Debt, diversification and earnings management

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Abstract

In this article we use panel-estimation techniques to calculate discretionary accruals (DAC) and to produce a better understanding of the nature of the relation between debt and earnings management. Consistent with the transparency hypothesis (which suggests that diversification increases the complexity of firms' activities and reduces their transparency to outsiders), we find that for less-diversified (more transparent) firms, debt reduces positive discretionary accruals, whereas in relatively more-diversified (less transparent) firms the impact of debt becomes positive. Our paper shows that marginal increases in debt provide the incentives for managers to manipulate earnings, and diversification provides the needed context for this accounting practice to be possible. We have also found that only in the sub-sample of aggressive firms, those that manage discretionary accruals with enough magnitude to increase income, do lenders exert their control. Some firms, however, take advantage of diversification to avoid this control. Our findings are robust to several earnings-management measures and methodologies

1. Introduction

The objective of this study is to shed more light on the relation among debt, diversification and discretionary accruals (DAC) as a proxy for earnings management in a specific sample of Spanish firms. Several motivations underlie this study. First, in recent years international accounting has become a subject of increasing interest, due to economic globalization and convergence in accounting standards. Differences in country-characteristics should be taken into account in order to make accounting harmonization more effective. Second, while most studies analyze earnings management in the US context (see Ronen and Yaari, 2008), Leuz et al. (2003) suggest that earnings management practices differ across countries. Thus, additional international evidence may usefully contribute to explaining these differences. Third, our study shows that the relation between earnings management and debt is better understood when a firm-specific characteristic, diversification, is considered.

Using a sample of Spanish quoted firms, we find evidence showing that debt has a negative impact on income-increasing DAC. Such a result adds to earlier contributions in the literature, which generally report that leverage affects accounting choices. However, the contribution of this paper is to show that the nature of this relation is affected by the level of firm diversification. Diversification provides the firm with opportunities to escape debt-holders' monitoring activities and, thus, mitigate the impact of debt on earnings management.

Previous research on the relation between debt and earnings management offers mixed results. On the one hand, some studies have shown a negative relation between debt and income-increasing DAC (Chung et al., 2005; Zhong et al., 2007; Lee et al., 2007), suggesting that managers in leveraged firms may face control from debt-holders, making it difficult for them to engage in earnings management. On the other hand, other studies show that debt is positively associated with income-increasing earnings management when firms want to reduce the probability of debt covenant violations and improve the firm's bargaining power during debt negotiation (DeFond and Jiambalvo (1994), Sweeney (1994), Klein (2002), and Othman and Zhegal (2006) for French firms, but not for Canadian firms).

These different findings about the relation between debt and income-increasing DAC can also be explained by country differences, as indicated in Othman and Zhegal (2006). Our study contributes to the relation between the debt- and earnings-management debate by presenting evidence for a European code-law country (Spain), where a different set of arguments is needed to the ones normally employed in the United States (common-law context).

Similarly to findings in other studies of common-law countries, mainly the United States, our results show that, at least for some types of firms (non-diversified), debt is negatively associated with DAC. In these cases, debt-holders appear to undertake monitoring activities which successfully reduce the scope for earnings management. However, we also show that their

monitoring effectiveness may depend on the firm's level of diversification. From an agency theory perspective, a transparency hypothesis considers that corporate diversification increases organizational complexity, leading to a higher level of informational asymmetry between managers and financial suppliers (Thomas, 2002). Managers in diversified firms may exploit this informational asymmetry to engage in earnings management. For non-diversified firms debt reduces earnings management, whereas in diversified firms the impact of debt becomes positive. Our results are robust to several alternative earnings-management models (Jones short-term cash flow; Jones short-term cash flow and lagged accruals; McNichols, 2002; Kothari et al., 2005; Hribar and Collins, 2002), which capture different aspects of earnings manipulation. We have also found that only in the case of aggressive firms, those that manage DAC with enough magnitude to increase income, do lenders exert their control. Some firms, however, take advantage of diversification to avoid this control.

This study also makes a methodological contribution. Panel-estimation techniques have been used to calculate discretionary accruals and to test the formulated hypothesis, providing new results on the comparability of accruals models that highlight their relative explanatory power. Most studies have calculated DAC using ordinary-least-squares regression (OLS), considering time-series data for each firm (i.e., Jones, 1991; Dechow et al., 1995), or cross-section data. But panel-regression is more accurate when we have time observations for each firm. Since the first edition of panel data analysis (Hsiao, 1986), the growth of applied studies and the methodological development of new econometric tools of panel data has been phenomenal (Hsiao, 2005). As Hsiao indicates, panel data, by blending inter-individual differences and intra-individual dynamics, have several advantages over cross-sectional or time-series data.[1]This paper is organized as follows: in order to develop the background and the hypotheses, Section 2 presents a brief description of the Spanish accounting-manipulation context and the role of debt-holders. Section 3 discusses different questions related to the research method: sample, earnings-management measures used in this study, model and control variables. Section 4 displays the empirical results. Finally, Section 5 concludes with implications and limitations.

2. Background and hypotheses

2.1. Accounting manipulation and the role of debt-holders in Spain

[1] (a) More accurate inference of model parameters, because panel data usually contain more degrees of freedom and less multicollinearity than cross-sectional data. (b) It is possible to observe the before- and after-effects of receiving the treatment for the same individual as well as providing the possibility of isolating the effects of treatment from other factors affecting the outcome. (c) It contains information on the intertemporal dynamics, and the individuality of the entities may allow to control for the effects of missing or unobserved variables. (d) Economic behavior is inherently dynamic so that most econometrically interesting relations are explicitly or implicitly dynamic. (e) Panel-data regression generates more accurate predictions for individual outcomes by pooling the data rather than by generating predictions of individual outcomes using the data on the individual.

In contrast to most common-law countries such as the United States, Spain has developed a code law institutional framework, which has been associated with higher accounting manipulation. Concretely, Leuz et al. (2003) find that earnings management is more pervasive in countries where legal protection of a firm's outsiders is weak (continental Europe and Asia) because insiders enjoy greater private-control benefits and have stronger incentives to obfuscate firm performance. van Hemmen and Stephen (2005) review the importance of institutional factors such as rule of law, investor and creditor protection. In general, the literature acknowledges that the protection of creditors very much relies on the degree of access to information on the quality of firms' investments.

On the other hand, there is evidence in the United States which suggests that market pressure explains higher levels of earnings manipulation among public firms (Beatty and Harris, 1998; Beatty et al., 2002). Although less pronounced than in the United States, Arnedo et al. (2007) point out that there is enough market pressure in Spain for earnings management to be used as a tool to improve the firm's image. Some papers on Spanish listed firms suggest that they may have incentives to increase earnings (Azofra et al., 2003; Gallén and Giner, 2005) in response to increased market pressure.

Our paper is concerned with the explanation of the variance of earnings management across Spanish public firms. In particular, we aim to orient the regulator by identifying public firm characteristics which increase the likelihood of such manipulation being practiced. Among other factors, the degree of leverage may contribute to explaining the extent to which managers manipulate earnings. Before we discuss the interplay between debt and earnings management, it is worth describing the governance status played by creditors in the Spanish quoted firms.

As Ojah and Manrique (2005, p. 455) point out, unlike major developed capital markets such as is the case in the United States, Japan and Britain, the Spanish capital market is dominated by private (bank and non-bank) debt providers. In Spain, public debt is basically limited to government issues. de Andrés et al. (2005, p. 313) have found that for most of the Spanish quoted firms the proportion of bank debt to total debt is almost 99%.

On the other hand, the relation of banks and industrial firms has undergone profound historical evolution. Traditionally, Spanish banks have played a similar role to that of the German and Japanese ones, serving as both significant shareholders and creditors of leading industrial groups. As Hernansanz (2001) points out, this relation dates back to the early stages of Spanish industrialization in the 19th century, when most of the leading Spanish banks were born. Banks used credits to support the growth of firms in which they held significant share-holdings, a strategy which has been widely acknowledged as one of the causes of the 1970s banking crisis. The presence of banks on the board of directors contributed to a concentration of power and to the issuance of credits without the constraints of market discipline.

In the early 1980s, however, the regulatory pressure exerted by the Bank of Spain changed the situation drastically. Among other changes, Hernansanz (2001, p. 126) highlights the definition and establishment of strict limits on share-holdings and lending activity on a proportion to the total risk incurred in by a credit institution, not only with individual firms but also with industrial conglomerates. Additionally, the author points out that the banks' practice of providing direct support to firms in which they hold significant share-holdings has diminished. In fact, most banks now manage industrial portfolios and corporate banking through separate departments.

