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## **Tax Loss Carryforward Disclosure**

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# Tax Loss Carryforward Disclosure

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## ABSTRACT

This study examines firms' voluntary disclosure of tax loss carryforward (TLCF) information. We identify a setting (conservative German accounting environment) under which the demand for TLCF disclosure is particularly pronounced and analyze firms' TLCF disclosure behavior while controlling for overall reporting quality. We argue and find that uncertainty about the usability of TLCF is the main driver of voluntary TLCF disclosure. Value relevance tests suggest that the incremental effect of disclosure under uncertainty is positive, indicating the usefulness of firms' voluntary disclosure. We also find that the content and type of disclosure vary systematically with the signal of uncertainty. While firms provide different kinds of complex TLCF information, investors only value very basic and less complex information. Our study provides detailed and unique insights into TLCF disclosure, documenting that managers enrich the information environment with voluntary disclosure that caters to expected investors' needs, but the perception of the content's usefulness is limited to simple information.

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

**JEL Classifications:** M41, M48

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# **Tax Loss Carryforward Disclosure**

## **ABSTRACT**

This study examines firms' voluntary disclosure of tax loss carryforward (TLCF) information. We identify a setting (conservative German accounting environment) under which the demand for TLCF disclosure is particularly pronounced and analyze firms' TLCF disclosure behavior while controlling for overall reporting quality. We argue and find that uncertainty about the usability of TLCF is the main driver of voluntary TLCF disclosure. Value relevance tests suggest that the incremental effect of disclosure under uncertainty is positive, indicating the usefulness of firms' voluntary disclosure. We also find that the content and type of disclosure vary systematically with the signal of uncertainty. While firms provide different kinds of complex TLCF information, investors only value very basic and less complex information. Our study provides detailed and unique insights into TLCF disclosure, documenting that managers enrich the information environment with voluntary disclosure that caters to expected investors' needs, but the perception of the content's usefulness is limited to simple information.

## **1. INTRODUCTION**

Information about tax loss carryforwards (TLCF) is complex and difficult to comprehend, but it is important for estimating future tax savings. The COVID-19 pandemic and the resulting financial problems for certain businesses have likely increased the amount of TLCF, highlighting the economic relevance of TLCF. To assess the effect of TLCF on firms' future tax payments, it is essential for financial statement users to understand the firm's potentially complex TLCF situation. Whether mandatory disclosure requirements produce sufficient information is unclear, evident, for example, from the Financial Accounting Standards Board's (FASB) Proposed Accounting Standards Update on Income Taxes (FASB 2019). The suggested amendments include additional disclosure requirements for TLCF and are intended to increase the usefulness of income tax disclosures for financial statement users. Research focuses primarily on the properties of TLCF, such as the use of tax losses over time (Cooper & Knittel, 2006) and the precision of TLCF measurement (Mills et al., 2003; Max et al., 2021; Heitzman & Lester, 2021). Yet, the reporting of TLCF information is underexplored. To date, we know little about how and when firms choose to supplement mandatory TLCF disclosure with additional voluntary information and whether the provided information helps investors better understand and value this important item. We address this question by analyzing the determinants of voluntary TLCF disclosure and whether investors value this information.

We study a setting in which we expect the demand for TLCF information to be particularly high. This allows us to examine how firms voluntarily cater to investors' information needs. The traditionally

conservative German accounting environment is such a setting because investors' valuation of the TILCF of German firms seems not to rely on deferred tax assets reported under International Financial Reporting Standards (IFRS) (Chluddek, 2011; Flagmeier, 2020). Generally, a possible way for firms to communicate the usability of TILCF is the recognition of deferred tax assets, making this item an important source of information for investors.<sup>1</sup> Accordingly, the literature on deferred taxes in other settings mainly provides evidence on the value relevance of this position (e.g., Amir & Sougiannis, 1999; Chang et al., 2009; Badenhorst & Ferreira, 2016). However, alternative information channels may become important if the recognition of deferred tax assets is more conservative and is thus perceived as less value relevant by investors (Flagmeier, 2020). Specific TILCF disclosures in the notes may serve as such an information channel. These institutional benefits of the German setting are reinforced by an innovative design feature of our study. We control for the general disclosure behavior of a firm based on proprietary data of the German yearly annual report competition of 'Manager Magazin'. This allows us to analyze the incremental tax reporting disclosure choice relative to the general disclosure policy of a firm.

Regarding the determinants of the disclosure decision, we predict that firms provide additional TILCF information when the future usability and hence the value of TILCF are uncertain. While the expectation to offset TILCF in the near future creates value for investors (McGuire et al., 2016), the existence of unusable TILCF indicates unfavorable earnings expectations or even further losses in the future (Amir & Sougiannis, 1999). It is therefore essential for investors to assess whether TILCF can offset future taxable income. Uncertainty about the usability of TILCF can create (or increase) capital market pressures, for example affecting the liquidity of a firm's shares and hence the cost of capital.<sup>2</sup> To avoid this scenario, firms can voluntarily provide TILCF information. This mechanism of using voluntary disclosure to mitigate information asymmetry is well established in the accounting literature (e.g., Verrecchia, 2001; Guay et al., 2016). However, TILCF is an economically important tax item with some unique features. First, unlike many financial accounting items, TILCF provides not only information about past events but also forward-looking information, which aids in assessing (potential) future tax savings and can be particularly informative for

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<sup>1</sup> As International Accounting Standard (IAS) 12 and other international standards allow the recognition of deferred tax assets only to the extent that the TILCF are expected to be usable, the recognized amount is an indicator of management's assessment of usability.

<sup>2</sup> Note that uncertainty does not necessarily mean that TILCF is unlikely to be used; rather, it means that it is *not clear* whether TILCF can be used.

investors. Second, the audience for tax information is generally broader than the primary target audience for financial reporting. In addition to outside equity investors, tax authorities, legislators and the general public are interested in a firm's tax details, potentially creating additional disclosure costs (e.g., Robinson & Schmidt, 2013; Bozanic et al., 2017; Müller et al., 2020). Third, gathering and editing the relevant TLCF information is costly, as it has to be derived from single entity tax statements (e.g., Smith Raedy et al., 2011; PwC, 2012). Fourth, due to the complex nature of TLCF information, high processing costs occur, which may distort the investor perception of such information. In sum, firms have incentives to disclose more TLCF information in the case of uncertain usability, but they also face disclosure costs.

To examine whether firms disclose more TLCF information if its usability is uncertain, we derive two signals of uncertainty from IAS 12: historic uncertainty resulting from a firm's loss history and future uncertainty based on expected future earnings (and hence loss-offsetting options). To measure TLCF disclosure, we create a disclosure score. The score captures all information about TLCF that is disclosed voluntarily, i.e., beyond the mandatory requirements under IAS 12. Each TLCF disclosure is evaluated regarding the information content and the type of information disclosed (e.g., qualitative vs. quantitative), including the way in which it is presented. This comprehensive approach allows us to distinguish between different disclosure properties and to draw granular inferences about firms' disclosure behavior. We apply the score to a sample of large German public firms between 2005 (after mandatory adoption of IFRS) and 2016, and we mainly hand-collect data from their annual reports' notes on income taxes.

We find that greater uncertainty about TLCF usability drives the voluntary disclosure of TLCF information. This positive association is economically meaningful: We find, for example, that the disclosure score is on average 3.96 points higher for firms with a strong loss history vis-à-vis firms without such a loss history, representing 45 percent of the average disclosure score. The finding holds for both signals of uncertainty, historic and future, and suggests that firms use their TLCF disclosure to guide users with TLCF information. A placebo test in which we use the annual report disclosure quality instead of the TLCF disclosure score yields mainly insignificant results, suggesting that firms' disclosure choices are TLCF specific. Furthermore, the result is robust to a battery of sensitivity tests, including a two-stage estimation to address endogeneity concerns and an exogenous uncertainty shock.

In cross-sectional tests, we divide the disclosure score into subcategories to investigate the properties of disclosure behavior. First, we find systematic disclosure behavior regarding the content, depending on the uncertainty signal. Firms increase their reporting of why and how TLCF changes or affects their current year's income in the case of historic uncertainty, while they increase their disclosure of valuation allowance information in the case of future uncertainty.<sup>3</sup> Second, the disclosure type partly varies with our uncertainty measures. Firms provide additional detail on TLCF items and enhance visibility via tables under both uncertainty signals. In the case of historic uncertainty, firms also tend to provide more quantitative information. Taken together, firms seem to disclose situation-adjusted TLCF information in terms of both content and ease of processing.

Next, we analyze whether the provided information is valued by investors. We find that the incremental association between TLCF disclosure and market value in the case of uncertainty is positive, suggesting that investors value the provided information. Cross-sectional tests on the type of disclosure indicate that investors' valuation follows firms' disclosure choices in that investors prefer additional details and the presentation of information in tables. With respect to content, investors' valuation seems not to be in line with firms' disclosure: while firms provide different kinds of complex TLCF information depending on the uncertainty signal, investors only value basic TLCF information. This basic information refers to items such as the total amount of TLCF or expiration dates. This finding indicates a mismatch between the supply of TLCF information and the usefulness of the information provided for investors.

We contribute to the literature in three ways. First, we advance the understanding of firms' strategic tax disclosure by providing insights into firms' disclosure behavior for TLCF, an economically important tax item with the unique nature of complex forward-looking information elements. Prior studies analyze the disclosure characteristics of the full tax footnote (Hutchens, 2017; Inger et al., 2018), disclosure related to the effective tax rate (Chen et al., 2018; Chychyla et al., 2022; Flagmeier et al., 2021), and book-tax difference disclosures in earnings releases (Schwab, 2009). Our analyses support and extend findings of increased voluntary tax-related disclosure in the case of high information asymmetry (Balakrishnan et al., 2019; Chen et al., 2018) and, in a broader context, voluntary disclosure as a response to financial statement

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<sup>3</sup> While the deferred tax recognition under IAS 12 does not use the concept of valuation allowance (in contrast to US GAAP), many firms voluntarily provide valuation allowance information.

complexity (Guay et al., 2016). These findings advance the understanding of tax disclosure decisions and tax footnote heterogeneity (e.g., Smith Raedy et al., 2011; Kvaal & Nobes, 2013).

