karim, 1990; Kilgore et al, 2011; Causholli et al. 2014). DeAngelo (1981) was a pioneer in analyzing the relationship between audit quality and auditor size from a theoretical viewpoint. Her

main assumption is that large auditors will have more diversified total fees due to their larger customer portfolio. As such, auditing firms' business performance—their growth or even their survival—is less dependent on each customer, which fosters the auditor's independence (Cano, 2010). For this reason, DeAngelo suggests a positive relationship between auditor firm size and audit quality. Huguet and Gandía (2016) propose that audited financial statements are perceived to be the most reliable and thus provide higher quality information. Yet they remark the lack of empirical evidence between audited companies and higher quality information.

In line with DeAngelo (1981), Palmrose (1988) and Simunic and Stein (1987) find that, given their "deep pockets" and heavy spending on building their brand names, large audit firms have an incentive to lower litigation risk and protect their reputational capital by providing more credible financial reports. In this manner, the previous literature suggests that audit firm size is an important determinant of auditor quality. Specifically, large auditing firms are able to spend heavily on training and audit technology (thereby contributing to their competence). In addition, because they are less dependent on each individual client, they can better resist client pressure to issue a "clean" (unqualified) audit opinion or to restrain earnings management.

Based on these findings, the literature widely recognizes that the Big Four[1] provide higher quality audits and offer greater reliability for their clients' financial statements than the non–Big (e.g., Kim et al. (2003) or Huguet (2016). Eshleman and Guo (2014) find a negative relationship between the level of abnormal audit fees paid by the client and the likelihood of using discretionary accruals. Becker et al. (1998) observe that companies audited by the Big Six have lower income-increasing discretionary accruals than firms using non–Big Six auditors. Krishnan (2003a) shows that the Big Four are better at constraining clients' earnings management compared to the non–Big Four auditors because the non–Big Four's clients have higher levels of discretionary accruals. Also, Ahsen (2011) and Craswell et al. (1995) note that firms audited by Big Four auditors have lower earnings management than that of firms audited by non–Big Four auditors. Similarly, Francis and Yu (2009), and Choi et al. (2010) show that audit office size is a primary determinant of auditor quality. As a result, prior research links audit quality to earnings management and suggests that large audit firms are more effective at constraining earnings manipulation in firms.

Despite the evidence that large audit firms are more able to minimize opportunistic behaviors, Francis et al. (1999) argue that firms with high values for discretionary accruals have a greater opportunity to present opportunistic earnings management and have an incentive to hire a Big Four auditor to provide assurance that the earnings are credible. With respect to the market concentration within the Big Four group of accounting firms, Francis, Michas, and Seavey (2013) find some support for the concerns of regulators. Increased concentration within the Big Four auditors is negatively associated with audit quality. Specifically, when one or two of the Big Four auditors have a concentrated, dominated market share-rather than the market share being spread equally across all Big Four firms-Big Four clients have larger accruals and auditors are less likely to report losses and exhibit less timely loss recognition. These results suggest that a coun-

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[1]The number of Big N auditors has changed during the years (Big 8 until 1987, Big 6 until 1998, Big 5 until 2001 and, currently, Big 4). The Big Four accounting firms are Deloitte, Ernst & Young, KPMG, and Pricewaterhouse-Coopers.

try's regulator should not necessarily be concerned with the overall Big Four market share relative to non–Big Four auditors. Instead, regulators ought to have misgivings about the dominance of one or two auditors within the Big Four group, which can potentially have an adverse effect on the quality of audited earnings (Francis et al., 2013). Kim et al. (2003) indicate that Big Six auditors are more effective than non-Big Six auditors only when the conflict of reporting incentive exists between the two issues.

Consequently, the evidence on the impact of auditor firm size on earnings management is currently not clear. Recent high-profile reports in the United States, the United Kingdom, and the European Union have raised concerns about the Big Four accounting firms' concentration of supply and the potentially adverse effect that this concentration may have on audit markets and the quality of audits in these legal jurisdictions (Francis et al., 2013; GAO, 2003, 2008; Oxera, 2006, 2007; United States Treasury, 2006, 2008). Given the previously discussed literature that investigates the evolution of earnings management around events with a significant impact on firms (such as an economic crisis), we formulate our first hypothesis as follows:

> H1: During the recent economic crisis, firms audited by a Big Four auditor engage less in earnings management than firms audited by non–Big Four auditors.

Auditor tenure and earnings management

A considerable debate exists in the literature regarding whether longer auditor tenure is associated with higher or lower earnings management. Some studies even state that auditor tenure has a mixed effect.

The auditing literature shows that auditor tenure is associated with higher earnings management (Geiger and Raghunandan, 2002; Gul et al., 2007; Chen et al., 2008). Johnson, Khurana, and Reynolds (2002) report higher unexpected discretionary accruals when the auditor tenure is short (2–3 years), compared to when it is medium in length (4–8 years). Also, Ghosh and Moon (2005) provide evidence that firms with longer auditor tenures are associated with stronger earnings response coefficients. They suggest that investors perceive the earnings management of firms with longer auditor tenures to be better than the earnings management of firms with shorter auditor tenures. These findings are consistent with learning theory (Glaser and Bassok, 1989; Lapre et al., 2000) and the existence of a learning curve in the auditing industry, which suggest that it takes time for auditors to develop client-specific knowledge to perform an effective audit.

Other possible explanations for the relationship between auditor tenure and earnings management are that (i) firms with higher earnings management have a tendency to retain the same auditor as reported in the auditor-switching and opinion-shopping literature (e.g., DeFond and Subrahmanyam, 1998; Krishnan, 1994; Lennox, 2000), and (ii) high-quality auditors may drop risky clients—especially clients with large unexpected discretionary accruals—in the first few years of their audit engagements (Gul et al., 2009).

In contrast, other studies find that longer auditor tenure is associated with higher levels of earnings management. The justification of these findings is that longer auditor tenure leads to more friendly relationships with the management and can therefore impair auditor independence. Consequently, these authors support mandatory audit firm rotation (Cohen and Zarowin, 2010; Chi et al., 2011). Furthermore, the effect of tenure may be mixed, with tenure

affecting the auditor's objectivity and knowledge of the client favorably in the early years but adversely in later years (Public Oversight Board, 2002; Casterella et al. 2002; Davis et al. 2009). These studies point to a connection between higher auditor tenure and a closer auditor–customer relationship over time. Thus, auditing reports are more likely to be biased toward the customer's requests with the goal of retaining customers, hence reducing auditor quality.