Although some authors emphasize the association between debt and banks' capital participation (Gutiérrez et al., 2000; Saa-Requejo, 1996), the analysis by de Andrés et al. (2005, p. 325) suggests that this relation is not significant: neither descriptive nor econometric analysis show any positive relation between bank debt and a bank being the main shareholder (only 19.54% of sample firms were under the majority control of a bank). Rather, using a sample of Spanish non-financial quoted firms for the period 1991–1996, the authors find a positive association between bank debt and family control. This association appears to be negative when the largest shareholder is the State, another Spanish firm or a multinational. Consistently, Ojah and Manrique (2005, p. 460) found that the presence of a bank in the firm's ownership did not contribute to explaining the levels of bank debt in non-quoted firms either.

In a context of increased competition and reduced banking profit margins, Spanish banks have become much more interested in increasing their returns by holding a proportion of their assets in shares of Spanish non-financial quoted firms and profiting from the growth experienced by the latter since the early nineties. Accordingly, Salas and Saurina (2003, p. 1070) find that the Madrid Stock Exchange Index has had a positive and significant impact on Spanish banks' Tobin's q.

Accounting-manipulation practices are likely to occur when there is a clear separation of ownership and control. Both regulatory pressures and the focus on financial returns yielded by their industrial portfolios suggest that it would be misleading to consider Spanish banks as firms' insiders (i.e., actively involved in firms' management), even in those cases where they are among the largest shareholders. Pindado and de la Torre (2006, p. 670) show that Spanish quoted firms (their sample covers the period 1990–1999) are characterized by high ownership concentration (on average, the five largest Spanish shareholders own more than 60% of the quoted firms' capital). However, the proportion of shares owned by insiders (defined as those present on the board of directors) was only 17%, on average, which raises a possible issue of high agency costs. Anecdotal descriptions of Spanish CEOs' behavior managing quoted firms suggest that they face little control by blockholders. This evidence suggests that managers face few restrictions to maintain their informative advantage over different blockholders and creditors.

2.2. Hypothesis

In order to obtain funds at favorable conditions, Watts and Zimmerman (1986) suggest that managers in highly leveraged firms may artificially increase reported earnings to improve the firm's bargaining power during debt negotiation, as well as to reduce creditors' perceived risks and loosen credit rationing. This is known in the literature as the debt/equity hypothesis, which predicts a positive association between the debt/equity ratio and the probability that managers shift reported earnings from future periods to the current period. DeFond and Jiambalvo (1994), Sweeney (1994), Dichev and Skinner (2002), Jaggi and Lee (2002), and Othman and Zhegal (2006), for French firms but not Canadian firms, found a positive relation between debt and income-increasing earnings management.

However, high leverage is also associated with financial distress (Beneish and Press, 1995; Ohlson, 1980), and firms with failed covenants are likely to manage earnings downwards to achieve better concessions. According to DeAngelo et al. (1994), troubled companies have large negative accruals related to contractual renegotiations, which provides incentives to reduce earnings. Becker et al. (1998) and Mohd and Ahmed (2005) found that debt is negatively related to income-increasing manipulation, indicating that contractual renegotiations in firms with high debt provide incentives to reduce earnings.

In contexts different from financial distress and debt renegotiation, some studies point out that debt restricts the discretionary accruals produced by managers' accounting practices because the firm is subject to certain financial commitments (Jensen, 1986; Harris and Raviv, 1991). Some studies have documented a negative and significant relation between debt and income-increasing earnings management (Chung et al., 2005; Lee et al., 2007; Zhong et al., 2007). This suggests that companies with high debt levels face increased monitoring by bankers and creditors, thus inhibiting the use of positive discretionary accounting accruals. For highly indebted firms, it may be efficient for banks to incur in monitoring costs in order to assess the real quality of the debtor. This is the control hypothesis (Jensen, 1986), when debt constrains opportunistic behavior. According to evidence found in the US, we can hypothesize a negative relation between debt and income-increasing earnings management in our sample of Spanish quoted firms:

H1: for Spanish quoted firms, leverage has a negative association with income-increasing earnings management.

To infer the relation between corporate diversification and DAC, earnings management could be considered to be an agency cost, that is, a cost caused by the informational asymmetry between the firm's insiders and its financial suppliers. Thomas (2002) provides two hypotheses to explain informational asymmetries for diversified versus focused firms. The first one is the information diversification hypothesis. It can be considered that accruals in various divisions are uncorrelated and tend to compensate themselves. Consequently, it can be argued that there is no

relation between the degree of abnormal consolidated accruals and corporate diversification. In this case, while managers of diversified firms can accurately estimate or directly manipulate divisional cash flows, outsiders can observe only noisy estimates of them. Subrahmanyam (1991) and Gorton and Pennacchi (1993) show that basket securities are subject to less asymmetric information precisely because their cash flows are aggregates. Information asymmetries associated with each security can be diversified away by means of the securities that constitute the basket.

On the other hand, Thomas (2002) considers an alternative hypothesis. Under the transparency hypothesis, he argues that diversified firms have a higher degree of information asymmetry (less transparent) than focused firms, because they are likely to have the most complex structures. This complexity requires more resources and expertise to accurately examine earnings that are derived from disparate business divisions in different industries and countries. As Bushman et al. (2004) point out, firm complexity derived from extensive lines of diversified businesses limits corporate transparency. The implication is that the costs associated with monitoring accounting information disclosed by focused firms may be comparatively lower, reducing the potential for managerial accounting manipulation. Informational asymmetry is likely to be more severe in diversified firms (Best et al., 2004), and their managers may exploit the informational asymmetry by engaging in income-increasing earnings management (to maximize their compensation, when tied to performance, for instance).

Although we do not know about any literature that directly connects earnings management with diversification, Barton (2001) suggests that financial derivatives can be used to smooth earnings, because they reduce the volatility of both cash flows and income. In some cases, derivatives substitute DAC to manipulate earnings. He found that business diversification is negatively associated with accrual management, because accruals can be managed through diversification. On the other hand, Hadlock et al. (2001) find that accounting-based financial reporting in focused firms is more informative than it is for diversified firms, and Dunn and Nathan (2008) demonstrate that individual analysts' earnings forecasts are less accurate, and there is more inter-analyst disagreement, as the level of firm diversification increases, thus indicating that diversification make it difficult to forecast precise accounting numbers.

The above-mentioned aspects suggest that the relation between firm diversification and earnings management is unclear. However, in a weak regulatory context on diversification disclosure, such as the Spanish one, it is reasonable to argue that corporate diversification could be associated with more earnings management. Spanish segment-accounting practices have traditionally been very poor. For the period covered in this study (1992–2002), the Spanish accounting law (Plan General de Contabilidad) only established voluntary requirements for segment revenues, and the Spanish Stock Market Commission, Comisión Nacional de Mercado de Valores (CNMV), requires firms to reveal revenue distribution by activity and geographically, but this

information is insufficient, since it only covers total net revenues. Thus, we can formulate our next hypothesis:

H2: for Spanish quoted firms, corporate diversification is positively associated with income increasing earnings management.

To-date, debt and diversification have been considered separately. Nevertheless, the effectiveness of monitoring activity may vary with the complexity of the firm. If the quality of information in diversified (complex) firms differs from focused firms, the impact of debt on income-increasing earnings management would then depend on the level of diversification.

If managers in leveraged firms benefit from generating income-increasing earnings management, then reduced informational transparency caused by diversification may facilitate engaging in such accounting activities. Diversified firms could also have particular incentives to manipulate earnings upwards when debt increases. Diversifying processes may be financed through external financing. In this context, debt could be related to income-increasing earnings management when large and diversified firms need to present a good image to increase their access to financial funds. Consequently, the effect of diversification may change the nature (and possibly, the sign) of the relation between debt and income-increasing DAC. Thus, we propose the following hypothesis:

H3: for Spanish quoted firms, the impact of debt in diversified firms is positively associated with the existence of income-increasing earnings management.

3. Research method

3.1. Sample

The sample is drawn from parent companies included in the database of the Comisión Nacional del Mercado de Valores (CNMV), the Spanish equivalent to the SEC, during the period 1992–2002. This database includes 4097 company-year observations corresponding to firms that quote stocks on the continuous market or that issue bonds. First, we have eliminated financial and insurance firms, reducing the sample to 2893 company-year observations (443 firms). In order to give stability to the sample, and because many firms only appear for one or two years, only firms with information available for more than seven years have been chosen. This restriction reduces the sample to 216 firms. Finally, very extreme observations have been eliminated.[2] As a result, our

[2] The main criterion to eliminate these observations has been to obtain normal distributions of the variables in a histogram, reducing skewness, although without statistical signification because it is difficult to achieve that with financial data. Therefore, each variable has a different treatment. In particular, we have eliminated observations where the debt variable ranges outside 1% and 150% (144 eliminated year obs.), and where effective

sample has 1853 non-financial firm-year observations (192 non-consolidated firms). In the sample, 40% of the firms are industrially diversified, 47% geographically and 23% both. For each firm, the industrial classification proposed by the CNMV is considered: food and beverage (11%), cement and building material (6%), trade and services (10%), building (6%), electricity (5%), chemical and metal (11%), real estate (20%), manufacturing (12%), utilities (4%), paper and timber (5%), transport and communication (6%) and other firms (4%). The percentage distribution is similar when years are separately considered. A 36% of the total sample is related to the building industry (building, cement and building material and real state), reflecting the Spanish high dependence on this industry. When firms operating in the food and beverage industry and in the paper and timber industry are also considered, we find that nearly 32% of the sample are manufacturing firms. The resulting distribution is thus strongly affected by the extraordinary growth the building sector has experienced in the last two decades.

