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Tax system characteristics and country-level differences in earnings management

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Abstract
We examine the extent to which European listed firms use deferred tax accounting to manage their GAAP earnings in order to meet financial analysts' earnings forecasts. The cross-country nature of our data allows us to compare the use of this earnings management channel across countries and to relate these differences to certain country characteristics, in particular country-specific features of the tax system. Our results clearly document that European listed firms use deferred tax assets to inflate earnings when pre-manipulated earnings fall below the average analyst forecast. On average, they increase their return on assets by 0.2 percentage points (or 3 percent) through this channel. Our results also show a large variation in this effect across countries. Firms that face larger deviations between tax and financial accounting, higher tax rates, a stricter tax enforcement and a more lenient tax loss offset may, to some extent, make greater use of this earnings management channel.

Keywords Earnings management · Deferred tax accounting · Tax law · Tax strategy

JEL Classification H25 · M41

1 Introduction

Meeting or exceeding financial analyst forecasts is an important financial target for publicly traded firms. It is likely to be associated with positive capital market reactions (e.g., Bartov et al. 2002; Kasznik and McNichols 2002; Brown and Cay-

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lor 2005), while missing forecasts may have negative consequences, especially for growth firms (e.g., Dreman and Berry 1995; Skinner and Sloan 2002). Hence, earnings management is a common instrument, especially when no other means are available (Frank and Rego 2006; Herbohn et al. 2010).

One potential channel for earnings management is deferred tax accounting. There are at least three reasons that make deferred tax accounting attractive in this respect. First, the size of deferred tax assets is relevant, as documented by recent studies based on U.S. data. Drake et al. (2020) show that the downward trend in U.S. firms' effective tax rates (ETR) over the past twenty years can be largely explained by valuation allowances on deferred tax assets for prior year losses. Similarly, Schwab et al. (2022) point to the particular importance of deferred tax assets and other non-tax avoidance items in explaining very low or very high values of GAAP ETRs. Second, accounting for deferred tax assets involves a considerable degree of discretion. According to IAS 12, firms may capitalize deferred tax assets only if they expect sufficient profits in the near future to offset the underlying tax losses or temporary differences. Müller et al. (2014) therefore conclude that, in practice, firms have a hidden balance sheet option for recognizing deferred tax assets. Third, Dhaliwal et al. (2004) argue that the tax expense is attractive for earnings management since it is one of the last accounts to be closed before the earnings announcement.

Several studies have documented that firms from individual countries use deferred taxes for earnings management purposes. Phillips et al. (2003), Dhaliwal et al. (2004), Frank and Rego (2006) and Christensen et al. (2008) provide such evidence for the U.S., Herbohn et al. (2010) for Australian firms, and Dreher (2019) and Gordon and Joos (2004) for German and UK firms. However, all of these studies use a single country setting. In contrast to other earnings management channels, for which the relevance of certain firm-, industry- and country-specific determinants has been demonstrated (e.g., Leuz et al. 2003; Burgstahler et al. 2006; An et al. 2016; Beuselinck et al. 2019), no study has directly compared the use of deferred tax accounting in this context across countries. Moreover, it is unclear whether the use of this earnings management channel additionally depends upon certain features of the local tax systems, such as the size of book-tax-differences, tax loss offset rules as well as the complexity and enforcement of tax rules.

Our study is the first to directly compare the use of deferred tax accounting as an earnings management tool across countries and to relate the observed differences to certain features of the countries' tax systems as well as the institutional environment. We base our analysis on financial information for a sample of firms from 17 different European countries that are listed in the STOXX Europe 600. The analysis of listed European firms provides a perfect setting for this research question, as these firms are subject to the same financial accounting rules (IFRS) but heterogeneous tax rules (Jacob 2022). Our data cover the period from 2011 to 2020 and contain hand-collected information on recognized and unrecognized deferred tax assets and other financial information obtained from Thomson Reuters.

We analyze whether firms increase their after-tax earnings by strategically reducing unrecognized deferred tax assets in order to meet financial analyst forecasts.[1] We call this strategy tax-related earnings management. Our analysis is based on a first differences fixed effects regression model. The main explanatory variable is the change in the earnings management incentive, which we assume to exist when the firms' pre-manipulated earnings fall below the average analyst forecast.

Our analysis proceeds in three steps. First, we document the general existence of tax-related earnings management in our sample. We find that the firms in our sample significantly reduce unrecognized deferred tax assets and unrecognized deferred tax assets on loss carryforwards upon the occurrence of the earnings management incentive. This effect is substantial. Relative to an unchanged amount of unrecognized deferred tax assets, the incentive-related change is equivalent to a 0.2 percentage point increase in return on assets, which corresponds to 3 percent of the sample average. Approximately 40 percent of this effect relates to deferred tax assets on loss carryforwards. We also show that this effect reverses when the incentive to manage earnings no longer exists.

Second, we examine the heterogeneity of this effect across headquarter countries. We find that it is not limited to individual countries within our sample, but that this type of earnings management is very common in European countries. Depending on the applied definition of the dependent variable used, the effect turns out significant in 14 or 15 out of 17 countries. However, the strength and size of this effect differs largely across countries. Belgium, Luxembourg and Norway are among the countries with the strongest use of tax-related earnings management, whereas we find only small or insignificant effects for Ireland, Italy and Switzerland.

Third, we relate these cross-country differences to certain country characteristics, in particular characteristics of the tax systems that the firms in our sample face. We determine the tax system exposure by averaging these country variables across the subsidiary locations of the firms in our sample. Our results indicate to some extent that higher tax rates, less book-tax conformity, more lenient loss offset regulations, and a stricter tax enforcement are associated with more tax-related earnings management. By contrast, we find only weak evidence for an association between earnings management and institutional quality and no such evidence for the level of tax complexity.

Our study makes two important contributions. First, we contribute to the literature on the use of deferred tax accounting for earnings management purposes. We document that this accounting practice is not limited to firms from a single country, as previous studies have shown, but rather is a widespread phenomenon. This finding is particularly important for investors, because it provides a potential explanation for the limited predictive accuracy of deferred taxes for future financial statement items (Dreher et al. 2024; Flagmeier 2022). Our findings also suggest that investors should rather focus on pre-tax earnings when making predictions of future firm development.

On the other hand, and perhaps even more importantly, we extend the strand of literature on the institutional and country-level determinants of earnings management.

[1] The reduction in unrecognized deferred tax assets is associated with an increase in the capitalization of deferred tax assets, which results in an earnings increase.

Previous studies have shown that the institutional quality (e.g., Leuz et al. 2003; Burgstahler et al. 2006; An et al. 2016; Beuselinck et al. 2019) and the characteristics of the applicable financial accounting standards (e.g., Chen et al. 2007; Jeanjean and Stolowy 2008; Sundvik 2019) matter. We are the first to show that the use of a specific earnings management channel is also associated with certain features of the tax system, and that firms facing high tax rates and less restrictive loss offset rules use it more actively. Additionally, our results indicate to some extent that the level of tax enforcement and book-tax differences in a given country promote earnings management. These findings are important for investors in assessing a firm's ability to meet analyst forecasts but also inform policymakers about most likely unintended consequences of their tax policy decisions. Knowing from prior research that earnings management is associated with a reduced usefulness of accounting information, we are the first to show that this effect is, to some extent, associated with tax policy decisions.[2]

The remainder of this paper is organized as follows. In Sect. 2, we derive the hypotheses for our analysis. In Sect. 3, we describe the research design and data used. The empirical results are then presented in Sect. 4. Section 5 concludes the paper.

2 Related literature and hypotheses

Several studies have examined the use of deferred tax positions for earnings management in a single-country setting. Phillips et al. (2003) analyze the usefulness of deferred tax information for detecting earnings management for a sample of U.S. firms. They find that firms use deferred tax accounting to avoid GAAP losses and to smooth earnings over time. Deferred tax accounting by U.S. firms may also be motivated by other earnings patterns. Dhaliwal et al. (2004) relate adjustments from third to fourth quarter ETRs to the risk of missing analyst forecasts. Similarly, Frank and Rego (2006) find that firms use valuation allowance accounts to align earnings with analyst forecasts. Christensen et al. (2008) find that some firms use deferred tax valuation allowances to maximize losses in one year in order to generate profit-maximizing potential in subsequent years (big bath accounting).[3]

Similar patterns are also observed for non-U.S. firms. Herbohn et al. (2010) document that Australian firms use DTA on TLCF to meet financial market analyst earnings forecasts. Similarly, Dreher (2019) finds that German firms use available discretion in accounting for tax losses to meet financial analyst forecasts and smooth earnings volatility. Gordon and Joos (2004) examine the predictive power of unrecognized deferred taxes in the United Kingdom. Their results support the notion that currently unrecognized deferred taxes affect profitability in subsequent years. They

[2] Our results may also – to some extent – be relevant in the context of the newly introduced global minimum tax, as they show how flexible European firms are in manipulating their deferred tax position. Such practices can, in principle, also be used to strategically affect ETRs and avoid potential tax payments under the global minimum tax. However, the calculation of the GLOBE ETR is subject to several modifications and thus deviates considerably from the regular IFRS GAAP ETR.

[3] In contrast to these studies, Miller and Skinner (1998) find in an earlier study no evidence for the use of valuation allowances for earnings management.

also show a correlation with future reversals of deferred taxes, which can be interpreted as an indicator of earnings management.[4]

The legal framework for the capitalization of deferred tax assets for the firms in our sample is provided by IAS 12. In principle, the capitalization of deferred tax assets requires that a company expects sufficient profits in the near future to allow for the offsetting of tax losses or the utilization of temporary differences (IAS 12.34). However, forecasting future profits involves a significant degree of subjectivity. In a public statement, the European Securities and Markets Authority (2019) states that all available sources of evidence, both positive and negative, must be included in this judgment. The institution is guided by the "more likely than not" threshold, which sets the cut-off at a 50 percent probability of use. The measurement reflects the entity's expectations at the end of the reporting period as to how the carrying amount of its DTA will be recovered (IAS 12.51). Müller et al. (2014) therefore conclude that, in practice, a hidden balance sheet option exists for the recognition of DTA.

Some studies point to a limited usefulness of deferred tax information in financial statements. Dreher et al. (2024) analyze the tax footnotes of German publicly listed firms to examine the usefulness of deferred taxes to predict future outcomes. Using out-of-sample tests they show that considering accounting information on tax loss carryforwards does not enhance performance forecasts but typically even worsens predictions. Flagmeier (2022) uses a similar dataset and empirically shows that a different categorization of deferred tax information may improve the information content of it. This evidence of limited informational quality of deferred tax information as reported under IFRS is also consistent with firms using this position to manipulate earnings.

We thus formulate our first hypothesis:

H1 European publicly listed firms use tax-related earnings management.

