The Impact of Deferred Taxes on Firm Value

Three Empirical Studies on the Cash Flow and Value Relevance of Deferred Taxes and Related Disclosures

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Dipl.-Volksw. Astrid K. Chludek

aus Aachen

Referent: Prof. Dr. Norbert Herzig

Coreferent: Prof. Dr. Christoph Kuhner

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Astrid K. Chludek

Cologne Graduate School in Management, Economics and Social Sciences

University of Cologne

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Chapter II of this dissertation is published under the title *Perceived versus Actual Cash Flow Implications of Deferred Taxes – An Analysis of Value Relevance and Reversal under IFRS* in the *Journal of International Accounting Research*, Vol. 10 (1), 2011, pp. 1-25. Chapters III and IV are submitted for review at two international journals. Parts of Chapter I are used in an article, which is accepted for publication in a national journal.

INTRODUCTION

1. Purpose of this Dissertation

According to IASB and FASB, "*Financial reporting should provide information that is useful to present and potential investors and creditors and other users in making rational investment, credit, and similar decisions*" (Statement of Financial Accounting Concepts (SFAC) No. 1, para. 34), in particular by helping them in assessing the amounts, timing, and probability of future cash flow (SFAC No. 1, para.37). The decision usefulness of provided information is therefore assessed along the criteria: understandability, comparability, relevance, reliability, predictive value, and materiality, among others (SFAC No. 2 and IASB's *Conceptual Framework*). However, when developing accounting standards, *"a standard-setting body* […] *must also be aware constantly of the calculus of costs and benefits*" (SFAC No. 2, para. 133) and "*safeguard the cost-effectiveness of its standards*" (SFAC No. 2, para. 143).

Regarding the special case of deferred tax accounting, it is common knowledge that accounting for deferred taxes is relatively effort- and time-consuming and, hence, relatively costly.[1] The *Commission of the European Communities*, for example, concludes in its *Communication from the Commission on a simplified business environment for companies in the areas of company law, accounting and auditing* in 2007 (COM(2007) 394 final, p. 18) that "[…] *accounting for deferred taxes* […] *is very burdensome for companies in general*". The high accounting costs arise due to the fact that accounting for deferred taxes is rather complex and requires a high level of coordination. It is necessary, for instance, to prepare the tax report within a narrow time frame and to assess the future realizability of deferred tax assets. Latter includes estimating future taxable income as well as assessing the reversal of taxable temporary differences. Moreover, it is necessary to determine the expected manner of recovery/settlement of assets/liabilities if the manner of recovery/settlement affects the applicable tax rate. Hence, accountants name deferred tax allocation as one of the most complex and costly provisions to comply with.[2]

Because of the relatively high costs involved, it is of economic significance to determine the benefits of deferred tax accounting. While the cost to produce deferred tax information are rather easily assessable, there is an ongoing controversy among preparers, standard setters, and financial statement users about whether there is any (adequate) benefit in deferred tax

[1] See Eierle et al. (2007) or Colley et al. (2009), for example.
[2] See, for instance, Eierle et al. (2007), COM(2007) 394 final.

information that could justify the rather high accounting costs involved.[3] Survey results of Eierle et al. (2007) give an impression about the perceived cost-benefit ratio: While 54 percent of the respondents (directors in charge of the annual accounts of 401 German small and medium-sized enterprises (SMEs)) and even 64 percent of the accounting directors of larger firms (i.e., firms with annual sales of larger than €100 million) classify the cost of deferred tax accounting as high or very high, 48 percent of the respondents assess deferred tax information to be not or only moderately useful for external financial statement user. Additional 21 percent of the respondents are not even able to assess the informational benefit of deferred tax disclosures at all.

Referring to the general objectives and purposes of financial reporting, stated in IASB's *Conceptual Framework* and FASB's SFAC No. 1 and No. 2, to define benefit, the core purpose of the analyses presented in this dissertation is therefore to assess the benefit of deferred tax accounting with regard to the relevance and decision-usefulness of disclosed deferred tax information for financial statement users. In detail, the dissertation investigates in three separate empirical studies the cash flow relevance (materiality and predictive value) of disclosed deferred taxes and the impact of deferred taxes on firm value.

Since firm value equals the present value of expected firm cash flows, quantification of deferred tax cash flow is particularly important in order to determine the relevance of deferred taxes for firm value and, thus, to determine the decision relevance and usefulness of provided deferred tax information for financial statement users. This is the first study, however, that systematically tries to quantify deferred tax cash flow and that empirically investigates the economic significance of this deferred tax cash flow. Furthermore, this is the first study analyzing the information content of disclosed deferred taxes with respect to future tax cash flow. Since the primary purpose of deferred tax accounting is to inform about future tax benefits and future tax liabilities, an analysis of the relation of currently disclosed deferred taxes to actual future tax cash flow is crucial for assessing whether deferred tax accounting actually meets its intended purpose.

I assess the impact of deferred taxes on firm value first directly, by conducting a classical value relevance analysis. Second, I use several methods to quantify deferred tax cash flow in order to determine the cash flow implications and cash flow relevance of disclosed deferred tax information. Specifically, the reversal behavior of deferred tax balances in the short- and in the medium-term is analyzed, and deferred tax cash flow is estimated as it is implied by balance

[3] See, for instance, Colley et al. (2009) and Beechy (2007).

reversal (Chapter II). In addition, the relation of deferred taxes and actual tax cash flow is determined by using regression analysis. Deferred tax cash flow is quantified, then, by using the estimated coefficients (Chapter III). Furthermore, the relevance of current deferred tax information for future tax cash flow is assessed by means of a forecasting analysis (Chapter III). In the last part of this dissertation (Chapter IV), which was produced in collaboration with Duc Hung Tran (Seminar of Financial Accounting & Auditing, University of Cologne), underlying factors, which are not directly related to deferred tax cash flow, but which might influence value relevance as correlated omitted variables through recognition decisions in the context of deferred tax asset recognition, are analyzed.

The main results of the empirical analyses suggest that

(a) except for large net deferred tax assets, deferred taxes are generally not reflected in firm value, i.e., investors do in general not expect deferred taxes to result in material cash flow in the near future.

(b) there is some reversal in the balances in the short-run. The magnitude of these reversals, however, is rather small, suggesting that large implied deferred tax cash flows are rare.

(c) reversal as well as regression analyses suggest that deferred taxes have indeed timely cash flow implications. Yet, the economic significance of implied deferred tax cash flow seems to be rather small. Estimations of deferred tax cash flow based on regression analyses suggest that deferred tax cash flow constitutes less than 5 percent of total tax cash flow for the majority of observations.

(d) the analysis of the long-term development of deferred tax balances clearly shows that deferred tax balances continuously increase in the long-run.

(e) deferred taxes are not (materially) informative about future tax cash flow for the majority of observations.

Hence, the results of the cash flow and reversal analyses (Chapter II and III), largely suggesting no material deferred tax cash flow, provide a rationale for the largely found irrelevance of deferred taxes for firm value (Chapter II). The empirical analysis of Chapter IV deals with the hypothesis that the found value relevance of certain (net) deferred tax assets in the value relevance analysis of Chapter II might be caused by underlying factors (correlated omitted

variables) that influence the deferred tax asset recognition decision and that, at the same time, are value-relevant on their own.

Accounting for deferred taxes is under permanent criticism from the user and preparer community, arguing that, on the one hand, recognition and disclosure requirements of deferred tax accounting are extensive and complex and, thus, very costly to implement, while, on the other hand, deferred taxes are not considered to be decision-useful by financial statement users because of lacking cash flow relevance and information content of disclosed deferred tax amounts, and because of lacking understanding of the concept of deferred taxes and the related disclosures. The empirical analyses of this dissertation aim at shedding more light on this perceived gap of cost versus benefits of deferred tax accounting, focusing on the cash flow relevance and value relevance of deferred taxes.

The results of the empirical analyses suggest that disclosed deferred taxes indeed lack material cash flow implications and are generally not informative about future tax cash flow for the majority of firms, which is consistent with and would explain lacking value relevance and lacking decision usefulness of disclosed deferred taxes. For one thing, these results are of relevance for standard setters, who deal with the most appropriate way to account for deferred taxes, thereby considering information content, predictive ability, cash flow and value relevance, as well as cost-benefit ratios of the numbers and information produced by the respective accounting standards. The findings of this study should help standard setters to assess the usefulness of inter-period tax allocation and of the currently required method of accounting for deferred taxes. In particular, the largely found cash flow and value irrelevance of disclosed deferred taxes in this study point toward a *flow-through* approach of tax recognition in financial reporting, according to which only current tax expenses and current taxes payable, respectively, are recognized.

For another thing, the results of this study should be helpful for financial statement users. The knowledge whether and how disclosed deferred tax balances are related to actual future tax cash flow, i.e., to what extent deferred taxes will translate into actual cash flow in the near future, is important to assess whether deferred tax information should be considered in their decision making process.

Last but not least, additional evidence on the value (ir)relevance of deferred taxes might be of interest to preparers of financial statements: Knowledge on how capital markets interpret and value their deferred taxes might help them, in particular, in their decision on how much of their potential deferred tax assets to recognize.

The next section presents motivation, research questions, main findings, and contribution of this dissertation in more detail.

2. Motivation, Research Questions, Main Findings, and Contribution

Since the 1980s, disclosure requirements for deferred taxes have been enhanced considerably in US GAAP, IFRS/IAS, and in national accounting standards. The most recent instance is the reform of national accounting law in Germany (BilMoG, generally applicable for fiscal years beginning after December 31, 2009), which materially increases recognition, disclosure, and documentation requirements for deferred taxes of medium-sized and large corporations. Meanwhile, the overall usefulness of deferred tax accounting is on debate continuously.

Critics argue that the informative value of deferred taxes is only low due to highly uncertain cash flow implications, which results in most financial statement users ignoring deferred tax disclosures as they do not consider them to provide relevant information for decision making. The EFRAG even has started a general project dealing with the financial reporting of corporate income taxes because "[t]*he accounting for corporate income taxes has been subject to much criticism from the user and preparer community, who have questioned the decision-usefulness of the numbers produced by the existing IAS 12 Income Taxes, and claim that the standard is too difficult to apply and understand.*"[4] The *Commission of the European Communities* specifies in its communication on a simplified business environment in 2007 that "*it has been confirmed by preparers and users, e.g. credit institutions and rating agencies, that deferred tax information (whether recognised in the balance sheet or provided in the notes) often is not considered a relevant input for the decisions to be taken*."[5]

Providing interview-evidence on this, Haller *et al.* (2008) report that most of the interviewees in their study (59 employees of 32 credit institutions, who work in the area of credit analysis and scoring of medium-sized enterprises) declared to offset deferred tax assets against equity because of doubtful value. Alternatively, deferred tax information is ignored because of lacking knowledge about and understanding of deferred tax accounting.[6] Illustrating this point, accounting analyst Robert Willens summarizes financial analysts' idea of deferred tax accounting

[4] http://www.efrag.org/Front/p177-1-272/Proactive---Financial-Reporting-for-Corporate-Income-Taxes.aspx. Accessed: 07/15/2011.
[5] *Communication from the Commission on a simplified business environment for companies in the areas of company law, accounting and auditing*, Commission of the European Communities, COM(2007) 394 final, p. 18.
[6] Chen and Schoderbek (2000), for example, report that deferred tax adjustments as a consequence of a change in the corporate tax rate were reflected in share prices at the same rate as recurring earnings, despite their different implications for future cash flows, which suggests that investors are not familiar with the accounting rules for and/or the concept of deferred taxes, or that they ignore deferred taxes altogether.

as "[…] *a total black box. I've never met a stock analyst who has any idea what it is*." (see Carnahan and Novack 2002). In any case, there is a lot of anecdotal evidence suggesting that banks and other lenders as well as credit and financial analysts routinely reverse out the impact of inter-period tax allocation, adding deferred tax expense back to net income and treating deferred tax balances as equity. Beechy 2007, Carnahan and Novack 2002, and Cheung et al. 1997, for example, provide additional anecdotal evidence and Chen and Schoderbek 2000, Amir and Sougiannis 1999, and Chattopadhyay et al. 1997 find empirical evidence that analysts and lenders do not consider deferred tax information in their decision making process.

With respect to consideration of deferred tax information by investors (value relevance studies), empirical results are highly mixed. While early studies, based on the first fiscal years after implementation of SFAS No. 109, find significant valuation coefficients of deferred taxes (Amir et al. 1997 and Ayers 1998), more recent studies based on US GAAP-data (Raedy et al. 2011), as well as studies based on non-US GAAP-data (Citron 2001 and Chang et al. 2009) find no consistent evidence for value relevance. Therefore, Chapter II of this dissertation provides additional empirical evidence regarding the value relevance of deferred taxes, by investigating as first study the value relevance of deferred taxes under IFRS/IAS.[7]

The relevance and information content of deferred tax disclosures under IFRS/IAS is of common international interest because IFRS affect the accounting and reporting practice of a continuously increasing number of companies worldwide. Besides more than 100 countries already requiring or at least allowing some or all of their companies to report in accordance with IFRS/IAS,[8] national accounting standards worldwide are converging to IFRS/IAS. This convergence is likely to cause material additional costs for firms with respect to deferred tax accounting because recognition and disclosure requirements are typically much more extensive

[7] In detail, a sample of German firms, covering fiscal-years 2005 to 2008, is used.

