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TAX LOSS CARRYFORWARD DISCLOSURE AND UNCERTAINTY

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Abstract

We examine whether companies voluntarily disclose additional information about tax loss carryforwards when the recoverability is more uncertain. With this study, we aim to explain part of the huge cross-sectional variation in the tax footnote. To assess disclosure behavior, we hand-collect data from notes of large German firms' IFRS financial statements and identify voluntarily disclosed information. First, our results support prior literature's evidence of a considerable cross-sectional variation of disclosure in the tax footnote. Second, we find that uncertainty about the usability of tax losses has a significantly positive relation to the amount and quality of disclosure, controlling for other disclosure determinants derived from prior literature and for sample selection. Third, our results indicate that the observed disclosure behavior is not simply a reflection of the firm's general disclosure behavior but specific to the tax footnote. These findings are robust to several historic and forward-looking indicators representing uncertainty. Our findings suggest that managers anticipate the investors' need for more private information and disclose them voluntarily to reduce information asymmetries. This result indicates that part of the cross-sectional variation in the tax footnote can be explained by firms anticipating investors' demand for additional information.

Keywords: Tax loss carryforwards, disclosure, uncertainty, tax footnote, deferred taxes

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1. Introduction

Respondents to a recent discussion paper of the European Financial Reporting Advisory Group and the UK's Financial Reporting Council (EFRAG/FRC, 2011) call for "more detailed and improved disclosures regarding deferred tax assets, especially unused tax losses and unused tax credits" (EFRAG/FRC, 2013, p. 12/13). While these claims indicate that information about unused tax losses seems to be particularly complex, an OECD (2011) study indicates that the amount of losses carried forward is constantly rising. Even in 2006, before the financial crisis exacerbated the loss situation of firms, large OECD countries had an aggregated amount of losses carried forward (in percent of the GDP) of 13.6% in France, 15.2% in Sweden and up to 24.8% in Germany. These amounts can lead to significant tax savings for the respective firms and have big economic relevance. Therefore, unused tax losses are an important factor of firms' future after-tax income and are of interest for capital-market participants (e.g., McGuire et al., 2016). Despite the relevance, there are only few studies investigating tax loss carryforwards. Hanlon and Heitzman (2010, p. 129) claim that "we do not have a very good understanding of loss firms, the utilization and value of tax-loss carryforwards, and how the existence of losses affects the behavior (e.g., tax and accounting reporting and "real" decisions) of any of the involved parties.".

We respond to this call for research by enhancing the understanding of the reporting of tax loss carryforward information. In particular, we analyze under which conditions firms voluntarily provide additional information about tax loss carryforwards. Prior research indicates a lack of cross-sectional comparability of tax information in financial statements (e.g., Raedy et al., 2011; Kvaal and Nobes, 2013) and calls for examination of why some companies provide extensive details in the tax footnote while others report only fundamental or aggregated information. In this study, we explain part of the cross-sectional variation in the tax loss carryforward reporting of firms by identifying a systematic disclosure behavior.

We expect the disclosed information about tax loss carryforwards to depend on the financial statement user's demand for information. The crucial point is how easily it can be determined whether and when the tax loss carryforwards reduce taxable income. If carryforwards are usable in the near future, the tax saving potential is valued as an asset (McGuire et al, 2016). On the other hand, existence of carryforwards that are not expected to be usable indicates a non-favorable earnings expectation and can even be an indicator for further losses in the future (Amir and Sougiannis, 1999). It is therefore essential for analysts and investors to know whether the tax loss carryforwards can be offset against future taxable income. We therefore define uncertainty as difficulties for an investor to predict whether the tax losses can be used, i.e. whether the firm will generate sufficient future income to offset the tax loss carryforwards. Note that uncertainty in our context does not necessarily mean that it is *unlikely* that the tax loss carryforwards can be used but that it is *not clear* whether they can be used.

Uncertainty about the usability of tax loss carryforwards can create (or increase) information asymmetries between more and less informed investors. Resulting information asymmetries can affect the liquidity of the firm's shares and hence the cost of capital (Leuz and Wysocki, 2016). To avoid additional costs, companies should be interested in reducing information asymmetries in the case of uncertainty about the usability of tax loss carryforwards. Therefore, we expect an increase in the disclosure of tax loss information if the usability of tax loss carryforwards becomes more uncertain.

At the same time, there are at least two reasons why firms might not disclose this information. First, gathering and editing the relevant information is costly. Firms derive tax loss carryforwards and all respective information from single entity tax statements for most jurisdictions. However, anecdotal evidence suggests that it cannot easily be summarized at the accounting group level. Researchers as well as practitioners agree that tax footnotes are costly and complex to produce (Raedy et al., 2011; PwC, 2012). Second, extensive tax information reveals insights into company performance (Lenter et al., 2003). According to Kvaal and Nobes (2013), the tax footnote can be useful to draw conclusions on the firm's tax return and reveal information about performance, strategy and tax planning. The resulting insights can create proprietary costs. Robinson and Schmidt (2013) examine proprietary costs resulting from disclosure of uncertain tax positions and find a negative association with disclosure quality, consistent with a reduction in disclosure quality for firms that face high proprietary costs. In sum, firms have incentives to disclose more tax loss carryforward information in the case of uncertain usability but also bear the costs of disclosure.

In this study, we analyze whether firms increase disclosure for uncertain tax loss carryforwards. Apart from legal loss offsetting rules, the main indicator to assess the usability of tax losses is future earnings. Without taxable income in the future, loss carryforwards cannot be offset. Hence, if it is harder for investors to assess whether future earnings are sufficient to offset tax losses, uncertainty arises (or increases). While companies' future earnings are uncertain by nature, the level of uncertainty may increase under particular conditions. We identify different conditions and examine whether these sources of uncertainty are associated with the voluntary tax loss disclosure level. Our uncertainty proxies include historic and forward-looking indicators. To mitigate concerns about reverse causality in the case of forward-looking variables, we measure uncertainty before the annual report is published.[1] We refer to the disclosure requirements of the International Accounting Standard (IAS) 12 Income Taxes to distinguish between mandatory and voluntary disclosures. Every tax loss carryforward item disclosed beyond the guidelines is counted as voluntary. Apart from the number of disclosed items, we evaluate reporting quality. We emphasize that we do not assess content quality of the reported information but the quality of presentation. We use a disclosure scale to incorporate the level of detail and way of

[1] However, due to low variation in the within-firm disclosure behavior, we cannot rule out that the expectation of disclosure in t (which can be very similar to the disclosure in t-1) has an effect on the uncertainty variables in t. See Section 5.1 for descriptive results on the disclosure behavior and Section 4.5 for a more comprehensive discussion of endogeneity concerns.

presentation, differentiating between qualitative and quantitative disclosures and the presentation in a table or in textual form.[2]

Our sample consists of the German DAX-30 and M-DAX firms between 2005 and 2014 and we mainly hand-collected data from annual reports' notes on income taxes. We use a sample of German firms because the traditionally conservative accounting environment in Germany can foster the expected relationship. As the recognition of deferred taxes for loss carryforwards has only recently gained relevance under German local GAAP, firms may even under international standards continue to understate this item. Kvaal and Nobes (2012) document that reporting after IFRS adoption continues to be shaped by national patterns. Hence, investors' valuation of loss carryforwards needs to be based on additional information. Results of Chludek (2011) support this assumption, indicating basically no value relevance of deferred taxes for loss carryforwards for her German IFRS sample. Consequently, management needs other means to communicate the value of tax losses, like increased disclosure of information.

We identify 15 different types of voluntarily disclosed tax loss carryforward items in the tax footnote and our results indicate that the disclosure of these items varies considerably between different firms while it is rather stable within firms. To analyze the variation in disclosure behavior, we estimate a pooled cross-sectional regression and investigate the relation between several proxies for uncertainty and the level of disclosure. We find that companies with greater ex ante uncertainty about the usability voluntarily disclose more and more salient information about tax loss carryforwards.[3] These findings are robust to several historic and forward-looking indicators representing uncertainty. To address sample selection concerns related to the availability of tax loss information, we estimate a Heckman (1979) model. Findings from the selection model support our main results and suggest that managers anticipate the investors' need for more private information and thus disclose it voluntarily to signal credibility to the market participants.

In additional tests, we partition the voluntary disclosures into sub-categories to derive more information about firms' disclosure behavior. We re-estimate our main models with three different disclosure categories to test which part of the information drives the results of our main tests. For the historic indicators, we find a significant relation to information about income effects and changes in tax loss carryforwards. The results for the future indicators are driven by valuation allowance disclosures. We find no significant results for basic tax loss carryforward information, indicating that the disclosure of this information is unrelated to uncertainty. Firms seem to increase reporting of why and how tax losses affect current year's income in the case of recent losses while they increase disclosure of valuation

[2] The disclosure scale is based on criteria of the German yearly annual report contest 'Best Annual Report' (Baetge, 1997), for further details see Section 4 *Disclosure Level*.

[3] 'Salient' refers to the quality of presentation, based on the classification of the disclosure scale.

allowance information in the case of future uncertainty. However, findings for the sub-category tests have to be interpreted with caution because results might be affected by selection issues.

While the general finding of increased disclosure in the case of more uncertainty about future earnings is not new to the literature (e.g., Chen et al., 2002),[4] we are the first to examine this relation in a tax setting and differ from prior studies in the following aspects. First, in contrast to for example earnings announcement studies, the disclosure that we examine is not necessarily only an acceleration of disclosure. Some information about tax losses, for example the total amount of tax loss carryforwards,[5] might never become public in the case of non-disclosure. Hence, in our setting the decision to disclose or not to disclose might not be limited to a timing decision. Second, while prior studies usually examine balance sheet information (e.g., Chen et al., 2002), we focus on footnote information. It is unclear, whether their inferences also hold for the less salient items of the financial statement. Third, we contribute to the literature about tax information in the financial statement. It is not evident from prior literature why some firms provide extensive details in the tax footnote while others report only (if anything) mandatory items. In this study, we aim to explain part of the variation. We provide insights in the incentives to disclose tax loss carryforward information, an important component of the tax footnote.

Further, our findings provide first insights into which information is disclosed under which type of uncertainty. Our results are consistent with firms adjusting their tax disclosure to the demand for information due to uncertainty. While the IAS 12 disclosure requirements are perceived to be incomplete and to allow a lot of discretion, firms seem to voluntarily provide additional information when needed. This result is specific to the tax footnote and is incrementally important to the findings of the prior literature. A distinguishing feature of our research is furthermore the sample of IFRS statements – most of the international tax loss and deferred tax literature investigates US-GAAP or local GAAP data. As the number of IFRS adopting countries is steadily increasing, the disclosure under IAS 12 is of interest to international community.

The remainder of this paper is structured as follows. Section 2 discusses related literature and underlying theory. In Section 3, we provide the development of the hypothesis. Section 4 describes the research design and Section 5 presents our results. Section 6 discusses several robustness tests. Concluding remarks are given in Section 7.

[4] Chen et al. (2002) find increased disclosure in quarterly earnings announcements when future earnings are more uncertain, arguing that investors demand this disclosure to assess firm value.

[5] Under IAS 12, the total amount of tax loss carryforwards is not a mandatory disclosure. If part of the tax losses in subsidiary XY expires before they can be used, the financial-statement reader might never know of their existence and cannot draw conclusions for possible losses in the future.

2. Literature Review and Underlying Theory

2.1 Value Relevance of Tax Loss Carryforwards

The assumption that firms try to reduce their cost of capital via additional tax loss disclosure requires that tax loss carryforward information is relevant for capital market participants. While there are a number of studies about the pricing of deferred taxes on loss carryforwards, there is less evidence on the valuation of the underlying tax loss carryforwards.[6] McGuire et al. (2016) find a positive association between newly generated tax loss carryforwards and stock returns. Further, the authors provide evidence that the valuation is more positive when firms have a high level and variability of prior tax avoidance. Their results suggest that investors expect future benefits from tax loss carryforwards, particularly if the firm has demonstrated an ability to engage in tax reducing activities in the past. Zeng (2003) examines the value relevance of tax loss carryforwards for Canadian data. He classifies loss carryforwards into different categories depending on the restrictions that inhibit or delay the offset against income. He finds a positive and significant association between market value and tax loss carryforwards. Moreover, he concludes that tax loss carryforwards with fewer restrictions enhance firm value more significantly.

Amir et al. (1997) examine the value relevance of deferred taxes under SFAS 109. Their results indicate a negative but nonsignificant correlation between deferred taxes from losses (and credits) carried forward and stock prices. Amir et al. (1997) conclude that investors expect part of these carryforwards to be unusable. Chludek (2011) analyzes the value relevance and reversal of deferred taxes under IFRS/IAS. Her results indicate that generally investors do not consider deferred tax information to be value relevant. She attributes the lack of value relevance to missing cash-flow implications, finding that deferred tax assets for loss carryforwards translate more timely into cash-flow than other deferred tax components. Moreover, Chludek (2011) finds a significantly negative association between market value and deferred taxes for loss carryforwards for loss-making firms. As loss-makers can be expected to generate further losses in the future, these findings support our assumption about the relation between uncertain future earnings and a negative impact on firm value. Overall, the results of Amir et al. (1997), Zeng (2003), McGuire et al. (2016), and Chludek (2011) indicate that the value of tax loss carryforwards increases with the likelihood of reversal.

Further evidence concerning deferred taxes for loss carryforwards is rather inconclusive. Amir and Sougiannis (1999) find a positive and significant association between deferred taxes for loss carryforwards and share prices. At the same time, they also find evidence indicating that analysts estimate earnings of firms with loss carryforwards to be less persistent. The authors conclude that analysts do not fully capture the relation between tax loss carryforwards and future earnings. Chang et al. (2009) use Australian data to investigate the market perception of deferred taxes under the income method, finding a positive association between recognized deferred taxes form carryforward losses and

[6] For studies concerning deferred taxes without focusing on tax losses, see e.g. Chaney and Jeter (1994), Ayers (1998), Citron (2001), Bauman and Das (2004). Another related stream of literature investigates the valuation allowance for deferred taxes (for an overview, see Graham et al., 2010).

returns. Hence, the market seems to support management's assessment of the tax loss carryforward valuation. While the above mentioned studies focus on the part of tax loss carryforwards that is expected to be usable, Herbohn et al. (2010) investigate those tax losses for which no deferred taxes are recognized. Their findings indicate that this amount is used for earnings management but at the same time to communicate management's private information about future profitability. In sum, the literature indicates that tax loss carryforwards affect firm valuation but the findings are ambiguous whether deferred taxes are a suitable way for management to signal tax loss usability.