3.2. Earnings-management measure

Consistent with previous research, discretionary accruals are used to identify earnings management. Based on total accruals (TAC), these can be broken down into a discretionary (DAC) and a non-discretionary (NDAC) accruals component. Most models estimate non-discretionary accruals across a regression, where TAC is the dependent variable, and the independent variables are the factors that can explain total accruals. To-date, most studies that use a cross-section approach to estimate DAC (or working-capital discretionary accruals WCDAC) have employed a regression for each industry and year using ordinary-least-square regression (OLS). But when we have different temporal observations for each firm, a panel-regression for each industry is more accurate. The challenge of panel methodology is to control for the impact of unobserved heterogeneity (firm-specific effect), represented by the incidental parameters, u_{it}, to obtain valid inference on the structural parameters a_i. Firms are heterogeneous and, as a consequence, there are always characteristics that are difficult to measure or information hard to obtain that lead to biased results. The effects of unobserved heterogeneity can either be assumed to be random variables, referred to as the random-effects model, or fixed parameters, referred to as the fixed-effects model. As a result, our methodology controls for the impact of the independent variables on the estimated coefficients which is caused by variables not entered into the model whenever they could be considered as part of the heterogeneity of each firm. Thus, we have adopted a panel approach to calculate DAC.

In the Spanish context, Alcarria and Gill (2004) test several working-capital discretionary-accruals models for a sample that is similar to the one used in our research. They conclude that a Jones model adaptation, the Jones cash-flow model, produces the most powerful

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tax rate ranges outside 200% and 200% (65 eliminated year obs.). Furthermore, year observations with some data errors, such as reporting assets equal to zero (24 obs.), have also been eliminated. We have also imposed the restriction of having seven years to each firm (this allows improving accuracy in panel regressions, by isolating the individual firm effect in the error term), leading to the elimination of 10 firms.

tests in the three types of manipulation studied. This variation responds to the empirical evidence presented by Dechow (1994) of the existence of a strong negative association between cash flow and accruals.

Alcarria and Gill (2004) also use a working-capital version of this model. As discussed by Beneish (1998) and Young (1999), this formulation is potentially more appealing, since continuous (i.e., yearby-year) earnings management via depreciation accrual is likely to have limited potential due to its visibility and predictability. Thus, we use the Jones cash-flow model proposed by Alcarria and Gill (2004) with a panel approach (Jones short-term cash-flow model):

$$WCA_{i,t}/A_{i,t-1} = \alpha_0 (1/A_{i,t-1}) + \alpha_1 (\Delta REV_{i,t}/A_{i,t-1}) + \alpha_2 (CFO_{i,t}/A_{i,t-1}) + \mu_{it} + \varepsilon_{i,t}, \quad \text{Eq. (1)}$$

where $WCA/A_{i,t1}$ are working-capital accruals divided by lagged total assets (all variables are scaled by lagged assets to reduce heteroscedasticity). WCA is calculated as: (Dcurrent assets Dcash) (Dcurrent liabilities Dshort-term debt Dtaxes payable). DREV is the change in sales revenues and CFO (operating cash flow) is the difference between ordinary net income and observed accruals, which considers working-capital accruals minus depreciation and amortization expenses. u_{it} is the fixed-or random-effect component (=0 if we consider an OLS regression), and $e_{i,t}$ denotes unspecified random factors. The standardized residuals of ($u_{it} + e_{it}$) are our primary proxy for WCDAC (working-capital discretionary accruals).

To reinforce our results, other models have been considered to generate DAC. Based on the previous model, lagged WCA is introduced as an explanatory variable, to capture reversal of accruals. Since accruals are accounting adjustments to cash flows and should add up to zero over the life of a firm, the upwardly managed accruals are expected to be followed by reversals. Accruals in the t-period should be a function of accruals in t 1 period. The model we propose is based on Nwaeze (2001) and Pae (2005), and we incorporate lagged accruals into a Jones short-term cash-flow model:

$$WCA_{i,t}/A_{i,t-1} = \alpha_0 (1/A_{i,t-1}) + \alpha_1 (\Delta REV_{i,t}/A_{i,t-1}) + \alpha_2 (CFO_{i,t}/A_{i,t-1}) + \alpha_2 (WCA_{i,t-1}/A_{i,t-2}) + u_{it} + \varepsilon_{i,t}, \quad \text{Eq. (2)}$$

Taking into consideration other cash-flow adjustments, another model we have used is McNichols (2002), which also controls for current, t 1 and t + 1 operating cash flows, in this case considering depreciation accruals (PPE = property, plant and equipment; TA = total accruals):

$$TA_{i,t}/A_{i,t-1} = \alpha_0 (1/A_{i,t-1}) + \alpha_1 (\Delta REV_{i,t}/A_{i,t-1}) + \alpha_2 (PPE_{i,t}/A_{i,t-1}) + \alpha_3 (CFO_{i,t}/A_{i,t-1}) + \alpha_4 (CFO_{i,t-1}/A_{i,t-2}) + \alpha_5 (CFO_{i,t+1}/A_{i,t}) + u_{it} + \varepsilon_{i,t}, \quad \text{Eq. (3)}$$

Considering other control variables, we use Kothari et al. (2005), whose model controls for lagged ROA, because their extreme values can affect accruals:

$$TA_{i,t}/A_{i,t-1} = \alpha_0 (1/A_{i,t-1}) + \alpha_1 (\Delta REV_{i,t}/A_{i,t-1}) + \alpha_2 (PPE_{i,t}/A_{i,t-1}) + \alpha_3 (ROA_{,t-1}/A_{i,t-2}) + \alpha_4 (CFO_{i,t+1}/A_{i,t}) + u_{it} + \varepsilon_{i,t}, \quad \text{Eq. (4)}$$

In addition to the above models, which use a balance-sheet approach, we consider the Hribar and Collins (2002) model, based on an income-statement approach. These authors consider that the use of balance-sheet approach suffers from a potentially large measurement problem and this can lead to erroneously concluding that earnings management exists when no such opportunistic activity is present. Changes in current assets and liabilities due to non-operating events show up in the balance sheet, but do not flow through the income statement. The Hribar and Collins (2002) model is based on the following regression of total accruals adjustments ($TACC_t$, as the difference between operating income and operative cash flow) on change in revenues ($DREV_t$) and property, plant and equipment (PPE_t) deflated by beginning total assets (A_{t1})[3]:

$$TACC_{i,t}/A_{i,t-1} = \alpha_0 (1/A_{i,t-1}) + \alpha_1 (\Delta REV_{i,t}/A_{i,t-1}) + \alpha_2 (PPE_{i,t}/A_{i,t-1}) + u_{it} + \varepsilon_{i,t}, \quad \text{Eq. (5)}$$

With the explained models, we wish to capture different approaches of DAC, making the analysis of this study more robust.

3.2.1. Estimation of expected accrual models

Table 1 reports the estimation results of accrual models. Model A reports the estimation results of the Jones short-term cash-flow model. Consistent with previous studies, the mean coefficient estimate on change in revenue is positive, as is the case for the rest of the models presented. As in other models, and consistent with Dechow and Dichev (2002), Model A reports that mean coefficient estimates on current operating cash flows are negative. The adjusted R^2 is 0.67, very similar to the R^2 for Model B (0.69), where we have added lagged accruals to capture reversals.

Contrary to other studies which detect long-term reversal effects (two or more years), we observe that this variable has a negative sign, showing that the reversal effect is produced in one year. Dechow et al. (1996) found that firms manipulate earnings for up to three years, with the reversal of initially manipulated earnings occurring in the fourth year at the earliest. Also Chan et

[3] The Hribar and Collins (2002) model is a different accrual measurement methodology. Accruals calculated under their methodology can be regressed by taking into account the different earnings-management models based on the balance approach. We present the Hribar and Collins (2002) model based on Jone's (1991) regressors. However, the reference to this separate accrual measurement methodology is lax and duplicating their measurement of accruals to other models has no qualitative effect on the results.

al. (2004) found such long-term effects, while Nwaeze (2001) showed adjustment length ranges of between two and three years. If managers manipulate accruals to alter prospective investors' perceptions of a firm's value, then they may adjust the effects gradually to maintain the perceived credibility of earlier reports. Incentives to delay the adjustment of managed accruals may also arise from a manager's desire to "protect" his/her reputation or mitigate looming political/regulatory risks. Adding lagged accruals to our Model A only improves the explanatory power measured by R^2 by 2%, a difference similar to the one observed by of Pae (2005).