Second, we add to the literature on the value relevance of TLCF information. In contrast to US-GAAP studies, the results of Chluddek (2011) and Flagmeier (2020) indicate that investors in a conservative accounting environment generally do not consider TLCF deferred tax assets to be value relevant. We assume that this creates demand for additional TLCF information. Hence, our setting enables us to investigate whether managers anticipate the need of investors for information and whether investors value the provided information. Our evidence suggests that investors value voluntary disclosure about TLCF but that this applies only to rather basic TLCF information. While firms respond to uncertainty with the disclosure of complex situation-adjusted specifics, investors seem not to consider these details in their valuation. This finding adds to recent evidence that retail investors fixate on certain tax information and ignore supplemental information that is harder to process (Dierynck et al., 2021). These insights are interesting for regulators, capital market participants, and firms, outlining potential future avenues for improving the usefulness of the tax footnote. As such, they speak to the FASB's proposed income tax disclosure amendments with respect to the suggested extension of disclosure requirements to additional TLCF information (e.g., disaggregated amounts and expiration dates).

Third, we extend the emerging literature that performs textual analyses of tax information (e.g., Hutchens, 2017; Inger et al., 2018) by introducing a disclosure score that captures the content and type of TLCF information. Our disclosure measure allows us to model disclosure decisions more precisely and to distinguish between the content and type of disclosure. The complexity of accounting for TLCF provides ample opportunities for voluntary disclosures. At the same time, such information is not easy to collect, present or comprehend, which provides a unique setting with an unclear cost–benefit balance. Hutchens (2017) identifies disclosure characteristics that improve analysts' understanding of the tax footnote and emphasizes the need for more research examining how disclosure characteristics affect users' ability to process tax information. Our findings improve the understanding of the content and type of voluntary disclosure (e.g., Chen et al., 2017; Li, 2010; Loughran & McDonald, 2016) and investors' valuation of certain tax attributes (Wilde & Wilson, 2018).

## **2. HYPOTHESIS DEVELOPMENT**

### **2.1.Uncertainty Definition**

Theoretical studies that analyze the value relevance of TLCF include De Waegenaere et al. (2003) and Sarkar (2014), both highlighting the ability of TLCF to reduce future tax payments. In line with this notion, empirical studies on US and Australian data mostly find a positive association between newly generated TLCF and stock returns (Amir & Sougiannis, 1999; Chang et al., 2009; McGuire et al., 2016). Without offsetting options, the TLCF is worthless and can be interpreted as a signal for further losses in future periods (Amir & Sougiannis, 1999). Investors can be assumed to be particularly interested in TLCF information when it is not obvious which of the two scenarios applies, i.e., when there is uncertainty about the usability of the TLCF. Our definition of uncertainty is derived from IAS 12.34: deferred tax assets “shall be recognized for the carryforward of unused tax losses [...] to the extent that it is probable that future taxable profit will be available against which the unused tax losses [...] can be utilized”. Hence, the expectation of future taxable profits is one of the key criteria to assess the value of TLCF. Another important aspect is the existence of a “history of recent losses” (IAS 12.35), which potentially increases the uncertainty about future taxable income. Firms are supposed to consider both factors in their recognition of deferred tax assets for TLCF, and we propose that investors rely on similar criteria to derive the value of TLCF. Based on these criteria, we derive two categories of uncertainty: future uncertainty related to the expectation of future income and historic uncertainty resulting from a history of losses.

### **2.2.Setting**

Firms can communicate private information about TLCF value via the recognition of deferred taxes for TLCF. For the recognition of deferred taxes, both IAS 12 and the US-GAAP Accounting Standards Codification (ASC) 740 require taxable profit in the future.<sup>4</sup> Hence, the amount of recognized deferred tax assets for TLCF is a signal of management’s earnings expectations. However, Chludek (2011) and Flagmeier (2020) examine a setting in which deferred taxes for TLCF do not provide sufficient information. Both studies analyze German firms and do not find value relevance of deferred tax assets for TLCF. A possible explanation is that German accounting is traditionally conservative (Leuz & Wüstemann, 2004) and restrictive regarding the recognition of deferred tax assets for TLCF. The recognition was not permitted

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<sup>4</sup> For institutional differences in accounting for deferred tax assets under both regimes, see, e.g., Flagmeier (2020).



under German local GAAP until 2002 and is to date still restricted to TILCF that can be offset within the next five years (§ 274 HGB). This conservative attitude toward deferred tax assets for TILCF might translate into recognition under international standards, as prior literature documents that reporting under IFRS is shaped by national reporting patterns (Kvaal & Nobes, 2012). Hence, in conservative accounting environments such as Germany, deferred tax assets for TILCF are perceived as less reliable by investors and thus may not be an appropriate way to communicate private information. Therefore, Germany is an ideal setting to investigate whether firms use an alternative channel – the disclosure of additional information in the notes – to reduce information asymmetries.

### **2.3. Disclosure Costs**

Information that goes beyond the mandatory disclosures, for example, reasons for changes in the amount of TILCF or when and why the firm expects to use the TILCF, can be of particular interest for capital market participants. Nevertheless, there are at least two reasons why firms might not disclose this information. First, gathering and editing the information is costly. Usually, firms derive tax information from single-entity tax returns, often from different jurisdictions. Aggregating this information at the group level can be a challenging task. According to researchers and practitioners, tax footnotes are very complex and costly to produce (Smith Raedy et al., 2011; PwC, 2012). In particular, the recognition of deferred tax assets is a controversial issue under both IFRS and US-GAAP. According to Petree et al. (1995), 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 firms face in estimating the amount of TILCF for the consolidated statement. Deutsche Post DHL states in their annual report for 2011 (p. 184) that a “...refined method for determining unused TILCF 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 TILCF amounts to 2.4 billion euros, which can be expressed as six percent of the firm’s total assets. This example illustrates that firms need sophisticated methods to determine the amount of TILCF at the group level, implying costs for the creation of the tax footnote.

Second, the provision of detailed tax information can reveal insights into firm performance (Lenter et al., 2003) and help estimate firms’ tax returns (Kvaal & Nobes 2013). These insights can involve proprietary costs (Verrecchia, 1983). For instance, Robinson and Schmidt (2013) analyze the disclosure of uncertain tax

benefit information under US-Standard FIN 48. They find lower disclosure quality, i.e., a lower level of compliance with the standard, for firms with higher proprietary costs. This finding is consistent with firms reducing their disclosure when they face high proprietary costs. Similarly, Bozanic et al. (2017) find that Internal Revenue Service (IRS) attention to tax positions is positively associated with TLCF, indicating that tax authorities are interested in this item.

In sum, capital market pressure can incentivize firms to increase their disclosure in the case of uncertainty, but they also have to consider the costs. We analyze whether firms expect a net benefit and therefore increase their disclosure for uncertain TLCF, and we pose the following hypothesis:

**H1:** The level of voluntary disclosure is positively associated with uncertainty about the usability of TLCF.

### 3. RESEARCH DESIGN

#### 3.1. Sample

To investigate the financial statement disclosure of TLCF, we employ a sample of hand-collected data from annual reports' notes on income taxes.<sup>5</sup> Further firm-specific accounting information is obtained from Refinitiv's Worldscope and the I/B/E/S database. Our sample comprises financial statements of listed DAX-30 and M-DAX firms over fiscal years 2005 to 2016 that are prepared in accordance with IFRS. Our sample period ends in 2016 because one of our main control variables (*AR\_DISCL* to control for the overall disclosure quality of a firm; for details, see the *Model* section) is no longer available after 2016. DAX-30 and M-DAX include the 80 largest and most liquid firms on the German stock market, based on free float market capitalization and exchange turnover.<sup>6</sup> Moreover, the information environment (e.g., disclosure requirements, investor relations, visibility, analyst following) is rather homogeneous for firms in these market segments in comparison to other German stock-listed firms. We exclude 17 non-IFRS observations and lose 38 observations due to a lack of availability of annual reports. Furthermore, the sample is reduced

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<sup>5</sup> Using footnote disclosures to assess a 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., 2019).

<sup>6</sup> We consider firms that are DAX-30 and M-DAX members on an arbitrary date: April 30, 2010. German firms listed on an EU-regulated market were required to adopt IFRS in their consolidated statements for each fiscal year beginning on or after January 1, 2005. An exception applies to firms that already used internationally accepted standards such as US-GAAP; they were allowed to postpone the adoption of IFRS until the financial year 2007 (European regulation 1606/2002). We exclude the respective US-GAAP statements from our sample.

by 183 observations with missing data, particularly for the variables *AR\_DISLC* (100) and *ADTA\_TLCF* (35), resulting in a final sample of 79 firms with 723 firm-year observations. Of these 723 observations, we can infer from the collected data that at least 721 firm-years have TLCF.<sup>7</sup> Our sample selection is detailed in Table 1.

[Insert Table 1 here]

### 3.2. Disclosure Level

To investigate the voluntary disclosure level, our measure captures all information that is provided beyond mandatory IAS 12 requirements.<sup>8</sup> To measure disclosure, prior studies commonly use a disclosure index (e.g., Chow & Wong-Boren, 1987; Raffournier, 1995; Makhija & Patton, 2004) that compares an expected or preferred list of items to the effectively disclosed figures and aggregates the results to a score. We do not want to restrict the collected data to a predefined set of items, and we want to avoid the subjectivity involved in setting up a list of disclosures. Thus, we employ a disclosure score based on the number of *all* voluntary TLCF disclosures weighted by their quality of presentation. While all items are considered in our disclosure score, we record the content of each item and classify them into different content groups, enabling us to analyze each content category separately in additional tests. This approach provides detailed insights into firms' disclosure behavior without restricting the scope of the analysis.

We measure the quality of presentation because prior research indicates that financial statement users rely on readily available and salient information. Hirst and Hopkins (1998) find that alternative presentations of the same information affect analysts' firm valuation judgments differently. Furthermore, Atwood and Reynolds (2008) document that the pricing of realized tax benefits from TLCF is affected by its presentation in income statements. Taken together, the way in which information is presented is important for the information processing of financial statement users. It can be assumed that clearer and more salient disclosure is easier to process and thus is preferred by analysts and investors.

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<sup>7</sup> In the tax footnotes of 721 of our 723 firm-year observations, we find either deferred tax assets recognized for TLCF or, in 23 cases where the amount is zero, other information indicating the existence of TLCF (including the total amount of TLCF for 21 observations, the nonusable TLCF for one observation, and the deferred tax effect due to unused tax losses for one observation). There are only two observations with zero deferred taxes for TLCF and without other evidence for the existence of TLCF, indicating that no TLCF exists for these two firm-years.

<sup>8</sup> See Appendix A for the distinction between mandatory and voluntary information.

Hence, to measure the quality of tax disclosure, we examine the way in which an item is presented.<sup>9</sup> We apply a scale developed for the German ‘Best Annual Report’ competition and used by a number of prior studies, e.g., Daske (2005) and Glaum et al. (2013). Disclosed items are analyzed and scored according to their level of detail and form of disclosure, which we summarize as disclosure type. A higher score is assigned if an item is a precise number vs. an interval or qualitative information.<sup>10</sup> Table 2 Panel A provides an overview of the scale, and Panel B and Appendix C give examples of how points are assigned.