2.2 Disclosure of Tax Information

The second stream of related literature concerns the disclosure of tax information. As tax returns are not publicly available, tax information has to be derived from accounting statements. However, due to incomplete or complex information, it is often difficult to establish the link between financial statements and tax information. Hanlon (2003) outlines the problems to calculate taxable income based on financial statements. Practitioners confirm this notion: "…tax information in the financial statements is one of the least understood areas of financial reporting, according to investors." (PwC, 2012, p. 34). Few studies so far examine the characteristics of tax information in detail.

Balakrishnan et al. (2012) indicate that managers augment tax-related disclosure in an attempt to mitigate a reduction in financial reporting transparency caused by aggressive tax planning. They find that tax aggressive firms increase the tax related disclosure in conference calls and in the management discussion and analysis section of the financial statement. Kvaal and Nobes (2013) analyze the disclosure of two tax reconciliations in financial statements: tax expense to pre-tax profit and deferred tax expense to net deferred tax liabilities. The authors find systematic differences between companies from different countries and industry sectors. Related to our setting, Kvaal and Nobes (2013) find that German firms report incomplete deferred tax reconciliations and that the reconciliation of tax expense to pretax profit varies substantially among German companies. The authors conclude with a list of suggested improvements to IAS 12. Raedy et al. (2011) analyze the tax footnote in detail with respect to book-tax difference items. They find a stable reporting policy within companies but wide variation across firms. Raedy et al. (2011) call for future research to examine why some companies provide extensive details in the tax footnote and others report only fundamental information or aggregate all items. Similarly, Evers et al. (2014) find large differences in the deferred tax reporting behavior of German firms.

In this study, we try to explain part of the variation. To our knowledge, we are the first to provide insights into the incentives to disclose tax loss carryforward information, an important component of the tax footnote. We investigate whether a firm voluntarily provides more tax loss carryforward information, when the usability of the tax losses is uncertain. Therefore, we help to explain differences in the composition and level of detail of the tax footnote.

2.3 Capital Market and Information

We assume that firms can reduce information asymmetries with respect to the usability of tax losses and hence their cost of capital by increasing disclosure. Without the threat of additional cost of capital, management would not be willing to bear the cost and effort that comes along with increased disclosure. Thus, the relationship between information asymmetries and cost of capital is the main theoretical foundation of our analysis.

There is a rich literature on the relation between information asymmetries and cost of capital.[7] The presence of information asymmetries among market participants can result in an increasing bid-ask spread and reduce the liquidity of a firm's shares (Glosten and Milgrom, 1985). To spur potential investors to buy the shares despite reduced liquidity, firms have to issue capital at a discount. This increase in capital costs can be avoided by additional disclosure. Diamond and Verrecchia (1991) find that reduced information asymmetries result (in most cases) in a decrease in the firm's cost of capital. Empirical studies corroborate the negative relation between disclosure and cost of capital. For example, Healy, Hutton, and Palepu (1999) document that increased voluntary disclosure is associated with increased stock returns and stock liquidity. Leuz and Verrecchia (2000) examine firms that have committed themselves to a higher disclosure level and find that those firms have smaller bid-ask spreads and higher trading volume than the control group. Botosan and Plumlee (2002) find a negative relation between the annual report disclosure level and the cost of equity capital. Further evidence on liquidity effects of disclosure as well as possible direct effects of disclosure on the cost of capital is summarized in Healy and Palepu (2001) and, more recently, in Leuz and Wysocki (2016).

Overall, theory and empirical findings indicate that a decrease in information asymmetries can reduce a firm's cost of capital. Hence, firms have an incentive to increase disclosure in the presence of uncertainty about the usability of tax losses.

3. Hypothesis Development

The effect of tax loss carryforwards on firm valuation is controversially discussed. Accounting standards as well as prior literature seem to be torn between the positive effect due to potential future tax savings and the possibly negative impact of losses. The distinction between the two effects depends crucially on the expectation whether the carryforwards can be used in the near future. If investors expect sufficient taxable income, the tax loss carryforwards represent tax saving potential and are value enhancing. Without offsetting options, the carryforwards are worthless and can be interpreted as a signal for further losses in future periods (Amir and Sougiannis, 1999). Investors can be assumed to be particularly interested in information about tax loss carryforwards when it is not obvious which of the two scenarios applies. The inability to distinguish between the positive and negative effect is how we define

[7] For a review of the disclosure theory, see Verrecchia (2001) and Leuz and Wysocki (2016). For a review of the direct link between disclosure and cost of capital, see Botosan (2006).

uncertainty: uncertainty exists if it is not clear whether the tax loss carryforwards can be offset against future taxable income. This does not necessarily mean that the firm is in a disadvantageous situation, although this can of course be the case. For example, if the earnings forecasts for a firm are negative for the following years, this does not create uncertainty because it is obvious that the losses cannot be offset. On the other hand, if the next year's earnings forecast is close to the amount of usable tax loss carryforwards but the forecasts are inconclusive and unsteady, this creates uncertainty about the usability of the tax losses.

The source of such uncertainty can be manifold - apart from tax law rules that allow or restrict a loss offset,[8] the main indicator for the usability of tax losses is future earnings. Although future income is uncertain by nature, this uncertainty can be more pronounced under certain conditions. We examine different historic and forward-looking measures that can lead to a higher level of uncertainty, based on past losses and expected future earnings. If there is higher uncertainty, it is more difficult for investors to assess the usability of tax losses. This situation can create information asymmetries among more informed and less informed investors. According to theory and empirical evidence, information asymmetries can result in increased cost of capital.[9] As firms are interested in avoiding this increase, they have incentives to reduce information asymmetries.

In line with international accounting regulations, management can communicate private information via the recognition of deferred taxes for loss carryforwards. For the recognition of deferred taxes, IAS 12 and ASC 740 require taxable profit in the future. Hence, given that the standards are applied correctly, the amount of recognized deferred tax assets for loss carryforwards is a signal of management's earnings expectation. However, prior research indicates that the recognition of deferred taxes for loss carryforwards is subject to a remarkable level of discretion and might be driven by short-term income effects of deferred tax recognition. For example, Herbohn et al. (2010) find that, on the one hand, deferred taxes for loss carryforwards provide information about management's earnings expectations. On the other hand, the deferred taxes are used to manage earnings. Moreover, Bauman and Das (2004) argue that companies recognize too few deferred taxes and hence understate their future expectations due to strict US-GAAP requirements and fear of litigation. Nevertheless, their findings indicate that investors use deferred taxes to predict future earnings. While the above-mentioned literature investigates Australian and US data, Chludek (2011) provides evidence for German firms reporting under IFRS. She finds value relevance of deferred taxes for carryforwards only for loss-making firms. Considering the

[8] We do not explicitly test uncertainty resulting from tax law rules because there is, for the majority of firms, no information available from databank sources (or the firms' financial statements) on the countries in which a firm has taxable income, let alone tax loss carryforwards. However, we use a proxy for the degree of international operations of a firm in our robustness tests in Section 6.3 by including the fraction of international assets and sales as control variables. The results indicate that observations with a stronger international orientation (that are possibly more subject to loss offsetting restrictions and therefore to higher uncertainty) have a higher disclosure score.

[9] See Section 2 for an overview of the literature.

German environment of traditionally conservative accounting and the empirical evidence, the informative value of the recognized deferred taxes is questionable.[10]

Therefore, we assume that firms use an alternative way to reduce the information asymmetries: the disclosure of additional information. Particularly disclosure that goes beyond the requirements of accounting standards, for example reasons for changes in the amount of tax loss carryforwards or when and why the company expects to use the carryforwards, can be of interest for capital market participants.[11]

Still, there can be at least two reasons why firms do not disclose this information. First, gathering and editing the information is costly. Usually, firms derive tax information from the single-entity tax returns. However, aggregating the information at the group level can be a challenging task. According to researchers and practitioners, the tax footnote is very complex and costly to produce (Raedy et al., 2011; PwC, 2012). Particularly, the recognition of deferred tax assets is a controversial issue – under IFRS as well as US-GAAP. According to Petree et al. (1995, p. 71), the recognition of deferred tax assets is probably "the most complex and subjective area of Financial Accounting Standards Board Statement no. 109". Anecdotal evidence highlights the difficulties of firms to estimate the amount of tax loss carryforwards for the consolidated statement: Deutsche Post DHL states in the annual report for 2011 (p. 184) that a "…refined method for determining unused loss carryforwards was applied for the first time as at the current balance sheet date. The prior-period amounts were adjusted". The adjustment of the prior period's unused tax loss carryforwards amounts to 2.4 billion Euro, which can be expressed as six percent of the company's total assets. This example illustrates that firms need sophisticated methods to determine the amount of tax loss carryforwards at the group level, indicating costs for the creation of the tax footnote.

Second, the provision of detailed tax information can reveal insights into company performance (Lenter et al., 2003). Kvaal and Nobes (2013, p. 251) state that "…complete tax disclosures provide the opportunity to estimate important amounts in the company's tax return. By comparing these amounts with financial reporting amounts, the analyst may obtain insights about the company's performance and strategies, for example, regarding earnings quality, adequacy of depreciation schedules, the degree of conservatism and tax planning activities." These insights can cause proprietary costs (Verrecchia, 1983). Robinson and Schmidt (2013) analyze the disclosure of uncertain tax benefit information under the US-Standard FIN 48. They find a lower disclosure quality, i.e. a lower level of compliance with the standard,

[10] A number of German studies report an increase over time in the importance of deferred taxes for loss carryforwards, but at the same time criticize the level of discretion in the recognition, see e.g. Küting and Zwirner (2003, 2007); Baetge and Lienau (2007).

[11] Using footnote disclosures to assess firm's information dissemination is in line with the finding of De Franco et al. (2011) that financial statement users incorporate note information into stock prices. However, tax information might of course also be disclosed via other channels, e.g. press releases or conference calls (Balakrishnan et al., 2012).

for firms with higher proprietary costs.[12] This finding is consistent with firms reducing their disclosure in the case of high proprietary costs. Similarly, Bozanic et al. (2017) examine Internal Revenue Service (IRS) attention related to tax positions. They find that IRS attention is positively associated to tax loss carryforwards, indicating that tax authorities are interested in this item. Further, their results suggest that firms increase disclosure when proprietary costs (relating to the IRS) are reduced.

In sum, the threat of increased cost of capital can incentivize firms to increase disclosure in the case of uncertainty but they also have to consider the related costs. We analyze whether firms expect a net benefit and therefore increase disclosure for uncertain tax loss carryforwards, stating the following hypothesis:

> **H1***: The level of voluntary disclosure is positively associated with uncertainty about the recoverability of tax loss carryforwards.*

4. Research Design

4.1 Sample

To investigate the financial statement disclosure of tax loss carryforwards, we employ a sample of hand-collected data from annual reports' notes on income taxes. Further firm-specific accounting information is obtained from Thomson Reuters' Worldscope and I/B/E/S database. Our sample comprises the financial statements of listed DAX-30 and M-DAX companies over fiscal years 2005 to 2014 that are prepared in accordance with IFRS.[13] German firms listed on an EU-regulated market are required to adopt IFRS in their consolidated statements for each fiscal year beginning on or after January 1, 2005.[14] Our initial sample consists of 80 companies with 800 firm-year observations. 17 non-IFRS observations are excluded.[15] Moreover, we lose 178 observations due to missing data, resulting in a final sample of 78 companies and 605 firm-year observations. Table 1 gives an overview of the sample selection procedure.

[Insert Table 1 here]

4.2 Disclosure Level

For the investigation of the voluntary disclosure level, we first distinguish between mandatory and voluntary information. As we use IFRS-data, the relevant standard is IAS 12. We identify six mandatory

[12] Robinson and Schmidt (2013) further find that investors value the withholding of information in the case of high proprietary costs positively. However, in their setting proprietary costs arise from potential tax authority actions due to new tax information while the tax information in our setting is assumed to be primarily valuable for investors and competitors.

[13] We consider the companies listed on an arbitrary date: April 30, 2010.

[14] An exception applies to those who already use internationally accepted standards like US-GAAP – they could postpone the adoption of IFRS until the financial year 2007 (European regulation 1606/2002). We exclude the respective US-GAAP statements from our sample.

[15] We exclude US-GAAP statements due to differences in the tax loss carryforward disclosure requirements between IAS 12 and the US-GAAP standard ASC 740.

disclosures concerning tax loss carryforwards:

- the amount of deferred tax assets recognized in the balance sheet for unused tax losses (IAS 12.81 (g) (i))
- the amount of the benefit from a previously unrecognized tax loss of a prior period that is used to reduce deferred tax expense (IAS 12.80 (f))
- the amount of the benefit from a previously unrecognized tax loss of a prior period that is used to reduce current tax expense (IAS 12.80 (e))
- the amount of unused tax losses for which no deferred tax asset is recognized in the balance sheet (IAS 12.81 (e))
- the expiry date of unused tax losses for which no deferred tax asset is recognized in the balance sheet (IAS 12.81 (e))
- the amount and nature of evidence supporting the recognition of a deferred tax asset when the entity has suffered a loss in the current or preceding period (IAS 12.82 (b))

Moreover, one item cannot clearly be classified as voluntary or mandatory: the amount of deferred tax income or expense recognized in the income statement due to unused tax losses (IAS 12.81 (g) (ii)). The classification is not clear because of the additional remark that this disclosure is only necessary if it is not apparent from changes in the amounts recognized in the balance sheet. Thus, the firm can choose whether it states the amount separately or leaves it to the reader to derive it from the balance sheet. Due to this discretion, we decided to classify this item as voluntary.[16] Moreover, every disclosure beyond the six required items is considered as voluntary.