The main contribution of our study is to compare the use of tax-related earnings management across countries and to relate these differences to specific tax parameters. Previous studies have documented that the use of other earnings management channels can depend on certain firm-, industry- and country-specific determinants (e.g., Leuz et al. 2003; Burgstahler et al. 2006; An et al. 2016; Beuselinck et al. 2019), particularly the regulatory quality of countries. Leuz et al. (2003) observe systematic differences in earnings management across countries and relate these to differences in investor protection and legal enforcement. They argue that firm insiders use earnings management to conceal firm performance from outsiders in order to maintain their private control benefits. Burgstahler et al. (2006) document that earnings management is more pervasive in private than in public firms and that more earnings management happens in countries with a weak governance. An et al. (2016) add to this literature and show that earnings management is associated with a higher

[4] Other studies focus on the use of deferred tax accounting for earnings management by firms with specific characteristics. Schrand and Wong (2003) examine firms from the financial sector, Bauman et al. (2000) focus on U.S. firms with very large revenues, whereas Burgstahler et al. (2002) consider firms with very small profits or losses.

firm leverage and that this relation is attenuated by a strong institutional environment. Beuselinck et al. (2019) find that institutional quality not only explains differences in earnings management across multinational firms, but also the location of earnings management within these firms. Multinational firms tend to cluster their earnings management activities in countries with more lenient regulations. We have no reason to doubt that these findings for other channels also extend to tax-related earnings management and formulate Hypothesis 2a as follows:

H2a The use of tax-related earnings management is negatively associated with regulatory quality.

We now turn to the relevance of tax system parameters. We expect that the accuracy of tax enforcement and the complexity of tax processes and tax rules matter. While we expect a negative association of tax-related earnings management and regulatory quality (see Hypothesis 2a), this relationship not necessarily extends to the quality of tax enforcement. Tax authorities are concerned with the current tax payments of firms. Hence, if any, their actions should only have an indirect effect on deferred tax accounting.

On the one hand, tax enforcement may impede tax-related earnings management. Prior literature suggests that increased tax enforcement can lead to organizational changes, making managerial diversion more difficult. If such changes increase firm value, this may reduce – to some extent – the earnings management incentive (Desai et al. 2007). Erickson et al. (2004) provide evidence that firms are inclined to pay taxes on earnings overstatements in order to avoid suspicion by tax authorities. This may require these firms to utilize earnings management strategies that do not involve book-tax differences.

On the other hand, stricter tax enforcement may also be associated with more tax-related earnings management. First, a strict tax enforcement may increase the (positive) discrepancies between a firm's taxable income and its financial accounting profit, which positively affects the potential for deferred tax assets. Second, firms may use a stricter tax enforcement as an argument for the future recoverability of tax benefits, which is a necessary requirement for the capitalization of deferred tax assets under IAS 12. Third, if a stricter tax enforcement is associated with more frequent tax audits, then this may cause a more frequent restatement of a firm's tax position. Firms may use this volatility to also more frequently restate their deferred tax position.

Against this background, the direction of this effect ultimately remains an empirical question. We therefore formulate Hypothesis 2b as follows:

H2b The use of tax-related earnings management is (positively or negatively) associated with stricter tax enforcement.

We also expect the complexity of the tax system to play a role for the use of tax-related earnings management. Tax complexity may result from complex tax rules and complex tax processes (Hoppe et al. 2021). Tax complexity is known to affect tax planning of firms, though the direction of this effect is unclear. The interaction with more complex rules may hide tax planning opportunities and make tax planning

more costly, especially for smaller firms (Amberger et al. 2024). On the other hand, ambiguity in the tax code may also create new tax planning opportunities (Laplante et al. 2019; Hoppe et al. 2021) and thus encourage tax avoidance. Besides that, not all types of tax avoidance have implications for deferred tax accounting. Tax-related earnings management requires that taxable income and financial accounting income deviates, which is true only for non-conforming tax avoidance (see Eichfelder et al. 2024, for an analysis of the determinants and implications of conforming tax avoidance). It is therefore unclear how tax complexity affects the use of tax-related earnings management through this tax avoidance channel.

Besides its effect on tax avoidance, complexity of tax rules and tax processes has also been shown to affect the uncertainty of tax payments (Giese et al. 2024; Devereux 2016). We argue that firms can use this uncertainty to more flexibly adjust their assessment of the future recoverability of tax benefits and adjust the capitalized deferred tax assets in the desired direction. Thus, we formulate Hypothesis 2c as follows:

H2c The use of tax-related earnings management is positively associated with tax complexity.

Not only general characteristics of the tax system, like the quality of tax enforcement or the level of tax complexity, but also the design of specific tax regulations may play a role. So far, several studies have shown that earnings management depends on the design of the accounting standards. Results by Sundvik (2019) indicate that principle-based accounting standards – in contrast to rule-based accounting standards – are associated with more earnings management. Chen et al. (2007) show that more conservative accounting standards are associated with less earnings management. In the context of earnings management with deferred taxes, the design of tax rules may likely be an additional legal determinant.

Most importantly, the effectiveness of using deferred tax assets to manipulate earnings depends on the availability of book-tax-differences that revert over time. While the firms in our sample uniformly fall under the financial accounting rules of IFRS, tax accounting rules differ from country to country. Thus, the amount of deferred tax assets that a firm can potentially capitalize generally depends on the country-specific tax accounting rules. Larger differences between financial accounting and tax accounting rules should generally lead to higher deferred tax assets and, thus, more potential for earnings management. Similarly, the value of these deferred tax assets also increases with the applicable corporation tax rate. Higher statutory tax rates may also worsen corporate governance in general (Desai et al. 2007). We therefore formulate Hypothesis 2d as follows:

H2d The use of tax-related earnings management is positively associated with larger book-tax differences and a higher statutory tax rate.

In addition, country-specific tax loss offset rules may affect the flexibility of earnings management with deferred tax assets on loss carryforwards. These regulations dif-

fer largely across countries.[5] Only few countries offer their firms the option to carry losses back, i.e. to offset them against prior year profits. By contrast, all industrialized countries allow, at least to some extent, to carry losses forward and to offset them against future profits. Differences arise, however, in respect of the limits of such loss carryforward. While in some countries tax losses can only be offset against profits generated within a certain number of years, other countries apply no such time restrictions. Similarly, the tax systems in some countries limit the amount of profits that can be used to offset tax losses in a given year (so-called minimum tax regimes). Either of these two possible restrictions, a time limit on loss carryforwards or an amount-based restriction, should make it more difficult for firms to justify a (perceived) increase in the usability of tax loss carryforwards. Consequently, the potential for earnings management via deferred tax assets may be lower in such countries. We therefore formulate Hypothesis 2e as follows:

H2e The use of tax-related earnings management is negatively associated with stricter tax loss-offset regulations.

3 Research design and data

3.1 Research design

We base our analysis on a fixed effects OLS regression model described by Eq. (1).

$$\begin{aligned}\Delta\mathrm{UDTA}_{\mathrm{it}} = {} & \beta_0 + \boldsymbol{\beta_1 \Delta \mathbf{INCENTIVE}_{\mathbf{it}}} + \beta_2 \Delta \mathrm{SIZE}_{\mathrm{it}} + \beta_3 \Delta \mathrm{GROWTH}_{\mathrm{it}} \\ & + \beta_4 \Delta \mathrm{LEVERAGE}_{\mathrm{it}} + \beta_5 \Delta \mathrm{DEBT\_MATURITY}_{\mathrm{it}} + \beta_6 \Delta \mathrm{DTL}_{\mathrm{it}} + \beta_7 \Delta \mathrm{MTB}_{\mathrm{it}} \\ & + \beta_8 \Delta \mathrm{LOSS}_{\mathrm{it}} + \beta_9 \Delta \mathrm{ETR}_{\mathrm{it}} + \beta_{10} \Delta \mathrm{PASTROA}_{\mathrm{it}} + \gamma_{\mathrm{j}} + \delta_{\mathrm{t}} + \varepsilon_{\mathrm{it}}\end{aligned} \quad (1)$$

The dependent variable is $\Delta UDTA_{it}$, the scaled change in unrecognized deferred tax assets of firm i from year $t-1$ to year t. In our analysis, we consider four different definitions of $\Delta UDTA_{it}$. First, we differentiate based on the scope of the considered deferred tax assets. Specifically, we either consider all deferred tax assets or restrict the definition of the dependent variable to deferred tax assets on loss carryforwards. This distinction is rooted in the findings of recent literature, which has identified the accounting for tax losses as a particularly salient determinant of GAAP effective tax rates (Drake et al. 2020; Schwab et al. 2022). Second, two distinct variables are used to scale $\Delta UDTA_{it}$. The first is potential deferred tax assets (or potential deferred tax assets on tax losses), the second is total assets in year t. Potential deferred tax assets capture the total of recognized and unrecognized deferred tax assets. The scaling of $\Delta UDTA_{it}$ by this variable implies that it exclusively mirrors the accounting choice of recognizing deferred tax assets or not. However, it does not reflect the relevance of (unrecognized or recognized) deferred tax assets in relation to the balance sheet total. This additional effect is captured if $\Delta UDTA_{it}$ is scaled by total assets. Besides, this

[5] A recent overview of these regulations is provided by Koch et al. (2023).

latter definition is particularly useful in assessing the magnitude of estimated effects, as it allows us to interpret the estimated coefficients as impact on return on assets.

The dependent variable and all independent variables are defined in first differences from year *t-1* to year *t*. This definition follows the notion that firms may encounter challenges in reversing past accounting decisions due to the accounting principle of consistency. Consequently, it may be more difficult to justify a recognition of previously unrecognized deferred tax assets than for newly arising deferred tax assets.

The explanatory variable of primary interest is $\Delta INCENTIVE_{it}$, which captures the change in the firm-level incentive to inflate earnings in order to meet financial analyst earnings forecasts. $INCENTIVE_{it}$ equals one if pre-manipulated earnings, defined as earnings before the change in unrecognized deferred tax assets (or unrecognized deferred tax assets from loss carryforwards), are lower than the average analyst forecast as reported by Thomson Reuters. Capitalizing deferred tax assets leads to deferred tax income, thereby exerting a positive effect on a company's after-tax earnings. Unrecognized deferred tax assets have an adverse effect. Consequently, it is anticipated that negative coefficients will be observed for all four definitions of $\Delta UDTA_{it}$.

We control for industry (γ_j) and year fixed effects (δ_t) and include a comprehensive set of firm-level controls, which particularly capture a firm's ability and non-tax motives for earnings management. The selection of control variables follows, in principle, prior literature (in particular Behn et al. 1998; Miller and Skinner 1998; Christensen et al. 2008). $SIZE_{it}$, $GROWTH_{it}$, $LEVERAGE_{it}$, and $DEBT\_MATURITY_{it}$ account for firm-level size and financial characteristics that may explain earnings management (e.g., Fields et al. 2001; Burgstahler et al. 2006; Gaio 2010; An et al. 2016; Beuselinck et al. 2019). DTL_{it} is included as deferred tax liabilities may generate future taxable income upon their reversion, which increases the likelihood that firms can realize the future benefits of deferred tax assets (Behn et al. 1998). The firms‘ market-to-book-ratio ($MTB_{it,}$) reflects a firm's profitability and its expected future development, which likely affects deferred tax accounting according to IAS 12.34. The indicator variable $LOSS_{it}$ takes the value one if the operating cash flow, operating income or profit after tax is negative in the current year. The effective tax rate (ETR_{it}) is included to control for the firms' ability of effectively planning taxes.[6] With $PASTROA_{it}$, we control for a manager's expectations of future taxable income derived from the firm's past financial performance and productivity. If $\Delta UDTA_{it}$ is scaled by total assets, we additionally include $POTDTA_{it}$ or $POTDTATLCF_{it}$ to control for the capitalization potential of deferred tax assets. We provide detailed definitions of all variables in Appendix 1. We include all control variables in terms of their first differences and winsorize all independent variables except for $LOSS_{it}$ at the one percent level to avoid bias from influential outliers.