[Insert Table 2 here]

We apply the scale to every voluntary TILCF item to account for disclosure type.<sup>11</sup> We then add the scores of the same year and firm to obtain one score for each firm-year observation. The resulting score is our dependent variable *DISCL*, as presented in Figure 1.

[Insert Figure 1 here]

### 3.3. Uncertainty

The usability of TILCF depends on the availability of sufficient taxable income in future years. Our uncertainty proxies include direct future estimates as well as historic indicators. They are derived from IAS 12.35-12.36, which propose criteria to assess the probability that taxable profit will be available against which unused tax losses can be utilized. These proxies serve two roles at the same time. They are used not only by firms to determine whether deferred tax assets for TILCF must be recognized but also by investors who may use these proxies to assess the usability of TILCF. Consequently, information underlying the firms’ probability assessment beyond the recognized amounts could ease investors’ uncertainty about the value of TILCF.

#### 3.3.1. Future Indicators

The future estimates measure different aspects of expected earnings. The best available proxy of future

<sup>9</sup> 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 judgment and make the findings very hard to replicate (Healy & Palepu, 2001).

<sup>10</sup> The degree of quantification is commonly used in recent literature to assess the readability of disclosure, e.g., Lundholm et al. (2014).

<sup>11</sup> If mandatory items are disclosed with additional information, we classify the additional information as voluntary disclosure. For example, Merck (annual report 2014, 198) discloses the deferred tax assets for TILCF (mandatory) and splits it into the amount based on German TILCF and TILCF from abroad (voluntary, score: 1.5).

earnings is analysts' earnings forecasts. For our main uncertainty measure, we compare expected earnings with the amount of usable TLCF. 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 a forecast can lead to the unexpected offsetting or nonoffsetting of the TLCF. In this situation, we expect that investors demand more information about the TLCF. In contrast, if forecasts far exceed carryforwards (II), there is little doubt that the TLCF can be used, and additional disclosure is less necessary. If, on the other hand, carryforwards largely exceed forecasts (III), the prediction is less clear. Two different scenarios can be applied. If the forecast is smaller than the TLCF and negative, it is obvious that the TLCF cannot be offset in the near future, and there is little uncertainty about usability. In contrast, if the forecast is smaller than the TLCF and positive, part of the TLCF is usable, but for the remaining part of the TLCF, usability is hard to predict. In this second scenario, uncertainty increases. Given the opposing effects depending on the two outlined scenarios, we make no prediction about disclosure for the third case (III).

As a basis for our future indicators, we use the last mean earnings before tax (EBT) analyst forecast for year  $t+1$ , issued before the end of fiscal year  $t$ , provided by I/B/E/S. At this point in time, financial statement notes for period  $t$  are not available and cannot affect the forecast, reducing concerns about reverse causality.<sup>12</sup>

The amount of TLCF is not available in standard databases and must be hand-collected from tax footnotes. However, IAS 12 does not require the disclosure of this amount, and only 16 percent of our observations disclose it voluntarily. Thus, we calculate TLCF by grossing deferred tax assets recognized for TLCF. If the tax rate is disclosed, we divide deferred tax assets for TLCF by the tax rate that the firm uses to calculate deferred taxes; otherwise, we divide it by the statutory tax rate.<sup>13</sup>

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<sup>12</sup> However, if the reporting behavior within firms is relatively stable, we cannot discard the possibility that the expected disclosure in  $t$  (based on the disclosure in  $t-1$ ) affects the uncertainty variables in  $t$ .

<sup>13</sup> A comparison of the calculated amounts with the disclosed TLCF amounts (when they are provided) yields an average deviation of 5.79 percent. Despite the low deviation, we employ a number of robustness checks to test the sensitivity of our findings. If we use the amount of TLCF as disclosed in the annual report when it is available and use the calculated amount otherwise, we find qualitatively unchanged results. Further robustness tests are provided in Section 6.

On the basis of the forecast and the TLCF, we calculate the difference between the two amounts. For case I), we create an indicator variable,  $AEF \approx TLCF$ , that has a value of 1 if the difference lies in the two deciles around zero. We expect  $AEF \approx TLCF$  to have a positive association with disclosure because uncertainty increases when forecasts are close to TLCF. For case II), we create a second indicator variable,  $AEF > TLCF$ , that has a value of 1 when earnings forecasts are higher than TLCF and the difference is not included in the two deciles around zero. We expect a negative relation because less disclosure is needed when the forecast is considerably higher than the TLCF. For case III), our third indicator variable,  $AEF < TLCF$ , has a value of 1 when the amount of TLCF is higher than the forecast and the difference does not lie within two deciles around zero. We have no ex ante expectation for  $AEF < TLCF$ .

Another factor to consider in assessing uncertainty is the dispersion of forecasts. Large variation in forecasted earnings indicates disagreement between analysts and complicates the evaluation of TLCF usability from the investors' perspective. Therefore, our fourth future indicator,  $STDEV$ , measures the standard deviation of the last mean EBT forecast for the following fiscal year, scaled by the absolute value of  $AEF$ . We expect a positive association because higher dispersion signals uncertainty among analysts and increases the demand for disclosure.

### 3.3.2. Historic Indicators

The role of historic indicators is twofold. First, they indicate whether a firm has any information to disclose about TLCF. Without prior negative earnings and accordingly without TLCF, no information about this item can be disclosed. Although nearly all of our sample firms have TLCF (see Footnote 7 for details), it seems plausible that a firm has more to tell about TLCF if the loss emerged in the recent past than if TLCF resulted from negative earnings ten years ago. Accordingly, we expect a higher level of disclosure if a firm had losses in recent years, indicating more disclosure if more information is available. Nevertheless, a firm still has to decide whether to publish the information in light of the incentives and costs discussed above.

Second, the historic indicators are alternative proxies for uncertainty. Regarding the assessment of TLCF usability, an 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. Hence, it is harder to assess the usability of TLCF if a firm has a recent loss. Based on the literature, we expect higher uncertainty and hence

higher disclosure if a firm has a history of recent losses.

We use three different historic indicators. The first indicator variable, *LH\_5Y*, measures whether a firm had at least one negative EBT in the past five years. The second variable, *LH\_CUM*, is based on the accounting standards' definition of a loss history and is more restrictive than the first proxy: the variable has a value of 1 if a firm has a cumulative negative EBT in the current and the two previous years.<sup>14</sup> Hence, only very large losses are considered here. The third measure, *N\_LOSS*, counts the years with negative EBT in the past five years and ranges from zero to five. For all historic indicators, we expect a positive association with *DISCL* because the existence and a higher frequency of losses should increase uncertainty and hence disclosure.

### 3.4. Model

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

$$DISCL_{it} = \beta_0 + \beta_1 FUTURE\ INDICATOR_{it} + \beta_2 HISTORIC\ INDICATOR_{it} + \sum \beta control_{it} + \varepsilon_{it} \quad (1)$$

where firms are identified by *i* and years by *t*. Detailed variable definitions are presented in Appendix B. We estimate the model separately for each of our four future indicators, *AEF≈TLCF*, *AEF>TLCF*, *AEF<TLCF*, and *STDEV*. Given that the historic indicators not only serve as alternative proxies for uncertainty but also indicate the availability of TLCF 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.<sup>15</sup> Additionally, we re-estimate the model focusing only on one of the different historic variables, *LH\_5Y*, *LH\_CUM*, or *N\_LOSS*.

Our control variables are derived from the disclosure literature and the specific characteristics of TLCF. The first is *ADTA\_TLCF*, denoting the change in deferred tax assets for TLCF. This item can indicate management's earnings expectations because international accounting standards allow the recognition of deferred tax assets only if sufficient future taxable income is likely to be available. However, whether a change in deferred tax assets increases or reduces the voluntary disclosure level is unclear. An increase in

<sup>14</sup> As IAS 12 does not define a loss history, we use the US-GAAP definition of ASC 740.

<sup>15</sup> Untabulated tests show that using *LH\_CUM* or *N\_LOSS* instead basically does not change the inferences for our test variables. See Footnote 20 for details.

deferred tax assets for TILCF can, on the one hand, indicate new TILCF and hence the opportunity to disclose more information. On the other hand, an increase can indicate improved earnings expectations that result in the recognition of deferred tax assets on existing TILCF. In both scenarios, it is not obvious whether or how new deferred tax assets affect uncertainty about TILCF usability and hence the voluntary disclosure level. We calculate  $\Delta DTA\_TILCF$  as the change in deferred tax assets for TILCF 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 TILCF and draw more attention to the topic, possibly increasing disclosure. The indicator variable *LOSS* has a value of 1 if the firm has a negative EBT in the current year and zero otherwise.

Furthermore, previous research indicates a significant association between the level of disclosure and firm size (*SIZE*) (Cooke, 1989; Craig & Diga, 1998), analyst following (*AN\_FOL*) (Lang & Lundholm, 1996), leverage (*LEV*) (Meek et al., 1995; Ismail & Chandler, 2005), profitability (*AEBT*) (Singhvi & Desai, 1971; Broberg et al., 2010), audit firm (*AUD*) (Singhvi & Desai, 1971), and CEO turnover (*CEO\_TO*) (Kwak et al., 2011). In addition, we control for experience with accounting regulations by measuring the number of years that have passed since the firm adopted IFRS/IAS (*IFRS\_AD*).<sup>16</sup>

To address the concern that the variation in TILCF disclosure might be attributed to differences in a firm's overall disclosure behavior, we include a proxy for the annual report disclosure quality (*AR\_DISCL*). This is an important control variable, as it is a measure for the general (TILCF-unrelated) disclosure behavior of a firm. The score is based on the German yearly annual report competition of 'Manager Magazin' (the same as the scale for our dependent variable *DISCL*). For this competition, every year, the annual reports of large German listed companies are analyzed with respect to content, design, and language by a research group. The advantage of using this well-established score (Daske, 2005; Glaum et al., 2013) instead of, for example, the length of the annual report is that it incorporates the same disclosure characteristics for the full annual report that we study for TILCF, i.e., content and disclosure type. We use the results of the 'annual report content' category for which the scores range from zero to 100 (100 denotes the highest level of content

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<sup>16</sup> Our starting point for this variable is 1995; i.e., if a firm adopted IFRS (or IAS) before 1995, this variable understates 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.



quality).<sup>17</sup> The score is divided by 100, resulting in a score between zero and one for our variable *AR\_DISCL*, with a higher score indicating higher quality of content.

To control for other unobserved effects, we include year and industry fixed effects (one-digit Standard Industrial Classification (SIC) code).