Once the voluntary items are identified, we create our measure of the disclosure level. A common measure of information in the literature is the disclosure index (e.g., Chow and Wong-Boren, 1987; Raffournier, 1995; Makhija and Patton, 2004). A disclosure index compares a list of items that is expected or preferable to be reported with the effectively disclosed figures and aggregates the results to a single score. Although previous research frequently applies this method, we decided not to use an index. Instead, we count the number of all voluntary disclosures. We choose this way for the following reasons. First, we do not want to restrict the collected data to a predefined set of items. Second, we want to avoid the subjectivity that comes along with setting up a list of disclosures. However, a possible caveat of using the total number of disclosed items is that a higher number of disclosed items does not necessarily indicate more informative disclosure. We try to mitigate this concern by scoring the disclosed items based on the way in which the information is presented. We decided to measure the quality of presentation because prior research indicates that financial statement users rely on readily available and more salient information. Hirst and Hopkins (1998) find that alternative presentations of the same information differentially affect analysts' firm valuation judgements. Hirshleifer and Teoh

[16] Repeating our analysis with this item classified as mandatory does not affect our main results.

(2003) model the effect of firms' choices between different forms of presenting information on market prices. They find that, under the assumption of limited attention, aggregated information is mispriced by analysts. Further, Atwood and Reynolds (2008) document that the way in which tax information is disclosed is related to the pricing of the information. They find that the pricing of realized tax benefits from tax loss carryforwards is affected by its presentation in the income statement. Taken together, the way in which information is presented is important for the information processing of the financial statement user. It can be assumed that clearer and more salient disclosure is easier to process and thus preferred by analysts and investors.

Hence, in order to measure the quality of disclosure, we examine the way in which an item is presented. We emphasize that our method does not weigh the content of the disclosure. Again, we want to avoid the subjectivity of evaluating the usefulness of disclosure, which would involve judgement and make the findings very hard to replicate (Healy and Palepu, 2001). To measure the tax footnote disclosure quality, we apply a score that is developed for a national annual report contest and used by a number of prior studies, e.g. Daske (2005) and Glaum et al. (2013).[17] The German yearly annual report contest is organized by the 'Manager Magazin'. In this contest, a research group from the University of Münster investigates annual reports of firms listed on DAX-30, M-DAX, S-DAX, TecDAX and Stoxx 50 with respect to content, design, and language. Disclosed items are analyzed with regard to the way in which the information is reported. A scale assigns different scores to the items, depending on the level of detail and form of disclosure. The type of disclosure ranges from qualitative with a score of 0.5 over comparative and interval to quantitative with a score of two. If additional details are reported, the score increases by 1.5 points. The same holds for graphical support like the disclosure in a table or chart. Hence, the total score for one disclosed item can range from 0.5 for a simple qualitative item to five for a quantitative item with additional information and graphical support.[18] Table 2 Panel A provides an overview of the scale and Panel B gives examples on how the points are assigned.

[Insert Table 2 here]

We apply the scale to every voluntary tax loss carryforward item.[19] In the next step, we sum up the scores of the same year and company to get one score for each firm-year observation. The resulting score is our dependent variable *DISCL*.

4.3 Uncertainty

We test our hypothesis by regressing *DISCL* on uncertainty about the recoverability of tax losses. The

[17] For studies using data of other annual report contests, see e.g. Leuz and Verrecchia (2000), Daske and Gebhardt (2006).

[18] Assigned points: 2 (quantitative) + 1.5 (additional information) + 1.5 (graph or table).

[19] If mandatory items are disclosed with additional information, we classify the additional information as voluntary disclosure. Example: Merck (annual report 2014, p. 198) discloses the deferred tax assets for loss carryforwards (mandatory) and splits it into the amount based on German tax losses and tax losses from abroad (voluntary, score: 1.5).

usability of tax loss carryforwards depends in the first place on the availability of taxable income in future years. Given that tax return data and particularly estimates of future tax income are not available, we use accounting data to assess the offsetting expectations. Drawing inferences from accounting data on taxable income has many weaknesses, as discussed in the prior literature (Hanlon, 2003). However, it is in line with how most financial statement users form their expectations: without access to tax returns, they have to make inferences based on financial statement information (Hanlon et al., 2005). It can be assumed that management includes the expectations of the financial statement users into their decision about the disclosure level. Therefore, we expect accounting data, although being an imperfect proxy, to provide suitable information for our uncertainty measures.

There is not one single event or characteristic that causes uncertainty but rather a number of possible issues. Our proxies include direct future estimates as well as historic indicators. The future estimates are most straight forward, measuring different aspects of expected earnings. The historic indicators measure the existence of losses in the past. They are important for two reasons: first, they give information about the availability of tax loss carryforwards and therefore the potential to disclose information about tax losses. Although all of our sample firms have tax loss carryforwards, it can for example make a difference whether the losses were incurred 20 years ago or two years ago. Second, losses in the past can be an indicator for further losses in the future and make it harder to make precise earnings predictions (Hayn, 1995; Amir and Sougiannis, 1999), resulting in uncertainty about tax loss usability.

Future indicators

Our best available proxy of future earnings are analysts' earnings forecasts.[20] For our main uncertainty measure, we compare expected earnings with the amount of usable tax loss carryforwards. We investigate three possible cases: I) forecasts and carryforwards are close to each other, II) forecasts are considerably higher than carryforwards and III) forecasts are considerably lower than carryforwards.

We expect uncertainty to be particularly high in the first case (I) when the amounts are close to each other because minor deviations of earnings from the forecast can lead to unexpected offsetting or non-offsetting of the tax losses. In this situation, we expect that investors demand more information about the tax loss carryforwards. In comparison, if forecasts exceed carryforwards by far (II), there are few doubts that the tax loss carryforwards can be used and no additional disclosure is needed. If, on the other hand, carryforwards largely exceed forecasts (III), the prediction is less clear. Two different scenarios can apply. If the forecast is smaller than the tax loss carryforward and at the same time negative, it is rather clear that the tax loss carryforwards cannot be offset in the near future and there is little uncertainty about the usability. By contrast, if the forecast is smaller than the tax loss carryforwards and positive, part of the tax losses might be usable but for the remaining part of the carryforwards, the usability is hard to predict. In this second scenario, uncertainty would increase. Given the opposing effects depending on the two outlined scenarios, we make no prediction about disclosure for the third case (III).

[20] Management forecasts are endogenously determined by the firm and therefore no suitable proxy.

To create the future indicators, we need data on analyst forecasts and tax loss carryforwards. We use the last mean earnings before tax (EBT) analyst forecast for the year t+1, issued before the end of the fiscal year t, provided by I/B/E/S. According to Loitz (2007, p. 781), the majority of firms uses a forecasting horizon of three to five years to assess tax loss usability. We decide to use the forecast for only one year for the following two reasons: first, we expect to get the most precise forecast for t+1 while forecasts for later years are much noisier. Second, the availability of analyst forecasts beyond t+2 is limited and would further reduce our already modest sample size. Therefore, we create our main proxy with forecasts for t+1 but add tests including the forecast for t+2 to our robustness tests in Section 6.2.

The amount of tax loss carryforwards is not available in standard databases and has to be hand-collected from the tax footnote. However, IAS 12 does not require the disclosure of this amount and only 16% of our observations disclose the amount voluntarily. Thus, we have to calculate the tax loss carryforwards by grossing up the deferred tax assets recognized for tax losses. If the tax rate is disclosed, we divide the deferred tax assets for carryforwards by the tax rate that the firm uses for the calculation of deferred taxes; otherwise, we divide it by the statutory tax rate. A comparison of the calculated amounts with the disclosed tax loss carryforward amounts (when they are provided) yields an average deviation of 1.88%. Despite the rather low deviation, we employ a number of robustness checks in Section 6 to test sensitivity of our findings.

On the basis of the forecast and the tax loss carryforwards, we calculate the difference between the two amounts. For case I), we create an indicator variable (*AEF~TLC*) that is 1 if the difference lies in the two deciles close to zero.[21] We expect *AEF~TLC* to have a positive association with disclosure because uncertainty increases when forecasts are close to carryforwards. Our second indicator variable *AEF>TLC* is created for case II): it is 1 when earnings forecasts are higher than tax loss carryforwards and the difference is not included in the two deciles close to zero. We expect a negative relation because less disclosure is needed when the forecast is considerably higher than the tax losses carried forward. Our third indicator variable *AEF<TLC* is 1 when the amount of tax loss carryforwards is higher than the forecast and the difference does not lie within two deciles around zero. We have no ex-ante expectation for *AEF<TLC.*

Another factor to assess uncertainty is the dispersion of forecasts. A large variation in forecasted earnings indicates disagreement among analysts and complicates the evaluation of tax loss carryforward recoverability from the investors' perspective. Therefore, our fourth future indicator measures the standard deviation of EBT forecasts for the following fiscal year (*STDEV*). We expect a positive association because a higher dispersion creates uncertainty and increases the demand for disclosure.

[21] Taken together, the two deciles have a lower bound of -589 Million Euro and an upper bound of 23.7 Million Euro.

Historic indicators

The role of historic indicators is twofold. In the first place, they indicate whether the firm has any information to disclose about tax loss carryforwards. Without negative earnings in the past and accordingly without tax loss carryforwards, no information about this item can be disclosed in the financial statement. At this point, it is important to note that almost every firm-year in our sample has tax loss carryforwards.[22] Still, it seems plausible that a firm has more to tell about tax loss carryforwards if the loss emerged in the recent past compared to carryforwards that result from negative earnings ten years ago. Accordingly, we expect a higher level of disclosure if the firm had losses in recent years, indicating more disclosure if more information is available. Nevertheless, the firm still has to decide whether the information should be published, given the incentives and costs discussed above.

Second, the historic indicators are alternative proxies for uncertainty. Amir and Sougiannis (1999) argue that the existence of losses increases the likelihood of further losses in the future. International accounting standards follow a similar line of reasoning and allow the recognition of deferred taxes in the case of a loss history only if there is convincing evidence that sufficient taxable income will be available (IAS 12.35). Regarding the assessment of tax loss carryforward usability, a very important aspect is that losses make it harder to predict future earnings. Hayn (1995) finds that losses are less informative about future earnings than profits are. Based on the literature, we expect higher uncertainty and hence higher disclosure if the firm has a history of recent losses.

To measure recent losses, we use four different historic indicators. The first indicator variable *LH_3Y* measures whether the firm had at least one negative EBT in the past three years. The second variable *LH_5Y* extends the period to five years. The third variable *LH_CUM* is based on the accounting standards' definition of a loss history and more restrictive than the first two proxies are: the variable is 1 if the firm has a cumulative negative EBT in the current and the two previous years.[23] Hence, only very large losses are considered here. The fourth measure *N_LOSS* counts the years with negative EBT in the past five years and ranges from zero to five. For all four historic indicators, we expect a positive association with *DISCL* because the existence and a higher frequency of losses should increase uncertainty and hence disclosure.

4.4 Model

To analyze the association between disclosure and uncertainty, we estimate the following basic model:

$$DISCL_{it} = \beta_0 + \beta_1 FUTURE\ INDICATOR_{it} + \beta_2 HISTORIC\ INDICATOR_{it} + \sum \beta\ control_{it} + \varepsilon_{it} \qquad \text{(I-IV)}$$

[22] In the tax footnotes of 603 of our 605 firm-year observations, we find either deferred tax assets recognized for tax loss carryforwards or, in 21 cases where the amount is zero, other information indicating the existence of tax loss carryforwards (the total amount of tax loss carryforwards for 20 observations and the effect of using tax loss carryforwards on the income statement for one observation). There are only two observations with zero deferred taxes for loss carryforwards and without other evidence for the existence of tax loss carryforwards, indicating that for these two firm-years no tax loss carryforwards exist.

[23] As IAS 12 does not define a loss history, we use the US-GAAP definition of ASC 740.

Detailed variable definitions are presented in Table 3. Firms are identified by *i*, years by *t*. ε is the error term.

[Insert Table 3 here]

DISCL denotes the disclosure level, explained above. We estimate the model separately for each of our four future indicators *AEF~TLC, AEF>TLC, AEF<TLC,* and *STDEV*. Given that the historic indicators are not only alternative proxies for uncertainty but do also indicate the availability of tax loss information that can be disclosed, we include one of the historic indicators (*LH_5Y*) in each of our models to control for the opportunity to disclose.[24] Additionally, we estimate models (V) – (VIII), including only the different historic variables *LH_5Y, LH_3Y, LH_CUM,* and *N_LOSS* and controls.

$$DISCL_{it} = \beta_0 + \beta_1 HISTORIC\ INDICATOR_{it} + \sum \beta\ control_{it} + \varepsilon_{it} \quad \text{(V-VIII)}$$

Our control variables are derived from the disclosure literature and the specific characteristics of tax loss carryforwards. The first one is ΔDTA_TLC, denoting the change in deferred tax assets for tax loss carryforwards. This item can indicate management's earnings expectation because international accounting standards allow the recognition of deferred tax assets only if sufficient future taxable income is probably available. Accordingly, management would not have to report additional information to reduce uncertainty. However, previous research is inconclusive whether management actually uses deferred taxes to communicate private information.[25] The amount of deferred tax assets can be affected by earnings management (Herbohn et al., 2011) or fear of litigation (Bauman and Das, 2004). Moreover, management's considerable level of discretion regarding the recognition and subsequent adjustment of deferred taxes can lead to possible endogeneity problems. Hence, we are careful with ex ante expectations for the association. We calculate ΔDTA_TLC as the change in deferred tax assets for tax loss carryforwards from the previous to the current year, scaled by total assets. The second control variable indicates whether the firm has negative earnings in the current year. A current loss can increase existing tax loss carryforwards and draw more attention to the topic, possibly increasing disclosure. The indicator variable *LOSS* is 1 if the firm has a negative EBT in the current year and zero otherwise.