[8] The SEC (SEC Release No. 33-8879 "*Acceptance From Foreign Private Issuers of Financial Statements Prepared In Accordance With International Financial Reporting Standards Without Reconciliation To U.S. GAAP"*, p.6, available at http://www.sec.gov/rules/final/2007/22-8879.pdf, accessed: 07/17/2010) estimates in 2007 that "[a]*pproximately 100 countries now require or allow the use of IFRS*", among others all EU Member States. Besides, Canada is planning to require IFRS for domestic publicly accountable profit-oriented enterprises, and the SEC, already allowing foreign private issuers to include in their filings financial statements prepared in accordance with IFRS without reconciliation to US GAAP, considers to require the use of IFRS by U.S. issuers, too, (see SEC Release No. 33-8982 "*Roadmap for the Potential Use of Financial Statements Prepared in Accordance with International Financial Reporting Standards by U.S. Issuers*," available at http://www.sec.gov/rules/final/2007/33-8982.pdf, accessed: 07/17/2010).

under IFRS/IAS than under national accounting standards.[9] Specifically, empirical evidence on the relevance of IFRS/IAS-deferred tax disclosures should be of particular interest to the IASB and the FASB since the most appropriate way to account for deferred taxes and to disclose deferred tax information are discussed topics in the context of the convergence of IFRS/IAS and US GAAP.[10]

Moreover, in consideration of the ambiguous results of previous empirical studies analyzing consideration, interpretation, and understanding of deferred tax disclosures, it is important to cover other data sources and time horizons in order to be able to draw general conclusions. In particular, there is a general interest for empirical evidence based on non-U.S. data in tax research, see for instance Graham et al. (2011). In his talk at the *JAE Conference* in October 2009, Mihir Desai actually identified provincialism, i.e., the almost-exclusive emphasis on U.S./Compustat data, as one of the key empirical challenges in tax research.

Moreover, the value relevance analysis of Chapter II provides some methodological improvements, in comparison to prior studies. By using fixed effects estimation with Huber-White robust standard errors clustered at firm level, standard error estimation is adjusted for potential serial correlation, and correlated omitted variable bias in the estimated coefficients is mitigated by controlling for unobserved heterogeneity.

The results of the value relevance analysis (Chapter II.3.3) suggest that investors – similar to other financial statement users – do not include deferred taxes into their valuation of the firm, i.e., deferred taxes are generally not systematically related to a firm's market value, with the exception being large net deferred tax assets. In particular, the results suggest that the composition of deferred taxes is largely irrelevant for their value (ir)relevance. These findings suggest that investors perceive the cash flows deferred taxes account for generally as highly uncertain and do not expect them to be substantially realized in the near future.

[9] The most recent instance of convergence is the reform of national accounting law (BilMoG) in Germany. Key features of the reform with respect to deferred tax accounting are the change from the income statement method (timing concept) to the balance sheet method (temporary concept) and the requirement to recognize deferred tax assets for tax loss carryforwards to the extent that future taxable profits are expected to be generated within the next five years against which the unused tax losses can be offset. Because of the necessity to prepare a tax balance sheet as the basis for determining deferred taxes according to the balance sheet method and the requirement to disclose deferred tax components in the notes, as well as because of the necessity of five-year tax planning to be able to assess the realizable amount of tax loss carryforwards, both novelties will presumably cause material additional costs for firms. Other jurisdictions with converging national accounting standards are, for instance, Australia, Brazil, Canada, Hong Kong, Japan, and Singapore.

[10] For the latest development, see the Amendment to *IAS 12 – Income Taxes* Exposure Draft ED/2009/2.

These results are of relevance for standard setters, who deal with the most appropriate way to account for deferred taxes, thereby considering information content, cash flow and value relevance, as well as cost-benefit ratios of the numbers and information produced by the respective accounting standards.

Besides standard setters, the results should also be of interest to firms because many auditing and accounting service companies promote tools and planning instruments for assessing and enhancing the intrinsic value of deferred tax assets, arguing this would provide a positive signal to capital markets. The empirical analysis of Chapter II, however, shows that, except for case when deferred tax assets materially exceed deferred tax liabilities, deferred tax assets do not seem to be of relevance for a firm's market value.

The analysis of value relevance is complemented by an analysis of deferred tax balance reversal (Chapter II.4) in order to examine whether perceived lacking cash flow implications coincide with actual lacking reversal. The only other study analyzing deferred tax reversal seems to be a study conducted by Price Waterhouse in 1967 that covers years 1954 to 1965 and focuses exclusively on deferred taxes arising from timing differences due to depreciation and installment sales.[11] Hence, empirical evidence on reversal rates is not only rare but also pretty outdated. Yet, information on the reversal behavior of deferred tax balances is of crucial interest in the realm of cost-benefit and value relevance considerations, since lacking reversals imply a present value of deferred tax cash flow of zero, thus challenging the informativeness of deferred tax allocation and rationalizing the value irrelevance of deferred taxes. Studies dealing with deferred taxes usually only hypothesize about reversal behavior, so that the results of Chapter II.4 are also of interest to other researchers by giving an impression of the actual reversal behavior.

The analysis of balance reversal reveals that deferred tax assets show a higher rate of balance reversal than deferred tax liabilities, suggesting that deferred tax assets tend to translate more timely into tax cash flow than deferred tax liabilities. Rough quantifications of deferred tax cash flow based on reversal rates imply that, despite the distributions showing a considerable rate of balance reversal in the short-term, average cash flow implications of these reversals are only small. Overall, the results of the value relevance analysis are broadly consistent with the balances' reversal structure and cash flow implications.

[11] See Chaney and Jeter (1989).

The drawback of prior studies dealing with consideration, interpretation, and understanding of deferred tax disclosures is that these studies always (have to) hypothesize about implied deferred tax cash flow or indirectly deduct cash flow implications from observed (non-)consideration. Although the tax cash flow implications of deferred taxes are crucial for the value and decision relevance of deferred taxes, research directly addressing the cash flow implications of deferred taxes is very scarce, so that the empirical relation of deferred taxes and tax cash flow is still an open question, though. Therefore, Chapter III investigates the relation of deferred tax balance amounts and actual (future) tax cash flow. Thereby, Chapter III takes a more direct, in-depth, and methodologically much more sophisticated approach to identify deferred tax cash flow, as compared to the reversal analysis of Chapter II.4. Among other things, the study presented in Chapter III assesses the economic significance of deferred tax cash flow and investigates whether disclosed deferred taxes serve their primary purpose, to provide useful information with respect to future tax cash flow, by investigating whether consideration of deferred tax information improves forecasts of future tax cash flow.

The results of the study should be of interest for at least two groups. For one thing, the findings of this study should help standard setters to assess the usefulness of inter-period tax allocation and of the currently required method of accounting for deferred taxes. For another thing, the results of this study should be helpful for financial statement users. The knowledge whether and how disclosed deferred tax balances are related to actual future tax cash flow, i.e., to what extent deferred taxes will translate into actual cash flow in the near future, is important to assess whether deferred taxes should be considered in the decision making process. Moreover, by determining the exact cash flow implications of disclosed deferred tax balances, the study provides a basis for the ongoing debates concerning (lacking) value relevance of deferred taxes. Besides, this study provides additional insights concerning the predictive ability of financial reporting.

The analyses are based on a sample of 449 S&P 500-firms, with observations covering fiscal years 1994 to 2009. Resulting in a final sample of 4956 firm-year observations, this study uses one of the largest samples in the deferred tax research. The selected sample has several advantages. For one thing, by replicating the economy's sector composition of companies with market cap in excess of $3.5 billion, the S&P 500's sector-balanced composition facilitates

industry-specific analysis, and sector effects in the empirical results replicate sector effects as present in the total economy. For another thing, the particularly long time-series available allow an analysis by firm, which is important because deferred tax cash flow may be very firm-specific. Moreover, long time-series enable to analyze the development of deferred tax balances over time. Descriptive results reveal that, in line with the *equity view* of value relevance of deferred taxes, deferred tax balances do indeed increase consistently over time, yet not proportionally to firm growth, with about 40 percent of the observations exhibiting a decreasing ratio of deferred taxes to total assets over time (Chapter III.4.2).

By estimating static as well as dynamic models, I find that only deferred tax balances lagged by one and two years, respectively, are significantly related to current tax cash flow as measured by cash taxes paid; farther lags are insignificant. Consistently, deferred taxes are only incrementally useful in predicting future tax cash flow up to two years ahead. While the model explains 86.53 percent of the variation in cash taxes paid, inclusion of deferred tax information adds only negligible 0.05 to 0.37 percentage points in explanatory power (Chapter III.4.3).

Concerning the economic significance of implied deferred tax cash flow, the estimated coefficients suggest that, on average, 2 percent of the disclosed deferred tax balance amount translates into tax cash flow on an annual basis, which implies that deferred tax cash flow constitutes less than 5 percent of actual tax cash flow for the majority of observations (Chapter III.4.3). The economic significance of deferred tax cash flow is, thus, rather moderate.

Furthermore, deferred taxes are not significantly related to actual tax cash flow for 67.25 percent of the sample firms. Firms with significant deferred tax information tend to be underperformers in terms of showing, on average, less growth (of sales, operating cash flow, and total assets), lower ROA, and significantly less multinational activity (as measured by percent of foreign to total pre-tax income) as compared to the total sample. Moreover, results of industry-specific analyses suggest that deferred tax information is relatively more informative about future tax cash flow for firms belonging to the Industrial, Financial, IT, or Telecommunication Services sector (for Financials, particularly deferred tax asset information is useful). Yet, there are no dominating industry effects identifiable in deferred tax cash flow (Chapter III.4.3).

Regarding forecasting performance (Chapter III.5), I find only limited evidence for deferred tax information improving tax cash flow forecasts. For one thing, MAPE, RMSE, and rank tests suggest that the forecast model that excludes deferred tax information outperforms the

model that includes deferred tax information in terms of average forecast accuracy. For another thing, consideration of deferred tax information does not decrease the forecast error for the majority of forecasts. Moreover, the observed reductions in forecast error due to consideration of deferred tax information are rather small for their most part: the observed reduction in forecast error is smaller than 10 percent for 75 percent of the forecasts, for which consideration of deferred tax information improves the forecast.

Thus, although the core purpose of inter-temporal tax allocation is to inform about future tax payments and tax benefits, the overall results of the analysis presented in Chapter III rather indicate lacking relevance of recognized deferred taxes for (future) tax cash flow. Hence, the results of the study provide an empirical rationale for deferred taxes being not considered value- and decision-relevant by financial statement users. Moreover, since the estimated coefficients imply only small tax cash flow effects of deferred taxes for the majority of the sample firms, this study provides in particular empirical support for the *equity view* of deferred tax value relevance, which attributes only low present value to deferred tax cash flows.

Overall, the benefit of deferred tax balance information in terms of informing about future tax cash flow seems to be rather low, so that the findings of this study further contribute to questioning the usefulness of (extensive) recognition and disclosure requirements for deferred taxes.

Chapter IV finally provides a more in-depth analysis with focus on deferred tax assets. Since the results of the previous chapters suggest a slightly higher cash flow and value relevance of deferred tax assets, as compared to deferred tax liabilities, Chapter IV deals with the underlying factors that determine disclosure and recognition of deferred tax assets.

Under IFRS/IAS, deferred tax assets are only recognized to the extent that the realization of the related tax benefit is *probable*, this is, to the extent that it is probable that future taxable profit will be available against which the tax benefit can be utilized (IAS 12.24 and IAS 12.34). Particularly concerning deferred tax assets that account for the future tax benefits of tax loss carryforwards, IAS 12.36 specifies four criteria to be considered when assessing the probably realizable amount: (1) reversing deferred tax liabilities, (2) expected future taxable income, (3) the sources of the unused tax losses, and (4) available tax planning strategies. On the one hand,

these four criteria provide a quite objective guideline for assessing the probably realizable amount of tax loss carryforwards. On the other hand, management yet has still significant scope within the range of these four criteria to determine the amount of recognized deferred tax assets. Since, furthermore, changes in deferred tax assets generally flow through income tax expense, thus directly affecting net income, deferred tax assets may be an attractive account to manage earnings. Therefore, research on recognition of deferred tax assets has primarily focused on whether discretion in recognition is used for earnings management purposes (Visvanathan 1998, Bauman et al. 2001, Burgstahler et al. 2002, Schrand and Wong 2003, Frank and Rego 2006, Christensen et al. 2008).

Yet, earnings management incentives are dependent on specific earnings situations (e.g., incentives to manage earnings upward to meet analysts' forecasts, to avoid losses, to avoid a decline in earnings, or incentives to manage earnings downward to take big baths, to create cookie jar reserves, etc.), while subjectivity in recognition of deferred tax assets has to be exercised on a regular basis, even when there are no specific earnings management incentives or the intention to manage earnings present. The empirical analysis presented in Chapter IV of this dissertation is the first study trying to capture the general subjective influence determining the recognized amount of deferred tax assets, apart from situational incentives for earnings management.

Thereby, we[12] do not only analyze the determinants of recognized deferred tax assets in more depth, but we also contribute to the stream of research investigating the variety of underlying forces that shape the quality of the financial reporting outcome. As long as managers can elect to use their discretion over financial reporting, the effect of accounting standards alone may turn out to be weak relative to the effects of forces such as managerial incentives, auditor quality, enforcement, internal and external governance structures, and other institutional features of the economy (Holthausen 2009, Leuz and Wysocki 2008).