## 4. FIRMS' DISCLOSURE CHOICE

### 4.1.Descriptive Results

To assess disclosure, we first investigate the content of the TLCF information in annual reports' notes. We identify 15 different voluntary items. Table 3 gives an overview of the items and the frequency of these disclosures. Each item appears in several firm-years, and the column "Absolute" presents the number of observations that disclose the item. The column "Percent of Total Observations" puts this number in relation to the total number of 723 observations.

[Insert Table 3 here]

The most frequent disclosure is the effect of TLCF on tax reconciliation in 52 percent of all annual reports. In addition, 43 percent of the observations disclose the total amount of TLCF. Four other voluntary disclosures are reported in at least 30 percent of statements: the expiration date of total TLCF, deferred tax income/expenses recognized in the current year's income statement due to unused TLCF, valuation allowance for deferred tax assets on TLCF, and distinction between corporate tax loss and trade tax loss. To group the different items, we divide the voluntary disclosures into four subcategories. The first contains basic information about TLCF, i.e., amount and expiration date. The second category comprises items that explain why or to what extent TLCF (or the recognized deferred taxes) have changed, have been used or have affected the 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

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<sup>17</sup> Scores for the periods 2005 to 2012 and 2014 to 2016 are obtained from 'Manager Magazin' or are provided directly by the Baetge research group. For 2013, the annual report contest was not carried out; therefore, we use data from an alternative contest, 'Investors' Darling', which is organized by the Chair of Accounting and Auditing at the Leipzig Graduate School of Management (HHL). The data are available online (ID 2020) and start in 2013. We use the scores in the 'reporting annual report' category, which also range from zero to 100. To ensure the two rankings are comparable, we examine the yearly correlation of the scores for the overlapping years 2014 to 2016. We find a positive and significant (at least at the five percent level) Spearman correlation of between 0.38 and 0.40. If we instead drop all observations for 2013 (59 observations), the results are qualitatively unchanged.

further analyze the four groups by estimating our main model separately for each of the disclosure groups. Details are outlined in the subcategory regression section.

[Insert Figure 2 here]

Figure 2 shows boxplots of the disclosure score *DISCL* for the three uncertainty indicators that compare the earnings forecasts and TLCF:  $AEF \approx TLC$ ,  $AEF < TLC$ , and  $AEF > TLC$ . The figure indicates the highest disclosure score if earnings forecasts and TLCF are close ( $AEF \approx TLC$ ) with respect to the upper adjacent value and the outside values. We expect this variable to capture a situation with high uncertainty. The lowest disclosure scores are visible for  $AEF > TLCF$ , which we assume to signal a low level of uncertainty.

Table 4 presents summary statistics, and Table 5 presents a Spearman correlation matrix. The average voluntary disclosure score per year and firm (*DISCL*) amounts to 8.88 with a median of 7.5 and a range from 0 to 42. Approximately 19 percent of our observations have a difference between forecasts and carryforwards close to zero ( $AEF \approx TLC$ ), 10 percent have a carryforward surplus ( $AEF < TLC$ ) and 72 percent have a substantively higher forecast than TLCF ( $AEF > TLC$ ). Approximately 8 percent of observations have a dominating loss in the current three-year period (*LH\_CUM*), and 31 percent have at least one loss in the five previous years (*LH\_5Y*). The correlation matrix indicates a positive and significant association of *DISCL* with the uncertainty variables and a negative association with  $AEF > TLCF$ , which represents lower uncertainty. These correlations provide preliminary support for the hypothesized increase in TLCF disclosure under uncertainty.<sup>18</sup>

[Insert Table 4 and Table 5 here]

## 4.2. When Is Additional TLCF Information Disclosed? Disclosure Score Regression Results

We estimate a pooled cross-sectional regression with standard errors clustered by firm (reported in parentheses).<sup>19</sup> Panel A of Table 6 gives an overview of the results for the *FUTURE INDICATORS* in columns I-IV; Panel B shows columns V-VII with the different *HISTORIC INDICATORS*. Year and industry

<sup>18</sup> The matrix further shows some very high and significant correlations, for example, between *SIZE* and *AEF* (0.866) and between *N\_LOSS* and *LH\_5Y* (0.984). However, these correlations do not create multicollinearity concerns, as the respective variables are not simultaneously included in our models.

<sup>19</sup> If we estimate a Tobit regression instead of OLS to control for the nonnormal distribution properties of our dependent variable *DISCL*, inferences are not affected.

fixed effects are included in all models but are not reported.

[Insert Table 6 here]

Consistent with our expectations,  $AEF \approx TLCF$  and the dispersion of earnings forecasts measured by  $STDEV$  have significant coefficients with a positive sign. The results indicate that firms disclose on average more information when TLCF usability is uncertain because TLCF is close to earnings forecasts or because it is harder to estimate future earnings. We expect and find a negative and significant coefficient for  $AEF > TLCF$ , indicating that if TLCF is expected to be offset in the following fiscal year, uncertainty is low and less disclosure is provided. We do not make an ex ante prediction for the sign of  $AEF < TLCF$  and do not find significant results, in line with the unclear theoretical expectation. The results for the *FUTURE INDICATORS* are robust to the inclusion of one of the *HISTORIC INDICATORS* ( $LH\_5Y$ ) to control for the availability of TLCF information.<sup>20</sup> In columns V-VII (Panel B) with the *HISTORIC INDICATORS*, we find positive and significant coefficients for all loss history variables. At this point, we cannot disentangle whether the relation between disclosure and recent losses is driven primarily by the availability of TLCF information or by uncertainty about future earnings. To control for the availability of information, we estimate a selection model in the robustness section.

Regarding the magnitude of the documented relations, firms' disclosure score is on average two points higher if their earnings forecasts and TLCF are close to each other ( $AEF \approx TLCF = 1$ ). This difference can, for example, result from additional quantitative information (2 points) or the disclosure of information in a table (1.5 points) that was previously presented in the text plus an additional qualitative item (0.5 points). Observations with a cumulative loss history ( $LH\_CUM$ ) have, on average, a disclosure score nearly four points higher than the score of firm-years without a cumulative loss history, which can, for example, indicate additional quantitative information (2 points) presented in a table (1.5 points) and an additional qualitative item (0.5 points).

For our control variables, we find significantly positive coefficients for  $\Delta DTA\_TLCF$ , indicating that

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<sup>20</sup> After including  $LH\_CUM$  or  $N\_LOSS$  instead, we find no changes in the coefficient signs, minor changes in coefficient size and the following change in significance for the variables of interest: insignificance (significant at 5 percent in the main test) for the coefficient of  $STDEV$  if  $LH\_CUM$  is included and significance at the 10 percent level (5 percent in the main test) for the coefficients of  $AEF > TLC$  and  $STDEV$  when  $N\_LOSS$  is included.

more voluntary TLCF information is disclosed if deferred taxes for TLCF increase. Furthermore, we find significant coefficients for *SIZE* (positive) and *AN\_FOL* (negative), in line with higher disclosure scores for larger firms with fewer analysts following them. With respect to the control variable *AR\_DISCL*, we find a strong positive relation with *DISCL*, as expected. This finding suggests related disclosure behavior in the tax footnote and the overall annual report, yet incremental TLCF disclosure is significantly associated with uncertainty.

To further address the concern that tax disclosures mirror the overall disclosure strategy of a firm, we employ a placebo test and substitute our TLCF disclosure score *DISCL* with our control *AR\_DISCL* as the dependent variable and rerun the baseline model. If firms increase their overall disclosure in the case of uncertainty, we should find similar results for the uncertainty variables as in our baseline model. The results for the different model specifications are reported in the online appendix. The findings support the positive association between *DISCL* and *AR\_DISCL*. However, the remaining results differ considerably from our baseline findings. The *HISTORIC INDICATORS* have negative coefficients (reverse to our baseline model), significant only for *N\_LOSS*. 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 TLCF, and the standard deviation of earnings forecasts is a rather generic measure of uncertainty. Our findings thus align with the results of Chen et al. (2002), indicating that the overall disclosure quality increases in the case of uncertain future earnings but also suggesting that this does not hold in the case of TLCF-specific uncertainty. This result corroborates our baseline finding that firms provide specific voluntary tax disclosures where they anticipate investors' need for additional information.

### **4.3. What Kind of Information Is Disclosed?**

#### *4.3.1. Content*

Next, we aim to shed light on the nature of disclosed information, i.e., content and type. In Table 3, we identify four groups of disclosed items: 1) *Basic TLCF Information*, 2) information about *Changes and 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 subcategories 1) to

3).<sup>21</sup> Table 7, columns I to III, shows the aggregated estimation results. Each coefficient is from a separate estimation of the basic Model (1) with the respective disclosure subscore as the dependent variable. Full estimation results for all models are available in the online appendix.

[Insert Table 7 here]

The dependent variable in column I is the disclosure score for the *Basic TLCF Information*. We do not find a significant relation of the score with future or historic uncertainty indicators. For the *FUTURE INDICATORS* and one of the *HISTORIC INDICATORS* (*LH\_5Y*), the signs are opposite to those in our main tests. This finding suggests that the disclosure of essential TLCF information is unrelated to uncertainty about TLCF usability. Column II presents the results for *Changes and Effect on Income*. We see a strong significant 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 TLCF and the respective deferred taxes have changed and affected the current year's income. The results for the disclosure category *Valuation Allowance Information* are shown in column III. The results are opposite to those in column II: all *FUTURE INDICATORS* have significant coefficients with the expected sign, while the *HISTORIC INDICATORS* have insignificant coefficients. This finding indicates that the results for the forward-looking uncertainty proxies are driven mainly by valuation allowance information. When uncertainty about TLCF usability increases, firms have to adjust the amount of recognized deferred tax assets and report the respective valuation allowance activities in the tax footnote.

In sum, evidence from the disclosure content subcategories suggests three conclusions. First, in the case of forward-looking uncertainty, firms primarily provide valuation allowance details. Second, in the case of recent losses, firms mainly provide information about TLCF changes and the effect on the current year's income. Third, providing basic TLCF information seems to be unrelated to both types of uncertainty. Taken together, firms cater to the anticipated information needs of financial statement users by providing more explanations and guidance when TLCF usability is uncertain.

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<sup>21</sup> 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). Furthermore, we exclude  $AEF < TLCF$  from this set of tests because we have no clear prediction or finding of a significant relation with our aggregated disclosure score.

### 4.3.2. Type of Disclosure

We document the choice of disclosure type in columns IV to VIII of Table 7. The categories are based on the construction of the disclosure score (Table 2) and reflect the type and presentation of information. While *Quantitative Information* is rather associated with *HISTORIC INDICATORS*, *Qualitative* or *Interval Information* hardly exhibits any statistically significant association. In contrast, providing *Additional Detail* or highlighting information in *Tables* appears to be a frequently used disclosure choice when TLCF uncertainty is high, as both categories have highly significant coefficients with the expected signs for *FUTURE* and *HISTORIC INDICATORS*. Taken together, under uncertainty, firms prefer to disclose easily usable information (i.e., quantitative) and enhance the processing of stakeholders by making this information visible in the tax footnotes.