Further, previous research indicates a significant association between the level of disclosure and size of the company (*SIZE*) (Cooke, 1989; Craig and Diga, 1998), analyst following (*AN_FOL*) (Lang and Lundholm, 1996), leverage (*LEV*) (Meek et al., 1995; Ismail and Chandler, 2005), profitability (ΔEBT) (Singhvi and Desai, 1971; Broberg et al., 2010), audit firm (*AUD*) (Singhvi and Desai, 1971), and CEO-turnover (*CEO_TO*) (Kwak et al., 2011). Moreover, we control for experience with the accounting

[24] Untabulated tests show that using *LH_3Y, LH_CUM* or *N_LOSS* instead, does basically not change inferences for our test variables. See Footnote 37 for details.

[25] See section 2 for an overview of the deferred tax literature.

regulations via measuring years that have passed since the company adopted IFRS/IAS (*IFRS_AD*).[26]

To address the concern that the variation in tax loss disclosure might be attributable to differences in the overall firm's disclosure behavior, we include a proxy for the annual report disclosure level (*AR_DISCL*). Again, we refer to the annual report contest of the 'Manager Magazin'. We are primarily interested in the scores for the quality of information content.[27] The results, provided by the Baetge-Research group, range from zero to one where one indicates the highest quality of content. To control for other unobserved effects, we include year and industry dummies (one-digit Standard Industrial Classification (SIC) code).

4.5 Endogeneity

Given the composition of our sample, two related sample selection concerns may arise. First, we estimate our models on a subsample of observations that consists of only DAX-30 and M-DAX firms. We choose German firms because Germany is among the 2005 IFRS adopters with a large capital market and we expect the German conservative accounting history to be a suitable setting for our research question.[28] The need to hand-collect most of our data restricts our sample to a manageable size. Therefore, we examine the Prime Standards' 80 largest and most liquid firms. This is a non-random choice and makes our inferences less generalizable to the whole population of (capital-market oriented) firms. However, the chosen firms themselves constitute an essential component of the capital market – the DAX-30 firms alone represent around 80 percent of the prime standard's market capitalization (Deutsche Börse Group, 2016). Hence, our sample consists of a very important and largely homogenous, albeit not perfectly representative, group of firms. This is a common approach in the prior literature and reduces concerns that results are driven by firm-specific attributes like size or country of origin in cross-country studies.[29]

Second, our key element of interest is disclosure about tax loss carryforwards. A selection problem could arise if not all firms in our sample are able to disclose the same amount of information. While the fact that each of our firm-year observations has tax loss carryforwards mitigates this concern,[30] we cannot directly observe the availability of tax loss carryforward information. 26 of our observations have a disclosure score of zero, i.e. they do not report any information about tax loss carryforwards beyond the

[26] Our starting point for this variable is 1995, i.e. if a company adopted IFRS (or IAS) before 1995, this variable understates the experience with the standards. However, given that many standards changed over time, we do not expect experience in the early adoption years to bias this variable.

[27] Apart from the content, the annual report contest also evaluates design and language. For the years 2013 and 2014, the annual report contest is not organized by the Baetge research group but by a team of Professor Zülch from Handelshochschule Leipzig. For these years, we use the scores that are available in the "Manager Magazin" for our variable *AR_DISCL*.

[28] See Section 1 for more details on country choice.

[29] See e.g. Leuz and Verrecchia (2000) for the advantages of a single-country study.

[30] Except for two observations that have zero deferred taxes for loss carryforwards and no other information indicating the existence of tax loss carryforwards. For the remaining 603 observations, tax footnote disclosure indicate the existence of tax loss carryforwards. See Footnote 22 for further details.

mandatory requirements.[31] Moreover, the existence of tax loss carryforwards does not necessarily indicate that the same amount of information about the topic can be reported. We try to control for the availability of tax loss carryforward information in the first place by including one of the historic indicators in each model to control for recent losses. A way to address the sample selection concern more directly is to estimate a Heckman (1979) selection model (Prabhala and Li, 2008).[32]

Correlated Omitted Variable

We estimate a twostep Heckman (1979) selection model to control for the availability of tax loss carryforward information. The first step specifies a probit regression and models the availability of tax loss information. The second equation is our main model including the inverse Mills ratio from the first stage and models the relation between the level of disclosure and uncertainty. The instrument that we use in the first stage is the number of mandatory items that a firm reports about tax losses. We expect this instrument to be related to the availability of information because if more mandatory items are reported, this indicates more activity with respect to tax losses.[33] It seems reasonable to assume that the mandatory disclosure level is not related to our dependent variable in the second stage. The pure availability of information should not affect the way of voluntary reporting because even if a firm reports all possible mandatory items, it does not have to disclose a single word beyond the requirements.[34] We measure the mandatory disclosure (*MAND*) by counting all items that are disclosed about tax loss carryforwards and required under IAS 12. Results are presented in Section 5.

Reverse Causality

Another concern in our research design is reverse causality. While this does not apply to the historic variables, it could be an issue for the future estimates. More precisely, it could be argued that the firm does not choose the disclosure based e.g. on the ability to assess tax loss usability with the help of future earnings estimates (our argumentation), but that the disclosed information affects the forecasts of analysts and therefore the measure of uncertainty (reverse argumentation). To mitigate this concern, we measure uncertainty before the tax loss information is disclosed, i.e. for the forecast for t+1 we use the last mean forecast (and respective standard deviation) issued before the fiscal year end of t. At this point,

[31] All of the 26 firm-years report at least one mandatory item.

[32] Another possible remedy for correlated omitted variables can be firm-fixed effects (Amir et al., 2016). However, firm-fixed effects are only useful if the omitted variable is time-invariant. Further, firm-fixed effects models have limited power if the variables of interest have little over-time variation (Prabhala and Li, 2008) and can in this case even eliminate the variation of interest (Roberts and Whited, 2013). We believe that fixed-effects are no suitable remedy in our setting because we assume the omitted variable to be time-variant (the availability of tax loss carryforward information changes over time, e.g. depending on the emergence of new losses or offsetting of existing losses) and because much of the variation in our data probably comes from the cross-section. Nevertheless estimating our models with firm- and year-fixed effects yields a (positive) significant coefficient only for *STDEV*, in line with reduced statistical power due to low within-firm variation for the other variables.

[33] A potential caveat of this instrument is that we cannot verify whether a firm completely obeys the disclosure requirements.

[34] Note that we do not apply the disclosure scale to the mandatory items because considering the way of presentation and level of detail of mandatory disclosure is a deliberate decision of the firm and could very well be related to the voluntary disclosure.

the financial statement notes' disclosures for the period t are usually not available and cannot affect the forecast. However, our findings in Section 5 indicate a relatively stable reporting behavior within firms. Thus, we cannot discard the possibility that the expected disclosure in t (based on the disclosure in t-1) affects the uncertainty variables in t.

We acknowledge that despite addressing a number of possible endogeneity concerns, we cannot rule out that endogeneity affects our results.

5. Results

5.1 Descriptive Results

To assess the level of disclosure, we first investigate which type of tax loss carryforward information is disclosed in annual reports' notes. We identify 15 different types of voluntary items. Table 4 gives an overview of the type and frequency of these disclosures.

[Insert Table 4 here]

The most frequent disclosure is the effect of tax loss carryforwards in the tax reconciliation, which can be found in 52% of all annual reports. Moreover, 44% of the observations disclose the total amount of tax loss carryforwards. Four other voluntary disclosures are reported in at least 30% of the statements: expiry date of total tax loss carryforwards, deferred tax income/expense recognized in the current year's income statement due to unused tax losses, valuation allowance for deferred tax assets on loss carryforwards, and distinction between corporate tax loss and trade tax loss.

To group the different items, we partition the voluntary disclosures into four sub-categories. The first one contains basic information about tax loss carryforwards, i.e. amount and expiry date. The second category comprises items that explain why or to which amount tax loss carryforwards (or the recognized deferred taxes) have changed, have been used or have affected current fiscal year's income. The third group gives information about valuation allowances and deferred taxes that have not been recognized. Any other kind of disclosure is included in the fourth category. We further analyze the four groups by estimating our main model separately for each of the disclosure group. Details are outlined in the sub-category regressions in Section 5.5.

[Insert Figure 1 here]

To get an idea of the distribution of our dependent variable, Figure 1 shows a histogram of the within-firm dispersion of *DISCL*, i.e. the frequency of each sample firm's standard deviation of the disclosure score. The graph illustrates that the vast majority of firms has a standard deviation between zero and three - the average within-firm dispersion is 2.31. This finding indicates that firms change their voluntary disclosure only modestly over time and have a relatively stable tax footnote reporting behavior.

[Insert Table 5 here]

To put this number into perspective, Table 5 shows the average disclosure score and the standard deviation per year. The annual dispersion ranges from 6.53 to 7.71 with an average of 6.92 and is much higher than the within-firm variation. Taken together, these findings indicate that disclosure is relatively stable over time within a firm but varies strongly between different firms. This evidence is in line with prior literature – Kvaal and Nobes (2013), as well as Raedy et al. (2011), report a large divergence in tax footnote disclosures across firms. However, so far the driver of these large differences are unclear. In our regression section, we test whether the within-firm and the more intriguing across-firm variation is associated with uncertainty about the tax loss usability.

Table 6 presents summary statistics. The average voluntary disclosure score per year and firm (*DISCL*) amounts to 8.93 with a median of 7 and ranges from 0 to 42. The average analyst earnings forecast for the following fiscal year (*AEF*) and the average amount of tax loss carryforwards (*TLC*) are relatively close to each other with 1.62 Billion Euro and 1.47 Billion Euro. However, the tax loss carryforwards have a much higher dispersion with 5.8 Billion Euro compared to 2.46 Billion Euro for the forecasts. About 19% of our observations have a difference between forecast and carryforwards close to zero (*AEF~TLC*), 10% have a carryforward surplus (*AEF<TLC*) and 71% a substantively higher forecast than loss carryforward (*AEF>TLC*). The average dispersion of the mean analyst forecast (*STDEV*) is 22%. About 8% of the observations have a dominating loss in the current three-year period (*LH_CUM*), 21% at least one loss in the three previous years (*LH_3Y*) and 34% at least one loss in the five previous years (*LH_5Y*). The average number of losses in the past five years (*N_LOSS*) is 0.52.

[Insert Table 6 and Table 7 here]

Table 7 shows a Spearman correlation matrix. As expected, *DISCL* is positively (significantly) related to *AEF~TLC*, *STDEV* and all historic indicators (*LH_CUM*, *LH_3Y*, *LH_5Y*, *N_LOSS*). The correlation between *DISCL* and *AEF>TLC* has the expected negative sign. Absent an ex-ante expectation, we find a positive and significant relation between *DISCL* and *AEF<TLC*. The high correlation between *SIZE* and *AEF* (*SIZE* and *TLC*) does not affect our results because *AEF* and *TLC* are not included in our models. Similarly, the different future (historic) indicators are highly correlated by construction and not included jointly in our models.

5.2 Regression Results

We estimate a pooled cross-sectional regression, using Huber-White robust standard errors (reported in parentheses).[35] Panel A of Table 8 gives an overview of the results for the future uncertainty indicators

[35] Petersen (2009) recommends using two-way clustered standard errors for panel data. However, when there are too few clusters, clustered standard errors are biased (Petersen, 2009; Thompson, 2011). According to Thompson (2011, p. 2), at least 25 firms and 25 time periods are needed to estimate reliable two-way clustered standard errors. Having only 10 periods, we do not use two-way-clustering in our main test. However, repeating our tests with standard errors clustered by firm and time results in minor changes for our uncertainty proxies

in Models I-IV, Panel B shows Models V-VIII with the different historic indicators. Year and industry fixed effects are included in all models but not reported.[36]

[Insert Table 8 here]

Consistent with our expectations, *AEF~TLC* and the dispersion of earnings forecasts measured by *STDEV* have significant coefficients with a positive sign. The results indicate that firms disclose more information when tax loss usability is more uncertain because tax loss carryforwards are close to earnings forecasts or because it is harder to estimate future earnings. We expect and find a negative and significant coefficient for *AEF>TLC*, indicating that if tax losses are expected to be offset in the following fiscal year, uncertainty is low and less disclosure is provided. We did not make an ex-ante prediction for the sign of *AEF<TLC* and do not find significant results, in line with the unclear theoretical expectation. The results for the future indicators are robust to including one of the historic indicators (*LH_5Y*) to control for the availability of tax loss information.[37]

Regarding the historic indicators, we find positive and significant coefficients for all four loss history variables. At this point, we cannot disentangle whether the relation between disclosure and recent losses is primarily driven by the availability of tax loss information or uncertainty about future earnings. To control for the availability of information, our next step is to estimate a selection model in Section 5.3.

With respect to the control variables, our first finding is that the change in deferred taxes for loss carryforwards *(ΔDTA_TLC)* is positively associated with the disclosure level. As discussed in Section 4, the ex-ante expectation about the relation was not clear. Further, we find a positive association with *SIZE* and negative associations with *AN_FOL* and *LEV*, indicating that larger firms, firms that have a lower analyst coverage and are relying less on debt financing disclose more information. For the variable *AR_DISCL*, we find a strong positive relation with *DISCL*. This finding suggests a related disclosure behavior in the tax footnote and the overall annual report, encouraging us to examine this relation in more detail in additional tests in Section 5.4.

5.3 Selection Model Results

Table 9 A presents results for the probit model, i.e. the first step in the Heckman selection model. The instrument *MAND* has a positive and highly significant coefficient, indicating that a higher number of mandatory items increases the probability that a firm discloses voluntary information.

[Insert Table 9 A and 9 B here]

(significance of the coefficients for *STDEV*, *LH_CUM*, and *LH_3Y* is reduced from 1% to the 5% level), while the basic inferences are unchanged.

[36] The results are robust to excluding one or more control variables (not reported).