Set against this background, we extend possible determinants of recognized deferred tax assets beyond the guidelines provided by the accounting standard IAS 12 and earnings management incentives, and analyze the effects of certain corporate governance attributes, like executive compensation schemes and ownership, to differentiate between different types of

[12] Chapter IV was produced in collaboration with Duc Hung Tran, Seminar of Financial Accounting & Auditing, University of Cologne.

managers and their differing incentives, which possibly systematically affect the discretion exercised in recognition and, thus, possibly the value relevance of deferred tax assets. In addition, we investigate the effects different auditors might have.

Based on a sample of *DAX30*-, *MDAX*-, *TecDAX*-, and *SDAX*-firms over fiscal years 2006 to 2009, we examine in a first step of the analysis the heterogeneity in disclosures of **un**recognized amounts of deferred tax assets (Chapter IV.4).[13] The findings document, in particular, inter-temporal consistency in reporting even across accounting standards. Moreover, we can identify some auditor effects on disclosure.

The empirical results of our main analysis (Chapter IV.5) confirm that deferred tax assets for tax loss carryforwards are generally recognized in accordance with the guidelines provided by IAS 12.36. With respect to earnings management, we find some limited evidence that firms might tend to recognize higher deferred tax assets for tax loss carryforwards if this helps them to meet analysts' EPS forecasts.

Regarding corporate governance attributes, we find that firms with large shares of the firm held by the founding family tend to recognize *c.p.* a significantly lower amount of deferred tax assets for tax loss carryforwards. Evidence on the influence of differing incentives as they are set by diverse compensation schemes is only modest, though.[14] The recognized amount of deferred tax assets is, in particular, unaffected by equity-based compensation components (like stock options) in the manager's compensation package. This finding suggests that managers do generally not assume deferred tax assets to be considered value-relevant by investors, which is in line with the findings of Chapter II.

Regarding auditor effects for recognized amounts, we find some limited evidence that firms audited by smaller audit firms and by *Pricewaterhouse Coopers* are able to recognize *c.p.* higher amounts of deferred tax assets for tax loss carryforwards. Furthermore, the overall quality of a firm's financial statements, which we measure by using a transparency and quality score extracted from the yearly annual report contest *Deutsche Investor Relations Preis* (German

[13] Disclosures of unrecognized amounts of deferred tax assets are characterized by a high degree of heterogeneity under the currently effective version of IAS 12: The majority of firms disclose the amount of tax loss carryforwards for which no deferred tax asset has been recognized to meet the disclosure requirements in accordance with IAS 12.81(e), 27.52 percent of the sample firms disclose a valuation allowance, and about 50 percent of the firms (additionally) disclose the total amount of tax loss carryforwards as a voluntary disclosure. The IASB plans to make establishment and disclosure of a valuation allowance mandatory, similar to ASC 740-10 (see IASB Exposure Draft ED/2009/2, becoming effective at January 1, 2012). This amendment will enhance comparability and information content of income tax disclosures under IFRS/IAS considerably (see Chapter I.3).

[14] See Jensen (2000) for the incentives set by different forms of compensation.

Investor Relations Award) of the German business magazine *Capital*, is highly significantly related to the recognized amount of deferred tax assets for tax loss carryforwards. To exclude potential endogeneity problems, which might arise by use of this transparency score, we employ a 2SLS-approach (Hail 2002), modeling in a first step a firm's transparency choice (Chapter IV.5.2.2).

Besides providing useful additional insights for standard setting boards and regulators that not the accounting standard alone but other factors (such as certain corporate governance structures) shape the outcome of the financial reporting process, we reveal in the analysis of Chapter IV significant factors (beyond IAS 12-guidelines and earnings management incentives) that influence the recognition decision and might cause value relevance of deferred tax assets, potentially as correlated omitted variables.

Before turning by now to the empirical analyses of Chapters II to IV, Chapter I summarizes the key features of deferred tax accounting. Thereby, the chapter is not intended to provide a full picture of all deferred tax accounting rules. Instead, it shall expose the concept of deferred tax accounting and the most important accounting rules, to the extent that these are addressed in the subsequently following research analyses, to readers that are largely unfamiliar with deferred taxes, in order to enhance understanding and comprehension of the research questions, problems, and contributions presented in the subsequent chapters.

Besides providing the key features of deferred tax accounting under IFRS (IAS 12 – Income Taxes) in Section 1 of Chapter I, Section 2 concisely depicts the main differences of deferred tax accounting under US GAAP (ASC 740-10, formerly SFAS No. 109) as compared to the relevant accounting rules under IFRS/IAS. Section 3 of Chapter I finally deals with one point of the next step in the convergence project between IFRS/IAS and US GAAP: the proposed change from the single-step approach to the two-step approach of deferred tax asset recognition under IFRS/IAS.

CHAPTER I

Accounting for Deferred Taxes

1. Accounting for Deferred Taxes under IFRS/IAS (IAS 12)

Deferred taxes are a construct of financial reporting. The purpose of deferred tax accounting is to account for future tax effects that will arise due to different recognition and measurement principles of accounting standards versus tax law. Thus, deferred taxes represent future tax consequences of items and business transactions that have been recognized differently in the financial statement than in the tax report. Specifically, deferred taxes reflect the taxes that would be payable or receivable if the entity's assets and liabilities were recovered / settled at their present carrying amount.

Deferred tax accounting is an outcome of the matching principle, aiming at recognizing the tax consequences of an item reported within the financial statements in the same accounting period as the item itself. Thereby, total tax expense reflects the tax expenses / tax benefits that are attributable to pre-tax book income but that are not reflected in current tax expense of the period.

Recognition and Measurement:

IFRS/IAS and US GAAP follow the *liability method* of deferred tax accounting. Thereby, deferred tax liabilities (deferred tax assets) account for the amounts of income taxes payable (recoverable) in future periods that arise from temporary book-tax differences, i.e., differences between the book value of an asset or a liability and its tax base that will result in taxable (tax deductible) amounts when the book value of the asset / liability is recovered / settled.[15] Recognition of and changes in deferred taxes generally affect book income through deferred tax expense. Yet, (changes in) deferred taxes are recognized directly in equity, i.e., are income-neutral, if the underlying transaction or event, which causes the book-tax difference, is recognized outside profit or loss (IAS 12.58).

Deferred tax liabilities arise generally from financially recorded income that has not yet been taxed, for example in the case of accelerated tax depreciation, where taxable income is deferred into the future (as compared to book income) by tax depreciation rates that exceed book depreciation rates. Conversely, deferred tax assets arise generally as a result of earlier expensing for financial accounting than for tax purposes. Thereby, deferred tax components can reflect

[15] As an exception, IAS 12.15 and IAS 12.24 explicitly prohibit the recognition of deferred taxes arising from temporary differences due to the initial recognition of goodwill and in certain cases of business combinations.

book-tax differences that arise automatically due to differences in tax law versus accounting principles, as well as book-tax differences that inform about choices made for book purposes. Deferred tax assets arising from book-tax differences in pension provisions, for example, imply that firms usually use a lower discount rate in the calculation of the pension provision for book purposes than for tax purposes. For instance, Stadler (2010) reports that the average (median) pension discount rate used in consolidated financial statements of German firms is 5.24 (5.50) percent, whereas German tax law requires a fixed discount rate of 6 percent (§ 6a (3) EStG). In contrast, temporary book-tax differences in provisions reflect fixed differences in tax law versus accounting principles, since provisions are recognized under IFRS/IAS (IAS 37.10) for liabilities of uncertain timing or amount, whereas these liabilities are generally not relevant for tax purposes until payable amounts are actually fixed. Book-tax differences in current assets, as another example, may give rise to either deferred tax assets or deferred tax liabilities (for example, inventory may be written down for book purposes but not for tax purposes, resulting in a deferred tax asset; valuation of inventory according to FIFO for book purposes versus *average value* for tax purposes may give rise to either a deferred tax asset or a deferred tax liability). These examples illustrate that main parts of deferred taxes are generally due to recurring operating activities.

Beside deductible temporary differences, deferred tax assets also have to be recognized for unused tax loss carryforwards and unused tax credit carryforwards (IAS 12.34). Thereby, deferred tax assets are only allowed to be recognized to the extent that the realization of the related tax benefits is "*probable*", i.e., to the extent that it is probable that taxable profit will be available against which the deductible temporary difference, the unused tax losses and tax credits can be utilized (IAS 12.24 and IAS 12.34). The key criterion is a probability threshold of at least 50 percent likelihood of realization.[16] Yet, since the existence of unused tax losses and tax credits, as well as a recent history of losses might indicate that future taxable profit may not be available (IAS 12.35), IAS 12.36 offers additional guidelines concerning the recognition of deferred tax assets for tax loss and tax credit carryforwards. According to IAS 12.36, an entity should in particular consider (1) the availability of reversing deferred tax liabilities, (2) expected

[16] Since there was disagreement among preparers on the exact meaning of "*probable*", the IASB clarified in 2003 a probability threshold of 50 percent („*The Board agreed that the threshold for recognition should be 'more likely than not'. IAS 12 should be amended to clarify that, consistent with FAS 109, 'probable' means 'more likely than not' for the purposes of this Standard*.", Board Decisions on International Accounting Standards – IASB Update April 2003, p.3).

future taxable income, (3) the sources of the unused tax losses, and (4) available tax planning strategies when assessing the probably utilizable share of unused tax losses and tax credits.

Since deferred taxes shall represent future tax effects, they shall be measured at the tax rates that are expected to apply when the underlying asset / liability is realized / settled. Yet, since future tax rates are not known, current tax rates are applied for measurement, i.e., "*tax rates (and tax laws) that have been enacted or substantively enacted by the end of the reporting period*" (IAS 12.47).[17]

The following example shall illustrate procedure and idea behind deferred tax accounting.[18] We assume that a firm owns an asset, which had a purchase price of 150€, with a carrying amount of 100€. Since the cumulative deprecation for tax purposes is 90€, the tax base of the asset is 60€ (150€ - 90€). The applicable tax rate is 25%, so that the firm recognizes a deferred tax liability of 10€ ((100€ - 60€)*0.25). The rationale behind this deferred tax liability is that if the firm recovers the carrying amount of the asset (for example, by sale of the asset), it earns taxable income of 100€. With a tax base of 60€, this would result in a taxable profit of 40€, i.e., a tax liability of 10€ (40€*0.25) that would be payable at the time of recovery of the asset's carrying amount. As long as the firm will continuously replace the asset, to keep its operating capacity constant at a carrying amount of 100€, the firm will have an unchanging deferred tax liability of 10€.

Disclosure and Presentation in Financial Statements:

Deferred tax assets and deferred tax liabilities are classified as non-current assets and liabilities, respectively, on the balance sheet (IAS 1.56). Moreover, deferred tax assets and deferred tax liabilities are only offset if "*the entity has a legally enforceable right to set off current tax assets against current tax liabilities*" and to the extent that the deferred taxes relate to the same taxation authority and the same taxable entity (or different taxable entities that intend a simultaneous clearing of the relevant positions) (IAS 12.74). Discounting deferred taxes is prohibited (IAS 12.53).

[17] In the case of a change in applicable tax rates, deferred taxes are adjusted and re-measured at the new tax rates. To the extent that the recognition of the deferred taxes was included in net income, the adjustments flow through income, too.
[18] The example is taken from IAS 12.16.

Concerning unrecognized amounts of deferred tax assets, i.e., the share of deferred tax assets that has an expected realization probability of less than 50 percent, IAS 12.81(e) specifies to disclose "*the amount (and expiry date, if any) of deductible temporary differences, unused tax losses, and unused tax credits for which no deferred tax asset is recognised in the statement of financial position*."

2. Accounting for Deferred Taxes under US GAAP (ASC 740-10, formerly SFAS No. 109)

The key features of deferred tax accounting are very similar under IFRS/IAS (IAS 12) and under US GAAP (ASC 740-10, formerly SFAS No. 109). However, the standards include different exceptions to the temporary difference approach. Furthermore, differences between the standards concern the recognition and measurement of deferred taxes, as well as the allocation of deferred taxes to the components of comprehensive income and equity. Specifically, main differences concern

- the classification of deferred taxes,[19]
- the area of application of the exemption of deferred tax recognition for permanently reinvested earnings,[20]
- *backwards tracing*,[21]
- the recognition of deferred taxes on initial differences if both, taxable income and book income are not affected,[22]
- guidelines with respect to determination of the probably realizable amount of deferred tax assets,[23, 24]
- the approach to determine the recognized amount of deferred tax assets and related disclosures:

US GAAP require a two-step approach for the recognition of deferred tax assets, whereas IFRS/IAS take a single-step approach. According to ASC 740-10-30-5 (formerly SFAS No. 109, para. 17), deferred tax assets are established under US GAAP, in a first step, for **all** deductible

[19] While deferred taxes are classified into current and non-current components under US GAAP (ASC 740-10-45-4), all deferred taxes are classified as non-current under IFRS/IAS (IAS 1.56).
[20] While IFRS/IAS allow to omit recognition of a deferred tax liability for undistributed earnings of foreign and domestic subsidiaries as long as these earnings are declared to be permanently reinvested (IAS 12.40), US GAAP allow this recognition exemption only in the case of *foreign* subsidiaries (ASC 740-10-55-209 and APB 23).
[21] While IFRS/IAS require *backwards tracing*, US GAAP prohibit *backwards tracing*, i.e., while the effect of changes in deferred taxes that have originally been recognized outside *continuing operations* also has to be recognized outside *continuing operations* under IAS, US GAAP require that the effects of subsequent changes in recognized deferred taxes are always allocated to *continuing operations* (see, for example, ASC 740-10-45-15 versus IAS 12.60).
[22] IAS 12.33 and ASC 740-10-50-20 (SFAS No. 109, para. 11).
[23] See, for instance, ASC 740-10-30-17 to 30-25 versus IAS 12.30 and 12.36.
[24] Other differences relate to the areas of subsequent recognition of a deferred tax asset after a business combination, the calculation of tax benefits related to share-based payments, measurement of deferred taxes on undistributed earnings of a subsidiary, and specific exemptions from the temporary approach under US GAAP, that do not exist under IFRS/IAS (for example, concerning temporary differences arising from leveraged leases, intra-group inventories, changes in exchange rates).

temporary differences, operating loss and tax credit carryforwards. In a second step, a valuation allowance is established against this account, subsuming the portion of deferred tax assets that is not *more likely than not* to be realized, i.e., that is not likely to be realized with a probability of at least 50 percent. Moreover, US GAAP require to disclose the recognized amount of deferred tax assets, the valuation allowance (subsuming the unrecognized amount of deferred tax assets), and the total amount of operating loss and tax credit carryforwards (ASC 740-10-50-2 and 50-3). By contrast, IAS 12 only requires to disclose directly the probably realizable amount of deferred tax assets, in a single step (IAS 12.24 and 12.34). Thus, IAS 12 does not require to disclose the unrecognized amount of deferred tax assets. Neither is a disclosure of the total amount of tax loss carryforwards required.