According to these theoretical arguments and assuming that changes in the economic climate have an impact on earnings management, we propose the following research hypothesis :

> H2: During the economic crisis, the association between auditor tenure and earnings management is non-linear.

Auditor industry specialization and earnings management

Auditor industry specialization is a recurrent subject in literature (e.g., Lim and Tan, 2008; Carson, 2009; Gul et al., 2009; Cahan et al., 2011). Audit quality research has focused on the role of auditor industry specialization as a key indicator of auditor quality (Reichelt and Wang, 2010). The literature suggests that specialized auditors have additional incentives to ensure fair reporting (DeAngelo, 1981). Because they better understand industry trends and accounting practices, they can isolate potential errors more effectively (Maletta and Wright 1996). In this way, industry-specialized auditors play an important role in monitoring the financial reporting process (Sun and Liu, 2013). Hogan and Jeter (1999) find that measures of specialization have increased in both regulated and unregulated industries, and Craswell et al. (1995) argue that audit firms market themselves in terms of both a general reputation and industry expertise.

Previous research shows a negative relationship between earnings management and auditor industry specialization. Bonner and Lewis (1990) note that, on average, more experienced auditors outperform less experienced auditors. Similarly, Bedard and Biggs (1991) observe that auditors with more manufacturing experience are better able to identify errors in a manufacturing client's data than auditors with less manufacturing experience. Other studies also suggest that industry expert auditors are associated with a lower likelihood of being involved in SEC enforcement actions (Carcello and Nagy, 2004) and lower probabilities of restatements (Romanus et al., 2008). Consistent with these results and according to the possible impact of the macroeconomic environment, we state the next hypothesis:

> H3: During the economic crisis, firms audited by a specialist auditor engage less in earnings management than firms audited by non-specialist auditors.

Research design

Sample

In order to test our hypotheses, we have combined two databases: financial information has been obtained from Osiris[2], whereas the information about auditors has been drawn from Datastream[3]. Both databases have information

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[2]Osiris is a product of Bureau van Dijk Electronic Publishing and provides standardized annual accounts for companies throughout the world.

[3]Datastream is a product of Thomson Reuters Publishing and provides standardized annual accounts for companies throughout the world.

on listed companies around the world. The information is very detailed and includes more than financial reports. The initial sample included 1,107 firms corresponding to companies quoted on the stock markets over the period 2005-2009[4] in the US, the UK, Japan, Italy, France and Spain. However, the following filters were applied to the initial sample: (i) Financial firms were eliminated. Their Balance sheet structures and operating income statements are different to those of the other companies in the sample. This type of firms could probably distort the analysis. Thus, 63 banks were eliminated. (ii) Companies that had extreme values were eliminated, since they distort the results. In total 55 companies were removed.

So, after applying filters, the final sample, as detailed in Table 1, includes 3,830 observations corresponding to 989 non-financial companies.

Table 1
Composition of the sample by countries

Country	Companies	Observations	Percentage
U.S.	317	1233	32.20%
U.K.	169	653	17.05%
Japan	187	764	19.95%
Italy	113	384	10.03%
France	70	299	7.81%
Spain	133	496	12.95%
Total	989	3,829	100%

To guarantee the robustness of our results in different economic, social, and institutional environments, we use six countries (the US, the UK, Japan, Italy, France and Spain), instead of a single country, which is the common practice followed in previous studies. Additionally, by selecting this variety of countries our study is aligned with the current trend that suggests the need and opportunity of designing cross-country accounting research projects (Gordon et al. 2013). These six countries are selected for three reasons. Firstly, they represent the most relevant economies of three important worldwide economic areas (America, Europe, and Asia).[5] Secondly, they adopt the two different accounting normative models, IFRS (the United Kingdom, Japan, Italy, France, and Spain) and GAAP (the United States). The prior literature suggests that IFRS standards aim to be 'high-quality' rules for the preparation of financial reports. This should mean that their adoption decreases the level of earnings management in comparison with other accounting systems, such as GAAP. Thirdly, in these six countries, the two existing investor protection legal systems – common law (the United States and the United Kingdom) and civil law (Japan, Italy, France, and Spain) – are applied.[6] La Porta et al. (1998) suggest that higher legal protection of investors implies a better application of rules and, consequently, higher-quality accounting information and less accounting manipulation. Hence, with the countries considered here, our results are tested in heterogeneous situations.

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[4]Since we have used lagged values for some variables, the dataset covers the period 2004-2009.

[5]The six countries selected are the five countries with the highest gross domestic product (GDP) around the world (http://databank.worldbank.org/data/download/GDPpdf).

[6]Common law offers better legal protection than civil law (La Porta et al., 1998).

To improve the reliability of our results, we require at least six country-year-sector observations based on the Standard Industrial Classification (SIC). This enhances the comparability of our results with previous research on earnings management during the crisis (Habib et al., 2013). This method of classification allows the formation of homogeneous industry groups, as shown in Table 2. According to this table, manufacturing is the most representative sector in all the countries. The industry composition is balanced across countries, so that we can rule out any bias due to the over or underrepresentation of sectors.

Variables

Dependent variable: Discretionary accruals

Regulators have expressed their concern about auditors' work because it is expected that they allow their clients to engage in an aggressive management of earnings (Levitt, 1998). Besides, auditors try to guarantee their independence to protect their reputation and avoid litigation costs, although this is a controversial issue if we consider the flexibility allowed by the standard reporting process (Mayhew et al., 2001). Accordingly, we define earnings management as a proxy for audit quality because if auditors' independence is compromised earnings management could be an appropriate measure of its impairment (Causholli et al, 2014).

Dechow et al. (2010) state that there is no measure of earnings management which is superior for all the decision models. Since all of the proxies for earnings management have at their core the reported accrual-based earnings number, it makes sense to focus on earnings management. This course of action is coherent with the comprehensive survey of Dechow and Skinner (2000). They support the prevalence of earnings management, and provide both the academic and practitioner views on earnings management. Furthermore, McNichols (2000) arguments that the main issue in earnings management is the measure of discretionary accruals. Nonetheless, Huguet and Gandía (2016) found that audited companies have a lower level of absolutely discretionary accruals than the non-audited ones.