[37] After including *LH_CUM*, *LH_3Y* or *N_LOSS* instead, we find for our test variables no changes in the coefficient signs, minor changes in coefficient size and the following changes in significance: increase in significance to 1% level for coefficient of *AEF~TLC* for all three historic indicators, no significance for coefficient of *STDEV* for *LH_CUM*.

Results for the second stage of the selection model are presented in Table 9 B. The inverse Mills ratio *MILLS* has a positive and insignificant coefficient. *AEF~TLC*, *AEF>TLC*, and *AEF<TLC* have the same sign and significance as in our main model in Table 8. The coefficient of *STDEV* is positive but insignificant. All of the loss history variables have a positive and significant coefficient. With respect to the control variables, *ΔDTA_TLC* now has an insignificant coefficient while all other results stay qualitatively the same.[38] In sum, except for the standard deviation and the change in deferred taxes, qualitative results of the selection model do not differ from our main model.[39] Hence, after controlling for sample selection, our main inferences are unchanged.

5.4 Annual Report Disclosure Quality

In an additional test, we further examine the relation between the overall disclosure behavior of a firm and the tax footnote disclosure. The positive and significant coefficient of *AR_DISCL* in Table 8 indicates a related disclosure behavior regarding tax losses and the entire annual report. This finding could suggest that the tax loss disclosure increases because firms with higher uncertainty increase the overall disclosure level and the tax footnote is only a characteristic of this increase. In this case, our findings would not explain variation of the tax footnote disclosure but would rather be a byproduct of firms' broader disclosure decisions. This interpretation would be in line with Chen et al. (2002) who find that managers voluntarily add balance sheet information to quarterly earnings announcements when future earnings are relatively more uncertain. To examine this issue, we estimate our regression again, using the overall disclosure level *AR_DISCL* as the dependent variable. If firms increase their overall disclosure in the case of uncertainty, we would find similar results for the uncertainty variables as in our basic model. Results for the three different model specifications are reported in Table 10.

[Insert Table 10 here]

Results in Table 10 support the positive association between *DISCL* and *AR_DISCL*. However, apart from that relation, the results differ considerably from our findings in Table 8. While *AEF~TLC* is positively related to *DISCL* in our basic regressions, it now shows a negative and insignificant coefficient. Similarly, *AEF>TLC* is no longer significant while *AEF<TLC* now has a significant coefficient. Among the future indicators, *STDEV* is the only variable that has the same (positive) sign and significance as in our main regression. This finding seems plausible because *STDEV* is our least specific uncertainty measure – while the other variables measure uncertainty very closely tied to tax loss carryforwards, the standard deviation of earnings forecasts is a rather generic measure of uncertainty. This aligns our findings with the results of Chen et al. (2002), indicating that the overall disclosure quality increases in the case of uncertain future earnings but not in the case of tax loss carryforward

[38] The variance inflation factor (VIF) for the inverse Mills ratio ranges from 2.5 to 2.8 in the different models. The VIF for the uncertainty variables is between 1.0 and 1.7.

[39] The insignificant results for *ΔDTA_TLC* are not surprising given the unclear predictions about the relation (see Section 4.4 for details). *STDEV* is the most general measure of uncertainty and therefore our weakest identifier of tax loss specific uncertainty.

specific uncertainty. For the historic indicators, we find that all of the four variables have a negative sign and only three have a significant coefficient. Again, these findings are opposite to the results of our main model and indicate a lower overall disclosure quality in the case of recent losses.

In sum, the direction of association is reversed for nearly all of our treatment variables, indicating that higher uncertainty generally is related to a (if anything) lower overall disclosure level. This finding indicates that the tax footnote is not just a reflection of the broader annual report disclosure policy. Quite the contrary, the results of Table 10 suggest that most of the test variables measure tax loss specific uncertainty and lend support to the construction of our variables.

5.5 Regression Results Disclosure Sub-Categories

In Table 4, we identify four groups of disclosed items: 1) basic tax loss carryforward information, 2) information about changes and the effect on income, 3) valuation allowance information, and 4) other information. To analyze for which type of information our main results are most pronounced, we repeat our basic regressions for the subcategories 1) to 3).[40] We exclude *AEF<TLC* from this set of tests because we have neither a clear prediction nor do we find a significant relation with our aggregated disclosure score. Tables 11 - 13 show the estimation results for the remaining three future indicators and the historic variables with the respective disclosure sub-score as the dependent variable.

[Insert Tables 11 - 13 here]

The dependent variable in Table 11 is the disclosure score for the basic tax loss carryforward information. Interestingly, we do not find a consistent significant relation of the score with the future or with the historic uncertainty indicators. This finding suggests that the disclosure of essential tax loss information is unrelated to uncertainty about the usability, i.e. firms do or do not provide this information regardless of the usability of carryforwards.

Table 12 presents the results for sub-category 2), changes and effect on income. We see a strong significant and positive association for the historic indicators while the coefficients of the future indicators are all insignificant. Hence, in the case of recent losses, firms seem to report more information about how and why tax loss carryforwards and the respective deferred taxes affect the current year's income.

Results for disclosure category 3), valuation allowance information, are shown in Table 13. Results are opposite to Table 12: all future indicators have significant coefficients with the expected sign while the historic indicators all have insignificant coefficients. This finding indicates that the results for the forward-looking uncertainty proxies are mainly driven by valuation allowance information. When uncertainty about tax loss usability increases, firms might have to reduce the amount of recognized

[40] Examining group 4) would not lead to meaningful inferences because the group includes distinct and unrelated items that do not fit into groups 1) to 3).

deferred tax assets and report the respective valuation allowance activities in the tax footnote.

In sum, evidence from the disclosure sub-categories suggests three conclusions: first, in the case of forward-looking uncertainty, firms provide information that directly addresses the uncertain usability – in the first line valuation allowance details. Second, in the case of recent losses, firms mainly provide information about the effect on current year's income. Third, the provision of basic tax loss carryforward information seems to be unrelated to both types of uncertainty. We acknowledge that while the sub-category results appear plausible, they are rather exploratory in nature and again, selection problems might be an issue. Still, we find the results interesting enough to provide them under the before mentioned caveat.

6. Sensitivity Analyses

We conduct several sensitivity analyses to test whether our findings are robust (results not reported). We test the robustness of the dependent variable, the uncertainty proxies, the inclusion of additional control variables, and do standard tests like outlier correction.

6.1 Dependent Variable

Tobit Regression

In our main analysis, we estimate an OLS regression. However, for our dependent variable *DISCL* we observe a non-normal distribution, i.e. the variable has a right-skewed distribution with the lower bound at zero.[41] To address the censored dependent variable, we repeat the main tests using a Tobit regression. Results show that the coefficients of our test variables have a similar size and do not change sign and significance, i.e. our inferences are unchanged if we estimate a Tobit regression.

Number of Disclosed Items

Next, we test sensitivity with regard to our disclosure score. We use the number of reported items as a quantitative measure instead of the disclosure index *DISCL*, i.e. we do not apply the scale to the disclosed items. Results do not change regarding sign and significance. This finding could indicate that the number of disclosures is the driving force of the observed effect. However, we leave it for future research to further disentangle the effect of the number of disclosed information and the way of presenting the items.

Classification as Voluntary

Another robustness check refers to the classification of disclosures as mandatory or voluntary. Misinterpretation of the disclosure requirements on side of the company can lead to ambiguities. For example, Loitz (2007) finds that companies frequently disclose non-recognized deferred taxes instead

[41] The non-normality is confirmed by a Shapiro-Wilk test.

of the underlying loss carryforwards that are not usable.[42] According to our classification, we count the disclosure of non-recognized deferred taxes as a voluntary item though the company may have intended to report mandatory information. Hence, our disclosure score which is designed to capture management's intention to provide information beyond the requirements might be overstated.

We try to control for this case by excluding ambiguous items from our disclosure score. As it is impossible to identify every kind of misinterpretation, we try to account for the above mentioned frequent case. If a company discloses the non-recognized deferred taxes but does not report the underlying tax losses, we assume a misinterpretation and the item is not included in the disclosure score of the respective firm-year. As a result, we reduce the disclosure scores of 67 observations. In case of the disclosure of both items, we keep the non-recognized deferred taxes as a voluntary item.[43] Results for the modified dependent variable do not differ from our basic findings with respect to sign and significance of the test variables.

6.2 Uncertainty Proxies

Next, we examine the robustness of our future indicators of uncertainty. As our main indicator is a self-constructed measure, we test a number of different specifications of this variable. We begin with varying the calculation of the amount of tax loss carryforwards. For our main variables, we divide the deferred tax assets for loss carryforwards by the tax rate that the company discloses or, if this rate is not disclosed, by the statutory tax rate. In our first modification, we always use the German statutory tax rate, i.e. for the years 2005 and 2006 we apply a tax rate of 40 percent and afterwards a tax rate of 30 percent.[44] We re-estimate model I to III of our main regressions with the modified variables for *AEF~TLC*, *AEF>TLC*, and *AEF<TLC*. Inferences for *AEF~TLC* and *AEF>TLC* are unchanged while the coefficient for *AEF<TLC* now has a slightly significant positive coefficient (insignificant in main model).

In the second modification, we use the amount of tax loss carryforwards as disclosed in the annual report when available and the calculated amount otherwise. Again, we re-estimate model I to III with the modified variables and find qualitatively unchanged results compared to our main models.

The next robustness test refers to the analyst forecasts. We do not only use the EBT forecast for t+1 to calculate the difference between the forecast and the carryforwards, but the sum of the forecasts for t+1 and t+2. Our sample is reduced by nine observations. We can no longer estimate the model with *AEF<TLC* because under this classification, there is no case in which the carryforwards are considerably higher than the cumulated forecast. Results for the remaining two uncertainty variables *AEF~TLC* and *AEF>TLC* show a slight reduction in coefficient size but have the same sign and are both significant at

[42] IAS 12.81 (e) requires the disclosure of unused tax losses for which no deferred tax asset is recognized. The disclosure of the respective deferred taxes is not obligatory.

[43] The unused tax losses are not counted anyway because they are part of the mandatory disclosures.

[44] The German tax reform 2008 includes changes of the corporate tax rate. Based on the IFRS guidelines (liability method), a change in the tax rate has to be applied for the calculation of deferred taxes as soon as the law is substantively enacted. Hence, the 2008 reform has already to be considered in the financial statement for 2007.

the 5% level. In sum, our uncertainty proxies are robust to several modifications that are not affecting our main inferences.

6.3 Additional Control Variables

International Operations

In further robustness checks, we add different control variables that are not included in the main tests, because including them reduces our (already modest) sample size. We include the ratio of foreign to total assets (sales) as a measure of the international activity of a firm. The level of foreign operations can be a proxy for several things, e.g. on the one hand more international activity can lead to higher costs for gathering tax loss carryforward information for the tax footnote and on the other hand, it can make it more complicated to assess usability of tax losses due to varying international loss offsetting rules. Therefore, we make no prediction about the direction of association with the disclosure level. Our sample is reduced by 121 (25) observations when we include the ratio of foreign assets (sales) to total assets (sales). Coefficients for both variables are positive and highly significant in all of our models, while our main findings remain qualitatively unchanged.

Stock Performance Measures

Three of the uncertainty measures in our main model are very closely tied to tax losses, while the standard deviation of earnings forecasts captures uncertainty more generally. To further control for uncertainty in a broader sense, we include the stock market performance measures beta and price volatility (i.e. average annual price movement) as control variables. Including price volatility (beta) in models I to VIII, reduces our sample by 26 (34) observations. The coefficients of both variables are insignificant in all models. If we include price volatility in model VI, the coefficient for *LH_3Y* is still positive but not significant. All other results for our test variables are qualitatively the same as in the main model.

6.4 Other Tests

Outliers

We control for the effect of outliers. We truncate all continuous variables above the 99th and below the 1st percentile.[45] Truncating the variables reduces the sample size by 64 observations. Repeating our main regressions with the reduced sample results in a slight decrease in significance for the coefficients of *STDEV*, *LH_CUM*, and *LH_3Y* and a now significant coefficient of *AEF<TLC* (10% level). Overall, our inferences are unaffected.[46]

Financial Industry

Our last modification refers to the sample composition. In line with previous studies (Chaney and Jeter, 1994; Zeng, 2003; Chludek, 2011), we exclude bank, insurance and financial companies from our

[45] *DISCL*, *AN_FOL*, and *LEV* have a natural lower bound at zero and are truncated at the 99th percentile.

[46] If we winsorize the variables rather than truncating them, sign and significance of the test variable coefficients are the same as in the main regressions.

sample (SIC-Code 60-67). Our sample is reduced by 85 observations. For the reduced sample, we find a slight increase in significance for the coefficients of *AEF~TLC* and *LH_3Y* as well as a slight decrease for *STDEV*. The remaining results are unchanged.

7. Conclusion

This study focuses on the relation between the level of voluntary tax loss carryforward disclosure and uncertainty about the usability. Assuming that investors require a risk premium if it is not clear whether tax loss carryforwards can be offset against future earnings, this uncertainty increases a firm's cost of capital. A reduction of information asymmetries by voluntary disclosure can mitigate this increase. Hence, managers have incentives to report more information about tax loss carryforwards if future usability is uncertain. At the same time, costs of gathering and editing the information, as well as proprietary costs can deter firms from disclosing extensive tax details. In this study, we examine whether firms expect net benefits and therefore increase the level of voluntary disclosure with uncertainty about the usability of tax loss carryforwards.