## 5. VALUE RELEVANCE OF VOLUNTARY TLCF DISCLOSURE

In the next step, we investigate whether and how investors respond to TLCF-related disclosure. On the one hand, TLCF information is necessary to determine the tax shield and thus is value relevant. On the other hand, dealing with complex tax information requires expertise, and the disclosure thus may not be processed adequately, as previously documented by Chluddek (2011) and Flagmeier (2020) for deferred taxes. If our disclosure score is associated with market value, then voluntary disclosures indeed reflect relevant information.

### 5.1. Market Test Model

Our first market test focuses on the main disclosure variable, *DISCL*. To assess the market value of TLCF disclosure, we estimate the following version of the Ohlson (1995) model:

$$Q_{it} = \gamma_1 BVE_{it} + \gamma_2 EBT_{it} + \gamma_3 EBT_{it} * LOSS_{it} + \gamma_4 LOSS_{it} + \gamma_5 DTA\_TLCF_{it} + \gamma_6 DISCL_{it} + \gamma_7 FUTURE INDICATOR_{it} + \gamma_8 HISTORIC INDICATOR_{it} + \gamma_9 DISCL_{it} * UNCERTAINTY INDICATOR_{it} + \zeta_{it} \quad (2)$$

The dependent variable, *Q*, captures firms' market value and is Tobin's *Q* measured as market capitalization three months after the fiscal year end scaled by total asset. *BVE* is the book value of equity scaled by total assets, and *EBT* is earnings before taxes scaled by total assets. The interaction between *EBT* and *LOSS* controls for negative earnings. *DTA\_TLCF* are deferred tax assets for TLCF scaled by total assets, and all remaining variables are defined as before. Similar to Model (1), we include either one of the *FUTURE*

*INDICATORS* and the *HISTORIC INDICATOR LH\_5Y* as a control or alternatively include only one of the *HISTORIC INDICATORS*. The main coefficient of interest is  $\gamma_9$ , indicating the incremental value relevance of the disclosure score, *DISCL*, in the case of uncertainty.

## 5.2. When Is Additional TLCF Information Valued? Disclosure Score

The results are provided in Table 8 and show significant and reasonable coefficients for book value and earnings variables (see, e.g., Chen et al., 2017). *DISCL* has insignificant coefficients in the *FUTURE INDICATOR* models and negative and significant coefficients in the *HISTORIC INDICATOR* models. However, interactions of *DISCL* with the uncertainty variables show coefficients with the expected sign, weakly significant for two of the *FUTURE INDICATOR* variables (*AEF $\approx$ TLCF* and *AEF $>$ TLCF*) and significant at the five percent level for the *HISTORIC INDICATOR* variables. These findings indicate that in the case of (in particular historic) uncertainty, TLCF disclosure has an incremental positive association with market value. This result supports the usefulness of firms' disclosure: in the case of uncertainty about TLCF usability, investors value additional TLCF information, and firms anticipate this demand and provide the information to avoid or mitigate negative capital market consequences.

[Insert Table 8 here]

## 5.3. What Kind of Information Is Valued?

### 5.3.1. Content

Next, we again disaggregate the disclosure score to assess the content and type of disclosure that drive the association with firm value. Table 9 provides a summary of the estimations, presenting the interaction between the respective disclosure subcategory and the different uncertainty variables. Each coefficient is from a separate estimation, including all control variables from Model (2), one of the uncertainty variables (or two in the case of *FUTURE INDICATORS* because *LH\_5Y* is included as a control), the disclosure subcategory score, and the interaction between the uncertainty variable and the disclosure subcategory. The full results are available in the online appendix.

[Insert Table 9 here]

Columns I to III present the results for the disclosure content subcategories. Interestingly, neither the *Changes and Effect on Income* nor the *Valuation Allowance Information* category shows any significant coefficients for the interaction terms. This result is surprising, given that firms systematically provide information on *Changes and Effect on Income* (*Valuation Allowance Information*) under historic (future) uncertainty (see Table 7). It seems that this information is not associated with market value. Potential explanations could be that the information does not provide news to the capital market or that complexity hinders processing. The latter explanation is also consistent with our highly significant findings in column I (for all but one uncertainty variable) for *Basic TLCF Information*, representing a piece of information that is likely less complex and easier to process for market participants. Taken together, these findings suggest a discrepancy between the information content provided by firms under uncertainty and the kind of information that is perceived as useful by investors.

### 5.3.2. Type of Disclosure

Finally, we examine the relation between market value and subcategories for the type of disclosure, presented in columns IV to VIII of Table 9. In line with firms' disclosure choices, the categories *Additional Detail* and *Table* show mainly significant interaction coefficients, indicating that capital market participants appreciate visible and detailed TLCF information under both types of uncertainty. *Quantitative Information* shows a weak association with firm value when combined with historic uncertainty, corresponding with firms' disclosure behavior. We document significant coefficients for some interactions between uncertainty variables and interval information, suggesting that investors also value this information, although firms do not increase its disclosure under uncertainty. Similarly, in the case of future uncertainty, investors also seem to value *Qualitative Information*. Our most generic uncertainty proxy, *STDEV*, is insignificant in all specifications, indicating that TLCF disclosure is only valued under TLCF-specific uncertainty.

## 6. SENSITIVITY ANALYSES

### 6.1. Exogenous Uncertainty Shock

To validate our baseline results, we examine the European sovereign debt crisis as an exogenous shock to uncertainty. The financial sector was hit severely by charges on Greek debt, and concerns emerged about whether the euro zone would prevail (Rooney, 2011; Viñals, 2011). This situation creates high uncertainty about future earnings, particularly for the financial industry. 2011 was characterized by large write-offs on



debt that hit profits for several financial institutions. To avoid the direct effect of current negative earnings on TLCF disclosure, we examine disclosure in 2012.<sup>22</sup> The advantage of the year 2012 is that while there is a high uncertainty about future earnings (Laurent & Slater, 2012), current operating earnings in German Financial Institutions were still positive.<sup>23</sup> To examine whether firms in industry finance, insurance, and real estate increase TLCF disclosure in 2012, we include an interaction of a year-2012 indicator and a finance-industry indicator in our baseline Model (1). The results for the interaction variable show positive and significant coefficients (tabulated in the online appendix). The remaining results for our other uncertainty indicators and control variables are qualitatively unchanged. This finding indicates that those firms that face an exogenous rise in uncertainty about future earnings (and hence TLCF usability) increase TLCF disclosure, corroborating our baseline results.

## 6.2. 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. The results do not change qualitatively. This finding could indicate that the number of disclosures is the driving force of the observed main effect. However, we leave it for future research to further disentangle the effect of the amount of disclosed information and the way the items are presented.

## 6.3. Forecasting Horizon

We examine the robustness of our future uncertainty indicators and begin with the forecasting horizon. Anecdotal evidence indicates that firms often use forecasting horizons of more than one year to assess TLCF usability.<sup>24</sup> We use the forecast for only one year in our main tests for the following two reasons. First, we expect to obtain 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. However, in this robustness test, we repeat our main tests by using the sum of the forecasts for  $t+1$  and  $t+2$  to create the uncertainty proxies. Our sample is reduced by nine observations. We can no longer estimate

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<sup>22</sup> If current earnings are also affected, it is again more difficult to disentangle an increase in disclosure due to higher current TLCF and an increase due to higher uncertainty about the future usability of TLCF (which we aim to identify). Similar identification problems characterize other potential exogenous shocks, such as the financial crisis 2007/2008 or the COVID-19 pandemic.

<sup>23</sup> We inspect EBT for all of our sample firms in the financial industry in the year 2012 and find no firm with a pretax loss.

<sup>24</sup> Examples for a longer forecasting horizon are Klöckner & Co. SE with three years (annual report 2010, 154) and Rhön-Klinikum AG with five years (annual report 2012, 146).

the model with  $AEF < TLCF$  because under this classification, there is no case in which TLCF is considerably higher than the cumulated forecast. The results for the remaining two uncertainty variables,  $AEF \approx TLCF$  and  $AEF > TLCF$ , have the same sign and are both significant at the one-percent level, suggesting that our findings are robust to this modification.

## 6.4. Other Tests

In the online supplement, we further examine the robustness of our results. In particular, we address potential sample selection concerns estimating (i) a Heckman (1979) selection model.<sup>25</sup> The first step specifies a probit regression and models the availability of TLCF 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. In sum, except for the standard deviation, the results of the selection model corroborate our baseline findings.

To control for the effect of outliers, we (ii) truncate all continuous variables above the 99<sup>th</sup> percentile and below the 1<sup>st</sup> percentile or (iii) exclude bank, insurance, and financial firms from our sample (SIC Code 60-67). To examine the robustness of our findings to the effect of the financial crisis (iv), we drop the crisis years 2008 and 2009 from our sample (reducing the sample by 141 observations). Additionally, we test the sensitivity of our results by (v) including different additional variables controlling for the materiality of TLCF, internationalization of the firm, and market based uncertainty measures. Throughout these modifications our results remain robust.

## 7. CONCLUSION

This study provides a comprehensive analysis of firms' voluntary TLCF disclosures using data hand-collected from tax footnotes. We analyze when and how firms report TLCF information in a German setting characterized by a high demand for voluntary TLCF disclosure due to a lack of confidence in deferred tax assets on TLCF (Chluddek, 2011; Flagmeier, 2020). We examine different future and historic signals for

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<sup>25</sup> Another possible remedy for correlated omitted variables is firm fixed effects (Amir et al., 2016). However, firm-fixed effects are only useful if the omitted variable is time invariant. Furthermore, firm-fixed effects models have limited power if the variables of interest have little variation over time (Prabhala & Li, 2008) and can in this case even eliminate the variation of interest (Roberts & Whited, 2013). We believe that firm-fixed effects are not a suitable remedy in our setting because we assume the omitted variable to be time variant (the availability of TLCF information changes over time, e.g., depending on the emergence of new losses or the offsetting of existing losses) and because much of the variation in our data probably comes from the cross-section. 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.

uncertainty about the usability of TLCF and find a strong positive association between disclosure and uncertainty. Disaggregating our disclosure score indicates that firms disclose information on changes and the effect on income if uncertainty is created by (historic) losses and disclose valuation allowance-related information if uncertainty is based on (future) forecasts. The type of disclosure is primarily quantitative with additional details, and information is reported in a table. Value relevance tests suggest that investors consider the TLCF information in firm valuation, particularly easily processable basic TLCF information, quantitative information or interval information with additional details, and they prefer that the information be presented in a table. Our findings are robust to our controlling for the availability of TLCF information in a selection model and to several other sensitivity tests. Furthermore, our findings suggest that TLCF disclosure is specific to the tax footnote and does not simply reflect the overall disclosure policy of a firm.