The literature has developed a number of accruals models to detect the discretionary component of earnings management (De Fond and Jiambalvo 1994; Rees et al., 1996; Teoh et al., 1998). We consider a selection of models on based on Dechow et al. (2010), who conducted a review on earnings management and identified the five models most often used to calculate discretionary accruals: the Jones (1991) model, the modified Jones model (Dechow et al., 1995), the Jones model adjusted to returns on assets (ROA; Kothari et al., 2005), the Dechow and Dichev (2002) model, and the Francis et al. (2005) model. Then, to choose the most suitable model, we reviewed the models cited in Google Scholar published until April 2018. Table 9 provides the results of this review. According to our findings, the literature most often uses the Jones model and its variations. Hence, we adopt the Jones model, the modified Jones model, and the Jones model adjusted to ROA to calculate earnings management.

It can be seen that the Jones model (including some variations) is the one most often used by the literature. Furthermore, some authors have also used models developed by Dechow and Dichev (2002) and Kothari et al. (2005). Meanwhile, Dechow et al. (2010) carried out a review about earnings management and found that the models most used to calculate discretionary accruals are the Jones (1991), the modified Jones (Dechow et al., 1995), Kothari et al. (2005), the Dechow and Dichev (2002) and the Francis et al. (2005).

Table 2
Composition of the sample by countries and sectors

Country	Basic materials, energy, and construction	Manufacture	Transportation, communications and utilities	Consumer goods	Real Estate Services	Services
U.S.	5.52%	57.20%	13.95%	13.38%	2.49%	7.46%
U.K.	18.07%	37.83%	15.16%	14.24%	2.30%	12.40%
Japan	4.06%	70.16%	11.39%	7.46%	3.01%	3.93%
Italy	4.95%	60.94%	16.41%	3.65%	1.04%	13.02%
France	5.02%	34.11%	12.04%	10.37%	15.38%	23.08%
Spain	11.09%	42.52%	19.15%	1.21%	15.52%	10.48%

Table 9
Models of earnings management: citations review

	Nº cites	MODEL
Jones, J.J. (1991). Earnings Management During Import Relief Investigations. *Journal of Accounting Research*, 29(2), 193-228	7740	Jones
Dechow, P.M., Sloan, R.G., and Sweeney, A.P. (1995). Detecting Earnings Management. *The Accounting Review*, 70(2), 193-225.	7985	Jones modified
Peasnell, K., Pope, P.F., and Young. S. (2000). Detecting Earnings Management Using Cross-Sectional Abnormal Accrual Models. *Journal of Accounting and Business Research*, 30(4), 313-326.	426	Marginal model
Kang, S.H. and Sivaramakrishnan, K. (1995). Issues in Testing Earnings Management and an Instrumental Variable Approach. *Journal of Accounting Research,* 33(2), 353-367	481	Kang and Sivaramakrishnan
Kasznik, R. (1999).On the Association Between Voluntary Disclosure and Earnings Management. *Journal of Accounting Research*, 37(1), 57-81.	1416	Jones Cash-flow
Jeter, D.C., and Shivakumar, L. (1999). Cross-Sectional Estimation of Abnormal Accruals Using Quarterly and Annual Data: Effectiveness in Detecting Event-Specific Earnings Management. *Journal of Accounting and Business Research*, 29(4), 299-319.	227	
Garza-Gómez, X., Okumara, M., and Kunimura, M. (1999). Discretionary Accrual Models and the Accounting Process, SSRN Working Paper Series.	50	Accounting process
Kothari, S. P., Leone A. J., and Wasley, C.E. (2005). Performance matched discretionary accrual measures. *Journal of Accounting and Economics*, 39, 163-197.	4833	Jones model adjusted to ROA
Dechow, P. M., and Dichev, I. D. (2002). The Quality of Accruals and Earnings: The Role of Accrual Estimation Errors. *The Accounting Review*, 77, 35-59.	4308	Dechow and Dichey

In this manner, we have compared three accrual models to calculate earnings management: the Jones model (Jones, 1991), the modified Jones model (Dechow et al. 1995) and the Jones model adjusted to ROA (Kothari et al. 2005).

In order to determine which model has fewer margins of error calculating discretionary accruals after doing so based on the three models used (the Jones model, the modified Jones model and the Jones model adjusted to ROA), we apply a specification and a power test. These tests are based on the calculation of the number of times that type I errors and type II errors occur for each estimated model, following the methodology of Brown and Warner (1980, 1985).

On the one hand, a specification test refers to the number of times type I errors are committed. Table 10 shows the results of type I errors. The results test Z to calculate the proportion for each accrual model and the number of regressions per country. Our results show that the three models are at optimal levels, which are established as 10%. Nevertheless, for the Jones model in the United States and Japan, this limit was not satisfied. Thus, in order to determine if the percentage of error was lower than 10%, we applied another

test. This test confirmed that these values were not higher that 10%. In conclusion, we can confirm that the three models are well specified.

Table 10
Results specification test

Country	Nº Regressions	Jones		Jones modified		Jones adjusted to ROA	
		ET1*	Ho: P=0,1	ET1*	Ho: P=0,1	ET1*	Ho: P=0,1
U.S.	500	0.08**	0.07	0.09	0.46	0.12	0.18
U.K.	500	0.12	0.14	0.08	0.10	0.10	0.77
Japan	500	0.07**	0.05	0.12	0.23	0.12	0.18
Italy	500	0.11	0.5	0.11	0.55	0.11	0.55
France	500	0.11	0.37	0.12	0.14	0.09	0.30
Spain	500	0.10	0.88	0.09	0.30	0.11	0.37
TOTAL	3000	0.10	0.57	0.10	0.85	0.10	0.42

* Numbers of ET2 are expressed in parts hundred.
** In these cases, to reject the null hypothesis, the hypotheses that were less than 0.1 confirmed that the argument was tested.