We find a large cross-sectional variation in the tax footnote while the reporting behavior within firms is rather stable. We examine different future estimates and historic indicators related to earnings and find a strong positive association between disclosure and uncertainty about tax loss usability. Regarding the future indicators, we provide evidence that disclosure increases if forecasted earnings and tax loss carryforwards are close to each other, while disclosure decreases if the forecast exceeds tax loss carryforwards considerably. We find no consistent results for a surplus of carryforwards over forecasted earnings. Further, we find a positive and significant relation between disclosure and the dispersion of forecasts. The latter result is less robust than the other findings, probably because the standard deviation is the least tax-loss specific measure and represents uncertainty in a rather broad sense. For the historic indicators, we find robust evidence for a positive and significant relation with disclosure, indicating that more information is reported when the firm has recent losses. Our findings are robust to controlling for the availability of tax loss information by estimating a selection model and to several sensitivity tests. Further, our findings suggest that tax loss carryforward disclosure does not simply reflect the overall disclosure policy of a firm but is specific to the tax footnote.

In additional tests, we provide first evidence that firms increase disclosure of backward-looking information in the case of uncertainty due to recent losses, while they disclose valuation allowance information if uncertainty is based on future estimates. Basic tax loss information seems to be related to neither form of uncertainty. However, results of these sub-category tests have to be interpreted with caution because they are prone to potential sample selection issues.

In sum, we find that companies that are exposed to greater ex ante uncertainty voluntarily disclose more and more salient information about tax loss carryforwards. Our findings suggest that managers anticipate the investors' need for more private information and disclose them voluntarily to send a signal of

credibility to the market participants. We contribute to the literature on tax-related information in the annual report. Previous studies indicate incomplete and not easily understandable disclosures about taxes that differ remarkably between companies (Evers et al., 2014; Kvaal and Nobes, 2013; Raedy et al., 2011). In this study, we explain part of the variation. We provide insights into the incentives to disclose tax loss carryforward information, an important component of the tax footnote. Our results are consistent with firms adjusting their tax disclosure to the need for information caused by uncertainty and highlight a positive aspect of the, frequently criticized, flexibility of reporting under IAS 12.

A potential caveat of our study is that we examine the 80 largest German companies and our findings might not hold for smaller and less liquid firms that could have other disclosure incentives. Given that the DAX-30 firms alone represent around 80 percent of the prime standard's market capitalization (Deutsche Börse Group, 2016), our findings should still be of interest for a broad audience. However, though our findings suggest that firms voluntarily react to investors' information needs, we do not conclude that there is no room or need for improvements in the disclosure requirements.

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APPENDIX

Figure 1: Frequency of Within-Firm Standard Deviation of Disclosure

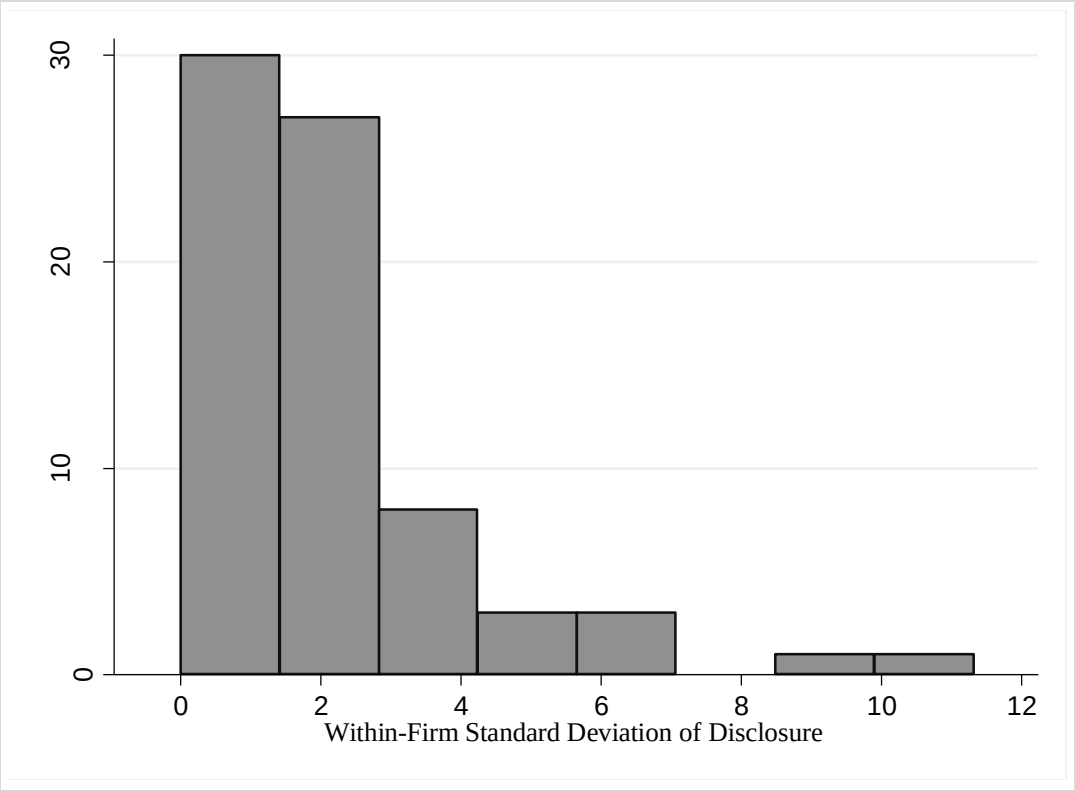

Table 1: Sample Overview (years 2005-2014)

	Firms	Observations
DAX-30	30	
M-DAX	50	
	80	**800**
Non-IFRS [a)]	-0	-17
Missing data [b)]	-2	-178
Total	**78**	**605**

Notes: [a)] Non-IFRS observations are dropped mainly for the years 2005 and 2006 for those firms that were allowed to postpone the IFRS adoption because they applied US-GAAP. [b)] The firms Fresenius Medical Care AG & Co. KGaA and Tognum AG are dropped completely because they have missing data for at least one variable in each of the sample years.

Table 2: Disclosure Scale

Panel A

Score	Type of Disclosure
0.5	Qualitative
1	Comparative
1.5	Interval
2	Quantitative
+ 1.5	Additional Information
+ 1.5	Using Graph/Table

Panel B

Disclosed Information	Type of Disclosure	Score
The company has tax loss carryforwards.	Qualitative	0.5
This year, the company's tax loss carryforwards are higher than in the previous year.*	Comparative	1
The company's tax loss carryforwards are usable within the next five to ten years.	Interval	1.5
This year, the company's tax loss carryforwards increased by 5 Mio EUR.	Quantitative	2
This year, the company's tax loss carryforwards increased by 5 Mio EUR, resulting primarily from restructuring in the XY subgroup.	Quantitative + Additional Information	3.5

Notes: *This is only a hypothetical example. We did not find a disclosure in the financial statements that was classified as comparative. All other examples are (slightly modified) extracts from financial statements' notes of our sample firms.

Table 3: Variable Description

Variable	Exp. sign	Description
$DISCL_{it}$		voluntary tax loss carryforward disclosure score, based on the scale in Table 2
AEF_{it}		last mean analyst EBT forecast for t+1, issued before fiscal year end t
TLC_{it}		tax loss carryforwards: deferred tax assets for tax loss carryforwards / tax rate (if available disclosed tax rate, otherwise statutory tax rate)
$AEF{\sim}TLC_{it}$	+	indicator variable: 1 if difference between AEF_{it} and TLC_{it} is in the two deciles close to zero, 0 otherwise
$AEF<TLC_{it}$	?	indicator variable: 1 if $AEF_{it} < TLC_{it}$ and $AEF_{it}{\sim}TLC_{it} = 0$, 0 otherwise
$AEF>TLC_{it}$	-	indicator variable: 1 if $AEF_{it} > TLC_{it}$ and $AEF_{it}{\sim}TLC_{it} = 0$, 0 otherwise
$STDEV_{it}$	+	percentage standard deviation of AEF_{it}
LH_CUM_{it}	+	indicator variable: 1 if company reported a cumulative negative EBT in the current and two previous years, 0 otherwise
LH_3Y_{it}	+	indicator variable: 1 if company reported at least one negative EBT in the three previous years, 0 otherwise
LH_5Y_{it}	+	indicator variable: 1 if company reported at least one negative EBT in the five previous years, 0 otherwise
N_LOSS_{it}	+	frequency of negative EBT in the previous five years
ΔDTA_TLC_{it}	?	change in deferred tax assets for tax loss carryforwards from previous to current year / total assets
$LOSS_{it}$	+	indicator variable: 1 if EBT in current year is negative, 0 otherwise
$SIZE_{it}$	+	natural logarithm of total assets
AN_FOL_{it}	?	number of analysts following the firm in the 11th month of the fiscal year
ΔEBT_{it}	?	percentage change in EBT from previous to current year
LEV_{it}	?	debt / total assets
AUD_{it}	+	indicator variable: 1 if company is audited by Big4 (Deloitte, Ernst and Young, KPMG, PWC), 0 otherwise
$IFRS\_AD_{it}$	+	years that have passed since the company adopted IAS/IFRS
AR_DISCL_{it}	+	disclosure score of annual report content quality
CEO_TO_{it}	?	indicator variable: 1 if CEO changed from previous to current year, 0 otherwise

Table 4: Disclosure Sub-categories

		No. of Observations Disclosing the Item	
		Absolute	**Percent of total observations**
Basic TLC information	Total amount of recoverable tax loss carryforwards	99	16%
	Expiry date of recoverable tax loss carryforwards	51	8%
	Total amount of tax loss carryforwards (recoverable and not recoverable)	264	44%
	Expiry date of total tax loss carryforwards	195	32%
Changes and Effect on Income	Explication for changes in tax loss carryforwards or deferred tax assets for loss carryforwards	154	25%
	Income/tax effect of using tax loss carryforwards	95	16%
	Deferred tax income/expense recognized in the current year's income statement due to unused tax losses	180	30%
Valuation Allowance Information	Valuation Allowance for deferred tax assets on loss carryforwards	182	30%
	Income effects of changes in tax loss carryforward valuation allowance	41	7%
	Tax losses for which a valuation allowance is recognized	23	4%
	Amount of deferred tax assets for tax losses which have not been recognized	155	26%
Others	Effect of tax losses on tax reconciliation	314	52%
	Distinction between corporate tax loss and trade tax loss	189	31%
	Reference to minimum taxation	85	14%
	Other disclosures	155	26%

Table 5: Disclosure Score per Year

Year	Mean	Median	Std. Dev.	N
2005	7.35	5.25	7.37	40.00
2006	7.91	5.75	6.79	50.00
2007	7.75	5.75	6.88	60.00
2008	8.74	7.00	6.84	68.00
2009	8.62	7.50	6.53	73.00
2010	9.78	8.00	7.71	71.00
2011	9.82	8.50	6.77	65.00
2012	9.35	8.50	6.62	62.00
2013	9.52	8.50	6.78	59.00
2014	9.62	8.50	7.00	57.00
Average	8.85	7.33	6.92	

Notes: Disclosure Score *DISCL* per year, for details on the score see Table 2.

Table 6: Descriptive Statistics

	Mean	Median	Std. Dev.	Min	Max	N
DISCL	8.93	7	6.92	0	42	605
AEF (in Bn €)	1.62	0.47	2.46	-0.25	15.86	605
TLC (in Bn €)	1.47	0.21	5.80	0	125.70	605
AEF~TLC	0.19	0	0.39	0	1	605
AEF<TLC	0.10	0	0.29	0	1	605
AEF>TLC	0.71	1	0.45	0	1	605
STDEV	22.47	10.23	260.73	-1,267.50	6,268.87	605
LH_CUM	0.08	0	0.27	0	1	605
LH_3Y	0.21	0	0.41	0	1	605
LH_5Y	0.34	0	0.47	0	1	605
N_LOSS	0.52	0	0.91	0	5	605
ΔDTA_TLC	0.01	0	0.26	-0.06	5.89	605
LOSS	0.10	0	0.30	0	1	605
SIZE	23.13	22.79	1.86	18.68	28.42	605
AN_FOL	16.27	16	6.30	1	35	605
ΔEBT	0.46	0.04	9.72	-42.32	220.91	605
LEV	0.24	0.23	0.15	0	0.75	605
AUD	0.89	1	0.31	0	1	605
IFRS_AD	7.74	7	3.83	0	19	605
AR_DISCL	0.60	0.6	0.08	0.36	0.85	605
CEO_TO	0.07	0	0.26	0	1	605

Notes: All variables are defined in Table 3.

Table 7: Spearman Correlation Matrix

	DISCL	*AEF*	*TLC*	*AEF~TLC*	*AEF>TLC*	*AEF<TLC*	*STDEV*	*LH_CUM*	*LH_3Y*	*LH_5Y*
DISCL	1.0000									
AEF	***0.1915***	1.0000								
TLC	***0.2668***	***0.6743***	1.0000							
AEF~TLC	***0.1319***	***-0.3285***	***0.1425***	1.0000						
AEF>TLC	***-0.2306***	***0.1150***	***-0.4408***	***-0.7665***	1.0000					
AEF<TLC	***0.1781***	***0.2626***	***0.4872***	***-0.1586***	***-0.5125***	1.0000				
STDEV	***0.2290***	-0.0370	***0.2388***	***0.2373***	***-0.3251***	***0.1826***	1.0000			
LH_CUM	***0.1431***	***-0.2187***	0.0453	***0.3038***	***-0.3275***	***0.0972***	***0.2312***	1.0000		
LH_3Y	***0.1210***	***-0.0987***	***0.1788***	***0.3131***	***-0.3951***	***0.1887***	***0.3919***	***0.5080***	1.0000	
LH_5Y	***0.1810***	-0.0788	***0.2209***	***0.3631***	***-0.4892***	***0.2665***	***0.3686***	***0.3758***	***0.7263***	1.0000
N_LOSS	***0.1960***	***-0.1123***	***0.2057***	***0.3685***	***-0.5007***	***0.2770***	***0.3727***	***0.4418***	***0.7483***	***0.9809***
ΔDTA_TLC	-0.0691	-0.0019	***0.1140***	0.0698	***-0.1011***	0.0621	-0.0102	0.0073	-0.0059	-0.0529
LOSS	0.0717	-0.0772	0.0756	***0.1995***	***-0.2238***	0.0774	***0.1658***	***0.4424***	***0.2029***	***0.1444***
SIZE	***0.2105***	***0.8609***	***0.7816***	***-0.1379***	***-0.1004***	***0.3387***	***0.1640***	-0.0318	0.0694	0.0749
AN_FOL	***0.1391***	***0.5871***	***0.3803***	***-0.2067***	0.0326	***0.2263***	-0.0144	-0.0630	-0.0029	-0.0365
ΔEBT	-0.0056	-0.0467	***-0.0883***	-0.0336	***0.0833***	***-0.0831***	***-0.1188***	***-0.1911***	***-0.1594***	***-0.0880***
LEV	0.0607	0.0006	***0.2236***	***0.1686***	***-0.2103***	***0.0979***	***0.1126***	***0.1634***	***0.0885***	0.0728
AUD	***0.1537***	***0.2449***	***0.1813***	0.0113	0.0085	-0.0282	***0.1115***	***0.1012***	0.0796	***0.0957***
IFRS_AD	***0.1390***	***0.1914***	***0.0887***	-0.0007	0.0553	***-0.0841***	0.0445	0.0265	0.0609	0.0780
AR_DISCL	***0.2789***	***0.2642***	***0.1696***	-0.0554	-0.0036	0.0796	***0.0998***	-0.0330	-0.0172	-0.0354
CEO_TO	-0.0563	0.0224	-0.0232	0.0220	0.0131	-0.0495	-0.0176	0.0613	-0.0080	-0.0290

Notes: All variables are defined in Table 3. Figures in bold and in italics indicate significance at 5% level.