The next section of this chapter will compare both recognition approaches, single-step and two-step approach, in more detail.

3. Single-Step Approach versus Two-Step Approach of Deferred Tax Asset Recognition

The IASB proposes currently in its Amendment to IAS 12 – Exposure Draft ED/2009/2 – to adopt US GAAP's two-step approach for the recognition of deferred tax assets. This is, the existing single-step recognition of the portion of deferred tax assets for which realization is probable (probability threshold of at least 50 percent) shall be replaced by a two-step approach, where deferred tax assets are recognized in full in a first step and are reduced in a second step, by establishment of a valuation allowance against the full account, to "*the highest amount that is more likely than not to be realizable against taxable profit*" (ED/2009/2.5 and 2.23).

The proposed change will considerably increase comparability and informativeness of disclosed deferred taxes. For one thing, the disaggregated presentation of the total amount of possible deferred tax assets into the probably realizable share of deferred tax assets and the valuation allowance (i.e., the share of deferred tax assets for which the probability of realization is less than 50 percent) increases transparency. The information provided will be enhanced, so that users of financial statements will obtain a more transparent picture of the underlying economics, as compared to the current net presentation of deferred tax assets. In particular, financial statement users will get more transparent information about a) the overall situation of the firm (future performance expectations, etc.) and b) how the recognized deferred tax asset amount has been determined. Latter should encourage preparers to be more careful and precise in calculating the recognized amount of deferred tax assets.[25]

For another thing (and most notably), the new approach will substantially increase the comparability of the disclosures with respect to unrecognized deferred tax benefits and, hence, improve the informativeness of the disclosures. Regarding unrecognized amounts, the current version of IAS 12 only requires to disclose the unrecognized amounts of deductible temporary differences, unused tax loss and tax credit carryforwards (IAS 12.81(e)), i.e., the amounts that will be deductible from taxable income, whereas disclosed recognized amounts reflect tax benefits, i.e., the deductible temporary differences and carryforwards after multiplication with the applicable tax rates, so that, first, it is difficult for financial statement users to relate recognized to

[25] Yet, a higher visibility of unrecognized amounts could also have the opposite effect. Since an increasing valuation allowance implies rather negative future performance expectations, it might be valued negatively by financial statement users (Kumar and Visvanathan 2003). This might result in firms being more reluctant to decrease the amount of recognized deferred tax assets to the actually probably realizable amount.

unrecognized amounts, in order to achieve a percentage of probably realizable tax benefits, since both amounts are disclosed in different units. Second, current IAS 12-disclosures regarding unrecognized amounts show a high degree of heterogeneity: While most firms disclose only the amount of tax loss carryforwards for which no deferred tax asset is recognized, others already disclose a valuation allowance, whereas few other firms only disclose the total amount of their unused tax loss carryforwards, so that a comparison of unrecognized amounts across firms is difficult.[26] Mandatory recognition and disclosure of a valuation allowance would eliminate this heterogeneity and substantially facilitate assessment of a firm's capability to utilize its potential tax benefits.

The following examples illustrate the advantages of the two-step approach as compared to the single-step approach.

Scenario 1:

We focus on two firms, A and B. Both firms have unused tax loss carryforwards of €100m. The tax loss carryforwards of firm A are assigned to the domestic parent company (applicable tax rate of 30%), while the tax loss carryforwards of firm B are assigned to its foreign subsidiary (applicable tax rate of 12%). Based on its medium-term business planning and tax planning, firm A estimates that €40m of its tax loss carryforwards are probable to be realized, while firm B assesses that €60m of its tax loss carryforwards are probable to be realized. Besides, both firms have no other deductible temporary differences, which could give rise to a deferred tax asset.

In accordance with the current IAS 12, firm A would recognize a deferred tax asset of €12m (€40m * 30%) and additionally disclose unrecognized tax loss carryforwards of €60m (see Table I.1). Firm B would disclose a deferred tax asset of €7.2m (€60m * 12%) and unrecognized tax loss carryforwards of €40m. The question, which arises now, is: What do these disclosures tell us about the relative capability of both firms to use their potential tax benefits and about their respective future firm performance prospects (to the extent that these are reflected in the recognition ratio of deferred tax assets; see Gordon and Joos 2003, Legoria and Sellers 2005, Herbohn et al. 2010)?

[26] See Chapter IV of this dissertation for an empirical analysis of the heterogeneity in IAS 12-dislcosures.

Table I.1 – Scenarios 1 and 2

		Scenario 1		Scenario 2	
		Firm A	Firm B	Firm A	Firm B
unused tax loss carryforwards	total	100	100	100	100
	realization probability < 50%	60	40	40	40
	applicable tax rate	30%	12%	30%	12%
disclosures acc. to IAS 12	recognized deferred tax assets	12	7,2	18	7,2
	unrecognized tax loss carryforwards	60	40	40	40
disclosures acc. to ED/2009/2	gross deferred tax assets	30	12	30	12
	valuation allowance	18	4,8	12	4,8
	recognized deferred tax assets	12	7,2	18	7,2
	realization ratio	2:3	3:2	3:2	3:2

The realization ratio displays the ratio of deferred tax assets that are expected to be realizable with a probability of at least 50 percent to deferred tax assets that have an expected realization probability of less than 50 percent.

The amount of tax loss carryforwards for which no deferred tax asset is recognized is indeed higher for firm A (€60m for firm A versus €40m for firm B). Yet, firm A also shows higher recognized deferred tax assets (€12m for firm A versus €7.2m for firm B). If we relate recognized deferred tax assets to disclosed unrecognized amounts (thereby implicitly assuming a single applicable tax rate within the corporate group), we get that firm A even shows a higher tax benefit realization-coefficient (€12m/€60m = 0.2) than firm B (€7.2m/€40m = 0.18), although firm A assesses a lower amount of its future tax benefits to be probably realizable (40 percent (firm A) versus 60 percent (firm B)). These difficulties in comparison arise due the fact that recognized and unrecognized amounts are disclosed in different units – after and before, respectively, applicable tax rates. It is nearly impossible, however, for financial statement users to determine the tax rate effects on unrecognized amounts. This is because, for one thing, only the range of applicable tax rates is generally disclosed. For another thing, the firm's effective tax rate may also be little informative, depending on the tax rates applicable to the main operating activities of the firm.

Recognition and disclosure of a valuation allowance, by contrast, enables to directly relate recognized to unrecognized amounts of tax benefits, obtaining a realization ratio. In the example, firm A would additionally disclose a valuation allowance of €18m (€60m * 30%) and firm B would disclose a valuation allowance of €4.8m (€40m * 12%) (see Table I.1). If we relate deferred tax assets to the valuation allowance amount, the disclosures directly reveal that firm A expects (with a probability of at least 50 percent) to realize only 40 percent (12/(12 + 18)) of its potential tax benefits, while firm B expects to be able to realize 60 percent (4.8/(4.8 + 7.2)) of its potential tax benefits.[27] To put it differently, we get an expected realization rate of 2:3 for firm A, while firm B shows a realization rate of 3:2. Thus, the disclosures clearly reveal that firm B is in a relatively better position, expecting to realize a larger percentage of its potential tax benefits (with a probability of at least 50 percent) than firm A. Hence, the two-step approach improves the comparability and, hence, informativeness of deferred tax disclosures substantially.

[27] We also get these percentages if we relate the unrecognized amount of tax loss carryforwards to the total amount of tax loss carryforwards. However, firms generally do not disclose both items (see Chapter IV). Moreover, such calculation does not take into account amounts of recognized and unrecognized deferred tax assets arising from deductible temporary differences.

Scenario 2:

Future performance expectations for firm A improve, so that firm A increases the amount of probably utilizable tax losses to €60m. While firm A shows a larger deferred tax assets balance than firm B because of its higher applicable tax rate, disclosures according to ED/2009/2 reveal that both firms have the same realization ratio of tax benefits (see Table I.1).

Scenarios 3, 4, and 5:

Now, firm B's foreign subsidiary records only tax loss carryforwards of €60m, while the domestic parent company records the other €40m of tax loss carryforwards. Besides, still €40m of firm B's total tax loss carryforwards do not meet the recognition threshold of 50 percent probability. These €40m of probably non-realizable tax losses are recorded at the parent company (Scenario 3), €20m at the parent company and €20m at the foreign subsidiary (Scenario 4), at the foreign subsidiary (Scenario 5). In all three scenarios, firms A and B show the same amount of unrecognized tax loss carryforwards: €40m (see Table I.2). The amount of recognized deferred tax assets, however, varies for firm B between €7.2m and €14.4m, according to different applicable tax rates. The two-step approach enables to compute realization ratios, which significantly facilitate comparison of the tax benefit realization potential of the firms across the scenarios, revealing that firm B shows in Scenario 5) the best ratio of probably realizable to probably foregone tax benefits by allocating non-utilizable tax loss carryforwards in low-tax countries (see Table I.2).

Inter-Temporal Comparison:

Besides improving inter-firm comparison, the two-step approach also facilitates analysis of inter-temporal development. For example, a firm has unused tax loss carryforwards of €100m in Period 1 and estimates €60m of these to be probably utilizable. Assuming a tax rate of 30%, this results in a recognized deferred tax asset of €18m in Period 1 (see Table I.3). The firm accrues additional €50m of tax losses in Period 2. Based on its medium-term business and tax planning, the firm still expects a ratio of 60 percent of its total tax losses to be utilizable, so that additional deferred tax assets of €9m ((€50m * 60%)*30%) are recognized in Period 2, resulting in total

Table I.2 – Scenarios 3, 4, and 5

				Scenario 3	Scenario 4	Scenario 5
			Firm A	Firm B	Firm B	Firm B
unused tax loss carryforwards	total	domestic	100	40	40	40
		foreign	0	60	60	60
	realization probability < 50%	domestic	40	40	20	0
		foreign	0	0	20	40
	applicable tax rate	domestic	30%	30%	30%	30%
		foreign	12%	12%	12%	12%
disclosures acc. to IAS 12	recognized deferred tax assets		18	7,2	10,8	14,4
	unrecognized tax loss carryforwards		40	40	40	40
disclosures acc. to ED/2009/2	gross deferred tax assets		30	19,2	19,2	19,2
	valuation allowance		12	12	8,4	4,8
	recognized deferred tax assets		18	7,2	10,8	14,4
	realization ratio		1,5:1	0,6:1	1,29:1	3:1

The realization ratio displays the ratio of deferred tax assets that are expected to be realizable with a probability of at least 50 percent to deferred tax assets that have an expected realization probability of less than 50 percent.

Table I.3 – Inter-Temporal

		Period 1	Period 2
unused tax loss carryforwards	total	100	150
	realization probability < 50%	40	60
	applicable tax rate	30%	30%
disclosures acc. to IAS 12	recognized deferred tax assets	18	27
	unrecognized tax loss carryforwards	40	60
disclosures acc. to ED/2009/2	gross deferred tax assets	30	45
	valuation allowance	12	18
	recognized deferred tax assets	18	27
	realization ratio	3:2	3:2

The realization ratio displays the ratio of deferred tax assets that are expected to be realizable with a probability of at least 50 percent to deferred tax assets that have an expected realization probability of less than 50 percent.

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deferred tax assets of €27m. Moreover, tax loss carryforwards, for which no deferred tax assets are recognized, of €60m are disclosed in Period 2 in accordance with IAS 12.

According to ED/2009/2, by contrast, the firm would disclose a deferred tax asset of €18m and a valuation allowance of €12m in Period 1, and a deferred tax asset of €27m and a valuation allowance of €18m in Period 2 (see Table I.3). Relating deferred tax assets to the valuation allowance reveals to financial statement users at first glance that the ratio of recognized to unrecognized tax benefits has not changed from Period 1 to Period 2. This is not determinable based on current IAS 12-disclosures.

Hence, the two-step approach of deferred tax asset recognition results in enhanced transparency, comparability, and informativeness as compared to the single-step approach. Recognition of a valuation allowance requires determination and application of relevant tax rates to unrecognized amounts, which might cause additional costs for firms, however.