Table 11 shows the results for type II errors. Following Dechow et al. (1995), Jeter and Shivakumar (1999), and Peasnell et al. (2000), we assess the earnings management detection power of the three accrual models using known magnitudes of simulated earnings management. This potency test refers to the number of times type II errors are committed; namely, the capacity of each model to detect discretionary accruals. To calculate type II errors, we manipulate the variables to work out the specification of each model. These variables increased from 1% to 20% in relation to the initial values. The table shows that the Jones model adjusted to ROA produces a lower type II error percentage: The percentage error of this model is 30.3% compared to 35.8% and 37.5% for the Jones model and the modified Jones model, respectively.

Table 11 shows the high power of the Jones model adjusted to ROA in detecting discretionary accruals for Spain, producing an error of only 16.4%. However, in Italy, the Jones model adjusted to ROA does not obtain a good approximation to discretionary accruals, having a percentage of error of 58.6%. In the other countries, the percentage of type II errors is around the mean of the Jones model adjusted to ROA (30.3%).

Table 11
Results potency test

Country	Jones		Jones modified		Jones adjusted to ROA	
	N° Regressions	ET2*	N° Regressions	ET2*	N° Regressions	ET2*
U.S.	20000	0.086	20000	0.328	30000	0.261
U.K.	20000	0.218	20000	0.239	30000	0.247
Japan	20000	0.499	20000	0.522	30000	0.359
Italy	20000	0.598	20000	0.616	30000	0.586
France	20000	0.537	20000	0.372	30000	0.201
Spain	20000	0.212	20000	0.173	30000	0.164
TOTAL	120000	0.358	120000	0.375	180000	0.303

* ET2 Numbers are expressed in parts hundred.

Given our previous findings, we conclude that the Jones model adjusted to ROA is better to calculate discretionary accruals than the Jones model and the modified Jones model. For this reason, all subsequent calculations use the Jones model adjusted to ROA.

Kothari et al. (2005) propose the Jones model adjusted to ROA based on the idea that accruals are correlated with the company's current and past performance . Specifically, to increase the model specification when firms experience extreme financial performances, Kothari et al. introduce ROA to the Jones model as a control variable. The Jones model adjusted to ROA is represented in Equation (1).

$$\frac{\text{TACC}_t}{A_t - 1} = \frac{\beta_0}{A_t - 1} + \beta_1 \left(\frac{\Delta \text{REV}_t}{A_t - 1} \right) + \beta_2 \left(\frac{\text{PPE}_t}{A_t - 1} \right) + \beta_3 \text{ROA}_t + e$$

(1)

where,
TACC_t = total accruals in year t
REV_t = changes in revenue in year t
PPE_t = property, plant and equipment in year t
ROA_t = return on total assets in year t
A_{t-1} = the total assets at the beginning of year t
e is the error term of the accruals of the accrual model, which represents discretionary accruals, and the t subscripts represent years.

Independent variables

Related with auditor quality, we define three variables: auditor size, auditor tenure, and auditor industry specialization. In accordance with the previous literature (DeAngelo, 1981; Krishnan, 2003a; Boone et al, 2010; Ahsen, 2011), we consider auditor size as a proxy of auditor quality. Hence, we define a variable, SIZE, which is equal to 1 if the auditor is a Big Four auditor firm (Deloitte, Ernst & Young, KPMG, or PricewaterhouseCoopers), and zero otherwise.

Table 3 reports the composition of audit firms, distinguishing two groups according to auditor size. From 2005 to 2007, the representation of the Big Four auditors in the companies was around 75%. However, with the beginning of the economic crisis, this percentage increased to 94%. Thus, the economic crisis motivated firms to contract services from a Big Four auditor to guarantee the quality of accounting statements.

Table 3
Composition of the audit firms for the period 2005-2009 by auditor size

	Audit firm	2005	2006	2007	2008	2009
	EY	16.8%	19.5%	18.3%	25.8%	24.4%
Big 4 auditor	PWC	22.1%	24.6%	22.3%	25.7%	25.9%
	DHS	19.1%	21.3%	20.7%	22.7%	23.5%
	KPMG	13.5%	13.2%	14.5%	19.8%	20.3%
Non-Big 4 auditor		28.3%	21.4%	24.3%	6.0%	5.9%

Percentage audit firm by year. EY: Ernst & Young; PWC: Pricewaterhouse Coopers; DT: Deloitte; KPMG: KPMG.

Following prior studies (Myerset al., 2003; Ghosh and Moon 2005), we measure auditor tenure as the cumulative number of years that the auditor has been employed by the firm. We do not employ a continuous measure for auditor tenure because the relationship between auditor tenure and audit quality may not be linear. Instead, we define two variables to capture the effect of tenure on audit quality. First, we use the number of consecutive years that the firm has retained the auditor (TENURE). Second, we define another variable that represents the cumulative number of years squared that the auditor has been employed by the firm (TENURE^2).

Regarding auditor industry specialization, the literature provides several criteria to measure the degree of auditor industry specialization. First, Yardley et al. (1992) and Know (1996) estimate industry specialization by the proportion of an auditor's audit fees earned from one industry of all those served. This approach is widely known as auditor portfolio share. Second, Gramling and Stone (2001) and Krishnan (2003b) calculate the auditors' industry expertise as a proportion of the total audit fees earned by all the auditors who serve that particular industry. This second approach is known as auditor industry market shares. Both approaches use sales or assets as the base to estimate the proportion of audit fees because audit fee information is largely unavailable.

Based on the arguments from Krishnan (2001, 2003b), which find that the portfolio share approach captures the effort of the auditors to differentiate their products better than the industry market share approach. So, the portfolio share approach may be a better proxy for auditors' industry expertise than the industry market share. Consistent with these arguments, we use the auditor portfolio share approach as a proxy for auditor industry specialization.

We define auditors with a large industry market share (defined as a two-digit SIC code) as the specialist (SPEC). We consider an auditor as having a large market share in the in-

dustry if the auditor holds at least 15 percent of that industry (Krishnan, 2003b).

Table 4 reports the auditor industry specialization percentage, considering whether the auditor firm specialist is a Big Four auditor. Specialist firms are the most representative and account for around 65% of the observations. This percentage has increased each year except in 2009. What is more, in 2008 and 2009, the percentage of other specialized audit firms decreases considerably from 15.20% in 2007 to 0.49% in 2008.