Table 7 Continued

	N_LOSS	*ΔDTA_TLC*	*LOSS*	*SIZE*	*AN_FOL*	*ΔEBT*	*LEV*	*AUD*	*IFRS_AD*	*AR_DISCL*	*CEO_TO*
N_LOSS	1.0000										
ΔDTA_TLC	-0.0606	1.0000									
LOSS	***0.1650***	***0.1070***	1.0000								
SIZE	0.0548	-0.0016	0.0059	1.0000							
AN_FOL	-0.0432	-0.273	***-0.1493***	***0.4868***	1.0000						
ΔEBT	***-0.0929***	***-0.2021***	***-0.3146***	-0.0579	-0.0199	1.0000					
LEV	***0.0852***	***0.0903***	0.0809	***0.1739***	-0.0366	-0.0533	1.0000				
AUD	***0.0937***	0.0147	0.0482	***0.2337***	***0.1234***	-0.0382	0.0517	1.0000			
IFRS_AD	0.0699	0.0716	0.0258	***0.2145***	***0.2481***	-0.0661	***-0.0846***	***0.1757***	1.0000		
AR_DISCL	-0.0449	0.0078	-0.0315	***0.2297***	***0.1508***	0.0216	0.0420	***0.1691***	***-0.1014***	1.0000	
CEO_TO	-0.0219	0.0125	***0.1771***	0.0213	***-0.1450***	-0.0485	0.0399	-0.0204	***-0.1273***	0.0676	1.0000

Notes: All variables are defined in Table 3. Figures in bold and in italics indicate significance at 5% level.

Table 8: OLS Regression Estimates (dependent variable: *DISCL*)

	Panel A: Future Uncertainty Indicators				Panel B: Historic Uncertainty Indicators			
	I	II	III	IV	V	VI	VII	VIII
Constant	-32.751***	-28.212***	-30.397***	-30.736***	-34.156***	-31.584***	-31.091***	-33.492***
	(4.254)	(4.137)	(4.293)	(4.173)	(4.309)	(4.185)	(4.162)	(4.203)
AEF~TLC	2.094**							
	(0.835)							
AEF>TLC		-2.124***						
		(0.769)						
AEF<TLC			0.605					
			(0.931)					
STDEV				0.001***				
				(0.000)				
LH_CUM					4.815***			
					(1.537)			
LH_3Y						1.676**		
						(0.792)		
LH_5Y	1.371**	1.027	1.842***	1.900***			1.937***	
	(0.658)	(0.706)	(0.667)	(0.635)			(0.634)	
N_LOSS								1.279***
								(0.315)
ΔDTA_TLC	0.547***	0.162	0.482*	0.582***	0.568**	0.574***	0.592***	0.607***
	(0.204)	(0.233)	(0.263)	(0.209)	(0.221)	(0.210)	(0.210)	(0.216)
LOSS	0.548	0.395	0.895	0.961	-0.579	0.857	0.937	0.462
	(1.101)	(1.113)	(1.079)	(1.076)	(1.290)	(1.100)	(1.077)	(1.135)
SIZE	1.053***	0.919***	0.920***	0.950***	1.132***	0.981***	0.959***	1.065***
	(0.203)	(0.195)	(0.206)	(0.198)	(0.207)	(0.198)	(0.198)	(0.198)
AN_FOL	-0.240***	-0.247***	-0.253***	-0.252***	-0.283***	-0.266***	-0.251***	-0.268***
	(0.069)	(0.070)	(0.071)	(0.072)	(0.070)	(0.072)	(0.072)	(0.071)
ΔEBT	0.023	0.026	0.025	0.025	0.025	0.023	0.024	0.023
	(0.022)	(0.024)	(0.025)	(0.025)	(0.026)	(0.024)	(0.025)	(0.024)

Table 8 Continued

	Panel A: Future Uncertainty Indicators				Panel B: Historic Uncertainty Indicators			
	I	II	III	IV	V	VI	VII	VIII
LEV	-4.089**	-4.058**	-3.083*	-3.123*	-3.974**	-3.151*	-3.096*	-3.348**
	(1.740)	(1.715)	(1.700)	(1.690)	(1.726)	(1.698)	(1.698)	(1.671)
AUD	0.196	0.488	0.402	0.336	0.154	0.415	0.318	0.167
	(0.635)	(0.606)	(0.617)	(0.637)	(0.646)	(0.641)	(0.635)	(0.631)
IFRS_AD	0.067	0.120	0.089	0.069	0.069	0.067	0.074	0.075
	(0.089)	(0.089)	(0.086)	(0.089)	(0.090)	(0.090)	(0.089)	(0.088)
AR_DISCL	20.555***	19.888***	20.184***	20.156***	19.540***	20.291***	20.375***	20.858***
	(3.147)	(3.137)	(3.190)	(3.194)	(3.119)	(3.160)	(3.193)	(3.110)
CEO_TO	-1.381	-1.272			-1.580	-1.470	-1.400	-1.483
	(0.934)	(0.930)			(0.990)	(0.955)	(0.925)	(0.919)
R^2	0.237	0.239	0.227	0.229	0.236	0.220	0.227	0.235
N	605	605	605	605	605	605	605	605
F-value	13.26	18.05	13.57	14.13	12.92	12.72	13.00	13.91

Notes: All variables are defined in Table 3. Robust standard errors in parentheses. Year and industry dummies included but not reported. ***, **, and * indicate significance at 1%, 5%, and 10% respectively.

Table 9 A: Heckman Model First Stage – Probit Estimation

	Panel A: Future Uncertainty Indicators				Panel B: Historic Uncertainty Indicators			
	I	II	III	IV	V	VI	VII	VIII
Constant	-3.054	-3.368*	-3.112	-3.279*	-3.249*	-3.199*	-3.282*	-3.534*
	(1.920)	(1.903)	(1.992)	(1.898)	(1.841)	(1.839)	(1.898)	(1.941)
MAND	0.352***	0.344***	0.357***	0.342***	0.334***	0.335***	0.342***	0.353***
	(0.116)	(0.113)	(0.119)	(0.113)	(0.112)	(0.112)	(0.113)	(0.115)
AEF~TLC	-0.311							
	(0.317)							
AEF>TLC		0.122						
		(0.315)						
AEF<TLC			85.639					
			(0.000)					
STDEV				-0.000				
				(0.002)				
LH_CUM					-0.225			
					(0.535)			
LH_3Y						0.206		
						(0.317)		
LH_5Y	0.578*	0.528*	0.356	0.473*			0.471*	
	(0.303)	(0.315)	(0.288)	(0.279)			(0.277)	
N_LOSS								0.409
								(0.433)
ΔDTA_TLC	0.542	0.602	-13.757	0.559	0.410	0.464	0.563	0.630
	(2.432)	(2.386)	(27.578)	(2.367)	(1.829)	(2.017)	(2.398)	(2.932)
LOSS	0.667	0.626	0.617	0.599	0.857	0.656	0.599	0.569
	(0.570)	(0.563)	(0.580)	(0.558)	(0.656)	(0.568)	(0.558)	(0.589)
SIZE	0.004	0.010	-0.001	0.009	0.020	0.015	0.009	0.018
	(0.086)	(0.085)	(0.089)	(0.086)	(0.083)	(0.084)	(0.086)	(0.088)
AN_FOL	-0.003	-0.001	-0.006	-0.001	-0.004	-0.002	-0.001	-0.002
	(0.021)	(0.021)	(0.022)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)

Table 9 A Continued

	Panel A: Future Uncertainty Indicators				Panel B: Historic Uncertainty Indicators			
	I	II	III	IV	V	VI	VII	VIII
ΔEBT	0.020	0.019	0.017	0.018	0.010	0.013	0.019	0.015
	(0.044)	(0.045)	(0.045)	(0.046)	(0.042)	(0.043)	(0.046)	(0.044)
LEV	0.319	0.186	0.236	0.118	0.274	0.162	0.119	0.058
	(0.760)	(0.749)	(0.759)	(0.733)	(0.720)	(0.719)	(0.733)	(0.748)
AUD	-0.029	-0.027	-0.014	-0.021	0.069	0.031	-0.021	-0.069
	(0.308)	(0.308)	(0.316)	(0.309)	(0.301)	(0.299)	(0.309)	(0.317)
IFRS_AD	0.096***	0.096***	0.106***	0.098***	0.094***	0.095***	0.098***	0.101***
	(0.037)	(0.037)	(0.038)	(0.037)	(0.036)	(0.036)	(0.037)	(0.037)
AR_DISCL	5.532***	5.647***	5.752***	5.714***	5.378***	5.467***	5.715***	5.857***
	(1.617)	(1.617)	(1.636)	(1.613)	(1.589)	(1.576)	(1.613)	(1.629)
CEO_TO	-0.392	-0.384	-0.332	-0.372	-0.423	-0.408	-0.372	-0.367
	(0.346)	(0.348)	(0.349)	(0.346)	(0.346)	(0.344)	(0.346)	(0.352)
Pseudo R^2	0.241	0.237	0.246	0.236	0.222	0.224	0.236	0.243
N	605	605	605	605	605	605	605	605

Notes: The dependent variable is an indicator variable, scoring 1 if the firm voluntarily discloses at least one tax loss carryforward item and 0 otherwise. The instrument is *MAND* and measures the number of mandatory tax loss carryforward items that a firm discloses in the tax footnote. All other variables are defined in Table 3. ***, **, and * indicate significance at 1%, 5%, and 10% respectively.

Table 9 B: Heckman Model Second Stage (dependent variable: *DISCL*)

	Panel A: Future Uncertainty Indicators				Panel B: Historic Uncertainty Indicators			
	I	II	III	IV	V	VI	VII	VIII
Constant	-35.115***	-30.578***	-30.991***	-32.227***	-35.960***	-35.049***	-32.755***	-34.537***
	(7.600)	(7.614)	(6.959)	(6.997)	(6.957)	(8.466)	(6.980)	(6.998)
MILLS	7.093	7.008	4.288	5.205	5.917	7.826	5.440	4.524
	(4.722)	(4.591)	(4.041)	(4.169)	(4.219)	(5.162)	(4.163)	(4.017)
AEF~TLC	2.078**							
	(0.875)							
AEF>TLC		-2.186***						
		(0.810)						
AEF<TLC			0.671					
			(1.093)					
STDEV				0.001				
				(0.001)				
LH_CUM					4.879***			
					(1.181)			
LH_3Y						1.783**		
						(0.861)		
LH_5Y	1.550**	1.153	1.895***	2.004***			2.050***	
	(0.746)	(0.774)	(0.633)	(0.625)			(0.626)	
N_LOSS								1.297***
								(0.326)
ΔDTA_TLC	0.945	0.566	0.735	0.906	0.859	0.979	0.929	0.898
	(1.395)	(1.386)	(1.288)	(1.275)	(1.266)	(1.540)	(1.276)	(1.272)
LOSS	0.777	0.586	0.983	1.096	-0.385	1.132	1.085	0.554
	(1.101)	(1.092)	(0.961)	(0.971)	(1.091)	(1.215)	(0.975)	(0.966)
SIZE	1.019***	0.885***	0.868***	0.911***	1.112***	0.969***	0.921***	1.024***
	(0.239)	(0.234)	(0.219)	(0.213)	(0.215)	(0.262)	(0.213)	(0.212)
AN_FOL	-0.224***	-0.230***	-0.240***	-0.238***	-0.270***	-0.253***	-0.238***	-0.256***
	(0.070)	(0.069)	(0.063)	(0.063)	(0.062)	(0.077)	(0.063)	(0.062)

Table 9 B Continued

	Panel A: Future Uncertainty Indicators				Panel B: Historic Uncertainty Indicators			
	I	II	III	IV	V	VI	VII	VIII
ΔEBT	0.024	0.027	0.025	0.025	0.025	0.024	0.025	0.023
	(0.030)	(0.030)	(0.027)	(0.027)	(0.027)	(0.033)	(0.027)	(0.027)
LEV	-3.763*	-3.821*	-2.815	-2.871	-3.708*	-2.826	-2.845	-3.117*
	(2.129)	(2.101)	(1.867)	(1.883)	(1.901)	(2.311)	(1.889)	(1.867)
AUD	0.268	0.617	0.527	0.468	0.392	0.636	0.460	0.305
	(1.047)	(1.036)	(0.956)	(0.942)	(0.950)	(1.156)	(0.945)	(0.931)
IFRS_AD	0.129	0.186*	0.125	0.116	0.128	0.142	0.122	0.116
	(0.108)	(0.109)	(0.101)	(0.097)	(0.099)	(0.121)	(0.098)	(0.096)
AR_DISCL	21.888***	21.113***	20.684***	21.038***	20.373***	22.366***	21.360***	21.410***
	(4.736)	(4.683)	(4.223)	(4.266)	(4.299)	(5.270)	(4.271)	(4.202)
CEO_TO	-1.625	-1.487	-1.428	-1.509	-1.719	-1.749	-1.525	-1.572
	(1.212)	(1.197)	(1.077)	(1.087)	(1.097)	(1.342)	(1.091)	(1.074)
Wald chi^2	101.32	102.70	111.08	113.67	133.08	79.16	111.65	116.21
N	605	605	605	605	605	605	605	605

Notes: *MILLS* is the inverse Mills ratio, calculated from the first stage of the Heckman model in Table 9 A. All other variables are defined in Table 3. Year and industry dummies included but not reported. ***, **, and * indicate significance at 1%, 5%, and 10% respectively.