In a third model, the McNichols (2002) one, the mean of the estimated coefficient on property, plant, and equipment is negative (which also holds when this variable is introduced in other models). Consistent with Dechow and Dichev (2002), coefficient estimates on current, and lagged operating cash flows are negative and positive, respectively. The mean adjusted R^2 increases to 0.83, which again is consistent with McNichols (2002), and represents the model with the best adjustment.

In the Kothari et al. (2005) model, the relation between ROA and accruals is negative, but the R^2 is 0.26, showing a significantly lower explanatory power. An identical R^2 (0.26) is found for the Hribar and Collins (2002) model.

To summarize, the model that includes current and operating t 1 and t + 1 cash flows (McNichols, 2002) in a Jones model presents the greatest explanatory power, followed by versions of Jones shortterm cash-flow models, with and without lagged accruals. Finally, the Kothari et al. (2005) and Hribar and Collins (2002) models present the smallest explanatory power.

3.2.2. Comparison of forecast accuracy of accrual models

As in Pae (2005), and based in Thomas and Zhang (2000), in Table 2 we use four metrics to compare the forecast accuracy of the five models expressed: (a) raw forecast errors, (b) absolute-forecast errors, (c) pseudo R^2, and (d) adjusted R^2 from a regression of actual accruals on predicted accruals. Forecast errors (FE) are measured by actual total accruals (TA) minus total accruals predicted (Pred(TA)) from each considered model ($FE_{i,t} = TA_{i,t}$ $Pred(TA_{i,t})$). We consider that models with minor forecast errors (raw or absolute) are those which present a better adjustment. The first part of Table 2 reports raw and absolute-forecast errors. Mean-forecast errors are negative across all accrual models, suggesting that actual accruals are, on average, less than predicted accruals. The Jones short-term model with cash flows and the same model with lagged accruals have the smallest mean-forecast error (0.0006). If we consider the median-forecast errors, results are similar. When we consider absolute-forecast errors, the Kothari et al. (2005) model and the Hribar and Collins (2002) model show the smallest forecast errors. Interquartile ranges do not allow any definite conclusion. Taking into account these results, it is not clear which model presents the higher accuracy.

Table 1
Estimation results for accruals models.

Variable		Mean	Standard deviation	First quartile	Median	Third quartile	Minimum	Maximum
Model A: coefficient estimates of the Jones short-term cash-flow model								
$1/A_{i,t1}$	(?)	36.0	325.4	50.8	24.2	90.0	737.3	466.2
$DREV_{i,t}/A_{i,t1}$	(+)	0.00123	0.00075	0.00084	0.00106	0.00166	0.00007	0.00239
$CFO_{i,t}/A_{i,t1}$	()	0.61675	0.26662	0.86800	0.65950	0.43000	0.91300	0.18300
Adj. R^2		0.67	0.20	0.54	0.66	0.84	0.32	0.93
Model B: coefficient estimates of the Jones short-term cash-flow and lagged-accruals model								
$1/A_{i,t1}$	(?)	44.0	324.0	87.4	3.6	91.4	744.2	523.6
$DREV_{i,t}/A_{i,t1}$	(+)	0.00127	0.00077	0.00080	0.00126	0.00176	0.00001	0.00248
$CFO_{i,t}/A_{i,t1}$	()	0.57625	0.27960	0.84625	0.57100	0.42575	0.92800	0.14000
$WCA_{i,t1}/A_{i,t2}$	(?)	0.08009	0.14030	0.13165	0.00386	0.00753	0.34400	0.07150
Adj. R^2		0.69	0.20	0.56	0.68	0.88	0.35	0.95
Model C: coefficient estimates of the McNichols (2002) model								
$1/A_{i,t1}$	(?)	49.1	456.0	111.4	4.5	113.9	593.2	1324.0
$DREV_{i,t}/A_{i,t1}$	(+)	0.00080	0.00090	0.00036	0.00068	0.00119	0.00082	0.00258
$PPE_{i,t}/A_{i,t1}$	()	0.03215	0.04313	0.06973	0.03620	0.00320	0.08050	0.03840
$CFO_{i,t}/A_{i,t1}$	()	0.76200	0.14670	0.87275	0.73050	0.69475	0.97200	0.49100
$CFO_{i,t1}/A_{i,t2}$	(+)	0.11025	0.08248	0.04035	0.10840	0.19225	0.00026	0.22100
$CFO_{i,t+1}/A_{i,t}$	(+)	0.14705	0.09152	0.06670	0.16300	0.20625	0.00472	0.29400
Adj. R^2		0.83	0.13	0.80	0.89	0.90	0.58	0.97
Model D: coefficient estimates of Kothari et al. (2005) model								
$1/A_{i,t1}$	(?)	17.2	301.2	33.4	55.4	197.3	660.0	368.3
$DREV_{i,t}/A_{i,t1}$	(+)	0.00062	0.00143	0.00030	0.00095	0.00151	0.00185	0.00305
$PPE_{i,t}/A_{i,t1}$	()	0.03512	0.06988	0.07690	0.03265	0.01840	0.15600	0.13500
$ROA_{i,t1}/A_{i,t2}$	()	0.00019	0.00284	0.00021	0.00017	0.00092	0.00639	0.00601
Adj. R^2		0.26	0.20	0.15	0.21	0.30	0.05	0.83
Model E: coefficient estimates of the Hribar and Collins (2002) model								
$1/A_{i,t1}$	(?)	5.3	345.5	28.9	52.3	188.2	701.2	435.7
$DREV_{i,t}/A_{i,t1}$	(+)	0.00041	0.00174	0.00035	0.00097	0.00140	0.00357	0.00280
$PPE_{i,t}/A_{i,t1}$	()	0.03425	0.07020	0.07708	0.03435	0.01793	0.14600	0.14300
Adj. R^2		0.26	0.20	0.15	0.20	0.29	0.04	0.83

The Jones short-term cash-flow model is based in the following firm-year specific regression of working-capital accruals (WCA_t) on change in revenue ($DREV_t$) and operative cash flow (CFO_t) deflated by beginning total assets (A_{t1}):

$WCA_{i,t}/A_{i,t1} = a_0(1/A_{i,t1}) + a_1(DREV_{i,t}/A_{i,t1}) + a_2(CFO_{i,t}/A_{i,t1}) + u_{it} + \varepsilon_{i,t}$.

The Jones short-term cash-flow and lagged-accruals model is based on the following firm-year specific regression of workingcapital accruals (WCA_t) on change in revenue ($DREV_t$), operative cash flow (CFO_t) and lagged working-capital accruals (WCA_{t1}) deflated by beginning total assets (A_{t1}):

$WCA_{i,t}/A_{i,t1} = a_0(1/A_{i,t1}) + a_1(DREV_{i,t}/A_{i,t1}) + a_2(CFO_{i,t}/A_{i,t1}) + a_2(WCA_{i,t1}/A_{i,t2}) + u_{it} + \varepsilon_{i,t}$.

The McNichols (2002) model is based on the following firm-year specific regression of total accruals (TA_t) on change in revenue ($DREV_t$), property, plant and equipment (PPE_t) and operative cash flow (CFO_t, CFO_{t1}, and CFO_{t1}) deflated by beginning total assets (A_{t1}):

$TA_{i,t}/A_{i,t1} = a_0(1/A_{i,t1}) + a_1(DREV_{i,t}/A_{i,t1}) + + a_2(PPE_{i,t}/A_{i,t1}) + a_3(CFO_{i,t}/A_{i,t1}) + a_4(CFO_{i,t1}/A_{i,t2}) + a_5(CFO_{i,t+1}/A_{i,t}) + u_{it} + \varepsilon_{i,t}$.

The Kothari et al. (2005) model is based on the following firm-year specific regression of total accruals (TA_t) on change in revenue ($DREV_t$), property, plant and equipment (PPE_t) and lagged ROA (ROA_{t1}) deflated by beginning total assets (A_{t1}):

$TA_{i,t}/A_{i,t1} = a_0(1/A_{i,t1}) + a_1(DREV_{i,t}/A_{i,t1}) + a_2(PPE_{i,t}/A_{i,t1}) + a_3(ROA_{i,t1}/A_{i,t2}) + u_{it} + \varepsilon_{i,t}$.