CHAPTER II

Perceived versus Actual Cash Flow Implications of Deferred Taxes - An Analysis of Value Relevance and Reversal under IFRS

This paper provides the first value relevance analysis of deferred tax disclosures under IFRS/IAS. The comprehensive analysis, taking into account the different deferred tax components, shows that investors generally do not consider deferred taxes to convey relevant information for assessing firm value, with the exception being large net deferred tax assets. In order to examine whether the general value irrelevance of deferred tax information may be due to lacking cash flow implications, the value relevance analysis is complemented by an analysis of deferred tax balance reversal. This supplemental analysis reveals that about 70 percent of the deferred tax balance persists over time, with increasing accounts dominating decreasing accounts over a four-year horizon, and that deferred tax assets are more reversing than deferred tax liabilities. Further, quantifications reveal that the majority of balance reversals have rather negligible cash flow implications.

The following article

Perceived versus Actual Cash Flow Implications of Deferred Taxes - An Analysis of Value Relevance and Reversal under IFRS

by Astrid K. Chludek

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1. Introduction

Since the 1980s, disclosure requirements for deferred taxes have been enhanced considerably in U.S. GAAP, IFRS/IAS, and in national accounting standards. The most recent instance is the reform of national accounting law in Germany (BilMoG, generally applicable for fiscal years beginning after December 31, 2009), which materially increases recognition, disclosure, and documentation requirements for deferred taxes of medium-sized and large corporations. Meanwhile, the overall usefulness of deferred tax accounting is on debate continuously. Critics argue that the informative value of deferred taxes is only low due to highly uncertain cash flow implications, which results in most financial statement users ignoring deferred tax disclosures, since these are not considered to provide relevant information for decision making.[28]

The reported lack of consideration of disclosed deferred tax information is opposed to rather high accounting costs that arise due to the fact that accounting for deferred taxes is quite complex and requires a high level of coordination. It is necessary, for instance, to prepare the tax report within a narrow time frame and to assess the future realizability of deferred tax assets. The latter includes estimating future taxable income, as well as assessing the reversal of taxable temporary differences. Accordingly, accountants name deferred tax allocation as one of the most complex and costly provisions with which to comply, so that there is an ongoing controversy about whether there is any (adequate) benefit that could justify the rather high accounting costs involved.[29]

This paper contributes to the cost-benefit controversy in two ways. In the first place, I investigate the use of under-IFRS disclosed deferred tax information by the primary consolidated financial statement addressees – equity investors. Specifically, I analyze whether deferred taxes, representing part of future tax cash flow, are considered relevant for assessing firm value. In the second place, I complement the value relevance analysis by an analysis of deferred tax balance reversal by this quantifying deferred tax cash flow.

The analyses are based on a unique set of German firm data for two reasons. First, to the best of my knowledge, this is the first study explicitly analyzing the value relevance of disclosed deferred tax information on IFRS-based data. Yet, the relevance and information

[28] See the Communication from the Commission of the European Communities (2007) and Beechy (2007) for anecdotal evidence, and Amir and Sougiannis (1999), Chattopadhyay et al. (1997), Chen and Schoderbek (2000), and Haller et al. (2008) for empirical evidence. Alternatively, deferred tax information may be ignored because of lacking knowledge about and understanding of deferred tax accounting (see Carnahan and Novack 2002).

[29] See Cheung et al. (1997), the Communication from the Commission of the European Communities (2007), as well as survey evidence of Eierle et al. (2007).

content of deferred tax disclosures under IFRS is of common international interest. Since recognition and disclosure requirements are typically much more extensive under IFRS than under national accounting standards, convergence to and adoption of IFRS are likely to cause material additional costs for firms with respect to deferred tax accounting. Second, the major studies in this field cover similar data by analyzing U.S. data of the middle of the 1990s. It is important to cover other data sources and time horizons in order to be able to draw general conclusions, in particular given the divergent and inconclusive results of these prior studies.

Using fixed effects estimation with Huber-White robust standard errors clustered at firm level, by this means not only adjusting standard error estimation for potential serial correlation, but also mitigating correlated omitted variable bias in the estimated coefficients by controlling for unobserved heterogeneity, I find that investors do not include deferred taxes into their valuation of the firm, i.e., deferred taxes are generally not systematically related to a firm's market value, with the exception being large net deferred tax assets. The results are robust to different estimation methods and model specifications; they are neither industry-specific nor do I find material evidence for the composition of deferred taxes being considered relevant. These findings suggest that investors perceive the cash flows deferred taxes account for as highly uncertain and do not expect them to be substantially realized in the near future.

The analysis of value relevance is complemented by an analysis of deferred tax balance reversal in order to examine whether perceived lacking cash flow implications coincide with actual lacking reversal. To the best of my knowledge, the only other study analyzing deferred tax reversal is a study conducted by Price Waterhouse in 1967, so that empirical evidence on reversal behavior is not only rare, but also outdated. Yet, information on the reversal behavior of deferred tax balances is of crucial interest in the context of cost-benefit considerations, since lacking reversals imply a present value of deferred tax cash flow of zero, thus challenging the informativeness of deferred tax allocation. The results suggest that in the short run, deferred tax balances oscillate as a consequence of normal variation in the firm's operating activities, whereas increasing accounts dominate decreasing accounts in the medium term. Furthermore, I find that deferred tax assets show a higher rate of balance reversal than deferred tax liabilities, suggesting that deferred tax assets tend to translate more timely into cash flow than deferred tax liabilities.

Additionally, this study provides an estimation of deferred tax cash flow as it is implied by balance reversal. Quantifications assessing the economic significance of deferred tax cash flow have been lacking so far. The quantifications reveal that despite the distributions

showing a considerable rate of balance reversal, average cash flow implications of these reversals are only small. Overall, the results of the value relevance analysis are broadly consistent with the balances' reversal structure and cash flow implications.

The proceeding of this chapter is organized as follows: Section 2 covers theories regarding the value relevance of deferred taxes and reviews related research. Section 3 describes data and sample selection, the regression model and estimation method, and discusses the results of the value relevance analysis. The analysis of balance reversal and quantifications of implied deferred tax cash flow are presented in Section 4. Robustness tests and results of supplemental analysis are reported in Section 5. Finally, Section 6 concludes.

2. The Value Relevance of Deferred Taxes: Theories and Literature Review

There are two opposed theories with respect to the value relevance of deferred taxes: *liability view* versus *equity view*. While proponents of the liability view argue that deferred tax liabilities (deferred tax assets) account for future tax liabilities (future tax benefits) and should therefore contribute negatively (positively) to firm value, proponents of the equity view reason that associated cash flows are highly uncertain, with a present value close to zero, and deferred taxes should therefore be of no value relevance.

IFRS and US GAAP follow the liability view by classifying deferred tax liabilities (deferred tax assets) as liabilities (assets).[30] According to IAS 12.5, deferred tax liabilities (deferred tax assets) account for the amounts of income taxes payable (recoverable) in future periods that arise from temporary book-tax differences, i.e., differences between the book value of an asset or a liability and its tax base that will result in taxable (tax deductible) amounts when the book value of the liability (asset) is settled (recovered).[31] Deferred tax liabilities arise, for example, from accelerated tax depreciation or from financially recorded income that has not yet been taxed. Deferred tax assets are recognized for the probably realizable tax benefits of tax loss carryforwards and arise, for example, from provisions for warranty costs or bad debts, which are already expensed for book purposes, but which are not tax deductible until the provision is utilized.

Critics of the liability view argue that, for one thing, the major part of deferred taxes is not expected to be realized in the near future as a consequence of arising from operating, and therefore periodically recurring, activities, so that single reversing temporary differences are offset by newly created temporary differences in the same fiscal year, in sum deferring the reversal of the aggregate temporary differences and the associated tax cash flow indefinitely. For another thing, uncertainty does not only exist concerning the timing of the associated tax cash flow, but also concerning the realizability of implied tax payments and tax benefits, since realization of these cash flows depends on the firm's development and future operations.[32] Particularly, if large parts of temporary differences reverse due to ceasing recurring operating

[30] Deferred tax accounting is very similar under IFRS/IAS (IAS 12) and under US GAAP (SFAS No. 109). Differences concern, for instance, reporting requirements like the disclosure of the valuation allowance and the extent to which deferred taxes are allowed to be included in other positions on the balance sheet.

[31] Deferred tax accounting is an outcome of the matching principle, aiming at recognizing the tax consequences of an item reported within the financial statements in the same accounting period as the item itself.

[32] This applies primarily to deferred tax liabilities, since deferred tax assets are only recognized to the extent that their associated benefits are "*probable*" (IAS 12.24, 12.27) to be realized. Yet, "*probable*" amounts can only be estimates, therefore containing uncertainty *per definitionem*. Besides, firms have an incentive to defer a downwards adjustment of their deferred tax assets in case of decreasing realization probability because such an adjustment would result in income-decreasing deferred tax expense and might be interpreted as a negative private signal concerning future firm performance.

activities, the firm will most likely be in severe financial difficulties, with the consequence that accruing tax benefits (tax liabilities) cannot be used (paid) because of lacking taxable income (cash inflow), such that deferred tax cash flow will not be realized even in case of reversing temporary differences. For these reasons, proponents of the equity view argue that deferred taxes account principally for distant and – in several dimensions – uncertain cash flows, being of no or only little relevance for the amount of tax payments in the next years, the associated cash flows having a present value that is close to zero. Therefore, deferred taxes are effectively part of equity according to this view.

Empirical evidence on whether financial statement users take deferred tax information into account is rather inconclusive. Using similar data,[33] Amir et al. (1997) and Ayers (1998) provide evidence consistent with the liability view and the market discounting deferred tax components according to their expected time and likelihood of reversal, while Chang et al. (2009), using Australian data, find only deferred tax assets to be value relevant. By contrast, Chandra and Ro (1997) provide evidence consistent with the equity view by showing that deferred taxes and stock risk are related negatively. Chen and Schoderbek (2000) report that deferred tax adjustments as a consequence of a change in the corporate tax rate were reflected in share prices at the same rate as recurring earnings, despite their different implications for future cash flows.[34] Apparently, investors did not expect the income effects due to tax rate change-induced deferred tax adjustments, which suggests either that investors are not familiar with deferred tax accounting rules, the concept of deferred taxes, or that they ignore deferred taxes altogether.[35] Consistent with the latter, Lev and Nissim (2004) find no significant relation between deferred tax expense and annual returns, which suggests that investors do not consider deferred taxes to be relevant.

Regarding other financial statement users, Amir and Sougiannis (1999) and Chen and Schoderbek (2000) report empirical evidence of financial analysts not including deferred tax information in their earnings forecasts. Likewise, several empirical studies report that deferred

[33] Amir et al. (1997) use data of Fortune 500 companies, years 1992 to 1994, and Ayers (1998) uses data of NYSE and AMEX firms, years 1992 and 1993.

[34] Deferred taxes are calculated by multiplying the temporary difference (the difference between book value and tax base) with the tax rate that is expected to apply at the time of its reversal. Since future tax rates are not known, current tax rates are used with the consequence that deferred tax balances have to be adjusted as soon as changes in income tax rates are enacted (IAS 12.47–49 and SFAS No. 109, para. 27). To the extent that the recognition of these deferred taxes was included in net income, the adjustments flow through income, too.

[35] Amir et al. (1997), as well as Weber (2009), suggest that lacking consideration of disclosed (deferred) tax information may be due to its complexity. In line with Plumlee's (2003) finding of market participants being less likely to incorporate complex information due to either inability or cost-benefit considerations, Chen and Schoderbek (2000) attribute their finding to investors possibly rationally deciding to not become informed of specific accounting rules based on cost-benefit considerations and/or considering estimation of the tax adjustments not cost-beneficial.

taxes are not reflected in bond ratings (see Huss and Zhao 1991, Chattopadhyay et al. 1997). In line, a German survey study by Haller et al. (2008) reports that the vast majority of their interviewees (59 employees of 32 credit institutions, who work in the area of credit analysis and scoring of medium-sized enterprises) declared to add deferred tax assets back to equity because of doubtful value.[36]

Reviewing the literature reveals that empirical evidence concerning the use and interpretation of disclosed deferred tax information is rather inconclusive. While some studies focusing on investors find evidence supportive of the liability view, others do not. Moreover, some of these studies have econometric issues, not properly controlling for serial correlation and possible correlated omitted variable bias, as indicated by unexpectedly high deferred tax coefficients. Furthermore, these studies are largely based on similar data, such that significant findings might be driven by observations of the implementation year of SFAS No. 109, 1992.[37] Studies examining the use of deferred tax information by other financial statement users – lenders, bond raters, and financial analysts – suggest that those typically ignore deferred taxes in their decision-making process and eventually reverse out the inter-period tax allocation by adding deferred taxes back to equity and earnings, respectively.

[36] See also Chaney and Jeter (1989), Carnahan and Novack (2002), and Beechy (2007), who report anecdotal evidence suggesting that banks and other lenders, as well as credit and financial analysts, routinely reverse out the impact of inter-period tax allocation, adding deferred tax expense back to net income and treating deferred tax balances as equity.

[37] Besides, many companies include under U.S. GAAP at least part of their deferred taxes in other balance sheet positions like *other (current) assets*, *other (current) liabilities*, *accrued liabilities*, or even in *income taxes payable*. If investors do not check the notes for deferred tax information, deferred taxes might be included automatically in firm value, although they are not deliberately considered by investors as future tax benefits and payments, respectively. Using IFRS/IAS data avoids this problem, since IAS require deferred taxes to be reported as separate positions on the balance sheet.