The main focus of our study lies on the country characteristics that are associated with more or less tax-related earnings management of firms. In a first step of this analysis, we test whether the use of tax-related earnings management differs

[6] We cannot rule out that including ETR_{it} and DTL_{it} in the regression introduces problems with reversed causality. Therefore, we test the robustness of our findings to dropping these variables.

across countries. We do this by adding interactions of country fixed effects and $\Delta INCENTIVE_{it}$ to Eq. (1). While this analysis allows us to ascertain how widespread the use of tax-related earnings management is and whether the overall size of this effect differs across countries, it allows no direct conclusion regarding the country characteristics that potentially explain these differences.

Therefore, in a second step, we stepwise include country characteristics that may moderate the earnings manipulation affect, as well as interactions of these country characteristics and $\Delta INCENTIVE_{it}$. These interaction terms allow us to test hypotheses 2a–2e formulated in Sect. 2. This approach is similar to that used by Beuselinck et al. (2019).

We consider five different groups of country characteristics. First, we consider two of the World Bank's worldwide governance indicators (Rule of Law Index ($WWGI\_RL_{it}$) and Regulatory Quality Index ($WWGI\_RQ_{it}$)) to capture the institutional environment of the country. In Hypothesis 2a we assume that firms from countries with weaker governance engage more in earnings management, since, for example, investor protection and enforcement of accounting regulations are less strict (Leuz et al. 2003; Burgstahler et al. 2006; Gaio 2010; Beuselinck et al. 2019). Second, we use three different indicators of countries' tax enforcement to test Hypothesis 2b. For $TAXENF1_{it}$ and $TAXENF2_{it}$ we use OECD data on tax audit staff and tax verification actions per registered corporate income taxpayer.[7] $TAXENF3_{it}$ is the tax audit likelihood obtained from the ITI database of the Research School of International Taxation (Wamser et al. 2024). Third, we use the tax complexity index by Hoppe et al. (2023) to test for the relevance of tax system complexity. We consider the overall tax complexity index ($TAXCOMPL1_{it}$) as well as the two sub-indices that separately reflect the complexity of tax regulations ($TAXCOMPL2_{it}$) and tax processes ($TAXCOMPL3_{it}$).

Fourth, we use the statutory tax rate as well as three different indicators of book-tax-conformity, which determine the potential for deferred tax assets in a country (Hypothesis 2d). BTC_WET_{it} is based on the book-tax-conformity measure by Watrin et al. (2014), BTC_ADM_{it} is based on the Atwood et al. (2010) measure and BTC_TANG_{it} follows Tang (2015). Lastly, we include different indicators of the countries' loss offset rules (Hypothesis 2e). To this end, we refer to the $LOSS\_OFFSET\_SCORE_{it}$ developed by Koch et al. (2023) as well as to dummy variables that indicate whether countries have a loss carryback option or apply a limitation of loss carryforwards as regards amount or time.

All of these country indicators are determined as weighted averages at the group level. We use the number of registered subsidiaries per country for determining the individual weights per firm. In doing so, we acknowledge that multinational firms are not uniformly taxed in the headquarters' countries and that firms may locate earnings management activities strategically to subsidiary locations where these activi-

[7] For both variables we assign values from 1 to 4 (higher values indicate higher tax enforcement or complexity) depending on the quartiles of the original data in order to ensure comparability to the scale of $TAXENF3_{it}$.

ties are most easily possible (Beuselinck et al. 2019).[8] The relevant subsidiary data is collected from the lists of shareholdings in the notes to the consolidated financial statements of our sample firms; we consider the 44 countries with the highest number of subsidiaries.[9] The calculation of all variables is described in detail in Appendix 1.

3.2 Data and descriptive statistics

Our analysis is based on consolidated financial information for European MNEs listed in the STOXX Europe 600, which comprises the 600 largest European listed companies (including Switzerland and the UK) based on free-float market capitalization (STOXX 2017). The index is subject to rolling adjustments, so we include such companies that were indexed in November 2021 and collect data for the ten-year period from 2011 to 2020. The resulting panel is a perfect fit for our research questions, as our sample firms are subject to country-specific tax rules but uniformly apply IFRS for their financial statements.[10]

Using consolidated accounts has two particular advantages for our analysis. First, it ensures that financial statements are based on uniform accounting standards (IFRS) and results are, therefore, not distorted by differences in the accounting for deferred tax assets. Second, using consolidated financial statements allows us to not only consider balance sheet information, but also more detailed information from the tax footnotes that we hand-collected from the published financial statements of the firms. This includes, in particular, the amount of unrecognized deferred tax assets and the distinction between deferred tax assets on loss carryforwards and other deferred tax assets. The information on unrecognized deferred tax assets is not provided in a standardized format. If companies only reported the amount of loss carryforwards for which no deferred taxes were capitalized, as allowed by IAS 12.81 (c), we calculated the corresponding tax value by multiplying this value by the statutory tax rate of the MNE's headquarter country.[11] All other financial information is obtained from Thomson Reuters.

In Table 1, we describe our sample selection. We start with 6000 observations (600 firms over the period from 2011 to 2020). We follow prior literature (e.g., Burgstahler et al. 2002; Gordon and Joos 2004; Chludek 2011) in excluding firms that belong to the banking and finance sector (860 observations) or the insurance sector (290 observations) due to the existence of industry-specific tax and accounting regulations. We further exclude firms with unavailable information for either the

[8] Note that, in contrast to Beuselinck et al. (2019), it is not the intention of our study to assess where multinational firms locate their earnings management activities, but rather whether they carry out such activities at all.

[9] These 44 countries account for 90 percent of all subsidiaries of our sample firms.

[10] Regulation (EC) No. 1606/2002 mandates IFRS reporting for all publicly listed EU firms. Swiss companies have an accounting option to use IFRS, U.S. GAAP, or Swiss GAAP with the majority of Swiss firms using IFRS. The United Kingdom has even implemented IFRS directly.

[11] The same is also applied for UDTA unrelated to tax losses. We have tested the robustness of our findings by alternatively using the weighted average statutory tax rate of the group (weighted by the number of group affiliates per country). Our results remain robust to this change: the coefficient signs and significance levels in all regression tables are unchanged, and the effect sizes change only marginally.

Table 1 Sample selection

Dependent variable:	(1)		(2)		(3)		(4)	
	$\Delta UDTA_{it}$		$\Delta UDTATLCF_{it}$		$\Delta UDTA_{it}$		$\Delta UDTATLCF_{it}$	
scaled by:	*pot. DTA*		*pot. DTA TLCF*		Total Assets		Total Assets	
600 Firms over 10 Years		6000		6000		6000		6000
Excluding Banks & Financial Services	./	860	./	860	./	860	./	860
Excluding Insurances	./	290	./	290	./	290	./	290
Excluding Incomplete *ΔUDTA(TLCF)* Data	./	1468	./	1829	./	1443	./	1765
Excluding Incomplete Data for *INCENTIVE*	./	541	./	492	./	528	./	489
Excluding Incomplete Control Variables	./	470	./	426	./	508	./	477
Final Sample		2371		2103		2371		2119

This table presents the sample selection procedure

dependent variable (between 1443 and 1829), the earnings management incentive (between 489 and 541) or the control variables (between 426 and 508). Unavailable information for the dependent variable[12] and the earnings management incentive resulted particularly from lacking information on unrecognized deferred tax assets.[13] The final sample comprises between 2103 and 2371 firm-year observations, depending on the applied definition of the dependent variable. Regressions that use deferred tax assets on loss carryforwards are based on a smaller sample as not all firms provide the required disaggregation of deferred tax assets.[14]

In Table 2, we report summary statistics for all variables entering Eq. (1) as well as for all country-level variables that are used to test Hypothesis 2. The average change in unrecognized deferred tax assets (on tax loss carryforwards) amounts to −0.26 percent (−1.25 percent) of potential deferred tax assets (on tax loss carryforwards). Relative to total assets, the average change in unrecognized deferred tax assets (on tax loss carryforwards) is 0.05 percent (0.04 percent).[15] The sample average for $\Delta INCENTIVE_{it}$ varies between 0.0105 and 0.0131, indicating that observations in which the incentive to manipulate earnings arises, persists, or falls away, are fairly balanced.

4 Empirical results

4.1 General existence of a tax-related earnings management pattern

We first estimate Eq. (1) to analyze whether the capitalization of deferred tax assets in our sample can be generally associated with the considered incentive to manage earnings, i.e., to adjust earnings to financial analyst forecasts. The baseline results are reported in Table 3.

We estimate Eq. (1) for four different definitions of our dependent variable $\Delta UDTA_{it}$, the change in deferred tax assets (or deferred tax assets on loss carryforwards) scaled by either the total amount of recognized and unrecognized deferred tax assets (specifications (1) and (3)) or by total assets (specifications (2) and (4)). We include the earnings management incentive and all other independent variables in first differences. Thus, $\Delta INCENTIVE_{it}$ takes the value one only if there is a new earnings management incentive in year t. This is the case for 16–18 percent of all

[12] We lose slightly more firm-year observations due to incomplete information for the dependent variable if it is scaled by the total amount of potential DTA. This is due to observations where firms report zero values of both recognized and unrecognized DTA (on TLCF), leading to zero values in the denominator of the dependent variable.

[13] For $\Delta INCENTIVE_{it}$, information on unrecognized deferred tax assets was required for the years t, $t-1$ and $t-2$ in order to determine pre-manipulated earnings. This requirement largely explains the additional sample reduction due to missing information on this variable.

[14] The small deviation between the sample size in columns 2 and 4 of Table 1 result from zero values in the denominator of the dependent variable.

[15] The different signs of the mean values can be explained by the different distributions of the variables used in the denominator (potential DTA or total assets), leading to a different weighting of individual observations.