The Hribar and Collins (2002) model is based on the following firm-year specific regression of total accruals adjustments ($TACC_t$, as the difference between operating income and operative cash flow) on change in revenue ($DREV_t$) and property, plant and equipment (PPE_t) deflated by beginning total assets (A_{t1}):

$TACC_{i,t}/A_{i,t1} = a_0(1/A_{i,t1}) + a_1(DREV_{i,t}/A_{i,t1}) + a_2(PPE_{i,t}/A_{i,t1}) + u_{it} + \varepsilon_{i,t}$.

Table 2
Forecast accuracy of accrual models.

Accrual model	Mean	Standard deviation	First quartile	Median	Third quartile
Raw forecast errors (actual total accruals minus predicted total accruals)					
Jones short-term cash-flow model	0.0006593	0.1458547	0.0443206	0.0393088	0.002999
Jones short-term cash-flow and laggedaccruals model	0.0006604	0.1486183	0.0422905	0.0023416	0.0365511
McNichols (2002) model	0.0294079	0.1579045	0.0764983	0.0318482	0.0102364
Kothari et al. (2005) model	0.0297481	0.1068044	0.059606	0.0294521	0.0009144
Hribar and Collins (2002) model	0.0301837	0.1041492	0.0564241	0.0319503	0.0012
Absolute-forecast errors (actual total accruals minus predicted total accruals)					
Jones short-term cash-flow model	0.0689109	0.1285409	0.0163646	0.0792139	0.0420744
Jones short-term cash-flow and laggedaccruals model	0.0675192	0.1323866	0.0164191	0.0405106	0.0773313
McNichols (2002) model	0.0796805	0.1394485	0.0239399	0.0519616	0.0988293
Kothari et al. (2005) model	0.0499909	0.0989553	0.0176201	0.0387241	0.0649679
Hribar and Collins (2002) model	0.0479422	0.097257	0.0188868	0.0388075	0.0609329

	Mean of pseudo R^2	Intercept	Predicted accruals	Adjusted R^2
Mean coefficient estimates of annual regressions of actual accruals on predicted accruals				
Jones short-term cash-flow model	0.0990	0.0005813	0.811821	0.1048
		(0.17)	(14.76)	
Jones short-term cash-flow and lagged-accruals model	0.1676	.0006512	.9382204	0.1173
		(0.18)	(14.84)	
McNichols (2002) model	0.1406	0.0293946	0.8924157	0.0675
		(7.14)	(10.36)	
Kothari et al. (2005) model	0.5021	.0297475	1.00505	0.5378
		(11.98)	(46.41)	
Hribar and Collins (2002) model	0.5211	0.0301839	0.9989648	0.5581
		(12.47)	(48.37)	

Pseudo R2 defined by $1- \sum FE^2 / \sum(TA-mean(TA))^2)$
TA = total accruals; FE = forecast errors = TA Pred(TA).

In the second part of Table 2, we report a pseudo R^2 and the mean adjusted R^2 from annual regressions of actual accruals on accruals predicted from accrual models. The pseudo R^2 is defined by

$$1- \sum FE^2 / \sum(TA-mean(TA))^2)$$

which is equivalent to the R from a regression of actual accruals on predicted accruals with the restriction of no intercept and a inclination of unity. Models with higher R^2 can be considered as presenting more accuracy. Results are similar with these two measures, which show that the Kothari et al. (2005) and the Hribar and Collins (2002) models perform better than the others, with similar values.

To summarize, Tables 1 and 2 show contradictory results about the accuracy of accrual models. In one case, Jones short-term models adjusted with cash flow and lagged accruals perform better (the first part of Table 2). In other cases, the Kothari et al. (2005) and Hribar and Collins (2002) models adjust better (second part of Table 2). And, in Table 1, the McNichols (2002) model

shows the highest mean R^2. These findings do not allow us to establish any preference among the five models. The fact that each model captures different earnings management profiles reinforces our conclusions. where DEBT is the leverage variable, defined as total debt over total assets. DIV is a dummy variable with value 1 if the firm is diversified, and zero otherwise. Other measures to indicate internal complexity could be used, but in the Spanish context diversification is the only one available, because disclosure requirements in this sense are weak.6 We have also introduced the DIV DEBT variable in the model, that is, the interaction between debt and the dummy variable. Relations among the above variables and income-increasing DAC have been explained.

3.3. Model and control variables

To test the hypothesis on the relation among debt, corporate diversification and income-increasing DAC, we estimate panel-regression models, where the different discretionary accruals calculated with each of the five models are used as the dependent variables. On the right hand side of the equation diversification and other control variables are considered. The estimated model is:

$$DAC_{i,t} = \alpha_0 + \alpha_1 DEBT_{i,t} + \alpha_2 DIV_{i,t} + \alpha_3 DIV_{i,t}*DEBT_{i,t} + \alpha_4 LOGTA_{i,t} + \alpha_5 EFTAX_{i,t} + \alpha_6 GROU_{i,t} + \alpha_7 IDEBT_{i,t} + \alpha_8 ICAP_{i,t} + \alpha_9 BIGSIX_{i,t}, \quad \text{Eq. (6)}$$

We have included control variables usually considered by the literature as earnings-management motives. The log of total assets (LOGTA) is considered as the size indicator. Under the agency theory, larger firms present more information asymmetries, and managers can use this advantage to exacerbate earnings management for their own benefit (Mohd and Ahmed, 2005; Chung et al., 2005; Othman and Zhegal, 2006). On the other hand, large firms may tend to decrease profits for the purpose of reducing political costs (Watts and Zimmerman, 1986; Young, 1999; Lee et al., 2007; Zhong et al., 2007). Others, such as Becker et al. (1998) and Jelinek (2007), do not find any relation between income-increasing earnings management and size. The empirical relation is not conclusive, but studies for code-law countries, such as Othman and Zhegal (2006), show a positive relation.

As suggested by Othman and Zhegal (2006), an important factor in explaining earnings management in countries with a code-law accounting system (as in Spain) is the effective tax rate (EFTAX, tax over income before tax). The reason for this is that accounting rules are heavily influenced by tax rules. These authors find a negative relation between tax rate and increasing DAC, explained by the fact that firms in countries with a higher tax rate have an incentive in reducing accounting earnings.

In order to capture the possible relation between earnings management and the size of the group's firm, we have built the GROU variable, which is the number of affiliated firms/total revenues. When a parent company has a dominant relation over affiliated companies, it can structure transactions between itself and affiliates in a way that allows it to manipulate earnings. As Thomas

et al. (2004) demonstrate, both parent and consolidated earnings in Japan are managed at three important earnings thresholds: avoiding losses, avoiding earnings declines, and avoiding negative forecast errors. We can suppose that greater values of the proposed variable can have a significant positive association with DAC. More affiliated firms offer more possibilities to manage earnings, but we cannot infer the sign of this relation, because the manipulation can be upwards or downwards, depending on the interests of the firm. We use unconsolidated financial statements, because in consolidated statements firms must eliminate all intra-group operations.

We also consider the IDEBT variable, which is a variable that shows the difference between the debt increases of the firm, with respect to the mean debt increase of the sample. With this variable, situations are considered where the firm needs financial resources and obtains it through debt. We must expect a negative relation between income-increasing DAC and IDEBT for similar reasons to those explained for debt: when the firm increases its debt, it increases the control of the firm for the new debtholders, and it is more difficult to manipulate earnings upwards – Jelinek, 2007.

ICAP considers the difference between the firm's increases of equity and securities issued in capital markets, with respect to the mean sample. In Ragan (1998) and Teoh et al. (1998a), managers increase earnings when the company produces equity offerings to give a positive signal, and we expect the same result. Also in Teoh et al. (1998b), IPO firms would aggressively manage pre-issue and post-issue earnings to facilitate insider trading, maintain their reputation, and avoid lawsuits. Thus, we can consider a positive relation between ICAP and income-increasing DAC.

The Big Six auditors (BSIX), now Big Four, are perceived as more competent and more independent and, therefore, provide higher-quality services than smaller, non-Big Six auditors. Previous literature suggests that quality auditors are more likely to object to management's accounting choices that increase earnings. Thus, income-increasing DAC might be negatively related to audit quality. (Becker et al., 1998; Davidson and Neu, 1993; DeFond and Subramanyam, 1998; Francis et al., 1999; Chung et al., 2005), although some authors, such as Jelinek (2007), do not confirm this relation.

4. Results

4.1. Univariate analysis

Table 3 shows descriptive and correlation statistics for the continuous variables used in the study. Entries in panel A in Table 3 are self-evident.

The correlations between the continuous independent variables are presented in panel B of Table 3. Some variables present significant correlations among them, but only in the case of the interacted variable with debt, and in the case of size and debt is this correlation greater than 20% (and positive). Up to 64% of the firms are diversified and, compared to non-diversified firms, show significantly

higher debt and size (at a significant level of 1% and 10%, respectively). The variable DIV (diversification) does not show any significant relation with other independent variables.