3. Value Relevance Analysis

3.1. Regression Model and Estimation Method

In order to assess whether and how investors consider disclosed deferred tax information, I base my regression model on the valuation model by Feltham and Ohlson (1995).[38] Consistent with Feltham and Ohlson (1995), I relate market value of equity (*P*) to net operating assets, net financial assets (*NFA*), and current abnormal operating earnings (*AOE*), with operating assets being disaggregated into net operating assets before deferred taxes (*NOA*), deferred tax assets (*DTA*), and deferred tax liabilities (*DTL*). This gives the following basic regression model:

$$P_{it} = \beta_0 + \beta_1 NOA_{it} + \beta_2 NFA_{it} + \beta_3 AOE_{it} + \beta_4 DTA_{it} + \beta_5 DTL_{it} + \sum_{\tau=2006}^{2008} \delta_\tau year_\tau + e_{it}$$

The variable definitions can be found in Table II.1. *i* is the firm identifier ($i = 1,\ldots,183$) and *t* is the period identifier ($t = 2005,\ldots,2008$). *e* is the error term.

P denotes share price three months after fiscal year-end, three months being a common time-lag to ensure that financial statements are already published and all available information is priced. In line with Feltham and Ohlson (1995), net financial assets (*NFA*) are defined as cash, cash equivalents, and short-term investments less total debt and preferred stock. Net operating assets before deferred taxes (*NOA*) are computed as book value of shareholders' equity less net financial assets less deferred tax assets plus deferred tax liabilities. *DTA* and *DTL* represent deferred tax assets and deferred tax liabilities, respectively, with *DTL* being coded as positive numbers. Current abnormal operating earnings (*AOE*) are calculated as after-tax operating earnings (approximated by tax-adjusted EBIT, i.e., EBIT multiplied with one minus income tax expense divided by EBT) less expected normal operating earnings (12 percent of lagged net operating assets).[39] I choose 12 percent as estimate of the required rate of return because the average annual return of the German stock market for the ten-year period preceding the sample period is 12.13 percent.[40] The distributional properties of the

[38] For a derivation of the Feltham-Ohlson model, see Appendix A.
[39] The empirical results are not sensitive to the way of tax adjustment. I checked different possible adjustments; among others, adjusting for current tax expense only, with unchanging results.
[40] Calculations are based on data provided by Strehle and Hartmond, Humboldt University, Berlin, available at: http://lehre.wiwi.hu-berlin.de/Professuren/bwl/bb/aktien/DatenReihen. For years 1955 to 2009, Strehle and Hartmond report an average (median) annual return of 12.21 (11.77) percent for the German stock market and of 12.68 (10.83) percent for the 30 largest firms.

Table II.1 – Variable Definitions

P_{it}	closing share price at Frankfurt Stock Exchange of firm *i* three months after fiscal year-end *t* (Datastream item P)
NFA_{it}	net financial assets per share of firm *i* at fiscal year-end *t* net financial assets$_{it}$ = cash, cash equivalents & short-term investments$_{it}$ (item 02001) - total debt including preferred stock$_{it}$ (item 03255)
NOA_{it}	net operating assets before deferred taxes per share of firm *i* at fiscal year-end *t* = book value of equity$_{it}$ (item 03501) per share – $NFA_{it} – DTA_{it} + DTL_{it}$
AOE_{it}	abnormal operating earnings per share of firm *i* at fiscal year-end *t* abnormal operating earnings$_{it}$ = EBIT$_{it}$ (item 18191)*(1- [income tax expense$_{it}$(item 01451) /EBT$_{it}$(item 01401)]) - 0.12*(book value of equity$_{it-1}$ (item 03501) - net financial assets$_{it-1}$)
DTA_{it}	deferred tax assets per share of firm *i* at fiscal year-end *t* (hand-collected)
DTL_{it}	deferred tax liabilities per share of firm *i* at fiscal year-end *t* (hand-collected)
$netDT_{it}$	net deferred taxes per share of firm *i* at fiscal year-end *t* = DTA_{it} - DTL_{it}
$netDTA_{it}$	net deferred tax assets per share of firm *i* at fiscal year-end *t* = $netDT_{it}$ if $netDT_{it} > 0$ ($DTA_{it} > DTL_{it}$), and 0 otherwise
$netDTL_{it}$	net deferred tax liabilities per share of firm *i* at fiscal year-end *t* = $netDT_{it}$ if $netDT_{it} < 0$ ($DTA_{it} < DTL_{it}$), and 0 otherwise
$netDT1_{it}$	= $netDT_{it}$ if $netDT_{it}$ is in the first quintile (0 to 20 percent) of the *netDT*-distribution, and 0 otherwise
…	….
$netDT5_{it}$	= $netDT_{it}$ if $netDT_{it}$ is in the fifth quintile (80 to 100 percent) of the *netDT*-distribution, and 0 otherwise

All variables are per share, i.e., deflated by common shares outstanding (Datastream item NOSH). All item numbers refer to Worldscope item numbers if not indicated differently.

sample's realized share returns and ROE additionally support the choice of 12 percent.[41] All variables are per share, i.e., deflated by the number of common shares outstanding. I additionally include year dummies (*year*), with reference year 2005, to control for unobserved time effects. Moreover, fixed firm effects are controlled for (see below).

According to the theoretical model, the coefficients of net operating (*NOA*) and net financial assets (*NFA*) should be equal to one in the case of unbiased accounting and larger than one in the case of conservative accounting. The *AOE* coefficient reflects the persistence of current abnormal operating earnings over time. Hence, I expect β_3 to take values that range from zero to one over the cost of equity (annuity–full persistence). The *DTA*- and *DTL*-coefficients are the subjects of this value relevance analysis. If investors value deferred taxes in accordance with the liability view as future tax benefits and future tax liabilities,

[41] Results are qualitatively unchanged if different uniform rates or firm-specific rates are used (see the robustness tests in Section 5).

respectively, the *DTA*-coefficient should be positive and the *DTL*-coefficient negative. Further, if the market discounts deferred taxes depending on timing and likelihood of their associated cash flows, β_4 and β_5 could be smaller than one. By contrast, *DTA*- and *DTL*-coefficients are expected to be not different from zero if investors do not consider deferred taxes to provide relevant information on future tax cash flow.

I estimate the model using fixed firm effects, thereby controlling for time-constant unobserved heterogeneity, i.e., time-constant firm-specific factors.[42] These factors bias estimated coefficients in case they are determinants of the dependent variable and correlated with one or more of the regressors, so that fixed effects estimation mitigates correlated omitted variable bias in the estimated coefficients. Further, the source of serial correlation due to time-constant factors is thereby eliminated. I additionally employ Huber-White robust standard errors clustered by firm, which are heteroscedasticity-consistent and corrected for any potentially remaining serial correlation in the error terms.

3.2. Data and Sample Selection

Market prices are obtained from Thomson Reuters' Datastream database, accounting data from Thomson Reuters' Worldscope database, while deferred tax data, being not available in the databases, are hand-collected from the notes to consolidated financial statements. Hand-collected data are matched with the database data by using firm name and year. The match is validated by total assets and net income.[43]

The observation period covers fiscal years 2005 to 2008. 2005 is chosen as starting point because the adoption of IFRS for consolidated financial statements became mandatory for all listed European companies for fiscal years beginning at or after January 1, 2005. Before 2005, listed German companies were allowed to prepare their consolidated financial statements according to either German GAAP (HGB), IFRS, or US GAAP. To ensure consistent reporting rules, 2005 is hence chosen as the first observation year.

Given that deferred tax data have to be hand-collected, the sample has to be restricted to a manageable size. Therefore, the initial sample consists of all 160 firms that compose the indices DAX, MDAX, TecDAX, and SDAX, and additional 50 firms listed in CDAX index

[42] The Hausman test rejects the null hypothesis of unobserved heterogeneity being uncorrelated with the regressors. Hence, random effects estimation would generate inconsistent coefficient estimates and, thus, I use fixed effects estimation.

[43] For 14 observations, database data did not correspond to the hand-collected data, so that I replaced the database data by hand-collected data for these observations. Results are unchanged if these observations are dropped.

Table II.2 - Sample Selection

	Firms	Observations
DAX	30	
MDAX	50	
TecDAX	30	
SDAX	50	
other CDAX	50	
	210	
excluded:		
firms without legal domicile in Germany	-11	
banks, insurance companies, REITs (NACE 1.1 codes 6500-6799)	-15	
	184	**736**
missing variable data for the basic regression		-79
outliers	-1	-31
Total	**183**	**626**

on August 31, 2007; all in all, the 210 firms with the highest free float market capitalization and exchange turnover on Frankfurt Stock Exchange in August 2007.[44] I exclude 11 firms without legal domicile in Germany, and 15 banks, insurance companies, and real estate investment trusts (NACE 1.1 codes 6500–6799) because of their different economic and financial regulatory environment, the difficulty of separating their financial assets from operating assets, their different asset composition, and their tax specificities. This leaves the sample with 184 firms and 736 firm-year observations. I lose 79 observations due to variable construction and missing variable data.[45] To minimize the effects of outliers on the inferences, I delete another 31 observations with an absolute value of the R-Student statistic of greater

[44] Including the shares of all listed domestic companies, the CDAX index represents the German equity market in its entirety, i.e., all companies listed on FWB Frankfurter Wertpapierbörse (Frankfurt Stock Exchange). The indices DAX, MDAX, TecDAX, and SDAX are subsets of the CDAX, containing the largest companies in terms of order book volume and free float market capitalization. These firms are chosen for the analysis because they are, on average, larger, more diversified, and more involved in international activities than the remainder of German firms, which may give rise to more significant deferred taxes from different sources. Mills et al. (2002), for instance, report that the largest 20 percent of their sample firms account for virtually all of their sample's book-tax income and balance sheet differences. For further information on the indices, see deutsche-boerse.com. The strike date August 31, 2007, is chosen randomly.

[45] For not losing the first observation year, 2005, as a consequence of the construction of abnormal operating earnings, *AOE*, including lagged net operating assets, I additionally collected the data necessary to compute net operating assets from all sample firms that already prepared consolidated financial statements according to IFRS in 2004 (125 of 184 firms). If I only use after-tax operating earnings as *AOE* or drop fiscal year 2005 from the analysis, results are qualitatively unchanged.

than three.[46] This results in a final sample of 183 firms and 626 firm-year observations over fiscal years 2005 to 2008. Table II.2 summarizes the sample selection procedure and Table II.3 reveals the sample's industry composition.

Table II.3 – Industry Composition

Industry	Number of Firms	NACE 1.1
Manufacturing	114	
Apparel & Leather Products	6	1800-1999
Automobile	8	3400-3599
Basic Resources	4	2500-2799
Chemicals	14	2400-2439, 2450-2499
Food & Beverages	1	1500-1599
Industrial & Technology	65	2800-3399
Pharmaceuticals	16	2440-2449, 7310
Business & Management Consultancy, Personel Services, Investment Consultancy, Holdings	12	7400-7499
Construction	5	4500-4599
Healthcare	1	8500-8599
Media	7	2200-2299, 9200-9299
Real Estate	8	7000-7099
Software	12	7200-7299
Telecommunication	4	6400-6499
Transportation & Logistics	6	6000-6399
Utilities	3	4000-4199
Wholesale & Retail	11	5100-5299
Total	**183**	

[46] The R-Student statistic is measured as the regression residual divided by the residuals' standard error. A cutoff of three is commonly used and implies that observations with a regression residual farther than three standard deviations from zero are considered as outliers.

3.3. Empirical Results

Table II.4 presents descriptive statistics of the basic regression variables, as well as some other statistics characterizing the sample. On average, deferred tax assets (DTA) and deferred tax liabilities (DTL) account for 3.18 and 2.74 percent, respectively, of total assets, and amount to approximately 10 percent of book equity, with nearly 30 percent of firm-year observations featuring even larger deferred tax balances. Further, deferred tax expense amounts to a substantial 17 percent of EBT, on average. Three hundred six firm-years exhibit net deferred tax assets (DTA in excess of DTL), whereas 320 exhibit net deferred tax liabilities (DTL in excess of DTA).