Table 2 Descriptive statistics

	(1)	(2)	(3)	(4)	(5)
	Obs.	Mean	Std. Dev.	Min.	Max.
Dependent and incentive variables					
$\Delta UDTA^a$	2371	−0.0026	0.2143	−1.3272	0.6136
$\Delta INCENTIVE^a$	2371	0.0131	0.5724	−1	1
$\Delta UDTATLCF^b$	2103	−0.0125	0.3030	−1.8758	0.7783
$\Delta INCENTIVE^b$	2103	0.0105	0.5602	−1	1
$\Delta UDTA^c$	2,371	0.0005	0.0089	−0.0376	0.0541
$\Delta INCENTIVE^c$	2371	0.0131	0.5724	−1	1
$\Delta UDTATLCF^d$	2119	0.0004	0.0068	−0.0277	0.0397
$\Delta INCENTIVE^d$	2119	0.0109	0.5611	−1	1
Firm-level controls					
$\Delta POTDTA^c$	2371	0.0013	0.0179	−0.2755	0.4291
$\Delta POTDTATLCF^d$	2119	0.0005	0.0102	−0.0704	0.1458
$\Delta SIZE^a$	2371	0.0653	0.1506	−0.2244	0.9325
$\Delta GROWTH^a$	2371	−0.0204	0.189	−0.8364	0.6783
$\Delta LEVERAGE^a$	2371	0.0025	0.0512	−0.2468	0.1999
$\Delta DEBT\_MA\ TURITY^a$	2371	−0.0078	0.0771	−0.3197	0.2552
ΔDTL^a	2371	0.4364	4.2435	−7.3905	49.9769
ΔMTB^a	2371	0.1535	1.5342	−7.7618	8.1929
$\Delta LOSS^a$	2371	0.0186	0.3658	−1	1
ΔETR^a	2371	0.0047	0.4043	−1.9820	2.1031
$\Delta PASTROA^a$	2371	0.0008	0.0116	−0.0419	0.0530
ΔSTR^a	2371	−0.0045	0.0072	−0.0775	0.0207
Country-level controls					
$WWGI\_RL^a$	2371	82.9416	7.3044	26.381	100
$WWGI\_RQ^a$	2371	84.4134	6.4301	36.5714	99.0521
$TAXENF1^a$	2371	2.2927	1.0399	1	4
$TAXENF2^a$	2371	2.3226	1.0831	1	4
$TAXENF3^a$	2363	3.4673	0.7232	1	5
BTC_WET^a	2361	0.3674	0.1264	0.0545	0.9231
BTC_ADM^a	2371	0.4489	0.0999	0.1	0.85
BTC_TANG^a	2371	0.5351	0.0941	0.1169	0.8512
STR^a	2371	0.2611	0.0279	0.1744	0.361
$LOSS\_OFFSET\_SCORE^a$	2371	1.9146	0.5009	0.4737	4
LCF_MINTAX^a	2371	0.448	0.2405	0	1
$LCF\_TIMELIMIT^a$	2371	0.3768	0.1946	0	1
$LOSS\_CARRYBACK^a$	2371	0.4608	0.2245	0	1
$TAXCOMPL1^a$	2371	0.3712	0.02	0.2226	0.4727
$TAXCOMPL2^a$	2371	0.4846	0.0267	0.2716	0.5927
$TAXCOMPL3^a$	2371	0.2579	0.019	0.1639	0.3569

This table presents summary statistics for all components in our sample (i.e., dependent and incentive variables as well as firm-level controls and country-level controls). Superscript letters *a, b, c* and *d* indicate the specific samples and translate to columns (1) to (4) of Table 3. For example, the superscript *a* refers to the specifications in which $\Delta UDTA_{it}$ scaled by the potential DTA is the dependent variable. Descriptives for control variables in other specifications are not shown as they do not deviate materially

Table 3 Change in unrecognized DTA (TLCF): Analysis of Earnings Management

Dependent variable:	(1)	(2)	(3)	(4)
	$\Delta UDTA_{it}$	$\Delta UDTATLCF_{it}$	$\Delta UDTA_{it}$	$\Delta UDTATLCF_{it}$
scaled by:	*pot. DTA*	*pot. DTA TLCF*	Total Assets	Total Assets
$\Delta INCENTIVE_{it}$	−0.0517***	−0.0679***	−0.0017***	−0.0007***
	(−7.57)	(−5.53)	(−5.74)	(−4.26)
$\Delta POTDTA(TLCF)_{it}$			0.3131***	0.5207***
			(4.50)	(28.50)
$\Delta SIZE_{it}$	0.1935***	0.1386**	−0.0008	−0.0015
	(3.05)	(2.20)	(−0.66)	(−1.24)
$\Delta GROWTH_{it}$	−0.1284**	−0.0781	−0.0018	0.0001
	(−2.27)	(−1.37)	(−1.72)	(0.13)
$\Delta LEVERAGE_{it}$	0.3442***	0.3418***	0.0065**	0.0020
	(3.87)	(3.06)	(2.50)	(0.39)
$\Delta DEBT\_MATURITY_{it}$	0.0758	−0.0110	0.0031*	0.0023
	(1.06)	(−0.09)	(1.88)	(1.60)
ΔDTL_{it}	−0.0049	0.0007	−0.0000	0.0000*
	(−1.72)	(0.58)	(−0.29)	(1.82)
ΔMTB_{it}	−0.0049***	−0.0112***	−0.0002**	0.0000
	(−4.17)	(−3.32)	(−2.91)	(0.22)
$\Delta LOSS_{it}$	0.0343***	0.0351**	0.0010**	0.0006**
	(3.60)	(2.64)	(2.48)	(2.76)
ΔETR_{it}	−0.0016	0.0038	0.0002	0.0000
	(−0.12)	(0.20)	(0.43)	(0.05)
$\Delta PASTROA_{it}$	−0.9264*	−1.9446**	−0.0442***	−0.0204**
	(−2.02)	(−2.85)	(−4.71)	(−2.51)
Observations	2,371	2,103	2,371	2,119
Adj. R-sq.	0.0589	0.0384	0.4333	0.6315
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes

This table presents results from fixed effects OLS regressions estimating our baseline equation as described in Sect. 4.1. The dependent variables are $\Delta UDTA_{it}$ and $\Delta UDTATLCF_{it}$, depicting the change in unrecognized DTA (on TLCF), alternatively scaled by either the potential DTA (on TLCF) or Total Assets. A constant has been included but is not reported. Detailed definitions of the dependent and all independent variables are presented in Appendix 1. All columns include winsorized data. Standard errors are robust to heteroscedasticity and clustered by headquarter country. t-statistics are given in parentheses. ***, **, and * denotes significance at the 1%, 5%, and 10% level, respectively

observations, depending on the applied definition of the dependent variable.[16] Conversely, $\Delta INCENTIVE_{it}$ is minus one if a previous earnings management incentive from year $t-1$ reverses in year t. In all other cases $\Delta INCENTIVE_{it}$ is equal to zero. According to Hypothesis 1, we expect an upward earnings bias (and thus a negative effect on $\Delta UDTA_{it}$) when pre-manipulated earnings fall below the analyst forecasts

[16] The earnings management incentive considered in this paper correlates with other incentives. Firms with pre-manipulated earnings below the analysts' forecasts more frequently have large losses (2.96 vs. 0.24 percent) or earnings that fall below the prior year earnings (45.6 vs. 20.5 percent). However, we do not assume that this biases our findings upwards. First, we control for these influences by including $LOSS_{it}$ and $PASTROA_{it}$. Second, the incentives for a big bath accounting rather point in the opposite direction and should thus lead to an understatement of effects (if any).

for the first time ($\Delta INCENTIVE_{it}=1$) and an adverse effect if a previous incentive no longer exists ($\Delta INCENTIVE_{it}=-1$).

The regression results reported in Table 3 clearly confirm this theoretical prediction. We estimate negative coefficients at the statistical significance level of one percent for all four definitions of the dependent variable. This effect is also economically significant in terms of its magnitude. The coefficient in specification (1) is −0.052. It indicates a 5.2 percentage point decline in the amount of unrecognized deferred tax assets relative to the overall amount of recognized and unrecognized deferred tax assets in year *t*. This decline is equivalent to 17 percent of the standard deviation of this variable. The effect on the capitalization of deferred tax assets on loss carry forwards is even somewhat larger (−0.0068; specification (2)).

Our findings hold if we use total assets to scale the change in unrecognized deferred tax assets (specifications (3) and (4)). These specifications also allow for a more intuitive interpretation of the effect's magnitude. Assuming that a decline in unrecognized deferred tax assets results in a corresponding increase in profits (relative to an unchanged amount of unrecognized deferred tax assets), the coefficients in specifications (3) and (4) can be interpreted as the manipulation of return on assets. Hence, a coefficient of −0.0017 in specification (3) indicates that, on average, firms manipulate their return on assets upwards by 0.17 percentage points when a new earnings management incentive exists. As the average return on assets of firms in our sample amounts to 5.61 percent, this corresponds to an increase of the return on assets by 3 percent. The effect size for deferred tax assets on loss carryforwards accounts for about 40 percent[17] of this overall effect.

In order to ascertain the significance of the earnings management incentive in the decision to capitalize deferred tax assets, we compare the adjusted R^2 values obtained from the regressions presented in Table 3 and those obtained from untabulated regressions that exclude the earnings management incentive ($\Delta INCENTIVE_{it}$) from the equation. In specifications (1) and (2) of Table 3, the inclusion of $\Delta INCENTIVE_{it}$ in the regression equation results in an increase in adjusted R^2 of 1.5 percentage points (or 64 percent) and 1.8 percentage points (or 45 percent), respectively. These findings underscore the significance of earnings management considerations for the accounting decision to capitalize deferred tax assets.

The coefficient estimated for the independent variable $\Delta INCENTIVE_{it}$ captures the average effects of all positive and negative changes in the earnings management incentive. The results reported in Table 3, thus, do not allow us to differentiate the effects that arise from a new earnings management incentive from those that result from the reversal of such an incentive. We therefore report additional results in Table 4, for which we split $\Delta INCENTIVE_{it}$ into two indicator variables that reflect new earnings management incentives ($\Delta INCENTIVE\_pos_{it}$) or reversals of previous earnings management incentives ($\Delta INCENTIVE\_neg_{it}$). We obtain negative and statistically significant coefficient estimates for $\Delta INCENTIVE\_pos_{it}$ for all four dependent variables. Also consistent with our expectations, we obtain significantly positive coefficient estimates for $\Delta INCENTIVE\_neg_{it}$ in all four columns. The adverse effect

[17] = 0.0007/0.0017.

Table 4 Change in unrecognized DTA (TLCF): Analysis of Earnings Management – Split Incentive Variable

Dependent variable:	(1)	(2)	(3)	(4)
	$\Delta UDTA_{it}$	$\Delta UDTATLCF_{it}$	$\Delta UDTA_{it}$	$\Delta UDTATLCF_{it}$
scaled by:	*pot. DTA*	*pot. DTA TLCF*	Total Assets	Total Assets
$\Delta INCENTIVE\_pos_{it}$	−0.0385***	−0.0629***	−0.0016***	−0.0005*
	(−3.68)	(−3.60)	(−3.99)	(−2.08)
$\Delta INCENTIVE\_neg_{it}$	0.0657***	0.0732***	0.0018***	0.0009**
	(7.34)	(5.05)	(5.32)	(2.69)
Observations	2,371	2,103	2,371	2,119
Adj. R-sq.	0.0593	0.0380	0.4330	0.6315
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes

This table presents results from fixed effects OLS regressions estimating our baseline equation as described in Sect. 4.1. In this variation, we have included two dummy variables instead of one to capture different changes in the earnings management incentive: $\Delta INCENTIVE\_pos_{it}$ takes the value 1 in case of a positive change, i.e. the incentive is given in the present year after it was absent in the prior year. Correspondingly, $\Delta INCENTIVE\_neg_{it}$ takes the value 1 in case of a negative change. The dependent variables are $\Delta UDTA_{it}$ and $\Delta UDTATLCF_{it}$, depicting the change in unrecognized DTA (on TLCF), alternatively scaled by either the potential DTA (on TLCF) or Total Assets. Control variables are not presented as they do not show material deviations from Table 3. A constant has been included but is not reported. Detailed definitions of the dependent and all independent variables are presented in Appendix 1. All columns include winsorized data. Standard errors are robust to heteroscedasticity and clustered by headquarter country. t-statistics are given in parentheses. ***, **, and * denotes significance at the 1%, 5%, and 10% level, respectively

in case that the incentive reverses increases our confidence that we truly observe earnings management (see similarly Christensen et al. 2008).

We test the robustness of our findings in several additional tests, of which we summarize the results in Tables 5 and 6. First, our findings may suffer from reverse causality with regard to the control variables ETR_{it} and DTL_{it}. The accounting treatment of deferred tax assets may directly affect the GAAP effective tax rate, as non-capitalized deferred tax assets come along with a higher deferred tax expense (or foregone deferred tax income). Similarly, the accounting treatment of deferred tax liabilities may not be independent from the accounting treatment of deferred tax assets. In section A of Table 5 we therefore report additional regression results where we replace ETR_{it} by the headquarters' statutory tax rate and drop DTL_{it}.