4.2. Multivariate analysis

In Table 4 we present our results with the regressions of independent variables explained above on each one of the dependent income-increasing DAC variables calculated with the five models we have used as earnings-management measures. For each of them two different regressions are presented. First of all, one regression where we consider all of the independent variables (complete form). Other regressions are also presented (reduced form) where we only take into account those independent variables that are significant at a minimum level of 90%, having arrived at these regressions after an iterative process. With this approach, we wish to avoid possible overfitting problems derived from introducing a great number of independent variables (some of them could be correlated), which can lead to an erroneous statistical inference of the coefficients on the main variables. Our comments are based on the results of the regressions with less independent variables (reduced form).

With respect to the central issue of this research, debt (DEBT) negatively affects income-increasing earnings management in all models, because more debt is associated with more control for creditors, and they inhibit upwards earnings-management manipulation. Thus, we accept our first hypothesis. This finding appears in all models considered, showing the robustness of the analysis.

In referring to the relation between diversification and income-increasing earnings management, we reject the transparency hypothesis (H2), which argues that diversified firms have a higher degree of information asymmetry than focused firms, and that managers exploit that to incur in incomeincreasing earnings management. The findings are in line with the information diversification hypothesis, which considers that accrual in various divisions are uncorrelated and tend to compensate themselves (Thomas, 2002). However, when we consider the interaction variable between debt and diversification, our findings show a positive relation, leading us to accept H3: diversification may reduce a creditor's ability to monitor managers. This result suggests that diversification has an indirect effect on earnings management through debt. Because in the rest of the regressions in Table 4 the findings are similar, our third hypothesis is accepted. Indeed, the level of diversification is relevant because it significantly affects the nature of the relation between debt and income-increasing DAC.

Table 3
Descriptive and correlation statistics.

Variable	Mean	Standard deviation	First quartile	Median	Third quartile	Minimum	Maximum
Panel A: descriptive statistics							
DEBT	39.76	23.17	21.25	39.00	55.71	1.39	148.04
DIV_DEBT	16.91	24.98	0	0	33.35	0	148.00
LOGTA	11.52	2.00	10.03	11.29	12.76	7.36	17.78

EFTAX	13.67	31.94	0	15.04	30.55	200.31	184.03
GROU	0.00138	0.00859	0	0	0.00002	0.00025	0.17918
IDEBT	1.73e07	1041.44	121.21	55.18	20.47	275.84	31,997.67
ICAP	2.41e08	52.74	9.36	6.58	2.42	105.46	1147.86

Panel B: correlations between continuous variables (%)

		(1)	(2)	(3)	(4)	(5)	(6)
(1)	DEBT						
(2)	DIV DEBT	41.03***					
(3)	LOGTA	29.19***	16.69***				
(4)	EFTAX	9.09***	2.83	8.04***			
(5)	GROU	9.62***	6.58***	5.06**	0.89		
(6)	IDEBT	1.03	0.10	0.99	0.72	0.68	
(7)	ICAP	2.80	3.09	4.46*	1.51	0.86	18.38***

DEBT: total debt/total assets; DIV DEBT: interacting variable between DEBT and DIV; LOGTA: log of total assets; EFTAX: effective tax rate; GROU: number of affiliated firms/total revenues; IDEBT: difference between debt increase and the mean sample of the debt increase; ICAP: difference between equity plus securities increase and the mean sample of the equity plus securities increase.

* Significant at the 10% level.

** Significant at the 5% level. *** Significant at the 1% level.

Our findings are consistent with the transparency hypothesis suggested by Thomas (2002). If diversified firms have a higher degree of information asymmetry (i.e., they are less transparent), monitoring costs may increase with the level of diversification. Consequently, for less-transparent diversified firms, managers in leveraged firms are likely to use accounting-manipulation strategies to show better performance.

In short, our paper suggests that marginal increases in debt provide the incentives for managers to manipulate earnings upwards, and diversification allows the needed context for this accounting practice to be possible. These findings are robust across different earnings-management measures. This fact is more remarkable if we take into account that, for the control variables, results are different depending on the earnings-management approach we use. In the case of debt, diversification and interacted variable findings are the same for all models.

No control variable appears as significant in all models. If we consider the reduced form of the regression for each model, only the ICAP (difference between the firm's increases of equity and securities issued in capital markets, with respect to the mean sample) variable shows significant and positive values in four regressions of the five. Firms increase their earnings artificially to attract and give confidence to securities investors (Ragan, 1998; Teoh et al., 1998a). If we consider the complete form of the regression, this variable appears as being significant in all five cases.

Size (LOGTA) appears as being significant in two of five reduced regressions (and in all of the regressions in their complete form, although size is correlated with debt). In line with other studies, larger firms manipulate earnings upwards more than smaller firms (Mohd and Ahmed, 2005; Chung et al., 2005;

Othman and Zhegal, 2006), taking advantage of their information asymmetries, not supporting the opposing argument that larger firms face supplementary political constraints that prevent them from manipulating.

Table 4
Regressions of determinants of income increasing discretionary accruals with different models.

		Jones short-term cash-flow model		Jones short-term cash-flow and lagged-accruals model		McNichols (2002) model		Kothari et al. (2005) model		Hribar and Collins (2002) model	
DEBT		0.000875***	0.000682***	0.000723***	0.000701***	0.000483***	0.000485***	0.000719***	0.000551**	0.000633**	0.000525**
		(8.014)	(7.98)	(7.944)	(8.09)	(5.891)	(6.28)	(2.819)	(2.30)	(2.485)	(2.17)
DIV	+	0.0107		0.00679		0.00141		0.0230		0.0203	
		(1.599)		(1.209)		(0.279)		(1.464)		(1.295)	
DIV DEBT	+	0.000341***	0.000203**	0.000271**	0.000183**	0.000120*	0.000142**	0.000605**	0.000439**	0.000550*	0.000473**
		(2.680)	(2.55)	(2.442)	(2.32)	(1.702)	(2.00)	(2.034)	(1.96)	(1.851)	(2.09)
LOGTA	+	0.00968***		0.00326**	0.00371***	0.00232**	0.00280***	0.0127*		0.0137**	
		(3.262)		(2.395)	(3.04)	(1.968)	(2.68)	(1.830)		(1.977)	
EFTAX		0.0000575		0.0000832**		0.0000965**		0.0000785		0.0000756	
		(1.389)		(2.099)		(2.375)		(0.812)		(0.782)	
GROU	?	0.371**	0.485***	0.624***	0.640***	0.194		0.290		0.265	
		(2.342)	(3.24)	(3.329)	(3.42)	(1.065)		(0.785)		(0.717)	
IDEBT		0.00000161		0.0000226**	0.0000022**	0.00000115		0.00000443		0.00000461*	
		(1.373)		(2.015)	(2.01)	(1.202)		(1.617)		(1.682)	
ICAP	+	0.000156***	0.000155***	0.000153***	0.000153***	0.0000968***	0.0000924***	0.000354***	0.000345***	0.000356***	
		(6.546)	(6.77)	(6.238)	(6.23)	(4.535)	(4.42)	(6.364)	(6.35)	(6.404)	
BSIX		0.00189		0.00412		0.00374		0.0304		0.0318	
		(0.202)		(0.748)		(0.781)		1.395		1.461	

CONSTANT	0.0772**	0.0241***	0.0149	0.0179	0.0139	0.0158	0.141*	0.0143	0.157**	0.0127
	(2.273)	(5.75)	(1.034)	(1.29)	(1.118)	(1.33)	(1.777)	(1.53)	(1.979)	(1.35)
Obs.	1845	1852	1643	1643	1463	1469	1843	1850	1845	1853
R^2 overall	7.00	6.03	8.40	6.04	5.69	6.55	1.16	1.04	1.07	0.02
BP Lagrange test	661.29	780.95*	439.28***	466.38***	313.59***	338.88***	1.48	1.47*	1.71	2.41
F-statistic	5.23***	5.61***	4.40***	450.00***	3.82***	3.94***	1.27***	1.23***	1.29***	1.28***
Hausman test	18.78***	7.72	13.34*	7.85	9.74	3.71	23.33***	8.85**	21.12***	7.13**

(i) Regressions are performed using panel-data methodology, controlling for the impact of unobserved heterogeneity. When we reject H_0 in Hausman test and H_0 in F-statistics, the effects of unobserved heterogeneity can be assumed to be fixed parameters (fixed-effects model). When we can not reject H_0 in Hausman test and we reject H_0 in the BP Lagrange test, the effects of unobserved heterogeneity can be assumed to be random parameters (random-effects model). H_0 is rejected at 5% level or more.