Table II.4 – Descriptive Statistics

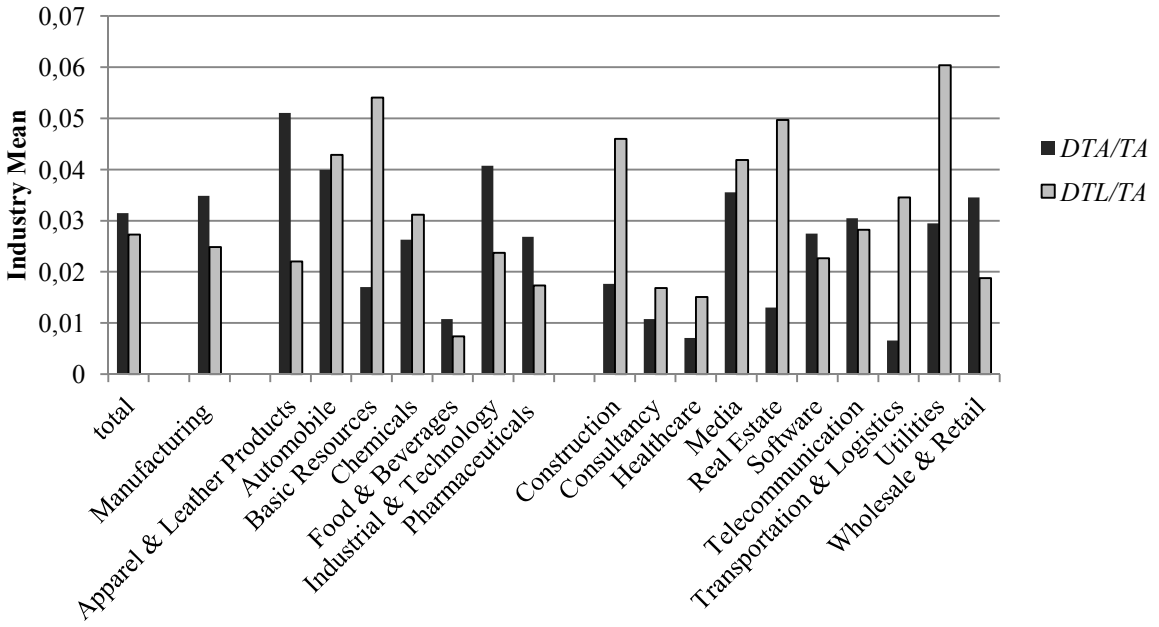
	mean	median	std. dev.	min	max	obs.
P	28.56	20.01	25.74	0.25	130.50	626
NOA	25.29	12.75	50.29	-117.79	920.97	626
NFA	-9.28	-2.22	30.22	-558.03	34.49	626
AOE	0.16	0.26	4.47	-70.97	24.18	626
DTA	1.31	0.48	2.80	0.00	43.80	626
DTL	1.59	0.48	3.02	0.00	22.15	626
netDT	-0.03	-0.01	2.98	-18.54	37.40	626
netDT1	-3.33	-2.01	3.67	-18.54	-0.96	126
netDT2	-0.33	-0.30	0.21	-0.81	-0.11	125
netDT3	0.00	0.00	0.05	-0.08	0.09	125
netDT4	0.28	0.26	0.16	0.10	0.60	125
netDT5	2.50	1.58	3.97	0.78	37.40	125
TA	8.8479	0.86	28.2	0.018	189.22	626
MV	3.9133	0.59	10.5	0.005	99.10	626
EBT	3.10	1.96	4.73	-9.53	32.26	626
EPS	1.71	1.27	3.23	-10.26	28.46	626
CF	6.23	3.73	9.29	-8.75	56.04	614
DTA/TA	0.0318	0.0186	0.05	0.00	0.2598	626
DTL/TA	0.0274	0.0191	0.03	0.00	0.1974	626
DTA/EK	0.0987	0.0487	0.24	0.00	1.8383	626
DTL/EK	0.0918	0.0503	0.17	0.00	1.1762	626
dte	-0.0005	0.0108	0.64	-4.46	7.00	572
dte/EBT	0.1686	-0.0070	2.01	-3.33	29.90	572

TA: total assets (Worldscope item 02999); *MV*: market value of equity (common shares outstanding*price (Datastream items NOSH*P)); *TA* and *MV* are in billion €uro. *EBT*: EBT (Worldscope item 01401) per share. *EPS*: earnings per share (Worldscope item 18209); *CF*: cash flow (Worldscope item 05501) per share. *DTA/TA (DTL/TA)*: ratio of deferred tax assets (deferred tax liabilities) to total assets; *DTA/EK (DTL/EK)*: ratio of deferred tax assets (deferred tax liabilities) to book equity (Worldscope item 03501); *dte*: deferred tax expense (hand-collected) per share; *dte/EBT*: ratio of deferred tax expense to EBT. For all other variable definitions, see Table II.1.

Figure II.1 displays average DTA and DTL relative to total assets separately by industry, revealing that the average amounts of deferred taxes, as well as the rate of average DTA to DTL, vary noticeably across industries. In particular, PPE-intensive industries (Basic Resources, Construction, Real Estate, Transportation and Logistics, Utilities) exhibit relatively larger shares of DTL, which is consistent with DTL arising from depreciation differences being one of the main DTL components.

Pairwise correlation coefficients of the main regression variables are presented in Table II.5. The relatively high correlation coefficient of deferred taxes and net operating assets reflects the underlying character of operating assets for deferred taxes. Furthermore, *DTA* and *DTL* are significantly positively correlated, implying that DTA and DTL arise complementarily to a certain extent.

Figure II.1 – Deferred Taxes to Total Assets by Industry



Based on 626 observations.

Table II.5 – Pearson Correlation Coefficients

	P	*NOA*	*NFA*	*AOE*	*DTA*	*DTL*	*netDT*	*netDT1*	*netDT2*	*netDT3*	*netDT4*	*netDT5*
P	**1.00**											
NOA	**0.26**	**1.00**										
NFA	**-0.10**	**-0.76**	**1.00**									
AOE	**0.28**	**-0.48**	**0.58**	**1.00**								
DTA	**0.20**	**0.49**	**-0.42**	**-0.36**	**1.00**							
DTL	**0.14**	**0.34**	**-0.28**	-0.04	**0.48**	**1.00**						
netDT	-0.00	**-0.08**	-0.07	**-0.12**	**0.17**	**-0.26**	**1.00**					
netDT1	**-0.15**	**-0.38**	**0.24**	0.00	-0.08	**-0.83**	**0.34**	**1.00**				
netDT2	-0.00	0.01	0.00	-0.04	**0.10**	0.06	0.03	**-0.14**	**1.00**			
netDT3	-0.01	0.01	-0.01	0.01	0.02	0.01	0.00	-0.01	0.01	**1.00**		
netDT4	-0.04	**-0.11**	**0.11**	0.03	-0.08	**0.16**	0.02	**0.14**	**0.18**	0.01	**1.00**	
netDT5	**0.08**	0.04	**-0.16**	**-0.13**	**0.20**	0.00	**0.95**	0.04	0.05	0.00	-0.05	**1.00**

Correlation coefficients that are significantly different from zero at the 5 percent level are in boldface. Based on 626 observations. For variable definitions, see Table 1.

Table II.6 presents the results of the regression analysis. By explaining 50.34 percent of the variance in share prices, the model explains a substantial part of share price variation. Furthermore, *NOA*, *NFA*, and *AOE* coefficients are highly significant in each of the model specifications and show the expected signs and magnitudes. In accordance with the theoretical model, *NOA*- and *NFA*-coefficients are statistically not different from one in nearly all of the model specifications. Regarding deferred taxes, I find, in general, no systematic relation between deferred taxes and firm value. Inconsistent with the liability view, the coefficients of separately included DTA and DTL balances, as well as the coefficient of net deferred taxes (*netDT*, defined as *DTA* minus *DTL*), are not significantly different from zero (Table II.6 Models (1) and (2)). Besides, deferred tax coefficients remain insignificant if I allow valuation coefficients to differ in net deferred tax assets (*netDTA*) versus net deferred tax liabilities (*netDTL*) (Table 6 Model (3)).

According to IAS 12.74, an entity is allowed to offset DTA against DTL if it has a "*legally enforceable right to set off current tax assets against current tax liabilities; and the deferred tax assets and the deferred tax liabilities relate to income taxes levied by the same taxation authority*"; hence, firms generally set off DTA against DTL to the extent that these relate to the same taxation authority and the same taxpayer. However, since additional tax

Table II.6 – Value Relevance Analysis

	intercept	*NOA*	*NFA*	*AOE*	*DTA*	*DTL*				within R^2	obs. / cross-sections
(1)	24.9029***	0.6013***	0.9428***	1.2748***	0.6759	1.5838				0.5034	626 / 183
	(7.86)	(2.91)	(3.60)	(2.79)	(0.86)	(1.47)					
					netDT						
(2)	24.6543***	0.8328***	1.1554***	1.1414**	0.3802					0.4941	626 / 183
	(7.27)	(3.49)	(3.87)	(2.52)	(1.03)						
					netDTA	***netDTL***					
(3)	24.0823***	0.7464***	1.0903***	1.1712**	1.1199	-1.7444				0.5028	626 / 183
	(7.83)	(3.22)	(3.79)	(2.61)	(0.93)	(-1.46)					
					netDT1	***netDT2***	***netDT3***	***netDT4***	***netDT5***		
(4)	24.2654***	0.7421***	1.0815***	1.1739**	-1.7284	-0.7545	-6.3068	7.2189	0.6853***	0.5049	626 / 183
	(6.66)	(3.06)	(3.58)	(2.55)	(-1.45)	(-0.15)	(-0.29)	(1.45)	(2.93)		
					DTA_TLC	***DTA_current assets***	***DTA_provisions***	***DTA_liabilities***	***DTA_other***		
(5)	16.0338***	0.6300***	0.7084***	1.5121***	-3.5429	-0.0123	4.5879	0.6078	0.5247		
	(6.92)	(4.62)	(3.34)	(3.06)	(-1.38)	(-0.18)	(1.33)	(0.27)	(0.82)		
						DTL_current assets	***DTL_PPE***	***DTL_intang***	***DTL_other***		
						1.7143	-1.8717	0.3934	0.3478	0.5012	564 / 166
						(0.82)	(-1.08)	(0.44)	(0.39)		

Table II.6 – Value Relevance Analysis (continued)

***, **, *: significantly different from zero at the 0.01, 0.05, and 0.1 level, respectively. Fixed effects estimation with t-statistics (reported in parentheses) calculated using Huber-White robust standard errors clustered by firm. Year dummies not reported. The number of available observations declines for this regression as a consequence of varying deferred tax disclosures, so that it is not possible to decompose all deferred tax balances unambiguously into these seven components. *DTA_TLC*: DTA for tax loss and tax credit carryforwards. *DTA_current assets*: DTA arising from current assets. *DTA_provisions*: DTA arising from pension provisions and other provisions. *DTA_liabilities*: DTA arising from liabilities. *DTA_other*: DTA arising from other deductible temporary differences. *DTL_current assets*: DTL arising from current assets. *DTL_PPE*: DTL arising from PPE. *DTL_intang*: DTL arising from intangible assets. *DTL_other*: DTL arising from other taxable temporary differences. All variables are per share. For all other variable definitions, see Table II.1.

(1) $P_{it} = \beta_0 + \beta_1 NOA_{it} + \beta_2 NFA_{it} + \beta_3 AOE_{it} + \beta_4 DTA_{it} + \beta_5 DTL_{it} + \sum_{\tau=2006}^{2008} \delta_\tau year_\tau + e_{it}$

(2) $P_{it} = \beta_0 + \beta_1 NOA_{it} + \beta_2 NFA_{it} + \beta_3 AOE_{it} + \beta_4 netDT_{it} + \sum_{\tau=2006}^{2008} \delta_\tau year_\tau + e_{it}$

(3) $P_{it} = \beta_0 + \beta_1 NOA_{it} + \beta_2 NFA_{it} + \beta_3 AOE_{it} + \beta_4 netDTA_{it} + \beta_5 netDTL_{it} + \sum_{\tau=2006}^{2008} \delta_\tau year_\tau + e_{it}$

(4) $P_{it} = \beta_0 + \beta_1 NOA_{it} + \beta_2 NFA_{it} + \beta_3 AOE_{it} + \beta_4 netDT1_{it} + \beta_5 netDT2_{it} + \beta_6 netDT3_{it} + \beta_7 netDT4_{it} + \beta_8 netDT5_{it} + \sum_{\tau=2006}^{2008} \delta_\tau year_\tau + e_{it}$

(5) $P_{it} = \beta_0 + \beta_1 NOA_{it} + \beta_2 NFA_{it} + \beta_3 AOE_{it} + \beta_4 DTA\_TLC_{it} + \beta_5 DTA\_current\ assets_{it} + \beta_6 DTA\_provisions_{it} + \beta_7 DTA\_liabilities_{it} + \beta_8 DTA\_other_{it} + \beta_9 DTL\_current\ assets_{it} + \beta_{10} DTL\_PPE_{it} + \beta_{11} DTL\_intang_{it} + \beta_{12} DTL\_other_{it} + \sum_{\tau=2006}^{2008} \delta_\tau year_\tau + e_{it}$

payments to one taxation authority are offset by the utilization of tax benefits granted by another taxation authority on group level, being included on a net basis over all tax authorities and taxpayers in the corporate group's total tax payments, the market could offset the total deferred tax balances, assuming that DTA and DTL will largely reverse in common patterns and value, hence, only notable surplus of DTA (DTL) over DTL (DTA). I examine, therefore, the value relevance of net deferred taxes separately by quintiles. Table II.6 Model (4) reveals that the coefficient of net deferred taxes in the highest quintile (*netDT5*), that is, the amount of *DTA* notably exceeding *DTL*, is significantly different from zero at the 1 percent level. It is not significantly different from the coefficient of net operating assets (*NOA*), and both coefficients are not significantly different from one.

What might cause this asymmetry in value relevance, large net deferred tax assets being value relevant, but large net deferred tax liabilities being not reflected in firm value?[47] Prior empirical evidence (see Legoria and Sellers 2005), as well as the reversal analysis presented in Section 4, suggest that DTA are more likely to be realized (in the near future) than DTL, so that the surplus of DTA over DTL is the minimum amount of likely to be

[47] Note that the value relevance of *netDT5* is not simply due to large *DTA* being value relevant, but to the surplus of *DTA* over DTL. If I separately test for the value relevance of DTA in the highest quintile of the DTA-per-share or the *DTA*-to-total-assets distribution, those (not tabulated) coefficients are not significantly different from zero. The significance of the *netDT5* coefficient is robust to slightly different model specifications, as well as to different estimation methods (see the robustness tests in Section 5).

realized net cash inflow, even in case of reversing DTL.[48] In other words, material surplus of DTA over DTL represents the amount of deferred taxes that is most likely to be realized in the sense that it involves the lowest risk of nonrealization and might, therefore, be value relevant.