Table 4
Auditor specialization for the period 2005-2009

	Audit firm	2005	2006	2007	2008	2009
	EY	12.4%	13.3%	14.7%	22.8%	18.1%
	PWC	19.7%	18.1%	17.3%	21.5%	23.3%
Specialist	DT	9.5%	13.3%	15.6%	11.9%	10.2%
	KPMG	6.2%	8.1%	9.6%	14.8%	10.9%
	OTHERS	15.3%	9.1%	13.8%	0.6%	0.9%
	TOTAL	63.2%	61.7%	70.9%	71.8%	63.5%
	EY	4.6%	3.4%	3.6%	3.0%	6.3%
	PWC	2.4%	3.0%	5.0%	4.1%	2.6%
Non-Specialist	DT	9.6%	4.9%	5.1%	10.7%	13.3%
	KPMG	7.3%	3.3%	5.0%	5.0%	9.3%
	OTHERS	13.0%	23.8%	10.4%	5.4%	4.9%
	TOTAL	36.8%	38.31%	29.1%	28.3%	36.5%

Percentage audit firm by year. EY: Ernst & Young; PWC: Pricewaterhouse Coopers; DT: Deloitte; KPMG: KPMG.

The economic crisis had important consequences for the development of economic activity by creating a strong climate of hostility. Given our interest in the impact of the economic crisis on earnings management, determining the crisis time framework is key to our study. While many definitions exist for a crisis, we define this following Guenther and Young (2002). They use two variables: income per capita and the unemployment rate. When both variables evolve in a negative way in two consequent years, that country is defined as being in crisis. Table 5 shows how both variables reacted since the beginning of the economic crisis. The onset of the crisis cannot be set uniformly for all six countries. The starting point of the crisis is 2007 in the United States, 2008 in Japan, Italy, Spain, and France, and 2009 in the United Kingdom. Accordingly, we define a dummy variable, CRISIS, which equals 1 if the country is in crisis, and zero otherwise.

Table 5
Evolution of the macroeconomic variables

Country	Variable	Variation 05-06	Variation 06-07	Variation 07-08	Variation 08-09	Mean variation
U.S.	Income per capita	0.050	0.039	0.012	-0.027	0.019
	% unemployment	-0.098	0.000	0.261	0.376	0.135
U.K.	Income per capita	0.065	0.143	-0.061	-0.231	-0.021
	% unemployment	0.152	-0.019	0.019	0.312	0.116
Japan	Income per capita	-0.042	0.003	0.115	0.032	0.027
	% unemployment	-0.068	-0.049	0.026	0.200	0.027
Italy	Income per capita	0.042	0.127	0.077	-0.094	0.038
	% unemployment	-0.117	-0.103	0.098	0.141	0.005
France	Income per capita	0.049	0.138	0.090	-0.085	0.048
	% unemployment	0.000	-0.091	-0.075	0.187	0.005
Spain	Income per capita	0.075	0.148	0.089	-0.097	0.054
	% unemployment	-0.076	-0.024	0.361	0.372	0.159

Control variables

Our model includes a group of control variable to account for certain firm characteristics, namely:, firm size, leverage, and growth opportunities. The size of the firm is defined as the log of total assets (LNTAB), firm leverage is measured with the ratio of total debt to total assets (DTBA) and the growth opportunities are measured as the ratio of equity to market-to-book value (MTB). In addition, to control for some institutional effects, we introduce a dummy variable (LAW), which equals 1 if the firm belongs to a common law country, and zero otherwise. We also control for the sector. We include dummy variables as well to control by the sector. Table 6 provides the definitions of the independent variables.

Table 6
Definition of variables

Abbreviation	Variable	Definition	Expected Sign
DACC	Discretionary accruals	The absolute value of the residuals of the Modified Jones Model.	
CRISIS	Economic crisis	Dummy variable: 1 if the country has been affected by the economic crisis; 0 otherwise.	+/-
SIZE	Auditor size	Dummy variable: 1 if the audit firm is a Big Auditor; 0 otherwise.	-
TENURE	Auditor tenure	Cumulative number of years the auditor has been employed by the firm.	-
SPEC	Auditor specialization	Dummy variable: 1 if the audit firm is the specialist in the industry; 0 otherwise.	-
LNTAB	Firm size	Total assets (logarithm)	-
DTBA	Leverage	Book value of debt /Total asset	+
MTB	Growth opportunities	Market to book ratio	
ROA	Profitability	Return on total assets	+
LAW	Legal system	Dummy variable: 1 if the country belongs to the Anglo-Saxon corporate system; 0 otherwise.	-
SDACC	Sign of discretionary accruals	Dummy variable: 1 if the company has negative discretionary accruals; 0 otherwise.	+/-

Table 7 displays the descriptive statistics of the most characteristic variables. Based on the statistics reported in Table 6, the average DACC of firms equals 0.063 (standard deviation = 0.055). According to the variables about audit firms, the mean number of years of auditor tenure is 6. In addition, the variables regarding firm characteristics show big companies according to size, leverage and growth opportunities.

Table 8 reports the correlation matrix between the main variables of the model. Although the correlation coefficients are not high, we compute the variance inflation factor (VIF) to test the lack of multicollinearity in our estimations. The VIF is well under 10, which is the threshold value for multicollinearity (Kutner et al., 2005).

Table 7
Descriptive statistics of the main variables

Variable	Mean	Std. Dev.	Q1	Median	Q3
DACC	0.061	0.053	0.021	0.046	0.086
CRISIS	0.436	0.496	0.000	0.000	1.000
SIZE	0.819	0.385	1.000	1.000	1.000
TENURE	6.383	3.495	3.000	7.000	9.000
SPEC	0.680	0.466	0.000	1.000	1.000
LNTAB	13.491	2.625	11.380	13.769	15.658
DTBA	0.525	0.239	0.350	0.534	0.689
MTB	2.558	1.688	1.360	2.079	3.312
ROA	0.049	0.071	0.021	0.045	0.081
LAW	0.508	0.500	0.000	1.000	1.000
SDACC	0.496	0.500	0.000	0.000	1.000

Mean, standard deviation, quartile one, median and quartile three of the variables. DACC is the absolute value of discretionary accruals; CRISIS is a dummy variable equal to 1 if the country has been affected by the economic crisis and 0 otherwise; SIZE is a dummy variable equal to 1 if the audit firm is a Big Auditor and 0 otherwise; TENURE is the number of years for which the current auditor has audited the client; SPEC is a dummy variable equal to 1 if the audit firm is the specialist in the industry and 0 otherwise; LNTAB is the size of the firm; DTBA is the financial leverage ratio; MTB is the growth opportunities; ROA is the return on total assets; LAW is a dummy variable equal to 1 if the country belongs to the Anglo-Saxon corporate system and 0 otherwise; SDACC is a dummy variable equal to 1 if the company has negative discretionary accruals and 0 otherwise.