We contribute to the tax disclosure literature with a comprehensive textual analysis of a unique TLCF disclosure dataset. TLCF information can be highly useful in estimating a firm's future net income, and it is important to understand whether firms' disclosure is helpful in this regard. Our findings indicate strategic disclosure behavior that mainly caters to investors' need for additional information regarding the type of disclosure. In regard to content, firms' disclosure depends on the signal of uncertainty about TLCF usability, while investors seem only to value basic and easy-to-process information, irrespective of the uncertainty signal. This finding indicates a partial mismatch between the supply of TLCF information and its usefulness for investors, which is potentially interesting for regulators, investors, and firms. It also outlines the complexity of TLCF information and calls for future research on how firms could further improve the informativeness of their tax disclosures.

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## FIGURE AND TABLES

**FIGURE 1**

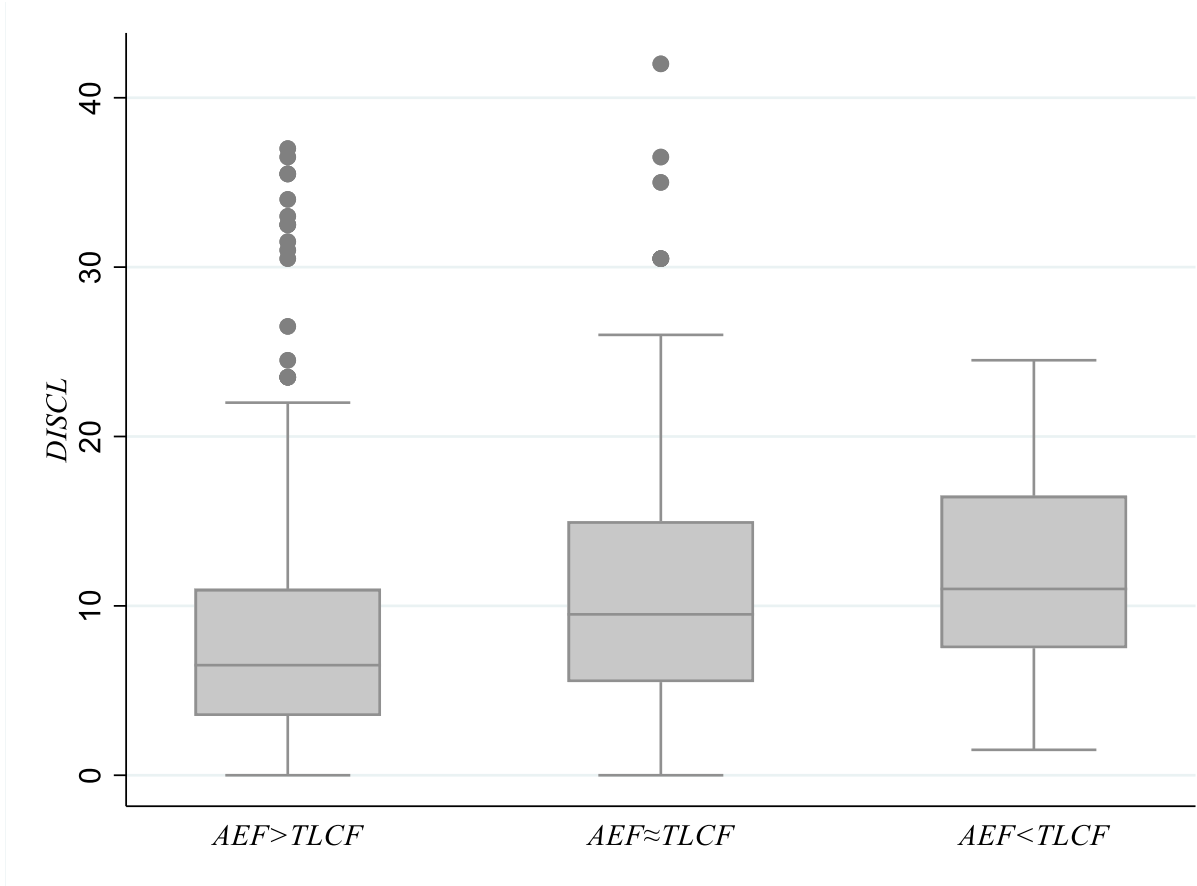
**Construction of Disclosure Score *DISCL***

Disclosure Content	Item	Disclosure Type	Value	<i>DISCL</i> score for a single TLCF item	
Basic TLCF Information	0	Qualitative	0		
Changes and Effect on Income	1	Comparative	0		
Valuation Allowance Information	0	Interval	0	*	
Others	0	Quantitative	2		
		Additional Detail	0		
		Table	1.5		
				=	3.5

This figure presents an example for the construction of the disclosure score *DISCL*. It is an outcome of multiplying the two disclosure subcategories content and type of disclosure. The score is calculated for each voluntary TLCF item and the sum of all scores per firm-year is the dependent variable *DISCL*. Details for the subcategory content are provided in Table 3 and for the subcategory type of disclosure in Table 2.



**FIGURE 2**  
**Disclosure Boxplot**



This figure presents boxplots for the disclosure score *DISCL* over the three *FUTURE INDICATOR* variables *AEF > TLCF*, *AEF ≈ TLCF*, and *AEF < TLCF*.

TABLE 1		
Sample Overview (Years 2005-2016)		
	Firms	Observations
DAX-30	30	
M-DAX	50	
	<b>80</b>	<b>960</b>
Non-IFRS		-17
Annual report availability		-38
Missing data for:		
<i>AR_DISCL</i>		-100
<i>ADTA_TLCF</i>		-35
Other variables		-47
<b>Total</b>	<b>79</b>	<b>723</b>
This table presents the sample selection process. The firms are selected based on the DAX-30 and M-DAX index composition on an arbitrary date (April 30, 2010).		

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**TABLE 2**
**Disclosure Subcategories: Type of Disclosure**
**Panel A: Scale**

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

**Panel B: Examples**

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

We assign a score based on the scale in Panel A for every voluntary TLCF information and add up all scores for one firm-year to calculate our dependent variable *DISCL*, as shown in Figure 1. Panel B shows examples of how the scale is applied. \*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. For more examples see Appendix C.

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TABLE 3			
Disclosure Subcategories: Content			
		No. of Observations Disclosing the Item	
		Absolute	Percent of Total Observations
Basic TLCF Information	Total amount of recoverable TLCF	119	16%
	Expiry date of recoverable TLCF	63	9%
	Total amount of TLCF (recoverable and not recoverable)	314	43%
	Expiry date of total TLCF	234	32%
Changes and Effect on Income	Explanation for changes in TLCF or deferred tax assets for TLCF	175	24%
	Income/tax effect of using TLCF	106	15%
	Deferred tax income/expense recognized in the current year’s income statement due to unused TLCF	217	30%
Valuation Allowance Information*	Valuation Allowance for deferred tax assets on TLCF	221	31%
	Income effects of changes in TLCF valuation allowance	52	7%
	TLCF for which a valuation allowance is recognized	25	3%
	Amount of deferred tax assets for TLCF which have not been recognized	189	26%
Others	Effect of TLCF on tax reconciliation	375	52%
	Distinction between corporate tax loss and trade tax loss	226	31%
	Reference to minimum taxation	95	13%
	Other disclosures	170	24%

This table presents the different voluntarily disclosed TLCF items, grouped into four content categories. The column 'Absolute' provides the number of observations that disclose the respective item, the column 'Percent of Total Observations' shows this number relative to the total number of observations (723). Each observation can disclose zero, one, or several items, hence the percentages do not add up to 100. \*In contrast to US GAAP, IAS 12 does not require a valuation allowance. However, many firms voluntarily provide valuation allowance information.

**TABLE 4****Summary Statistics**

	<b>Mean</b>	<b>Median</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>	<b>N</b>
<i>DISCL</i>	8.88	7.50	6.76	0	42.00	723
<i>AEF (in Bn €)</i>	1.74	0.52	2.60	-0.25	15.90	723
<i>TLCF (in Bn €)</i>	1.80	0.22	10.10	0	230.00	723
<i>AEF≈TLCF</i>	0.19	0	0.39	0	1	723
<i>AEF&lt;TLCF</i>	0.10	0	0.30	0	1	723
<i>AEF&gt;TLCF</i>	0.72	1	0.45	0	1	723
<i>STDEV</i>	24.70	10.18	238.12	0.21	6,268.87	723
<i>LH_CUM</i>	0.08	0	0.27	0	1	723
<i>LH_5Y</i>	0.31	0	0.46	0	1	723
<i>N_LOSS</i>	0.48	0	0.87	0	5.00	723
<i>ΔDTA_TLCF</i>	0.02	0	0.36	-0.07	7.08	723
<i>LOSS</i>	0.10	0	0.29	0	1	723
<i>SIZE</i>	23.22	22.82	1.85	18.68	28.42	723
<i>AN_FOL</i>	16.51	16.00	6.24	1	35.00	723
<i>ΔEBT</i>	0.42	0.05	8.93	-42.32	220.91	723
<i>LEV</i>	0.23	0.22	0.15	0	0.75	723
<i>AUD</i>	0.90	1	0.30	0	1	723
<i>IFRS_AD</i>	8.62	8.00	4.31	0	21.00	723
<i>AR_DISCL</i>	0.59	0.59	0.09	0.33	0.85	723
<i>CEO_TO</i>	0.06	0	0.24	0	1	723

This table presents descriptive statistics for the variables in our analysis of Model (1). The sample period is 2005-2016. Detailed variable definitions are provided in Appendix B.