Second, $\Delta INCENTIVE_{it}$ is zero in all cases where the earnings management incentive has not changed in year *t*. This is the case if the earnings management incentive existed neither in year *t* nor in year *t-1*, but also if the incentive was present in both continuous years. We render it possible that the effects on the accounting treatment of deferred tax assets differ between these two cases. We therefore re-estimate Eq. (1) for an adjusted sample that excludes all observations with zero values for $\Delta INCENTIVE_{it}$ that result from a continuous earnings management incentive in years *t-1* and *t*. The results are reported in section B of Table 5.

Third, we report additional regression results for an adjusted definition of $\Delta INCENTIVE_{it}$ (section C of Table 5). The original definition of that variable considered only whether the pre-manipulated earnings fall below the analyst forecasts or not. However, it does not account for the size of the difference between pre-

Table 5 Change in unrecognized DTA (TLCF): Analysis of Earnings Management – Robustness Tests

Dependent variable:	(1)	(2)	(3)	(4)
	$\Delta UDTA_{it}$	$\Delta UDTATLCF_{it}$	$\Delta UDTA_{it}$	$\Delta UDTATLCF_{it}$
scaled by:	*pot. DTA*	*pot. DTA TLCF*	Total Assets	Total Assets
Section A: Adjustment of the control variable set				
$\Delta INCENTIVE_{it}$	−0.0512***	−0.0636***	−0.0016***	−0.0008***
t-value	(−7.74)	(−5.89)	(−5.12)	(−3.64)
Adj. R-sq.	0.0539	0.0373	0.4532	0.5809
Section B: Disregarding continuously incentivized years				
$\Delta INCENTIVE_{it}$	−0.0523***	−0.0690***	−0.0018***	−0.0009***
t-value	(−8.28)	(−5.38)	(−4.25)	(−4.59)
Adj. R-sq.	0.0816	0.0523	0.4729	0.6284
Section C: Alternative incentive variable definition				
$\Delta INCENTIVE_{it}$	−1.2005***	−0.7396**	−0.0382***	−0.0091**
t-value	(−4.57)	(−2.84)	(−3.03)	(−2.43)
Adj. R-sq.	0.0618	0.0268	0.4341	0.6297
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes

This table presents robustness tests regarding fixed effects OLS regressions estimating our baseline equation as described in Sect. 4.1. In Section A, we omit the control variables ΔDTL_{it} and ΔETR_{it} and include ΔSTR_{it}. In Section B, we drop observations in which the earnings management incentive is given in the present as well as in the preceding year. For Section C, we alternatively compute $INCENTIVE_{it}$ as the (positive) delta between the pre-manipulated earnings and the analyst forecast if the pre-manipulated earnings are lower, and 0 otherwise. The dependent variables are $\Delta UDTA_{it}$ and $\Delta UDTATLCF_{it}$, depicting the change in unrecognized DTA (on TLCF), alternatively scaled by either the potential DTA (on TLCF) or Total Assets. Control variables are not presented as they do not show material deviations from Table 3. A constant has been included but is not reported. Detailed definitions of the dependent and all independent variables are presented in Appendix 1. All columns include winsorized data. Standard errors are robust to heteroscedasticity and clustered by headquarter country. t-statistics are given in parentheses. ***, **, and * denotes significance at the 1%, 5%, and 10% level, respectively

manipulated and forecasted earnings. The size of this difference may likely affect the accounting treatment of deferred tax assets. On the one hand, only small adjustments may be required if the pre-manipulated earnings miss the earnings forecast only by a small margin. Second, firms may decide against any upward manipulation of earnings if this difference is too large, and they apply a big-bath accounting policy. The adjusted definition of $\Delta INCENTIVE_{it}$ additionally accounts for the size of this difference. It is computed as the (positive) delta between the pre-manipulated earnings and the analyst forecast if the pre-manipulated earnings are lower, and is zero otherwise.

Finally, we want to ensure that the findings in this section do not reflect the accounting practices of only one specific country in our sample. We, therefore, stepwise exclude firms from single headquarter countries and estimate Eq. (1) for the so reduced samples. We summarize the resulting coefficients in Table 6.

Our baseline findings are robust to all of these modifications. None of them affect the estimated coefficients for $\Delta INCENTIVE_{it}$ to a significant extent.

Table 6 Change in unrecognized DTA (TLCF): Analysis of Earnings Management – Robustness Test: Disregarding Individual Headquarter Countries

Dependent variable:	(1)	(2)	(3)	(4)
	$\Delta UDTA_{it}$	$\Delta UDTATLCF_{it}$	$\Delta UDTA_{it}$	$\Delta UDTATLCF_{it}$
scaled by:	*pot. DTA*	*pot. DTA TLCF*	Total Assets	Total Assets
Excluding…				
Austria	−0.0500***	−0.0678***	−0.0017***	−0.0007***
Belgium	−0.0516***	−0.0679***	−0.0016***	−0.0006***
Denmark	−0.0537***	−0.0669***	−0.0017***	−0.0007***
Finland	−0.0536***	−0.0662***	−0.0018***	−0.0007***
France	−0.0557***	−0.0661***	−0.0017***	−0.0006***
Germany	−0.0504***	−0.0671***	−0.0015***	−0.0007***
Ireland	−0.0522***	−0.0684***	−0.0017***	−0.0007***
Italy	−0.0545***	−0.0708***	−0.0018***	−0.0007***
Luxembourg	−0.0510***	−0.0653***	−0.0016***	−0.0007***
Netherlands	−0.0525***	−0.0673***	−0.0016***	−0.0007***
Norway	−0.0483***	−0.0657***	−0.0017***	−0.0007***
Poland	−0.0531***	−0.0691***	−0.0017***	−0.0007***
Portugal	−0.0517***	−0.0673***	−0.0017***	−0.0007***
Spain	−0.0534***	−0.0693***	−0.0017***	−0.0007***
Sweden	−0.0445***	−0.0762***	−0.0018***	−0.0007***
Switzerland	−0.0556***	−0.0744***	−0.0019***	−0.0008***
United Kingdom	−0.0476***	−0.0594***	−0.0018***	−0.0007***
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes

This table presents a robustness test with regard to the fixed effects OLS regressions presented in Table 3. Here, we exclude the individual headquarter countries one at a time. The dependent variables are $\Delta UDTATLCF_{it}$ and $\Delta UDTA_{it}$, depicting the change in unrecognized DTA (on TLCF), alternatively scaled by either the potential DTA (on TLCF) or Total Assets. Control variables are not presented as they do not show material deviations from Table 3. A constant has been included but is not reported. Detailed definitions on the dependent and all independent variables are presented in Appendix 1. All columns include winsorized data. Standard errors are robust to heteroscedasticity. t-statistics are given in parentheses. ***, **, and * denotes significance at the 1%, 5%, and 10% level, respectively

4.2 Cross-country differences in tax-related earnings management

The primary focus of our paper lies on cross-country differences in the use of deferred tax accounting to manipulate earnings and whether these differences are associated with certain country characteristics. In this section, we start this analysis by investigating whether the findings of Table 3 from the previous section differ across countries.

Country-level differences may arise both with regard to the overall relevance and general accounting treatment of deferred taxes and with regard to the intensity with which deferred tax assets are used to manipulate earnings. The relevance of deferred tax assets (and liabilities) depends particularly on the differences between tax and financial accounting. While the firms in our sample uniformly use IFRS for financial accounting purposes, at least for their consolidated financial statements, tax accounting rules differ across countries. Deferred tax assets on loss carryforwards are further affected by the local loss offset rules that countries apply for tax purposes. Differ-

ences across countries may arise also with regard to the attitude towards capitalizing deferred tax assets. In Germany, for example, firms have a general option to capitalize deferred tax assets under local GAAP. Empirical studies show that German firms are reluctant to make use of this option, as capitalizing deferred tax assets has been interpreted by investors as an indicator of financial weakness in the past (Flagmeier 2017).[18]

The extent to which firms use the accounting for deferred tax assets to manipulate earnings may likely differ across countries. Previous studies have already demonstrated that the extent to which firms manipulate financial accounting earnings depends, for example, on the strength of governance and enforcement of financial accounting rules. We have no reason to doubt that these country characteristics also affect the earnings manipulation channel analyzed in our paper. However, we expect that the use of this earnings management channel additionally depends on certain features of the local tax systems, such as the size of book-tax-differences, tax loss offset rules as well as the complexity and enforcement of tax rules. We test for the existence of country-level differences in the use of tax-related earnings management by introducing an interaction between the country fixed effects and $\Delta INCENTIVE_{it}$ in regression Eq. (1).[19] The results of these regressions are reported in Table 7. They indicate for 14 or 15 of the 17 interaction terms (depending on the considered definition of the dependent variable) negative and statistically significant coefficients. Belgium, Luxembourg and Norway are among the countries with the strongest use of tax-related earnings management, whereas we find only small or insignificant effects for Ireland, Italy and Switzerland. An exception in our sample is Poland, for which we estimate positive and statistically significant coefficients. While we have no convincing explanation for this effect, we assume that it is unrelated to earnings management.

We observe considerable differences in the effect sizes across countries. For example, in specification (3), the coefficients estimated for Belgium, Norway and Luxembourg are two times, three times or even eight times as large as the coefficient estimated for all countries in Table 3. These effects are equivalent to 8 percent (Norway), 15 percent (Belgium) or even 67 percent (Luxembourg) of the average ROA per headquarter country. At the other end of the distribution, we find only a small increase of 1.7 percent of the average ROA for firms headquartered in Ireland. It should be noted that these country-level differences relate to our sample firms' headquarter countries and do not take into account their multinational structure. However, the results generally indicate that the use of tax-related earnings management is a widespread phenomenon in Europe.

The results in Table 7 do not allow us to assess whether the differences across countries result from the extensive margin, i.e. the likelihood that firms use this earnings management channel, or the intensive margin, i.e. the extent to which the earnings are manipulated. In order to address this question, we estimate Eq. (1) in a reduced form, i.e. without considering $\Delta INCENTIVE_{it}$, and then analyze the predic-

[18] Kvaal and Nobes (2010, 2012) provide some evidence that firms aim to use discretion in accounting choices under IFRS to preserve traditional national accounting practices.

[19] Note that we have not included the incentive variable as a stand-alone variable in order to facilitate the interpretation of country effects and to prevent the exclusion of one of the country-incentive interactions.