Table 10: OLS Regression Estimates (dependent variable: *AR_DISCL*)

	Panel A: Future Uncertainty Indicators				Panel B: Historic Uncertainty Indicators			
	I	II	III	IV	V	VI	VII	VIII
Constant	0.352***	0.347***	0.368***	0.351***	0.355***	0.344***	0.344***	0.362***
	(0.049)	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)	(0.048)
DISCL	0.003***	0.003***	0.003***	0.002***	0.003***	0.003***	0.003***	0.003***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
AEF~TLC	-0.009							
	(0.009)							
AEF>TLC		-0.003						
		(0.009)						
AEF<TLC			0.024**					
			(0.011)					
STDEV				0.000***				
				(0.000)				
LH_CUM					-0.010			
					(0.013)			
LH_3Y						-0.017**		
						(0.008)		
LH_5Y	-0.012	-0.015*	-0.018**				-0.014**	
	(0.007)	(0.008)	(0.007)				(0.007)	
N_LOSS								-0.010***
								(0.003)
ΔDTA_TLC	0.002	0.001	-0.003	0.002	0.002	0.002	0.002	0.001
	(0.003)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
LOSS	-0.013	-0.015	-0.016	-0.017*	-0.013	-0.013	-0.015	-0.011
	(0.010)	(0.010)	(0.010)	(0.010)	(0.011)	(0.010)	(0.010)	(0.010)
SIZE	0.005**	0.005**	0.003	0.005**	0.005**	0.005**	0.005**	0.004*
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
AN_FOL	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)

Table 10 Continued

	Panel A: Future Uncertainty Indicators				Panel B: Historic Uncertainty Indicators			
	I	II	III	IV	V	VI	VII	VIII
ΔEBT	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
LEV	0.002	-0.004	-0.002	-0.004	-0.002	-0.001	-0.002	0.000
	(0.022)	(0.022)	(0.021)	(0.021)	(0.022)	(0.021)	(0.021)	(0.021)
AUD	0.045***	0.045***	0.048***	0.044***	0.045***	0.045***	0.045***	0.046***
	(0.010)	(0.010)	(0.010)	(0.009)	(0.010)	(0.009)	(0.009)	(0.009)
IFRS_AD	0.002**	0.002**	0.003***	0.002**	0.002**	0.002**	0.002**	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
CEO_TO	-0.001	-0.001	0.000	-0.000	-0.000	-0.001	-0.001	-0.000
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
R^2	0.348	0.347	0.352	0.343	0.343	0.347	0.347	0.351
N	605	605	605	605	605	605	605	605
F-value	23.47	22.18	18.58	28.11	23.94	23.71	23.93	23.33

Notes: All variables are defined in Table 3. Robust standard errors in parentheses. Year and industry dummies included but not reported. ***, **, and * indicate significance at 1%, 5%, and 10% respectively.

Table 11: OLS Subcategory Regression Estimates (dependent variable: Basic TLC Information)

	Panel A: Future Uncertainty Indicators			Panel B: Historic Uncertainty Indicators			
	I	II	IV	V	VI	VII	VIII
Constant	-10.787***	-11.407***	-11.077***	-11.425***	-10.906***	-10.931***	-11.313***
	(2.211)	(2.214)	(2.176)	(2.199)	(2.152)	(2.167)	(2.121)
AEF~TLC	-0.182						
	(0.406)						
AEF>TLC		0.351					
		(0.380)					
STDEV			-0.001***				
			(0.000)				
LH_CUM				1.167*			
				(0.653)			
LH_3Y					0.105		
					(0.402)		
LH_5Y	0.069	0.170	0.035			0.019	
	(0.363)	(0.387)	(0.341)			(0.341)	
N_LOSS							0.357**
							(0.172)
ΔDTA_TLC	0.618***	0.685***	0.618***	0.616***	0.615***	0.614***	0.627***
	(0.162)	(0.190)	(0.162)	(0.165)	(0.162)	(0.162)	(0.165)
LOSS	-0.289	-0.233	-0.333	-0.761	-0.344	-0.323	-0.537
	(0.505)	(0.510)	(0.494)	(0.548)	(0.504)	(0.492)	(0.519)
SIZE	0.381***	0.396***	0.393***	0.419***	0.388***	0.390***	0.405***
	(0.099)	(0.096)	(0.096)	(0.098)	(0.095)	(0.096)	(0.093)
AN_FOL	-0.101***	-0.100***	-0.099***	-0.101***	-0.099***	-0.100***	-0.097***
	(0.034)	(0.035)	(0.034)	(0.034)	(0.034)	(0.034)	(0.034)
ΔEBT	0.035***	0.035***	0.035***	0.036***	0.035***	0.035***	0.036***
	(0.010)	(0.010)	(0.009)	(0.010)	(0.009)	(0.009)	(0.010)
LEV	-0.965	-0.892	-1.040	-1.308	-1.065	-1.051	-1.173
	(0.944)	(0.916)	(0.909)	(0.926)	(0.908)	(0.909)	(0.900)

Table 11 Continued

	Panel A: Future Uncertainty Indicators			Panel B: Historic Uncertainty Indicators			
	I	II	IV	V	VI	VII	VIII
AUD	-0.288	-0.327	-0.306	-0.386	-0.304	-0.299	-0.396
	(0.336)	(0.342)	(0.334)	(0.344)	(0.336)	(0.334)	(0.327)
IFRS_AD	0.047	0.039	0.048	0.046	0.046	0.046	0.047
	(0.050)	(0.049)	(0.050)	(0.049)	(0.049)	(0.049)	(0.049)
AR_DISCL	4.509***	4.605***	4.615***	4.488***	4.557***	4.525***	4.852***
	(1.712)	(1.719)	(1.713)	(1.716)	(1.716)	(1.709)	(1.710)
CEO_TO	0.242	0.222	0.242	0.233	0.246	0.243	0.258
	(0.525)	(0.528)	(0.525)	(0.521)	(0.521)	(0.524)	(0.503)
R^2	0.136	0.137	0.137	0.141	0.136	0.135	0.143
N	605	605	605	605	605	605	605
F-value	14.25	13.61	14.80	15.95	15.18	15.37	15.05

Notes: The dependent variable is a disclosure sub-score based on the four groups in Table 4. All other variables are defined in Table 3. Robust standard errors in parentheses. Year and industry dummies included but not reported. ***, **, and * indicate significance at 1%, 5%, and 10% respectively.

Table 12: OLS Subcategory Regression Estimates (dependent variable: Changes and Effect on Income)

	Panel A: Future Uncertainty Indicators			**Panel B: Historic Uncertainty Indicators**			
	I	II	IV	V	VI	VII	VIII
Constant	-5.472***	-4.834***	-5.264***	-6.643***	-5.426***	-5.301***	-6.382***
	(1.468)	(1.391)	(1.409)	(1.460)	(1.410)	(1.406)	(1.446)
AEF~TLC	0.215						
	(0.319)						
AEF>TLC		-0.344					
		(0.284)					
STDEV			0.000				
			(0.000)				
LH_CUM				2.145***			
				(0.565)			
LH_3Y					0.955***		
					(0.271)		
LH_5Y	0.763***	0.674***	0.818***			0.821***	
	(0.224)	(0.234)	(0.216)			(0.215)	
N_LOSS							0.603***
							(0.116)
ΔDTA_TLC	-0.040	-0.106	-0.037	-0.046	-0.041	-0.036	-0.027
	(0.064)	(0.091)	(0.063)	(0.061)	(0.062)	(0.063)	(0.060)
LOSS	0.649	0.601	0.691*	0.007	0.599	0.689*	0.450
	(0.398)	(0.404)	(0.381)	(0.446)	(0.384)	(0.381)	(0.399)
SIZE	0.102	0.086	0.092	0.169**	0.098	0.093	0.140**
	(0.069)	(0.064)	(0.065)	(0.068)	(0.065)	(0.065)	(0.066)
AN_FOL	-0.051**	-0.051**	-0.052**	-0.065***	-0.056**	-0.052**	-0.059**
	(0.023)	(0.024)	(0.024)	(0.023)	(0.024)	(0.024)	(0.024)
ΔEBT	-0.008	-0.007	-0.008	-0.007	-0.008	-0.008	-0.008*
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
LEV	-0.601	-0.655	-0.502	-0.894	-0.558	-0.499	-0.627
	(0.617)	(0.614)	(0.598)	(0.601)	(0.602)	(0.598)	(0.578)

Table 12 Continued

	Panel A: Future Uncertainty Indicators			Panel B: Historic Uncertainty Indicators			
	I	II	IV	V	VI	VII	VIII
AUD	-0.293	-0.253	-0.278	-0.358	-0.255	-0.280	-0.361
	(0.242)	(0.243)	(0.241)	(0.234)	(0.234)	(0.240)	(0.239)
IFRS_AD	-0.090***	-0.082***	-0.090***	-0.091***	-0.093***	-0.089***	-0.088***
	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)	(0.029)
AR_DISCL	7.277***	7.180***	7.236***	6.902***	7.315***	7.259***	7.521***
	(1.232)	(1.227)	(1.238)	(1.220)	(1.214)	(1.234)	(1.191)
CEO_TO	-0.376	-0.357	-0.378	-0.455	-0.397	-0.378	-0.410
	(0.300)	(0.301)	(0.298)	(0.309)	(0.298)	(0.298)	(0.298)
R^2	0.189	0.190	0.188	0.206	0.187	0.188	0.210
N	605	605	605	605	605	605	605
F-value	11.18	9.60	11.31	14.06	12.14	11.53	13.62

Notes: The dependent variable is a disclosure sub-score based on the four groups in Table 4. All other variables are defined in Table 3. Robust standard errors in parentheses. Year and industry dummies included but not reported. ***, **, and * indicate significance at 1%, 5%, and 10% respectively.

Table 13: OLS Subcategory Regression Estimates (dependent variable: Valuation Allowance Information)

	Panel A: Future Uncertainty Indicators			**Panel B: Historic Uncertainty Indicators**			
	I	II	IV	V	VI	VII	VIII
Constant	-13.418***	-12.134***	-12.698***	-13.051***	-12.927***	-12.859***	-12.899***
	(1.521)	(1.544)	(1.519)	(1.513)	(1.509)	(1.515)	(1.493)
AEF~TLC	0.704***						
	(0.247)						
AEF>TLC		-0.535**					
		(0.245)					
STDEV			0.001***				
			(0.000)				
LH_CUM				0.308			
				(0.384)			
LH_3Y					-0.009		
					(0.213)		
LH_5Y	-0.074	-0.112	0.100			0.117	
	(0.208)	(0.220)	(0.193)			(0.193)	
N_LOSS							-0.024
							(0.086)
ΔDTA_TLC	-0.018	-0.112	-0.008	-0.005	-0.005	-0.003	-0.006
	(0.058)	(0.076)	(0.058)	(0.057)	(0.057)	(0.057)	(0.057)
LOSS	-0.044	-0.049	0.098	-0.011	0.108	0.087	0.120
	(0.324)	(0.328)	(0.328)	(0.403)	(0.335)	(0.329)	(0.342)
SIZE	0.471***	0.429***	0.435***	0.450***	0.442***	0.439***	0.441***
	(0.071)	(0.070)	(0.071)	(0.071)	(0.071)	(0.071)	(0.070)
AN_FOL	-0.068***	-0.070***	-0.072***	-0.073***	-0.073***	-0.071***	-0.073***
	(0.020)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)	(0.021)
ΔEBT	-0.004	-0.003	-0.003	-0.003	-0.004	-0.003	-0.004
	(0.008)	(0.008)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
LEV	-0.783	-0.691	-0.461	-0.505	-0.436	-0.448	-0.428
	(0.628)	(0.623)	(0.611)	(0.626)	(0.613)	(0.614)	(0.613)

Table 13 Continued

	Panel A: Future Uncertainty Indicators			Panel B: Historic Uncertainty Indicators			
	I	II	IV	V	VI	VII	VIII
AUD	0.436**	0.520**	0.485**	0.466**	0.490**	0.477**	0.497**
	(0.200)	(0.204)	(0.208)	(0.213)	(0.208)	(0.207)	(0.210)
IFRS_AD	0.026	0.039	0.026	0.027	0.028	0.028	0.028
	(0.030)	(0.031)	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)
AR_DISCL	5.325***	5.142***	5.165***	5.213***	5.218***	5.264***	5.198***
	(1.021)	(1.035)	(1.042)	(1.048)	(1.050)	(1.043)	(1.048)
CEO_TO	-0.731**	-0.705**	-0.736**	-0.748**	-0.746**	-0.737**	-0.747**
	(0.306)	(0.306)	(0.303)	(0.304)	(0.303)	(0.303)	(0.303)
R^2	0.223	0.219	0.216	0.212	0.211	0.211	0.211
N	605	605	605	605	605	605	605
F-value	15.91	14.57	35.10	14.93	15.60	15.63	15.50

Notes: The dependent variable is a disclosure sub-score based on the four groups in Table 4. All other variables are defined in Table 3. Robust standard errors in parentheses. Year and industry dummies included but not reported. ***, **, and * indicate significance at 1%, 5%, and 10% respectively.