Methodology

As usual in this line of research, we divide our investigation into two stages. First, we estimate total accruals and compute the discretionary component using equation (1). Second, using the absolute value of discretionary accruals, we analyze the relation between the discretionary accruals and our independent variables, as shown in Equation (2)

$$\text{DACC}_{i,t} = \beta_0 + \beta_1 \text{CRISIS} + \beta_2 \text{SIZE} + \beta_3 \text{TENURE} +$$

$$\beta_4 \text{TENURE}^2 + \beta_5 \text{SPEC} + \beta_6 \text{ LNTAB}_{i,t} + \beta_7 \text{DTBA}_{i,t} +$$

$$\beta_8 \text{MTB}_{i,t} + \beta_9 \text{ROA}_{i,t} + \beta_{10} \text{LAW}_{i,t} + \beta_{11} \text{SDACC}_{i,t} +$$

$$\sum_{J=1}^{5} \beta_{12} DUM\_SECT_{jt} + \varepsilon_{it}$$

$$(2)$$

where β_0 is the intercept and β_i is the coefficient of each independent variable. The sub-index i identifies the individual and the sub-index t the year; μ_i represents the fixed individual effect; and $_{it}$, the stochastic error. The stochastic error term combines both the measurement errors of any independent variable and the omission of explanatory variables.

We use time-series and cross-sectional data to form the panel data. The panel data approach enables us to control for the unobservable constant heterogeneity or fixed effects term Arellano 2003. This term is intended to reflect the firm-level characteristics and it thereby avoids the omission bias and renders more efficient estimates. The fixed effects term

is unobservable and, consequently, is subsumed in the random disturbance. A key element in panel data is the relation between the fixed effects term and the other explanatory variables. This correlation is analyzed with the Hausman test, which examines the null hypothesis of the lack of correlation between the independent variables and the fixed effects term.[7] Accordingly, we use the Hausman test to choose the most suitable estimation method.

Results

To check the consistency of our results, we run four different models. Table 12 provides the results. We initially include all the independent variables (column 1). Then, we check our model proposed in Section 3.3., excluding auditor size (column 2). We next include all the independent variables except those related to auditor tenure (column 3). Finally, we use all the independent variables except those concerning auditor specialization (column 4). In all the models, we also test the effect of the crisis, both as an independent variable and interacted with the other independent variables. According to the results obtained from the Hausman test, random effects (RE) have been used in the regression analysis.

Our results show a positive effect of the CRISIS variable on the dependent variable. That is, the economic crisis creates incentives for managers to manipulate earnings. This result is in line with Davis and Stobaugh (1995), Lin and Shih (2003), and Kousenidis et al. (2013). Earnings management may occur for different reasons, including the desire to influence stock prices and benefit executive compensation schemes. Another possible motivation is loss-avoidance, so that managers have incentives to modify the income to reach targets set before the crisis. Another possible motivation is "big bath" practices, where managers boost losses in a context of generalized losses in their industry to show a better performance in the coming years. In any case, our results suggest that the economic crisis creates an environment in which managers are under pressure or have incentives to modify earnings.

Regarding our first hypothesis on the relation between audit size and earnings management, we find a positive effect of the SIZE variable. This could be explained by the recent high-profile reports in the United States, the United Kingdom and the European Union, which have raised concerns about the Big Four accounting firms' concentration of market share and the potentially adverse effect that this concentration may have on audit markets and the quality of audits in these legal jurisdictions (Francis, et al 2013). In line with our argument, the majority of sample firms are audited by a Big Auditor (Table 4), and Cahan et al. (2011) suggest that the large market shares of the Big Four are due to a decline in both the quality and the costs of the audit. Notwithstanding, we consider as a dependent variable the absolute value of discretionary accruals and large values for this variable include large positive and negative accruals. Concretely, our sample is made up of large negative discretionary accruals (mean= -0.063; std. dev.= 0.052) in relation to large positive accruals (mean= 0.059; std. dev.= 0.054). This means that the positive association between audit size and earnings management is explained by auditor conservatism, since auditors are more permissive with decreasing earnings (Huguet and Gandía, 2016; Kim et al, 2003). In this sense, research

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[7]This test follows a chi-squared distribution with as many degrees of freedom as estimated coefficients. When the null hypothesis is rejected, the fixed effects term must be eliminated with the within groups technique. Otherwise, the random effects method applies.

Table 8

Correlation matrix and variance inflation factors

Pearsons correlations between variables and variance inflation factor (VIF). DACC is the absolute value of discretionary accruals; CRISIS is a dummy variable equal to 1 if the country has been affected by the economic crisis and 0 otherwise; SIZE is a dummy variable equal to 1 if the audit firm is a Big Auditor and 0 otherwise; TENURE is the number of years for which the current auditor has audited the client; SPEC is a dummy variable equal to 1 if the audit firm is the specialist in the industry and 0 otherwise; LNTAB is the size of the firm; DTBA is the financial leverage ratio; MTB is the growth opportunities; ROA is the return on total assets; LAW is a dummy variable equal to 1 if the country belongs to the Anglo-Saxon corporate system and 0 otherwise; SDACC is a dummy variable equal to 1 if the company has negative discretionary accruals and 0 otherwise.

	CRISIS	SIZE	TENURE	SPEC	LNTAB	DTBA	MTB	ROA	LAW	SDACC
DACC	-0.035*	0.106***	0.029	-0.057**	-0.037**	0.031*	0.056***	0.025	0.005	-0.033*
CRISIS		0.293***	0.172***	0.086***	-0.100***	-0.016	-0.129***	-0.138***	0.137***	-0.084***
SIZE			0.256***	0.182***	-0.308***	-0.085***	0.138***	0.173***	0.401***	-0.063***
TENURE				0.028	-0.318***	-0.086***	0.190***	0.140***	0.530***	-0.022
SPEC					-0.025	0.055**	0.074***	0.040**	0.078***	-0.040**
LNTAB						0.278***	-0.177***	-0.122***	0.522***	0.030*
DTBA							-0.040**	-0.065***	0.091***	0.030*
MTB								0.408***	0.303***	0.014
ROA									0.228	0.043**
LAW										-0.049**
VIF	1.17	1.34	1.42	1.05	1.51	1.10	1.30	1.24	1.94	1.01

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

has shown that Big Auditors impose conditional conservatism on their clients (Basu et al., 2001; Cano-Rodríguez, 2010; Francis and Wang, 2008). This leads to the asymmetrical recognition of unrealized losses relative to unrealized gains (Cano-Rodríguez, 2010).