TABLE 5												
Spearman Correlation Matrix												
	<i>DISCL</i>	<i>AEF</i>	<i>TLCF</i>	<i>AEF</i> ≈ <i>TLCF</i>	<i>AEF</i> > <i>TLCF</i>	<i>AEF</i> < <i>TLCF</i>	<i>STDEV</i>	<i>LH</i> _ <i>CUM</i>	<i>LH_5Y</i>	<i>N_LOSS</i>	<i>ADTA</i> _ <i>TLCF</i>	<i>LOSS</i>
<i>DISCL</i>	1											
<i>AEF</i>	0.190*	1										
<i>TLCF</i>	0.261*	0.689*	1									
<i>AEF</i> ≈ <i>TLCF</i>	0.123*	-0.313*	0.143*	1								
<i>AEF</i> > <i>TLCF</i>	-0.215*	0.104*	-0.442*	-0.761*	1							
<i>AEF</i> < <i>TLCF</i>	0.166*	0.253*	0.486*	-0.156*	-0.522*	1						
<i>STDEV</i>	0.217*	-0.107*	0.211*	0.302*	-0.388*	0.194*	1					
<i>LH_CUM</i>	0.110*	-0.181*	0.068	0.253*	-0.319*	0.153*	0.366*	1				
<i>LH_5Y</i>	0.156*	-0.082*	0.205*	0.323*	-0.439*	0.243*	0.433*	0.392*	1			
<i>N_LOSS</i>	0.171*	-0.110*	0.195*	0.335*	-0.456*	0.254*	0.447*	0.452*	0.984*	1		
<i>ADTA_TLCF</i>	-0.052	-0.012	0.102*	0.076*	-0.103*	0.057	-0.002	0.002	-0.034	-0.042	1	
<i>LOSS</i>	0.043	-0.049	0.096*	0.160*	-0.215*	0.117*	0.282*	0.475*	0.177*	0.196*	0.088*	1
<i>SIZE</i>	0.210*	0.866*	0.778*	-0.138*	-0.096*	0.326*	0.116*	-0.006	0.065	0.050	-0.020	0.033
<i>AN_FOL</i>	0.127*	0.594*	0.418*	-0.170*	0.005	0.215*	-0.032	-0.052	-0.028	-0.033	-0.023	-0.126*
<i>ΔEBT</i>	-0.022	-0.036	-0.079*	-0.040	0.084*	-0.076*	-0.133*	-0.170*	-0.093*	-0.095*	-0.202*	-0.299*
<i>LEV</i>	0.063	0.032	0.200*	0.126*	-0.154*	0.069	0.146*	0.123*	0.073*	0.081*	0.064	0.072
<i>AUD</i>	0.157*	0.254*	0.200*	0.016	-0.003	-0.016	0.103*	0.095*	0.085*	0.083*	0.030	0.045
<i>IFRS_AD</i>	0.116*	0.202*	0.108*	-0.046	0.055	-0.023	0.013	0.003	0.009	0.003	0.082*	-0.009
<i>AR_DISCL</i>	0.263*	0.216*	0.131*	-0.024	-0.015	0.055	0.123*	-0.039	0.022	0.012	0.009	-0.027
<i>CEO_TO</i>	-0.052	0.006	-0.033	0.024	0.009	-0.046	0.004	0.056	-0.013	-0.007	0.010	0.170*

This table presents Spearman correlation coefficients. All variables are defined in Appendix B. \* denotes significance at 5 percent level.

**TABLE 5 (Continued)**

**Spearman Correlation Matrix**

	<i>SIZE</i>	<i>AN_FOL</i>	<i>ΔEBT</i>	<i>LEV</i>	<i>AUD</i>	<i>IFRS_AD</i>	<i>AR_DISCL</i>	<i>CEO_TO</i>
<i>SIZE</i>	1							
<i>AN_FOL</i>	0.492*	1						
<i>ΔEBT</i>	-0.051	-0.006	1					
<i>LEV</i>	0.183*	-0.018	-0.046	1				
<i>AUD</i>	0.235*	0.150*	-0.041	0.024	1			
<i>IFRS_AD</i>	0.218*	0.218*	-0.037	-0.125*	0.184*	1		
<i>AR_DISCL</i>	0.201*	0.145*	0.007	0.086*	0.148*	-0.194*	1	
<i>CEO_TO</i>	0.008	-0.141*	-0.049	0.044	-0.029	-0.159*	0.093*	1

This table presents Spearman correlation coefficients. All variables are defined in Appendix B. \* denotes significance at 5 percent level.

TABLE 6								
OLS Regression Estimates (Dependent Variable: <i>DISCL</i> )								
Panel A: Future Uncertainty Indicators						Panel B: Historic Uncertainty Indicators		
	Pred.	I	II	III	IV	V	VI	VII
<i>AEF≈TLCF</i>	+	2.019** (1.091)						
<i>AEF&gt;TLCF</i>	-		-1.907** (0.966)					
<i>AEF&lt;TLCF</i>	?			0.515 (1.799)				
<i>STDEV</i>	+				0.001** (0.000)			
<i>LH_CUM</i>	+					3.962** (1.830)		
<i>LH_5Y</i>	+	1.128* (0.849)	0.879 (0.813)	1.543** (0.848)	1.584** (0.852)		1.618** (0.853)	
<i>N_LOSS</i>	+							1.231*** (0.404)
<i>ΔDTA_TLCF</i>		0.446*** (0.154)	0.164 (0.209)	0.410 (0.347)	0.484** (0.168)	0.415** (0.175)	0.487*** (0.168)	0.464*** (0.171)
<i>LOSS</i>		-0.169 (0.997)	-0.312 (0.994)	0.089 (1.054)	0.113 (1.049)	-1.207 (1.134)	0.132 (1.048)	-0.342 (1.075)
<i>SIZE</i>		1.072** (0.459)	0.955** (0.456)	0.953* (0.488)	0.985** (0.459)	1.102** (0.473)	0.984** (0.459)	1.068** (0.456)
<i>AN_FOL</i>		-0.253* (0.134)	-0.258* (0.136)	-0.261* (0.138)	-0.261* (0.139)	-0.279** (0.137)	-0.260* (0.139)	-0.271* (0.138)
<i>ΔEBT</i>		0.018 (0.019)	0.021 (0.021)	0.020 (0.022)	0.019 (0.022)	0.019 (0.022)	0.019 (0.022)	0.019 (0.021)
<i>LEV</i>		-4.241 (3.744)	-4.000 (3.692)	-3.326 (3.749)	-3.474 (3.693)	-3.881 (3.712)	-3.378 (3.690)	-3.601 (3.592)
<i>AUD</i>		0.395 (1.389)	0.659 (1.337)	0.632 (1.326)	0.564 (1.410)	0.424 (1.390)	0.563 (1.408)	0.402 (1.379)
<i>IFRS_AD</i>		0.057 (0.218)	0.091 (0.213)	0.072 (0.207)	0.060 (0.217)	0.064 (0.219)	0.063 (0.217)	0.064 (0.214)
<i>AR_DISCL</i>		19.807*** (6.107)	19.295*** (6.072)	19.397*** (6.022)	19.394*** (6.174)	19.170*** (6.118)	19.532*** (6.187)	20.091*** (6.087)
<i>CEO_TO</i>		-1.244 (1.059)	-1.163 (1.059)	-1.241 (1.091)	-1.250 (1.064)	-1.385 (1.100)	-1.263 (1.062)	-1.326 (1.088)
N		723	723	723	723	723	723	723
Adj. R <sup>2</sup>		0.188	0.189	0.177	0.178	0.184	0.178	0.189

\*\*\*, \*\*, \* Denote significance at the 1, 5, and 10 percent levels, respectively, in one-tailed tests where an expectation is provided, and two-tailed tests otherwise. All variables are defined in Appendix B. Standard errors clustered by firm in parentheses. Year and industry indicators are included but not reported. The dependent variable is *DISCL*. Panel A presents models with future uncertainty indicators, panel B models with historic uncertainty indicators.



TABLE 7 Aggregated Results for Disclosure Subcategories									
	Content				Type of Disclosure				
	Pred.	I Basic TLCF Information	II Changes and Effect on Income	III Valuation Allowance Information	IV Qualitative Information	V Quantitative Information	VI Interval Information	VII Additional Detail	VIII Table
<i>AEF≈TLCF</i>	+	-0.418 (0.605)	0.323 (0.473)	0.708*** (0.341)	0.024 (0.063)	0.411 (0.578)	0.028 (0.167)	1.088*** (0.382)	0.467* (0.332)
<i>AEF&gt;TLCF</i>	-	0.540 (0.568)	-0.401 (0.371)	-0.523* (0.335)	-0.062 (0.066)	-0.257 (0.497)	-0.064 (0.185)	-1.133*** (0.358)	-0.393* (0.297)
<i>STDEV</i>	+	-0.001 (0.000)	-0.000 (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000** (0.000)	0.000*** (0.000)
<i>LH_CUM</i>	+	0.982 (0.837)	1.675*** (0.625)	0.168 (0.452)	-0.006 (0.041)	1.388** (0.833)	0.185 (0.169)	1.234** (0.570)	1.161** (0.606)
<i>LH_5Y</i>	+	-0.006 (0.506)	0.707*** (0.260)	0.058 (0.269)	0.021 (0.035)	0.490* (0.361)	0.079 (0.165)	0.735** (0.352)	0.293 (0.273)
<i>N_LOSS</i>	+	0.319 (0.252)	0.553*** (0.138)	-0.020 (0.116)	0.015 (0.019)	0.429*** (0.169)	0.060 (0.083)	0.439** (0.187)	0.289** (0.156)

\*\*\*, \*\*, \* Denote significance at the 1, 5, and 10 percent levels, respectively, in one-tailed tests where an expectation is provided, and two-tailed tests otherwise. All variables are defined in Appendix B. Standards errors clustered by firm in parentheses. The results are aggregated, each cell from a separate estimation (56 in total). The dependent variable is the respective subcategory variable. Each model includes one of the uncertainty variables (or two in the case of *FUTURE INDICATORS* because *LH\_5Y* is included as control) and additionally all control variables from Table 6 as well as year and industry indicators. Detailed results are provided in the online appendix.