Table 7 Change in unrecognized DTA (TLCF): Country Fixed Effects – Interactions with $\Delta INCENTIVE_{it}$

Dependent variable:	(1)	(2)	(3)	(4)
	$\Delta UDTA_{it}$	$\Delta UDTATLCF_{it}$	$\Delta UDTA_{it}$	$\Delta UDTATLCF_{it}$
scaled by:	*pot. DTA*	*pot. DTA TLCF*	Total Assets	Total Assets
$\Delta INCENTIVE_{it}$ *x* ...				
Austria	−0.1016***	−0.0995***	−0.0026***	−0.0019***
Belgium	−0.0433***	−0.0865***	−0.0058***	−0.0057***
Denmark	−0.0132**	−0.1030***	−0.0012***	−0.0002**
Finland	−0.0281***	−0.0917***	−0.0003	−0.0000
France	−0.0458***	−0.0793***	−0.0020***	−0.0011***
Germany	−0.0666***	−0.0802***	−0.0014**	−0.0010***
Ireland	0.0080	0.0074	−0.0008***	−0.0005
Italy	−0.0098**	0.0060	0.0001	−0.0007***
Luxembourg	−0.1363***	−0.3064***	−0.0129***	−0.0077***
Netherlands	−0.0254***	−0.0714***	−0.0012***	−0.0003*
Norway	−0.1862***	−0.1522***	−0.0035***	−0.0006***
Poland	0.3198***	0.1738***	0.0020***	0.0027***
Portugal	−0.0753***	−0.2575***	−0.0012***	−0.0008***
Spain	−0.0424***	−0.0370***	−0.0026***	−0.0010***
Sweden	−0.0780***	−0.0071***	−0.0016***	−0.0010***
Switzerland	−0.0361***	−0.0231***	−0.0012***	0.0004***
United Kingdom	−0.0618***	−0.0957***	−0.0018***	−0.0004***
Observations	2,371	2,103	2,371	2,119
Adj. R-sq.	0.0620	0.0392	0.4375	0.6369
Industry Fixed Effects	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes

This table presents results from fixed effects OLS regressions as presented in Table 3, but omitting $\Delta INCENTIVE_{it}$ and including the interaction term between $\Delta INCENTIVE_{it}$ and the country fixed effects. The dependent variables are $\Delta UDTATLCF_{it}$ and $\Delta UDTA_{it}$, depicting the change in unrecognized DTA (on TLCF), alternatively scaled by either the potential DTA (on TLCF) or Total Assets. Control variables are not presented as they do not show material deviations from Table 3. A constant has been included but is not reported. Detailed definitions on the dependent and all independent variables are presented in Appendix 1. All columns include winsorized data. Standard errors are robust to heteroscedasticity. t-statistics are given in parentheses. ***, **, and * denotes significance at the 1%, 5%, and 10% level, respectively

tion errors of observations with an earnings management incentive. We report in Table 8 for each country in our sample the share of observations with a negative prediction error (extensive margin) as well as the average size of the negative prediction errors (intensive margin). We find that the effects for the intensive and extensive margin point, in principle, in the same direction. For countries with particularly strong tax-related earnings management (Belgium, Luxembourg and Norway), we observe in most cases above-average values for the share of observations with a negative prediction error (Table 8, section A) and larger negative prediction errors (Table 8,

Table 8 Change in unrecognized DTA (TLCF): Analysis of Earnings Management – Prediction Errors for Years with $\Delta INCENTIVE_{it}=1$

Dependent variable:	(1)	(2)	(3)	(4)
	$\Delta UDTA_{it}$	$\Delta UDTATLCF_{it}$	$\Delta UDTA_{it}$	$\Delta UDTATLCF_{it}$
scaled by:	*pot. DTA*	*pot. DTA TLCF*	Total Assets	Total Assets
Section A: Share of negative prediction errors				
Austria	67%	33%	67%	100%
Belgium	67%	75%	78%	60%
Denmark	64%	44%	72%	39%
Finland	45%	38%	45%	50%
France	54%	64%	70%	52%
Germany	64%	59%	70%	65%
Ireland	57%	80%	71%	60%
Italy	42%	30%	58%	50%
Luxembourg	75%	75%	100%	50%
Netherlands	53%	50%	47%	57%
Norway	67%	50%	83%	63%
Poland	0%	100%	100%	100%
Portugal	0%	0%	100%	100%
Spain	46%	40%	69%	70%
Sweden	59%	64%	67%	69%
Switzerland	50%	39%	59%	54%
United Kingdom	51%	52%	56%	59%
Total	51%	52%	56%	59%
Section B: Average value of negative prediction errors				
Austria	−0.2973	−0.2372	−0.0077	−0.0009
Belgium	−0.0881	−0.0841	−0.0062	−0.0067
Denmark	−0.0749	−0.4468	−0.0039	−0.0007
Finland	−0.0865	−0.4379	−0.0013	−0.0009
France	−0.1041	−0.1330	−0.0033	−0.0039
Germany	−0.1545	−0.2260	−0.0052	−0.0031
Ireland	−0.0507	−0.0216	−0.0018	−0.0012
Italy	−0.0403	−0.0445	−0.0020	−0.0011
Luxembourg	−0.2630	−0.6530	−0.0107	−0.0040
Netherlands	−0.0824	−0.2017	−0.0049	−0.0030
Norway	−0.3797	−0.4521	−0.0051	−0.0030
Poland	n/a	−0.0595	−0.0009	−0.0005
Portugal	n/a	n/a	−0.0015	−0.0008
Spain	−0.0847	−0.0759	−0.0026	−0.0013
Sweden	−0.1920	−0.0973	−0.0034	−0.0018
Switzerland	−0.0744	−0.1908	−0.0025	−0.0016
United Kingdom	−0.1990	−0.2981	−0.0048	−0.0024
Total	−0.1412	−0.2161	−0.0040	−0.0024

This table presents an analysis of negative prediction errors per country for years with $\Delta INCENTIVE_{it}=1$. For this, we estimate our baseline fixed effects OLS regression as described in Sect. 4.1 and shown in Table 3, but without $\Delta INCENTIVE_{it}$. We use the coefficients and fixed effects to compute an estimated value for ΔUDTATLCF$_{it}$ and by substracting it from the observed value, we determine the prediction error. Negative prediction errors suggest a lower-than-expected $\Delta UDTATLCF_{it}$

section B). The opposite is true for countries with a low level of tax-related earnings management (Ireland,[20] Italy, and Switzerland).

4.3 Country-level determinants of tax-related earnings management

The results from the previous section indicate that the extent to which firms use deferred tax accounting for earnings management purposes differs across countries. In this section, we now aim to relate these differences to certain country characteristics. Can certain features of the tax system or the strength of governance explain why firms in some countries use this earnings management channel more intensely? To this end, we stepwise add country-level controls as well as an interaction of the respective country characteristic and $\Delta INCENTIVE_{it}$ to the regression equation. Multinational firms are not uniformly taxed in the headquarters' countries, but rather at the locations of their subsidiaries. We therefore follow Blouin et al. (2014) and define the country-level variables as average values weighted with the number of subsidiaries per country. We thus capture the exposure to tax system characteristics at the locations of the firms in our sample. The baseline results for this analysis are reported in Table 9.

Again, we consider the four different definitions of the dependent variable, which differ with regard to the considered scope of deferred tax assets (all deferred tax assets vs. deferred tax assets on loss carryforwards) and with regard to the variable used for scaling the change in unrecognized deferred tax assets (potential deferred tax assets (on loss carryforwards) vs. total assets). We find that most of the country characteristics have a significant effect either on the dependent variables that are scaled by total assets or on the dependent variables that use potential deferred tax assets, but not on both groups of dependent variables. These differences may relate to the different scope of these variables. If potential deferred tax assets are used for scaling, the dependent variables purely reflect the accounting choice to capitalize deferred tax assets. If total assets are used for scaling, the variables are affected by both the accounting choice and also the amount of potential deferred tax assets (relative to total assets). Differences in regression outcomes may thus reflect whether firms rather use the accounting choice for capitalizing deferred tax assets or also the amount of potential deferred tax assets to manipulate earnings.

Our results in Table 9 indicate, at least to some extent, that firms use tax-related earnings management more intensely if they face a higher statutory tax rate, stricter tax enforcement, or a higher level of book-tax differences.[21] However, these effects are observed only in specifications (3) and (4), i.e. those specifications that are based on the dependent variable that is scaled by total assets. We find no similar effects in specifications (1) and (2). As discussed above, these differences may indicate that the earnings management effect results from a higher potential for deferred tax assets, i.e.

[20] Ireland is an exception as for this country only the size of negative prediction errors is below average, whereas the share of negative prediction errors is high.

[21] Note that high values for the BTC variables reflect high levels of book-tax conformity and hence low levels of book-tax differences. Significant effects for book-tax conformity are observed only for BTC_ADM_{it} and BTC_TANG_{it}, while the coefficients for BTC_WET_{it} turn out insignificant and even negative.

Table 9 Change in unrecognized DTA (TLCF): Analysis of Country-related Earnings Management Determinants

		(1)	(2)	(3)	(4)
Dependent variable:		$\Delta UDTA_{it}$	$\Delta UDTATLCF_{it}$	$\Delta UDTA_{it}$	$\Delta UDTATLCF_{it}$
scaled by:		*pot. DTA*	*pot. DTA TLCF*	*Total Assets*	*Total Assets*
$\Delta INCENTIVE_{it}$ *x ... (exp. sign)*					
$WWGI\_RL_{it}$	(+)	−0.0014 (−1.05)	−0.0005 (−0.54)	0.0001 (1.36)	0.0001* (1.76)
$WWGI\_RQ_{it}$	(+)	−0.0007 (−0.57)	0.0003 (0.36)	0.0001 (1.73)	0.0001* (1.82)
$TAXENF1_{it}$	(+/−)	−0.0104 (−1.19)	−0.0107 (−0.63)	−0.0005** (−2.61)	−0.0003** (−2.20)
$TAXENF2_{it}$	(+/−)	0.0005 (0.05)	−0.0007 (−0.05)	−0.0004* (−1.96)	−0.0001 (−0.52)
$TAXENF3_{it}$	(+/−)	0.0009 (0.10)	0.0215 (1.27)	−0.0004 (−1.06)	−0.0005* (−1.93)
BTC_WET_{it}	(+)	0.0881 (1.52)	0.1209 (1.65)	−0.0004 (−0.20)	−0.0017 (−1.00)
BTC_ADM_{it}	(+)	0.0523 (0.86)	−0.0176 (−0.14)	0.0051 (1.62)	0.0042** (2.34)
BTC_TANG_{it}	(+)	0.1172 (1.22)	0.0432 (0.32)	0.0068** (2.13)	0.0029** (2.14)
STR_{it}	(−)	−0.3375 (−1.34)	−0.4173 (−1.00)	−0.0133* (−2.00)	−0.0172*** (−3.04)
$LOSS\_OFFSET\_SCORE_{it}$	(−)	−0.0253* (−1.89)	−0.0492*** (−2.98)	−0.0004 (−0.72)	0.0001 (0.21)
LCF_MINTAX_{it}	(+)	0.0822** (2.72)	0.1304** (2.43)	0.0030** (2.33)	0.0006 (1.18)
$LCF\_TIMELIMIT_{it}$	(+)	0.0274 (0.72)	−0.0620 (−1.49)	−0.0033* (−1.75)	−0.0008 (−0.71)
$LOSS\_CARRYBACK_{it}$	(−)	−0.0062 (−0.22)	−0.0512 (−0.99)	−0.0001 (−0.11)	0.0001 (0.17)
$TAXCOMPL1_{it}$	(−)	0.5675 (1.32)	0.6221 (0.99)	0.0129 (0.87)	−0.0086 (−1.41)
$TAXCOMPL2_{it}$	(−)	0.1384 (0.52)	0.1494 (0.26)	0.0154 (1.30)	−0.0013 (−0.36)
$TAXCOMPL3_{it}$	(−)	0.9532* (1.96)	1.0893** (2.19)	−0.0002 (−0.01)	−0.0163 (−1.63)
Observations		2,371	2,103	2,371	2,119
Industry Fixed Effects		Yes	Yes	Yes	Yes
Year Fixed Effects		Yes	Yes	Yes	Yes

This table presents results from fixed effects OLS regressions estimating our equation as shown in Table 3. As described in Sect. 4.3, here we additionally include specific country-level variables as well as the interaction term between $\Delta INCENTIVE_{it}$ and the respective country-level variable. The dependent variables are $\Delta UDTATLCF_{it}$ and $\Delta UDTA_{it}$, depicting the change in unrecognized DTA (on TLCF), alternatively scaled by either the potential DTA (on TLCF) or Total Assets. We include, without reporting the coefficients, firm-level controls as in Table 3, year fixed effects, and industry fixed effects in all specifications. A constant has been included but is not reported. Detailed definitions of the dependent and all independent variables are presented in Appendix 1. All columns include winsorized data. Standard errors are robust to heteroscedasticity and clustered by country. t-statistics are given in parentheses. ***, **, and * denotes significance at the 1%, 5%, and 10% level, respectively

an increase in book-tax-differences, rather than from the accounting choice to capitalize deferred tax assets. Thus, our findings provide some evidence for the theoretical predictions of Hypothesis 2d and help to clarify the direction of the effect expected in Hypothesis 2b. Our two measures of regulatory quality turn out significant only in one out of four specifications per variable; half of the insignificant coefficients even have the opposite sign. Hence, our results provide only weak evidence in support of Hypothesis 2a.