We now address the role played by auditor size during the crisis. The interacted variable SIZE-CRISIS has a negative and significant influence. This finding confirms our first hypothesis and means that the positive effect of the Big Four auditors on earnings management is even more important during the crisis years. Hence, this result confirms previous arguments about auditor conservatism since in our sample there is a greater distance between large positive and negative accruals during the global economic crisis.

Table 12 (columns 1, 2, and 4) shows the effect of auditor tenure on earnings management. We run both linear specification (TENURE) and non-linear specification of the model (TENURE^2). As expected, the linear effect is negative and significant on earnings management (TENURE in columns 1 and 4). These results are coherent with previous research on audit quality. However, the result for the TENURE^2 variable shows a positive and significant influence on earnings management. The results confirm a U-shaped relation between auditor tenure and earnings management, with the lowest point at seven years. Thus, our findings indicate that auditing a company after less than seven years can gain a reduction in discretionary accruals. The underlying rationale is that the auditor's independence and objectivity are in play, so in the first years audit firms develop their work more efficiently. Nevertheless, because auditors should guarantee the quality of firms' financial statements, a lengthy audit firm tenure reduces their independence and compromise audit materiality judgment. The European Commission (2011) establishes that a long auditor tenure might lead to excessive familiarity between the audit firm and the client. This can threaten auditor objectivity, resulting in less rigorous audit procedures. In this sense, our results suggest that, coherent with Davis et al. (2009) and Chi et al. (2011), when auditors serve in a company for a long time, they can develop lax auditing which leads to ineffectively mitigating earnings management.

Concerning the association between earnings management and audit tenure during the crisis, our results are contrary to previous arguments. On the one hand, the TENUREûCRISIS variable has a positive and significant coefficient. On the other hand, the TENURE^{2}ûCRISIS variable has a negative and significant coefficient. Consequently, the global economic crisis represents an external factor which should be considered. In this sense, Johnson et al. (2002) find that, compared to medium audit firm tenures of four to eight years, short audit firm tenures of two to three years are associated with increased earnings management. Yet, Casterella and Johnston (2013) support the idea that long audit tenures gain value and knowledge about the client since the audit firm can better evaluate the risk of material misstatements, gain more experience and have better insights into the client's operations and business strategies as well as internal controls over financial reporting.

Finally, we address our third hypothesis concerning the influence of auditor specialization on earnings management. Columns 1 and 3 of Table 12 show a negative and significant effect of the SPEC variable on earnings management. Auditors with industry specialization could perform high quality audits of such firms because they are familiar with industry practices regarding their internal operating, control and reporting processes (Leung et al., 2017). Meanwhile, the SPECûCRISIS interacted variable does not have a significant influence.

The results in all columns of Table 12 on the firm-level issues are fully consistent with prior research. As expected, larger (LNTAB) and less leveraged (DTBA) firms have lower earnings management. Moreover, related to LAW our findings suggest that earnings management is less in those countries which have a higher legal protection of investors (La Porta et al., 1998)

Finally, in order to test the robustness of the association between discretionary accruals and audit quality, an additional analysis was performed. In this manner, we also estimate discretionary accruals using a variation of the Jones Model modified by Dechow et al. (1995), which is known as the Jones modified model. The results, presented in Table 13, confirm previous evidence reported in the "Results" Section and support previous conclusions.

Conclusions

It is widely accepted that audit firms represent one of the key mechanisms to improve the quality and reliability of accounting information and reduce earnings management. Meanwhile, the recent economic crisis has attracted the at-

Table 12

Regression results

Coefficients (and standard errors) of the estimation of the model [1]. The dependent variable is always DACC, the absolute value of discretionary accruals. SIZE is a dummy variable equal to 1 if the audit firm is a Big Auditor and 0 otherwise; TENURE is the number of years during which the current auditor has audited the client; TENURE2 is the cumulative number of years squared that the auditor has been employed by the firm; SPEC is a dummy variable equal to 1 if the audit firm is the specialist in the industry and 0 otherwise; LNTAB is the size of the firm; DTBA is the financial leverage ratio; MTB is the growth opportunities; ROA is the return on total asset; LAW is a dummy variable equal to 1 if the country belongs to the Anglo-Saxon corporate system and 0 otherwise; SDACC is a dummy variable equal to 1 if the company has negative discretionary accruals and 0 otherwise.

VARIABLES	Jones modified model (1)	Jones modified model (2)	Jones modified model (3)	Jones modified model (4)
CRISIS	0.016*	-0.007	0.021***	0.015*
	(0.010)	(0.007)	(0.008)	(0.010)
SIZE	0.015***		0.014***	0.013***
	(0.005)		(0.004)	(0.005)
SIZE*CRISIS	-0.029***		-0.026***	-0.032***
	(0.008)		(0.008)	(0.008)
TENURE	-0.004**	-0.004*		-0.004**
	(0.002)	(0.002)		(0.002)
TENURE*CRISIS	0.004*	0.002		0.004*
	(0.003)	(0.003)		(0.003)
TENURE^2	0.000*	0.000*		0.000*
	(0.000)	(0.000)		(0.000)
TENURE^2*CRISIS	-0.000*	-0.000		-0.000*
	(0.000)	(0.000)		(0.000)
SPEC	-0.005*		-0.006*	
	(0.003)		(0.003)	
SPEC*CRISIS	-0.004		-0.003	
	(0.004)		(0.004)	
LNTAB	-0.001*	-0.001**	-0.001**	-0.001*
	(0.000)	(0.000)	(0.000)	(0.000)
DTBA	0.003	0.001	0.002	0.002
	(0.004)	(0.004)	(0.004)	(0.004)
MTB	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
ROA	-0.005	-0.010	-0.005	-0.007
	(0.015)	(0.015)	(0.014)	(0.015)
LAW	-0.006*	-0.005	-0.007**	-0.006*
	(0.003)	(0.003)	(0.003)	(0.003)
SDACC	0.001	0.001	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)
Sector dummies	Yes	Yes	Yes	Yes
Observations	2,549	2,549	2,615	2,549
R^2	0.048	0.030	0.050	0.038
F-Test	68.54***	41.11***	63.68***	59.11***
Fixed effect/Random effect	RE	RE	RE	RE