(ii) Dependent variables: the Jones short-term cash-flow model is based on the following firm-year specific regression of working-capital accruals (WCA_t) on change in revenue ($DREV_t$) and operative cash flow (CFO_t) deflated by beginning total assets (A_{t1}):

$$WCA_{i,t}/A_{i,t1} = a_0(1/A_{i,t1}) + a_1(DREV_{i,t}/A_{i,t1}) + a_2(CFO_{i,t}/A_{i,t1}) + u_{it} + e_{i,t}.$$

The Jones short-term cash-flow and lagged-accruals model is based on the following firm-year specific regression of working-capital accruals (WCA_t) on change in revenue ($DREV_t$), operative cash flow (CFO_t) and lagged-working-capital accruals (WCA_{t1}) deflated by beginning total assets (A_{t1}):

$$WCA_{i,t}/A_{i,t1} = a_0(1/A_{i,t1}) + a_1(DREV_{i,t}/A_{i,t1}) + a_2(CFO_{i,t}/A_{i,t1}) + a_2(WCA_{i,t1}/A_{i,t2}) + u_{it} + e_{i,t}.$$

The McNichols (2002) model is based on the following firm-year specific regression of total accruals (TA_t) on change in revenue ($DREV_t$), property, plant and equipment (PPE_t) and operative cash flow (CFO_t, CFO_{t1}, and CFO_{t1}) deflated by beginning total assets (A_{t1}):

$$TA_{i,t}/A_{i,t1} = a_0(1/A_{i,t1}) + a_1(DREV_{i,t}/A_{i,t1}) + a_2(PPE_{i,t}/A_{i,t1}) + a_3(CFO_{i,t}/A_{i,t1}) + a_4(CFO_{i,t1}/A_{i,t2}) + a_5(CFO_{i,t+1}/A_{i,t}) + u_{it} + e_{i,t}.$$

The Kothari et al. (2005) model is based on the following firm-year specific regression of total accruals (TA_t) on change in revenue ($DREV_t$), property, plant and equipment (PPE_t) and lagged ROA (ROA_{t1}) deflated by beginning total assets (A_{t1}):

$$TA_{i,t}/A_{i,t1} = a_0(1/A_{i,t1}) + a_1(DREV_{i,t}/A_{i,t1}) + a_2(PPE_{i,t}/A_{i,t1}) + a_3(ROA_{i,t1}/A_{i,t2}) + u_{it} + e_{i,t}.$$

The Hribar and Collins (2002) model is based on the following firm-year specific regression of total accruals adjustments ($TACC_t$, as the difference between operating income and operative cash flow) on change in revenue ($DREV_t$) and property, plant and equipment (PPE_t) deflated by beginning total assets (A_{t1}):

$$TACC_{i,t}/A_{i,t1} = a_0(1/A_{i,t1}) + a_1(DREV_{i,t}/A_{i,t1}) + a_2(PPE_{i,t}/A_{i,t1}) + u_{it} + e_{i,t}.$$

(iii) Independent variables: DEBT: total debt/total assets; DIV: dummy variable with value 1 if the firm is diversified, zero otherwise; DIV DEBT: interacting variable between DEBT and DIV; LOGTA: log of total assets; WCA: working-capital accruals; TA: total accruals; EFTAX: effective tax rate; GROU: number of affiliated firms/total revenues; ICAP: difference between equity plus securities increase and the mean sample of the equity plus securities increase; IDEBT: difference between debt increase and the mean sample of the debt increase; BSIX: value 1 if firm is audited by one of the Big Six.

(iv) Observations are different for McNichols (2002) and Jones short-term cash-flow and lagged-accruals models, with respect to the other models, because we lost two- and one-year data in their construction, considering lagged variables.

(v) R^2 overall explains overall variation, defined as the squared correlation between observed and predicted values.

(vi) BP Lagrange test: v^2 statistics for Breusch and Pagan multiplier test for random effects: indicates the significance of the random effects.

(vii) F-statistic for fixed-effects regression: indicates the significance of the fixed effects.

(viii) v^2 statistic for Hausman test, which indicates if we prefer random or fixed effects. *

Significant at the 10% level. **

Significant at the 5% level. ***

Significant at the 1% level.

Findings about the rest of the control variables are even less robust, because they do not appear in all the models, when reduced or complete forms are considered. Contrary to Othman and Zhegal (2006), effective tax rate (EFTAX) affects DAC positively, but only in two models in its complete form. Political costs can be behind this fact, because in Spain firms with high taxes could think that they are free from observation of regulators and exploit this fact to manipulate earnings upwards. This does not imply paying more, because accounting numbers need to be modified to serve as a base to calculate taxes, and artificial manipulation can be undone.

The group variable (GROU) appears with a negative sign in two of the five models (considering reduced and complete versions) indicating that the greater the group with respect to the matrix firm, the less increase-manipulation is done. Debt increase (IDEBT) appears as significant, showing a negative sign in one reduced model and in two complete models. Finally, we must note that the BSIX variable, which captures audit quality, only appears (with a positive sign) in two complete models. Country differences can explain these results. Regulations affecting big-audit-firm practices are country-specific, and can indicate that auditor quality might not be associated with larger firms in some countries (i.e., Spain).

As indicated above, only debt and the interacted variable between debt and diversification show a significant impact on income-increasing DAC in all of the estimated models. For the rest of the variables, the earnings-manipulation approach may affect the relation, perhaps with the exception of size, which appears with a significant and positive sign in all of the complete models.

4.3. Further analysis

In addition to the previous analysis of the relation between income-increasing DAC and other variables, for each of the five accruals models used, four regressions (in their reduced form, to avoid overfitting) are shown in Table 5: two regressions on the raw and absolute values of DAC for the total sample, and two additional regressions using two sub-samples, one for DAC > 0 and another one for DAC < 0 (firms with positive and negative discretionary accruals, respectively).

Following Larcker and Richardson (2004), when the earnings management is directional, the research design should focus on sign measures of discretionary accruals. For example, issuing equity creates an incentive to engage in income-increasing earnings management but, for example, being listed on a foreign stock market creates less incentive to engage in both income-increasing and incomedecreasing behavior. In this case, the research design should focus on the absolute value of discretionary accruals.

Very few studies have differentiated among total, absolute, positive and negative discretionary accruals. Othman and Zhegal (2006) and Lee et al. (2007) are exceptions. Different relations among

different directional earnings management have been found in the mentioned studies. In Lee et al. (2007), size has a negative relation with income-increasing DAC for the whole sample and for the sub-sample of DAC > 0, but a positive relation with the sub-sample of DAC < 0. On the other hand, for Othman and Zhegal (2006), size shows a positive relation with income-increasing DAC for the total sample and for the sub-sample of DAC < 0, whereas it has a negative relation with absolute DAC and for the sub-sample of DAC > 0. Differences in other variables have also been found by these authors.

With respect to the relation between debt and different directional DAC's, Lee et al. (2007) found a negative relation for the total sample of income-increasing DAC and for the sub-sample of DAC > 0, but a positive one for the sub-sample of DAC < 0. In Othman and Zhegal (2006), the relation is positive for the total raw and absolute samples and for the sub-sample of DAC > 0, whereas it is negative for the sub-sample of DAC < 0. Other studies use absolute values of DAC, but they do not compare with raw or other DAC values. For example, for absolute values of DAC, Kim and Yi (2006) find a positive relation with debt, although Klein (2002) does not. Actually, findings are not conclusive about the factors that explain some directional DAC approaches.

In Table 5, some variables do not show any incidence in all or almost all of the different directional DACs earnings-management models, like quality auditor (BSIX), diversification (DIV), effective tax rate (EFTAX), or group incidence (GROU). Size (LOGTA) has a positive influence in raw and absolute DACs, and in the sub-sample of DAC > 0 in several earnings-management models. We find that in all five earnings-management models, size is positively related to income-increasing DAC for firms in which

Table 5
Regressions of determinants of discretionary accruals with different models for different sub-samples and values of dependent variable.