We assess the relevance of these country influences on the strength of the earnings management effect by comparing the change in the dependent variable resulting from a one standard deviation change in the country variable in specification (4) of Table 9.[22] We find that the governance indicators ($WWGI\_RL_{it}$ and $WWGI\_RQ_{it}$) have the largest effect (0.07 and 0.06 percentage points), whereas the effects of the significant tax system parameters ($TAXENF1_{it}$, $TAXENF3_{it}$, BTC_ADM_{it}, BTC_TANG_{it} and STR_{it}) are smaller and do not differ largely in their size (between 0.03 and 0.05 percentage points).

Conversely, a statistically significant negative effect, i.e. a stronger use of tax-related earnings management, in the case of a more lenient tax loss offset, as predicted by Hypothesis 2e, is observed only in specifications (1) and (2). We estimate a negative coefficient for $LOSS\_OFFSET\_SCORE_{it}$, the variable that reflects the overall restrictiveness of loss-offset regulations; high values for this variable indicate more lenient regulations. However, this effect is limited to the dependent variables scaled by potential DTA (specifications (1) and (2)). Coefficient estimates for the other loss offset variables reveal that this effect is driven by amount-related restrictions of loss carryforwards, as evidenced by positive coefficients for LCF_MINTAX_{it}. By contrast, we find no significant effects for time-related limitations of loss carryforwards or the availability of a loss carryback.

Besides, our findings provide no support for hypothesis 2c regarding a negative impact of tax system complexity. In contrast to our expectations, coefficients for these proxies are by majority positive and even statistically significant in some cases.

We have tested whether our results differ when we refer only to the headquarters' countries for defining country-level variables (untabulated). This test is motivated by survey evidence suggesting that important accounting decisions are centralized at the headquarter (Deloitte 2013). This may likely include the accounting for deferred tax assets for earnings management purposes. For most of the country characteristics, we then observe similar or weaker effects. However, the association between the level of tax enforcement and the use tax related earnings management is stronger in these tests. We observe statistically negative coefficients in seven out of twelve specifications (including all four specifications of $TAXENF1_{it}$).

Again, we perform several further robustness tests. First, we re-estimate Table 9 but additionally include country fixed effects or consider all country-level controls at the same time (both untabulated). Neither of these two robustness tests changes our

[22] We use specification (4) as we obtain the largest number of significant interaction terms with country variables here.

results to a significant extent.[23] Besides, we perform the same three robustness tests as reported in Table 5 of Sect. 4.1 (non-consideration of ETR_{it} and DTL_{it}, disregarding continuously incentivized years, alternative incentive variable definition). The corresponding results are presented in Table 10.

While we observe no material changes in the findings of the first two robustness tests, the results are somewhat weaker for the third one. In particular, we no longer find the effect for book-tax conformity; even the sign of coefficient changes here. Also the results for the regulatory quality measures are no longer consistent.

Altogether, our empirical findings provide partial support for hypothesis 2d (a positive association between tax-related earnings management and both larger book-tax differences and higher statutory tax rates) and hypothesis 2e (a negative association between tax-related earnings management and stricter loss-offset regulations). They also help to clarify the direction of hypothesis 2b, indicating a positive association between tax-related earnings management and tax enforcement. By contrast, we find only weak evidence in support of hypothesis 2a (a negative association between tax-related earnings management and regulatory quality) and no evidence for hypothesis 2c (a positive association between tax-related earnings management and tax complexity).

5 Conclusion

In conclusion, our study sheds new light on the strategic use of deferred tax accounting as an earnings management tool across European countries. By demonstrating that firms actively reduce unrecognized deferred tax assets to meet financial analyst forecasts, we provide robust evidence that tax-related earnings management is a widespread and significant practice across diverse tax environments. Importantly, we show that the strength of this practice varies significantly across countries, suggesting that national tax systems play a pivotal role in shaping firms' earnings management behavior.

We identify key tax system features—such as tax rates, loss offset regulations, enforcement intensity, and book-tax differences—that may influence firms' propensity to engage in tax-related earnings management. These findings offer valuable insights for investors by enhancing their understanding of the predictive limitations of deferred tax items and after-tax profits in financial statements. Moreover, our results carry critical implications for policymakers, as they point to (most likely unintended) consequences of certain system characteristics.

[23] We have also run a "full model", where we include interactions for one regulatory quality proxy ($WWGI\_RQ_{it}$), one tax enforcement proxy ($TAXENF1_{it}$), one book-tax conformity proxy (BTC_TANG_{it}), STR_{it}, $LOSS\_SCORE_{it}$ und $TAXCOMPL3_{it}$ at the same time. This test confirms the positive coefficient for BTC_TANG_{it} and negative coefficient for STR_{it}. $WWGI\_RQ_{it}$ is now statistically significant and positive in most specifications. However, we no longer find effects for the loss offset score and tax enforcement, which may indicate that findings for these latter variables in the previous model may be driven – at least to some extent – by confounding influences.

Table 10 Change in unrecognized DTA (TLCF): Analysis of Country-related Earnings Management Determinants – Robustness Tests

Dependent variable:		(1)	(2)	(3)	(4)
		$\Delta UDTA_{it}$	$\Delta UDTATLCF_{it}$	$\Delta UDTA_{it}$	$\Delta UDTATLCF_{it}$
scaled by:		*pot. DTA*	*pot. DTA TLCF*	Total Assets	Total Assets
Section A: Adjustment of the control variable set					
ΔINCENTIVE$_{it}$ x … (exp. sign)					
WWGI_RL$_{it}$	(+)	−0.0016 (−1.16)	−0.0005 (−0.58)	0.0001 (1.22)	0.0001* (2.00)
WWGI_RQ$_{it}$	(+)	−0.0009 (−0.66)	0.0001 (0.11)	0.0001 (1.72)	0.0001** (2.20)
TAXENF1$_{it}$	(+/−)	−0.0087 (−1.12)	−0.0128 (−1.01)	−0.0003* (−1.89)	−0.0002 (−1.49)
TAXENF2$_{it}$	(+/−)	−0.0003 (−0.03)	−0.0038 (−0.27)	−0.0004 (−1.70)	−0.0001 (−0.43)
TAXENF3$_{it}$	(+/−)	−0.0012 (−0.12)	0.0166 (1.03)	−0.0004 (−1.43)	−0.0005** (−2.55)
BTC_WET$_{it}$	(+)	0.0946 (1.70)	0.0864 (1.33)	−0.0002 (−0.12)	−0.0022 (−1.26)
BTC_ADM$_{it}$	(+)	0.0438 (0.71)	−0.0057 (−0.05)	0.0046 (1.43)	0.0052** (2.69)
BTC_TANG$_{it}$	(+)	0.0895 (0.99)	0.0398 (0.31)	0.0055* (1.79)	0.0034** (2.31)
STR$_{it}$	(−)	−0.4016 (−1.54)	−0.1834 (−0.47)	−0.0147* (−2.07)	−0.0143** (−2.29)
LOSS_OFFSET_SCORE$_{it}$	(−)	−0.0209 (−1.24)	−0.0375*** (−3.30)	−0.0002 (−0.37)	0.0003 (0.90)
LCF_MINTAX$_{it}$	(+)	0.0746** (2.56)	0.1070** (2.32)	0.0024* (1.80)	0.0004 (0.76)
LCF_TIMELIMIT$_{it}$	(+)	0.0215 (0.51)	−0.0288 (−0.75)	−0.0032* (−1.85)	−0.0015 (−1.11)
LOSS_CARRYBACK$_{it}$	(−)	−0.0078 (−0.22)	−0.0401 (−0.98)	−0.0001 (−0.13)	0.0006 (0.72)
TAXCOMPL1$_{it}$	(−)	0.6157 (1.32)	0.6019 (1.03)	0.0121 (0.82)	−0.0081 (−1.35)
TAXCOMPL2$_{it}$	(−)	0.1629 (0.54)	0.1931 (0.36)	0.0137 (1.20)	0.0001 (0.02)
TAXCOMPL3$_{it}$	(−)	0.9498* (1.93)	0.9125** (2.17)	0.0018 (0.11)	−0.0167 (−1.74)
Section B: Disregarding continuously incentivized years					
ΔINCENTIVE$_{it}$ x … (exp. sign)					
WWGI_RL$_{it}$	(+)	−0.0015 (−1.11)	−0.0004 (−0.39)	0.0001 (1.36)	0.0001* (1.81)
WWGI_RQ$_{it}$	(+)	−0.0008 (−0.59)	0.0005 (0.49)	0.0001 (1.67)	0.0001* (1.82)
TAXENF1$_{it}$	(+/−)	−0.0114 (−1.48)	−0.0129 (−0.72)	−0.0005** (−2.32)	−0.0004** (−2.22)
TAXENF2$_{it}$	(+/−)	0.0002 (0.02)	−0.0013 (−0.09)	−0.0004 (−1.69)	−0.0001 (−0.53)
TAXENF3$_{it}$	(+/–)	0.0023 (0.24)	0.0221 (1.27)	−0.0003 (−1.05)	−0.0005* (−2.08)

Table 10 (continued)