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 13

Results of Sensitivity test

Coefficients (and standard errors) of the estimation of the model [1]. The dependent variable is DACC, the absolute value of discretionary accruals calculated using the Jones modified model. SIZE is a dummy variable equal to 1 if the audit firm is a Big Auditor and 0 otherwise; TENURE is the number of years during which the current auditor has audited the client; TENURE^2 is the cumulative number of years squared that the auditor has been employed by the firm; SPEC is a dummy variable equal to 1 if the audit firm is the specialist in the industry and 0 otherwise; LNTAB is the size of the firm; DTBA is the financial leverage ratio; MTB is the growth opportunities; ROA is the return on total assets; LAW is a dummy variable equal to 1 if the country belongs to the Anglo-Saxon corporate system and 0 otherwise; SDACC is a dummy variable equal to 1 if the company has negative discretionary accruals and 0 otherwise.

VARIABLES	Jones modified model (1)	Jones modified model (2)	Jones modified model (3)	Jones modified model (4)
CRISIS	0.016*	-0.007	0.021***	0.015*
	(0.010)	(0.007)	(0.008)	(0.010)
SIZE	0.015***		0.014***	0.013***
	(0.005)		(0.004)	(0.005)
SIZE*CRISIS	-0.029***		-0.026***	-0.032***
	(0.008)		(0.008)	(0.008)
TENURE	-0.004**	-0.004*		-0.004**
	(0.002)	(0.002)		(0.002)
TENURE*CRISIS	0.004*	0.002		0.004*
	(0.003)	(0.003)		(0.003)
TENURE^2	0.000*	0.000*		0.000*
	(0.000)	(0.000)		(0.000)
TENURE^2*CRISIS	-0.000*	-0.000		-0.000*
	(0.000)	(0.000)		(0.000)
SPEC	-0.005*		-0.006*	
	(0.003)		(0.003)	
SPEC*CRISIS	-0.004		-0.003	
	(0.004)		(0.004)	
LNTAB	-0.001*	-0.001**	-0.001**	-0.001*
	(0.000)	(0.000)	(0.000)	(0.000)
DTBA	0.003	0.001	0.002	0.002
	(0.004)	(0.004)	(0.004)	(0.004)
MTB	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
ROA	-0.005	-0.010	-0.005	-0.007
	(0.015)	(0.015)	(0.014)	(0.015)
LAW	-0.006*	-0.005	-0.007**	-0.006*
	(0.003)	(0.003)	(0.003)	(0.003)
SDACC	0.001	0.001	0.001	0.001
	(0.002)	(0.002)	(0.002)	(0.002)
Sector dummies	Yes	Yes	Yes	Yes
Observations	2,549	2,549	2,615	2,549
R^2	0.048	0.030	0.050	0.038
F-Test	68.54***	41.11***	63.68***	59.11***
Fixed effect/Random effect	RE	RE	RE	RE

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

tention of some researchers in the accounting field . In this context, we investigate whether the global economic crisis modifies the incentives to manage earnings and, if so, to what extent these incentives interact with the institutional environment.

From our analysis, we can draw three conclusions. First, our results confirm the prior literature's recognition that the Big Four provide higher quality audits and offer greater reliability for their clients' financial statements than non–Big Four auditors. Specifically, we find a potential effect of auditor conservatism which leads companies to recognize large negative earnings management. Additionally, the Big Four's effect on earnings management is very significant during the crisis years, reducing earnings management. Second, the relation between auditor tenure and earnings management is nonlinear and U-shaped. The effect of the current crisis in this relationship is positive, which can be explained by the increase in auditor tenure over the sample period. Finally, our findings show that auditor specialization may be import-

ant in mitigating earnings management.

Our research has implications both for academia, practitioners, and policymakers. We provide complementary evidence that the auditor firm quality influences earnings management and we consider a period of time that is characterized by an economic crisis. For practitioners and policymakers, our results shed light on how the characteristics of the audit firms affect earnings management and how these characteristics evolve during the economic crisis. We also find significant evidence of the relevance of auditor industry specialization. These results are important for clients. 80% of companies consider industry expertise or specialization to be an important factor when choosing an auditor (US Government Accountability Office 2003, 2008). In addition, our results show an important association between auditor tenure and earnings management, which clarifies the long and heated debate of whether audit firm rotation should be mandated (American Institute of CPAs, 1978, 1992; Cox 2006). The seriousness of the debate is evidenced by the Sarbanes–

Oxley Act, which required the US General Accountability Office to conduct a study of the potential effects of mandating audit firm rotation. Past research has exclusively focused on earnings management when analyzing the benefits/costs of mandatory auditor rotation (Johnson et al. 2002; Myers et al. 2003; Davis et al., 2009). Our results warn regulators and researchers that mandating audit firm rotation could potentially reduce earnings management, a potential result that has not been reported in prior research.

Due to our very large data set, both in the number of countries (six) and in the number of enterprises (989 listed companies), the contributions of this study are relevant and useful for big enterprises of any developed economy in the world. However, this paper presents certain limitations. First, we use a sample of listed companies, which are the largest companies of each country and they will tend to guarantee their reputation. Thus, the effect of earnings management in these companies may not have the same effect as in smaller enterprises. Furthermore, we have considered the length of the audit-client relationship as the total of years without considering the effect of any mandatory law which establishes the rotation of audit firms after different time period.

Finally, there are some future lines of research related with this paper. First, we have focused on earnings management, but other indicators of earnings management can be analyzed. Another interesting line of inquiry would be to study how the economic crisis modifies the interaction of firm-level corporate governance mechanisms (i.e., the ownership structure, the board of directors, etc.) and country-level corporate governance mechanisms as determinants of earnings management.

Conflict of interests

The authors declare no conflict of interests.

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