**TABLE 8**  
**Market Test with Main Disclosure Variable *DISCL* (Dependent Variable: Tobin's Q)**  
**Panel A: Future Uncertainty Indicators**      **Panel B: Historic Uncertainty Indicators**

	Pred.	I	II	III	IV	V	VI	VII
<i>BVE</i>	+	0.031*** (0.005)	0.031*** (0.005)	0.031*** (0.005)	0.031*** (0.005)	0.032*** (0.005)	0.031*** (0.005)	0.032*** (0.005)
<i>EBT</i>	+	2.197*** (0.139)	2.197*** (0.138)	2.209*** (0.140)	2.208*** (0.141)	2.208*** (0.142)	2.198*** (0.137)	2.199*** (0.139)
<i>EBT*LOSS</i>	-	-5.473*** (0.454)	-5.412*** (0.417)	-5.180*** (0.459)	-5.265*** (0.423)	-5.476*** (0.471)	-5.294*** (0.409)	-5.727*** (0.579)
<i>LOSS</i>	-	-0.072 (0.083)	-0.058 (0.084)	-0.072 (0.086)	-0.085 (0.083)	-0.055 (0.082)	-0.066 (0.086)	-0.060 (0.089)
<i>DTA_TLCF</i>	?	-0.057 (0.061)	-0.031 (0.060)	-0.038 (0.066)	-0.062 (0.061)	-0.057 (0.059)	-0.062 (0.063)	-0.059 (0.061)
<i>DISCL</i>	?	-0.011 (0.008)	0.002 (0.007)	-0.009 (0.007)	-0.008 (0.007)	-0.013* (0.007)	-0.018* (0.010)	-0.016* (0.009)
<i>LH_5Y</i>	-	-0.110** (0.057)	-0.091* (0.057)	-0.118** (0.055)	-0.133** (0.056)		-0.320*** (0.121)	
<i>AEF≈TLCF</i>	-	-0.234** (0.129)						
<i>AEF&gt;TLCF</i>	+		0.263** (0.131)					
<i>AEF&lt;TLCF</i>	-			-0.245 (0.378)				
<i>STDEV</i>	-				0.000 (0.000)			
<i>LH_CUM</i>	-					-0.359** (0.160)		
<i>N_LOSS</i>	-							-0.160** (0.067)
<i>AEF≈TLCF</i> <i>*DISCL</i>	+	0.013* (0.009)						
<i>AEF&gt;TLCF</i> <i>*DISCL</i>	-		-0.014* (0.009)					
<i>AEF&lt;TLCF</i> <i>*DISCL</i>	?			0.014 (0.027)				
<i>STDEV</i> <i>*DISCL</i>	+				0.000 (0.000)			
<i>LH_CUM</i> <i>*DISCL</i>	+					0.022** (0.010)		
<i>LH_5Y</i> <i>*DISCL</i>	+						0.020** (0.010)	
<i>N_LOSS</i> <i>*DISCL</i>	+							0.010** (0.005)
N		652	652	652	652	652	652	652
Adj. R <sup>2</sup>		0.734	0.735	0.733	0.732	0.732	0.736	0.734

\*\*\*, \*\*, \* Denote significance at the 1, 5, and 10 percent levels, respectively, in one-tailed tests where an expectation is provided, and two-tailed tests otherwise. Variables are defined in Appendix B. Standard errors clustered by firm in parentheses. Year and industry indicators are included but not reported. The dependent variable is Tobin's Q. Panel A presents models with future uncertainty indicators, panel B models with historic indicators.

**TABLE 9**  
**Aggregated Market Test Results for Disclosure Subcategories**

	Content				Type of Disclosure				
Interaction	Pred.	I Basic TLCF Information	II Changes and Effect on Income	III Valuation Allowance Information	IV Qualitative Information	V Quantitative Information	VI Interval Information	VII Additional Detail	VIII Table

<i>AEF</i> ≈ <i>TLCF</i> * <i>SUBCATEGORY</i>	+	0.050*** (0.019)	0.010 (0.021)	-0.043 (0.039)	0.251** (0.148)	-0.005 (0.024)	0.126** (0.058)	0.058** (0.032)	0.035* (0.025)
<i>AEF</i> > <i>TLCF</i> * <i>SUBCATEGORY</i>	-	-0.056*** (0.020)	0.006 (0.024)	0.035 (0.036)	-0.218* (0.159)	0.009 (0.024)	-0.130** (0.058)	-0.065** (0.032)	-0.035 (0.027)
<i>STDEV</i> * <i>SUBCATEGORY</i>	+	0.000 (0.000)	0.000 (0.000)	-0.001 (0.001)	-0.001 (0.002)	-0.000 (0.000)	0.000 (0.002)	0.000 (0.000)	0.000 (0.000)
<i>LH_CUM</i> * <i>SUBCATEGORY</i>	+	0.061*** (0.025)	0.027 (0.023)	0.058 (0.054)	0.039 (0.301)	0.041** (0.025)	0.083 (0.077)	0.073** (0.042)	0.041* (0.026)
<i>LH_5Y</i> * <i>SUBCATEGORY</i>	+	0.031* (0.020)	0.006 (0.022)	0.026 (0.026)	0.001 (0.153)	0.024 (0.020)	0.058 (0.048)	0.060** (0.032)	0.044* (0.029)
<i>N_LOSS</i> * <i>SUBCATEGORY</i>	+	0.022*** (0.009)	0.009 (0.010)	-0.003 (0.019)	0.079 (0.106)	0.013 (0.011)	0.038** (0.023)	0.035** (0.019)	0.018* (0.013)

\*\*\*, \*\*, \* Denote significance at the 1, 5, and 10 percent levels, respectively, in one-tailed tests where an expectation is provided, and two-tailed tests otherwise. All variables are defined in Appendix B. Standards errors clustered by firm in parentheses. The results are aggregated, each cell from a separate estimation (56 in total). The dependent variable in each of the estimations is Tobin's Q. Each model includes one of the uncertainty variables (or two in the case of *FUTURE INDICATORS* because *LH\_5Y* is included as control), the interaction with the disclosure subcategory and additionally all control variables from Table 8 as well as year and industry indicators. *SUBCATEGORY* represents the different content and type of disclosure subcategories, specified in the heading of each column. Detailed results are provided in the online appendix.

## APPENDIX A

### Differentiation in Mandatory IAS 12 and Voluntary Disclosures

We identify six mandatory IAS 12 disclosures concerning TLCF:

- the amount of deferred tax assets recognized in the balance sheet for unused TCF (IAS 12.81 (g) (i))
- the amount of the benefit from a previously unrecognized TCF 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 TCF of a prior period that is used to reduce current tax expense (IAS 12.80 (e))
- the amount of unused TCF for which no deferred tax asset is recognized in the balance sheet (IAS 12.81 (e))
- the expiration date of unused TCF 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))

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 TCF (IAS 12.81 (g) (ii)). The classification is ambiguous due to 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 classify this item as voluntary.<sup>1</sup> Furthermore, every disclosure beyond the six required items is considered voluntary.

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<sup>1</sup> Repeating our analysis with this item classified as mandatory does not affect our main results.

## APPENDIX B

### Variable Description

Variable	Exp. sign	Description
<b>Uncertainty variables</b>		
$AEF_{it}$		Last mean analyst EBT forecast for $t+1$ , issued before fiscal year end $t$
$TLCF_{it}$		TLCF: deferred tax assets for TLCF/tax rate (disclosed tax rate if available, otherwise statutory tax rate)
<u><b>FUTURE UNCERTAINTY INDICATORS</b></u>		
$AEF \approx TLCF_{it}$	+	Indicator variable: 1 if difference between $AEF_{it}$ and $TLCF_{it}$ is in the two deciles around zero, 0 otherwise
$AEF < TLCF_{it}$	?	Indicator variable: 1 if $AEF_{it} < TLCF_{it}$ and $AEF_{it} \approx TLCF_{it} = 0$ , 0 otherwise
$AEF > TLCF_{it}$	-	Indicator variable: 1 if $AEF_{it} > TLCF_{it}$ and $AEF_{it} \approx TLCF_{it} = 0$ , 0 otherwise
$STDEV_{it}$	+	Percentage standard deviation of $AEF_{it}$ : (standard deviation of $AEF_{it}/AEF_{it}$ )*100
<u><b>HISTORIC UNCERTAINTY INDICATORS</b></u>		
$LH\_CUM_{it}$	+	Indicator variable: 1 if firm reported a cumulative negative EBT in the current and two previous years, 0 otherwise
$LH\_5Y_{it}$	+	Indicator variable: 1 if firm reported at least one negative EBT in the five previous years, 0 otherwise
$N\_LOSS_{it}$	+	Frequency of negative EBT in the five previous years
<b>Disclosure variables</b>		
$DISCL_{it}$		Voluntary TLCF disclosure score, based on the scale in Table 2
$BASIC_{it}$		Disclosure score for <i>Basic TLCF Information</i> , see Table 3 for details
$CH\_EFF_{it}$		Disclosure score for <i>Changes and Effect on Income</i> , see Table 3 for details
$VA_{it}$		Disclosure score for <i>Valuation Allowance Information</i> , see Table 3 for details
$QUAL_{it}$		Disclosure score for <i>Qualitative Information</i> , see Table 2 for details
$QUANT_{it}$		Disclosure score for <i>Quantitative Information</i> , see Table 2 for details
$INTERVAL_{it}$		Disclosure score for <i>Interval Information</i> , see Table 2 for details
$DETAIL_{it}$		Disclosure score for <i>Additional Detail</i> , see Table 2 for details
$TABLE_{it}$		Disclosure score for information in <i>Tables</i> , see Table 2 for details
<b>Control variables</b>		
$\Delta DTA\_TLCF_{it}$		Change in deferred tax assets for TLCF from previous to current year, scaled by 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 11 <sup>th</sup> month of the fiscal year
$\Delta EBT_{it}$		Percentage change in EBT from previous to current year
$LEV_{it}$		debt/total assets
$AUD_{it}$		Indicator variable: 1 if firm is audited by Big4 (Deloitte, Ernst and Young, KPMG, PWC), 0 otherwise
$IFRS\_AD_{it}$		Number of years since the firm 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
<b>Market test variables</b>		
$Q$		Tobin's q = market capitalization three months after fiscal year end, scaled by total assets
$BVE_{it}$	+	Common shareholders' equity, scaled by total assets
$EBT_{it}$	+	Earnings before taxes, scaled by total assets
$DTA\_TLCF_{it}$	?	Deferred tax assets for TLCF, scaled by total assets

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## APPENDIX C

### Disclosure Examples from Tax Footnotes

Examples of Disclosed Information	Score	Explanation
<p>The actual existing and unused accumulated tax loss carryforwards of the Group amounted to € 156 million and € 47 million for the years ending December 31, 2006 and 2005, respectively. The increase of € 109 million results for the most part from the acquisition of Reebok and mainly relates to the effects of the acquisition on Reebok's U.S. tax position. (Adidas, annual report 2006, p. 175)</p>	3.5	<p>The first sentence is not counted because the unused TLCF are a mandatory disclosure.</p> <p>The number of the increase is a quantitative information and gets 2 points. The explanation of the increase is additional information and scores 1.5 points.</p>
<p>The change in the valuation allowance on deferred tax assets relating to tax losses available for carryforward and temporary differences resulted in a tax expense of € 3 million (2011: expense of € 6 million). (BMW, annual report 2012, p. 102)</p>	1.5	<p>Income effects of changes in the valuation allowance are a voluntary disclosure. The amount includes effects from temporary differences and hence gives an interval of possible values for TLCF (between zero and 3 million, depending on the amount for temporary differences). Interval disclosures get a score of 1.5 points.</p>
<p>The decrease in tax loss carryforwards is mainly due to the utilization of losses in Germany and the United States. (Linde, annual report 2009, p. 131)</p>	0.5	<p>This is a qualitative information and gets a score of 0.5 points.</p>
<hr/> <p>We assign a score based on the scale in Table 2 Panel A for every voluntary TLCF information. The differentiation between mandatory and voluntary items is illustrated in Appendix A. All examples are extracts from financial statements' notes of our sample firms.</p> <hr/>		

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