	Jones short-term cash-flow model				Jones short-term cash-flow and lagged-accruals				McNichols (2002) model model			
	Raw values	Abs. values	>0 values	<0 values	Raw values	Abs. values	>0 values	<0 values	Raw values	Abs. values	>0 values	<0 values
DEBT	0.000682***		0.000899***		0.000701***		0.000841***		0.000485***	0.000406***	0.000526***	
	(7.98)		(8.15)		(8.09)		(7.33)		(6.28)	(5.36)	(4.22)	
DIV												
DIV DEBT	0.000203**	0.000629***	0.000254**		0.000183**	0.000915***	0.000321***		0.000142**	0.000126*	0.000288**	
	(2.55)	(4.99)	(2.50)		(2.32)	(4.19)	(3.07)		(2.00)	(1.75)	(2.53)	
LOGTA			0.0192***		0.00371***		0.0153***		0.00280***	0.00533**	0.00780**	
			(5.81)		(3.04)		(4.36)		(2.68)	(2.42)	(2.03)	
EFTAX												0.000144***
												(2.75)
GROU	0.485***				0.640***		0.347**					
	(3.24)				(3.42)		(2.13)					
IDEBT		0.000049***		0.0000135**	0.000002**	0.000049***		0.0000148**				
		(19.9)		(2.39)	(2.01)	(18.5)		(2.41)				
ICAP	0.000155***	0.000404***	0.0000459*	0.000100***	0.000153***	0.000408***		0.000136***	0.000092***	0.000064***		0.000079***
	(6.77)	(8.06)	(1.65)	(3.82)	(6.23)	(6.92)		(5.54)	(4.42)	(3.92)		(3.39)
BSIX												
CONSTANT	0.0241***	0.0580***	0.229***	0.0435***	0.0179	0.0520***	0.184***	0.0387***	0.0158	0.0782***	0.0967**	0.0222***
	(5.75)	(14.0)	(6.20)	(38.2)	(1.29)	(11.3)	(4.69)	(20.1)	(1.33)	(3.09)	(2.26)	(15.6)
Obs.	1852	1845	924	926	1643	1643	827	821	1469	1469	725	744
R^2 overall	6.03	16.34	9.93	5.59	6.04	17.04	8.06	4.45	6.55	4.99	4.98	5.21
BP Lagrange test	780.95*	82.57***	119.39***	383.38***	466.38***	53.11***	66.47***	276.29***	338.88***	121.57***	101.44***	171.16***
F-statistic	5.61***	2.05***	2.57***	3.32***	450.00***	1.80***	2.31***	2.89***	3.94***	2.67***	2.53***	3.67***
Hausman test	7.72	5.83	33.76***	33.76***	7.85	4.98	31.61***	3.71	3.71	15.32***	13.98***	10.41**

	Kothari et al. (2005) model				Hribar and Collins (2002) model			
	Raw values	Abs. values	>0 values	<0 values	Raw values	Abs. values	>0 values	<0 values
DEBT	0.000551**	0.000904***	0.000657**		0.000525**		0.000551*	

	(2.30)	(5.63)	(2.22)		(2.17)		(1.84)	
DIV								
DIV DEBT	0.000439**		0.000524*		0.000473**	0.000265***	0.000493*	
	(1.96)		(1.93)		(2.09)	(3.12)	(1.79)	
LOGTA			0.0274***				0.0277***	
			(3.05)				(3.03)	
EFTAX								
GROU								
IDEBT			0.0000050**	0.000052***		0.000043***	0.0000052**	0.000052***
			(1.99)	(3.03)		(22.8)	(2.05)	(3.07)
ICAP	0.000345***	0.000259***	0.000319***	0.000194**		0.000215***	0.000336***	0.000188**
	(6.35)	(6.66)	(4.20)	(2.40)		(5.65)	(4.35)	(2.35)
BSIX								
CONSTANT	0.0143	0.0371***	0.326***	0.0320***	0.0127	0.0433***	0.333***	0.0323***
	(1.53)	(5.57)	(3.25)	(9.08)	(1.35)	(16.4)	(3.26)	(9.32)
Obs.	1850	1850	919	924	1853	1845	919	926
R^2 overall	1.04	15.39	1.52	14.59	0.02	25.42	1.47	1.11
BP Lagrange test	1.47*	171.00***	7.63***	26.82***	2.41	22.34***	7.37***	7.37***
F-statistic	1.23***	2.63***	1.44***	2.27***	1.28***	1.43***	1.41***	1.41***
Hausman test	8.85**	2.41	18.32***	7.96***	7.13**	2.67	18.73***	18.73***

Same descriptors as Table 4. * Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level.

DAC > 0. For firms that manage DAC upwards, size appears to facilitate income-increasing DAC. In contrast, size shows no impact in the sample of firms that manage DAC downwards. In the case of debt increases (IDEBT), the relation is not conclusive: in one case explains raw DAC with a negative sign, in two cases there is also a negative relation in the sub-sample of DAC > 0, in three cases it explains |DAC| with a positive sign and in four cases it explains income-increasing DAC with a positive sign for firms with DAC < 0. For firms presenting negative DACs, debt increases produced income-increasing DAC. New lenders do not appear to exert any effective control on these firms, perhaps because they already show a DAC that diminishes earnings.

We observe a clearer relation between different directional DACs and increases of equity and securities issued in the capital market (ICAP). With very few exceptions (three cases), a positive relation is observed, suggesting that when a firm makes use of financial markets to issue equity or securities, different types of earnings manipulation are practiced.

With respect to the relation between debt and |DAC|, in only two cases (McNichols and Kothari models) is there a positive relation. The significance of debt and of the interaction between debt and diversification for the DAC > 0 sub-sample is noticeable, because we find the same relation in all of the earnings-management models: debt is negatively related to income-increasing DAC, whereas the interaction is always positively related. Obtained with a sub-sample of firms with positive accruals (DAC > 0), these regressions confirm the results presented in the previous section, where the whole sample was considered. Presumably, these firms are actively monitored by lenders because they use DAC to artificially increase their income, while this control is not exerted on firms that artificially decrease income, perhaps because they are viewed as being conservative. Only in the case of aggressive firms (those that manage DAC to a sufficient degree to increase income) do lenders exert their control, with some firms taking advantage of diversification to avoid this control.

5. Conclusions, implications and limitations

The two main contributions of this paper are: (a) the use of panel methodologies in the analysis of earnings management, and (b) a better understanding of the relation between debt, corporate diversification and DAC in the Spanish context. Apart from Othman and Zhegal (2006), we know of no studies that have employed this methodology in the earnings-management context.

In order to capture different aspects of earnings manipulation and give robustness to the results, we use five approaches to calculate DAC as a proxy for earnings management. These are: a modified Jones working-capital cash-flow model, the same model but adding lagged accruals, the McNichols (2002) model, the Kothari et al. (2005) model and the Hribar and Collins (2002) model.

Taking an agency theory approach, information on the firm's financial position would be asymmetrically distributed, with managers enjoying an informational advantage over debt-holders. In order to reduce their disadvantage, debt-holders may incur in monitoring costs. Our concern is that

informational opacity may differ across firms. From the debt-holders' perspective, some firms may be relatively harder to monitor, particularly when they are engaged in complex activities. In fact, the level of diversification has been suggested as a source of complexity and asymmetric information. We have found that, in the absence of diversification, debt negatively affects earnings management. However, we also observe that derived asymmetries from diversification may be exploited by managers to engage in earnings management in indebted firms. These findings are robust to five earnings-management models. While the effect of several control variables depends on the estimated model, it does not alter our results on debt and its relation with DAC.

Moreover, we have found that the positive relation between interaction variable (debt and diversification) and DAC is meaningful for firms showing upwards DAC to a degree that makes income greater than operative cash flow. We obtain this result for the total sample and for the sub-sample of firms with DAC > 0. However, when firms with DAC < 0 are examined, no relation is found, possibly because lenders consider these firms as being conservative enough.

In order to better explain the observed variance in earnings management across firms, additional diversification variables and their relation with debt should be considered in future research. The use of panel methodologies for the estimation discretionary accruals should also be extended in the future. Practitioners, debt-holders, investors, auditors and analysts should consider diversification as a factor that significantly affects the impact of debt on earnings manipulation. This result is also relevant from the perspective of the regulator, who may impose stricter disclosure requirements for diversified firms. As part of a wider reform aiming at adapting the Spanish accounting regulation to international standards, larger and quoted firms have recently been subject to stricter information requirements. However, segment information has been limited to sales at geographic and business-line levels, and to income for business activities (Ley 16/2007, Circular 1/2005 and Circular 1/2008, Comisión Nacional del Mercado de Valores, CNMV). In order to confirm our findings, we need a detailed study of the effect of diversification indicators generated under this new regulation.

Additionally, earnings-management studies should pay more attention to directional DAC, because managerial incentives are likely to differ when DAC, |DAC|, DAC > 0 and DAC < 0 are separately considered. Our results suggest that different directional aspects of DAC may be explained by different variables. Furthermore, in future research the use of different models to estimate DAC also needs to be considered because earnings-management motives can depend on the employed model.

This research has some limitations. First, possible determinants of managerial discretion have not been considered. In particular, no attempt has been made to control for the impact of differential corporate-governance mechanisms (outside directors, audit committee structure, etc.). Also, because we only analyze individual accounts, our dataset does not allow a contrast on the extent to which the impact of diversification is alleviated or intensified by diversification when developed through subsidiaries. It would be interesting to verify whether accruals of different divisions offset themselves

or rather facilitate earnings management. An analysis of diversification and the use of subsidiaries by parent firms may add interesting results to the earnings management literature.

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