Dependent variable:		(1)	(2)	(3)	(4)
		$\Delta UDTA_{it}$	$\Delta UDTATLCF_{it}$	$\Delta UDTA_{it}$	$\Delta UDTATLCF_{it}$
scaled by:		*pot. DTA*	*pot. DTA TLCF*	Total Assets	Total Assets
BTC_WET_{it}	(+)	0.0785 (1.30)	0.0931 (1.34)	−0.0003 (−0.17)	−0.0013 (−0.81)
BTC_ADM_{it}	(+)	0.0528 (0.81)	−0.0215 (−0.17)	0.0051 (1.73)	0.0042* (2.06)
BTC_TANG_{it}	(+)	0.1233 (1.26)	0.0502 (0.36)	0.0069** (2.14)	0.0027* (1.80)
STR_{it}	(–)	−0.3234 (−1.28)	−0.4041 (−0.90)	−0.0140* (−1.82)	−0.0187*** (−3.27)
$LOSS\_OFFSET\_SCORE_{it}$	(–)	−0.0260* (−1.96)	−0.0497*** (−2.98)	−0.0005 (−0.88)	−0.0000 (−0.14)
LCF_MINTAX_{it}	(+)	0.0833** (2.80)	0.1363** (2.40)	0.0031** (2.62)	0.0007 (1.20)
$LCF\_TIMELIMIT_{it}$	(+)	0.0311 (0.81)	−0.0619 (−1.50)	−0.0033* (−1.84)	−0.0008 (−0.66)
$LOSS\_CARRYBACK_{it}$	(–)	−0.0058 (−0.21)	−0.0477 (−0.85)	−0.0001 (−0.12)	−0.0001 (−0.11)
$TAXCOMPL1_{it}$	(–)	0.5341 (1.24)	0.5574 (0.88)	0.0123 (0.83)	−0.0097 (−1.67)
$TAXCOMPL2_{it}$	(–)	0.1285 (0.47)	0.1246 (0.22)	0.0151 (1.37)	−0.0030 (−0.88)
$TAXCOMPL3_{it}$	(–)	0.9013* (1.85)	0.9984* (1.99)	−0.0007 (−0.04)	−0.0159 (−1.61)
Section C: Alternative incentive variable definition					
$\Delta INCENTIVE_{it}$ *x ... (exp. sign)*					
$WWGI\_RL_{it}$	(+)	0.0194 (1.08)	0.0274 (0.96)	0.0017** (2.45)	−0.0004* (−1.90)
$WWGI\_RQ_{it}$	(+)	0.0215 (1.35)	0.0301 (0.99)	0.0021** (2.57)	−0.0004** (−2.36)
$TAXENF1_{it}$	(+/−)	0.1670 (0.67)	−0.0430 (−0.13)	0.0031 (0.31)	0.0005 (0.09)
$TAXENF2_{it}$	(+/−)	−0.1646 (−0.57)	−0.1342 (−0.39)	−0.0084 (−1.07)	−0.0068** (−2.41)
$TAXENF3_{it}$	(+/−)	−0.1379 (−0.61)	−0.1218 (−0.35)	−0.0195* (−1.81)	−0.0051 (−0.85)
BTC_WET_{it}	(+)	−2.3493 (−1.26)	−2.7948 (−1.21)	−0.1311* (−2.10)	−0.0704** (−2.92)
BTC_ADM_{it}	(+)	−3.1951 (−1.04)	−1.0398 (−0.23)	−0.0445 (−0.52)	0.0234 (0.68)
BTC_TANG_{it}	(+)	−0.1180 (−0.03)	1.7804 (0.37)	−0.0056 (−0.05)	0.0191 (0.52)
STR_{it}	(−)	1.4349 (0.19)	−1.9004 (−0.19)	−0.1343 (−0.57)	−0.2430 (−1.48)
$LOSS\_OFFSET\_SCORE_{it}$	(−)	0.3706 (1.14)	0.3460 (0.73)	0.0230* (2.08)	0.0065 (1.65)
LCF_MINTAX_{it}	(+)	0.2925 (0.60)	−0.1775 (−0.26)	−0.0127 (−0.86)	−0.0209* (−1.99)
$LCF\_TIMELIMIT_{it}$	(+)	2.3920** (2.52)	2.5989** (2.31)	0.0430 (1.27)	0.0338** (2.30)

Table 10 (continued)

Dependent variable:		(1)	(2)	(3)	(4)
		$\Delta UDTA_{it}$	$\Delta UDTATLCF_{it}$	$\Delta UDTA_{it}$	$\Delta UDTATLCF_{it}$
scaled by:		*pot. DTA*	*pot. DTA TLCF*	Total Assets	Total Assets
$LOSS\_CARRYBACK_{it}$	(−)	2.7427** (2.58)	2.3140 (1.49)	0.0928*** (3.29)	0.0220 (1.04)
$TAXCOMPL1_{it}$	(−)	−11.1360 (−0.86)	−17.4624 (−0.90)	−0.6501 (−1.66)	−0.0111 (−0.05)
$TAXCOMPL2_{it}$	(−)	−2.8471 (−0.36)	−0.2059 (−0.02)	0.0034 (0.02)	0.2102 (1.54)
$TAXCOMPL3_{it}$	(−)	−12.4961 (−0.85)	−22.2208 (−1.17)	−0.8747** (−2.18)	−0.1831 (−1.60)
Observations		2,371	2,103	2,371	2,119
Industry Fixed Effects		Yes	Yes	Yes	Yes
Year Fixed Effects		Yes	Yes	Yes	Yes

This table presents robustness tests regarding our analysis shown in Table 9. In Section A, we omit the control variables ΔDTL_{it} and ΔETR_{it} and include ΔSTR_{it}. In Section B, we drop observations in which the earnings management incentive is given in the present as well as in the preceding year. For Section C, we alternatively compute $INCENTIVE_{it}$ as the (positive) delta between the pre-manipulated earnings and the analyst forecast if the pre-manipulated earnings are lower, and 0 otherwise. The dependent variables are $\Delta UDTA_{it}$ and $\Delta UDTATLCF_{it}$, depicting the change in unrecognized DTA (on TLCF), alternatively scaled by either the potential DTA (on TLCF) or Total Assets. Control variables are not presented as they do not show material deviations from Table 3. A constant has been included but is not reported. Detailed definitions of the dependent and all independent variables are presented in Appendix 1. All columns include winsorized data. Standard errors are robust to heteroscedasticity and clustered by headquarter country. t-statistics are given in parentheses. ***, **, and * denotes significance at the 1%, 5%, and 10% level, respectively

In summary, our study highlights the intersection of tax policy and financial reporting practices, emphasizing the need for a nuanced approach to both regulatory enforcement and the evaluation of deferred tax items in financial analysis.

Appendix 1

See Table 11.

Table 11 Variable Definitions

ΔUDTA	Change in unrecognized deferred tax assets from *t-1* to *t*, alternatively divided by either potential deferred tax assets or by total assets
ΔUDTATLCF	Change in unrecognized deferred tax assets on tax loss carryforwards from *t-1* to *t*, alternatively divided either by potential deferred tax assets on tax loss carryforwards or by total assets
ΔINCENTIVE	Change (from *t-1* to *t*) in a dummy variable indicating pre-manipulated earnings lower than profit forecasts
Pre-manipulated earnings	After-tax profit increased by change in unrecognized deferred tax assets (on tax loss carryforwards)
ΔPOTDTA	Change in the sum of unrecognized and recognized deferred tax assets from *t-1* to *t*, divided by total assets
ΔPOTDTATLCF	Change in the sum of unrecognized and recognized deferred tax assets on tax loss carryforwards from *t-1* to *t*, divided by total assets
ΔSIZE	Change (from *t-1* to *t*) in the natural logarithm of a firm's total assets
ΔGROWTH	Change (from *t-1* to *t*) in a firm's growth opportunities, computed as the percentage change in sales
ΔLEVERAGE	Change (from *t-1* to *t*) in the capital structure of a firm, computed as the ratio of total liabilities to total assets
ΔDEBT_MATURITY	Change (from *t-1* to *t*) in the debt maturity structure of a firm, computed as the ration of total current liabilities to total liabilities
ΔDTL	Change in deferred tax liabilities from *t-1* to *t* divided by total potential deferred tax assets
ΔMTB	Change in the market-to-book ratio from *t-1* to *t* (ratio computed as the number of shares issued multiplied by market value on balance sheet date (price close), divided by total equity)
ΔLOSS	Change (from *t-1* to *t*) in a dummy variable indicating a negative operating cash flow, operating income or after-tax profit
ΔETR	Change (from *t-1* to *t*) in the firm's effective tax rate reported in the annual report's income tax footnote
ΔPASTROA	Change (from *t-1* to *t*) in the average return on assets over the previous three years
(Δ)STR	Weighted variable indicating (the change in) the average statutory tax rate in a group's headquarter's and subsidiaries' home countries (weighted by the number of firms per country)
WWGI_RL	Weighted variable indicating the average percentile of a group's headquarter's and subsidiaries' home countries in the *Rule of Law* Index from the World Bank's *Worldwide Governance Indicators Series* (weighted by the number of firms per country)
WWGI_RQ	Weighted variable indicating the average percentile of a group's headquarter's and subsidiaries' home countries in the *Regulatory Quality* Index from the World Bank's *Worldwide Governance Indicators Series* (weighted by the number of firms per country)

Table 11 (continued)

TAXENF1 *TAXENF2* *TAXENF3*	Weighted variables approximating the average tax audit likelihood in a group's headquarter's and subsidiaries' home countries (weighted by the number of firms per country) For *TAXENF1*, the country's tax audit likelihood proxy is computed as the number of tax audit staff scaled by the count of registered corporate income taxpayers For *TAXENF2*, the country's tax audit likelihood proxy is computed as the number of tax verification actions scaled by the count of registered corporate income taxpayers Required data for *TAXENF1* and *TAXENF2* has been collected from the OECD's *Tax Administration Comparative Information Series* For *TAXENF3*, the tax audit likelihood per country is based on the *taxaudit* variable in the Research School of International Taxation's (RSIT, University of Tuebingen, Germany) International Tax Institutions (ITI) database (Wamser et al. 2024)
BTC_WET *BTC_ADM* *BTC_TANG*	Weighted variables indicating the average book-tax conformity in a group's headquarter's and subsidiaries' countries (weighted by the number of firms per country) *BTC_WET* is based on the book-tax conformity measure developed by Watrin et al. (2014) *BTC_ADM* is based on the book-tax conformity measure developed by Atwood et al. (2010) *BTC_WET* is based on the book-tax conformity measure developed by Tang (2015)
LOSS_OFFSETTING_SCORE	Weighted variable indicating the average loss offset generosity in a group's headquarter's and subsidiaries' home countries (weighted by the number of firms per country) A country's loss offset generosity in a given year is computed as a score that is increased by one point for a loss carryback of at least one year and a loss carryforward without time restriction. One further point is added for each of these regulations not being restricted in amount (following Koch et al. 2023)
LCF_MINTAX	Weighted variable indicating the share of a group's entities (parent company and subsidiaries) in a country with a minimum taxation regime for tax losses in a given year (based on Dressler and Overesch 2013)
LCF_TIMELIMIT	Weighted variable indicating the share of a group's entities (parent company and subsidiaries) in a country with a time limit for tax loss carryforwards in a given year (based on Dressler and Overesch 2013)
LOSS_CARRYBACK	Weighted variable indicating the share of a group's entities (parent company and subsidiaries) in a country with a carryback option for tax losses in a given year (based on Dressler and Overesch 2013)

Table 11 (continued)

TAXCOMPL1 *TAXCOMPL2* *TAXCOMPL3*	Weighted variables approximating the average tax complexity in a group's headquarter's and subsidiaries' home countries (weighted by the number of firms per country) *TAXCOMPL1* is based on *overall* tax complexity, *TAXCOMPL2* on *Tax Code* complexity and *TAXCOMPL3* on *Tax Framework* complexity We thank Caren Sureth-Sloane, Deborah Schanz and their team for sharing data from their Global MNC Tax Complexity Project with us, www.taxcomplexity.org. For further information on the survey and index construction see Hoppe et al. (2023) The respective tax complexity indices are available for years 2016, 2018 and 2020. For years before 2016, we assumed 2016 values, while for years 2017 and 2019 we computed averages of both neighbouring years.

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