To further explore whether the asymmetry in value relevance could be explained by deferred taxes arising from different sources, therefore entailing different cash flow timings, I examine the composition of deferred tax balances in detail. Examination reveals that the quintiles of net deferred taxes are relatively homogeneous with respect to balance composition.[49] Main differences are that DTA in the highest net deferred tax quintile feature, on average, significantly larger parts in DTA for tax loss carryforwards, while DTL in the highest quintile comprise a significantly lesser portion of DTL arising from book-tax differences in property, plant, and equipment (PPE) and intangible assets than the other four quintiles. DTA for tax loss carryforwards is certainly the deferred tax component that is least likely to be permanently recurring. Since (tax) losses are not expected to persist – either the loss-generating entity turns profitable again or it is shut down – and since tax losses are only capitalized via DTA to the extent that they are probable to be used – the utilizable amount typically being assessed based on the firm's medium-term business and tax planning – DTA for tax loss carryforwards may indeed account for tax benefits that will be realized within the next years. However, if I disaggregate deferred tax balances into their main components according to magnitude and recognition frequency – DTA for tax loss and tax credit carryforwards, DTA arising from temporary book-tax differences in pension and other provisions, in liabilities, in current assets, and other, and DTL arising from temporary book-tax differences in PPE, in intangible assets, in current assets, and other – and analyze the value relevance of the single components, all coefficients of the separate deferred tax components are not significantly different from zero (Table II.6 Model (5)).[50] Hence, the results suggest that (lacking) value relevance is independent of the balance's composition.

[48] Legoria and Sellers (2005) report that DTA are significantly positively related to future operating cash flow, while DTL-coefficients are insignificant. Moreover, the reversal analysis in Section IV shows that DTA balances exhibit a higher rate of reversal than DTL balances, suggesting that DTA tend to translate more timely into cash flow than DTL. Additionally, Section 4 shows that the net effect of simultaneously reversing DTA and DTL is positive, i.e., reversing DTA outweigh simultaneously reversing DTL, so that, on average, net deferred tax assets are realized.

[49] Moreover, there is no industry clustering present in the highest quintile of the *netDT* distribution, with 71 percent of the industries featuring observations in this quintile and only three industries (Apparel and Leather Products, Pharmaceuticals, Wholesale and Retail) being overrepresented, i.e., exhibiting a percentage of observations that is significantly greater than 20 percent. If I drop those industries from the sample, results are unchanged. Hence, the consideration of deferred tax information is not attributable to industry.

[50] The average DTA balance composes of 19 percent DTA for tax loss and tax credit carryforwards, 34 percent DTA arising from pension and other provisions, 23 percent DTA from liabilities, 11 percent DTA from current assets, and 13 percent other DTA. The average DTL balance composes of 38 percent DTL arising from PPE, 25

The overall results of the value relevance analysis show that deferred taxes are, for the most part, not reflected in firm value, which suggests that investors – similar to other financial statement users – generally do not consider deferred taxes to reflect valuable information on future tax payments.[51] Because of the high uncertainties involved in disclosed deferred tax balances, disclosed amounts probably bear hardly any relationship to the present value of what will ultimately be paid, and the costs of estimating deferred tax cash flow are very likely to outweigh any benefit of such estimates. Hence, investors may rationally decide to ignore deferred tax cash flow implications based on cost-benefit considerations.

percent DTL from intangible assets, 16 percent DTL from current assets, and 21 percent other DTL. For a graphical presentation, see Appendix B.

[51] The finding of general value irrelevance of deferred taxes is consistent with the findings of Beckman et al. (2007), who analyze the value relevance of reconciling items to net income and stockholders' equity from financial statements prepared according to German GAAP (HGB) to either IFRS or U.S. GAAP. Because of substantial differences in disclosure and capitalization requirements and firms straying further from German tax law when adjusting to IFRS or US GAAP, virtually all of their sample firms record reconciliations with respect to deferred taxes. Yet, the reconciling item *deferred taxes* turns out to be not value relevant.

4. Reversal Analysis

An analysis of deferred tax balance reversal allows an estimation of the magnitude and, therefore, economic significance of deferred tax cash flow. Particularly since lacking reversals imply a present value of deferred tax cash flow of zero, thus challenging the informativeness of deferred tax allocation, evidence about the actual development of deferred taxes is of crucial interest. Therefore, this section provides first, a descriptive analysis of the development of deferred tax balances, and second, a quantification of deferred tax cash flow as it is implied by balance reversal.

Figure II.2, Panels A and B, displays the distributions of the annual percentage changes in DTA and DTL balances.[52] The distributions basically resemble a normal distribution with zero mean, the distribution of annual changes in DTA peaking in the interval of -10 to +10 percent, and the distribution of annual changes in DTL peaking in the interval of 0 to +10 percent. In total, about 30 percent of the annual changes are concentrated in the 10 percent interval around zero, with 15 percent of all changes being smaller than 3 percent in absolute values. The majority of accounts increase over time, with 53.40 (62.74) percent of the annual changes in DTA (DTL) being positive.

Regarding medium-term development (fiscal years 2005 to 2008; Figure II.3 Panels A and B), both DTA and DTL show quite high amounts of balance increases that are larger than 100 percent: 18.75 (31.08) percent of the sample firms show DTA (DTL) that more than doubled from 2005 to 2008. Still, the DTA balance is relatively reversing: while 68.21 percent of the sample firms report a higher DTL balance in 2008 than in 2005, only 51.65 percent of the sample firms show an increased DTA balance in 2008 compared to 2005,[53] thus implying a higher realization frequency of deferred tax benefits than of deferred tax liabilities in the medium term.[54]

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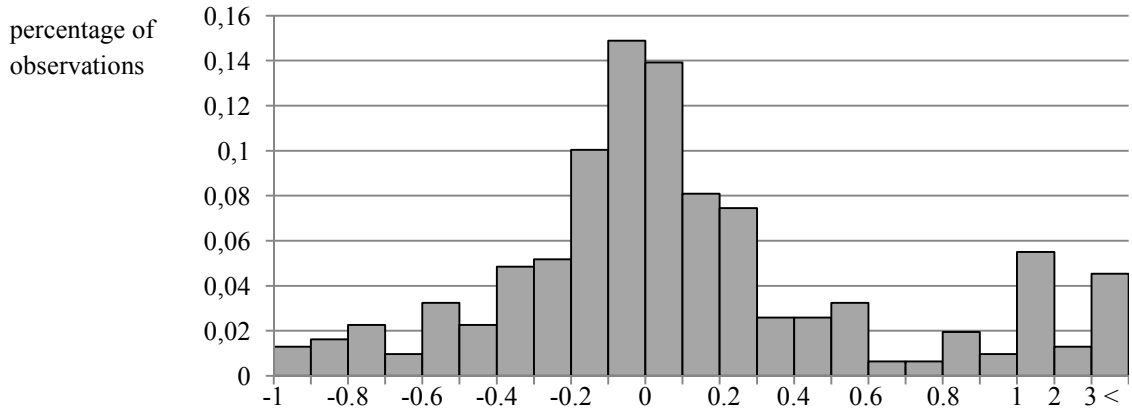
[52] The reversal analysis, as well as the subsequent cash flow estimations, is based on a subset of the sample, excluding annual changes from fiscal year 2006 to 2007. The reason for this exclusion is that the tax reform of 2008 in Germany involved a decrease in the statutory corporate tax rate, so that deferred tax balances had to be revalued with the lower tax rate in the financial statements of fiscal year 2007. Consequently, inclusion of annual changes from year 2006 to 2007 would bias the analysis toward finding a higher rate of reversal, including non-cash-flow-entailing reversals attributable to revaluation.

[53] The percentages of in the medium-term increasing balances are actually understated for both DTA and DTL because deferred taxes were recognized at a higher tax rate in 2005 than in 2008 as a consequence of a decrease in the corporate tax rate in 2008.

[54] A decrease in DTA can also be caused by a (non-cash-flow-entailing) downwards adjustment of the probably realizable amount of future tax benefits instead of the (cash-flow-entailing) realization of these benefits. Yet, changes in DTA are generally not determined by changes in the future realizability of tax benefits. If I adjust DTA for changes in the valuation allowance as disclosed in the rate reconciliation, the percentage of in the medium-term increasing DTA rises to 55.00 percent, which is still considerably less than for DTL, thus actually implying a higher likelihood of realizing deferred tax benefits than deferred tax liabilities in the medium term.

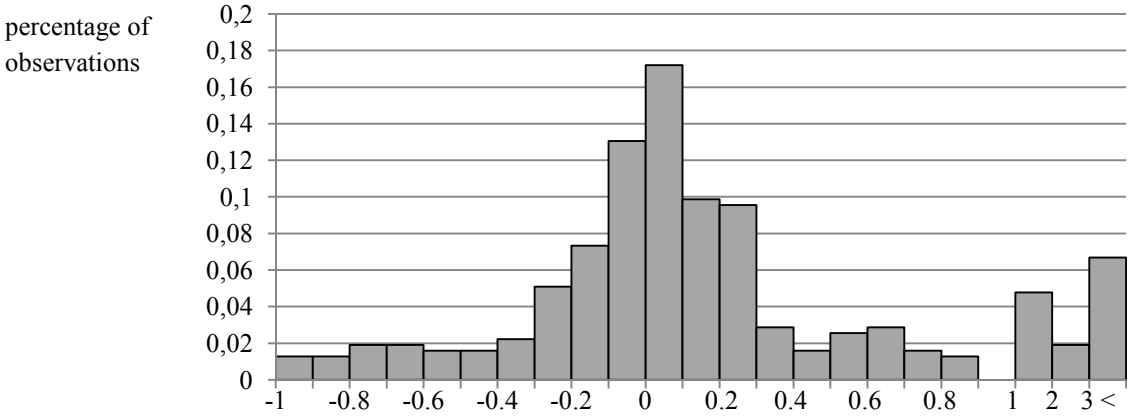
Figure II.2 – Annual Changes

Panel A – Annual Changes in Deferred Tax Assets



X-axis: Annual percentage change in the DTA balance. Y-axis: Percentage of observations, based on 340 observations.

Panel B – Annual Changes in Deferred Tax Liabilities

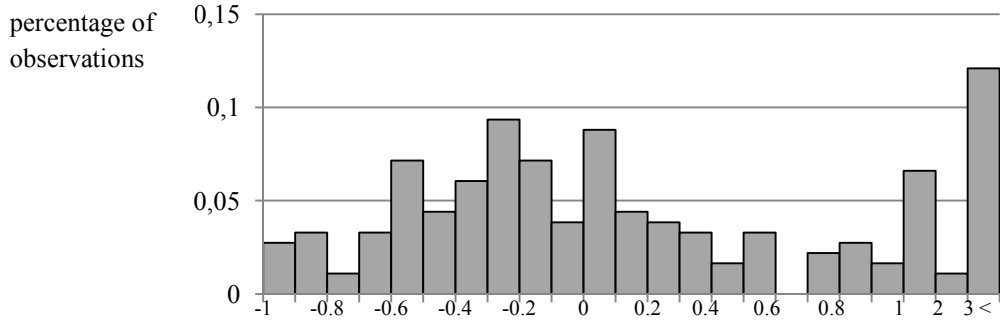


X-axis: Annual percentage change in the DTL balance. Y-axis: Percentage of observations, based on 340 observations.

Distributions of changes in and cash flow implications of adjusted and unadjusted DTA are very similar, with the main difference being that annual changes in adjusted DTA are even more concentrated in the 10 percent interval around zero (39.77 percent of the annual changes are between -10 and +10 percent).

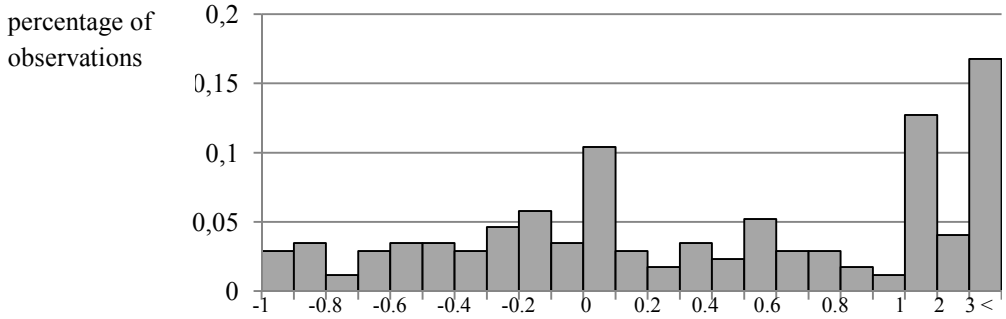
Figure II.3 – Medium-Term Development

Panel A – Medium-Term Development of Deferred Tax Assets



X-axis: Percentage change in the DTA balance from year 2005 to year 2008. Y-axis: Percentage of observations, based on 183 observations.

Panel B – Medium-Term Development of Deferred Tax Liabilities



X-axis: Percentage change in the DTL balance from year 2005 to year 2008. Y-axis: Percentage of observations, based on 183 observations.

The distributions of changes in the single deferred tax components (not reported) resemble the ones of the aggregated balances: annual changes peak in the 10 percent interval around zero and, generally, more than 60 percent of annual changes are positive. The distribution of DTA for tax loss carryforwards is slightly right skewed, with only 40.51 percent of the firms reporting increasing DTA for tax loss carryforwards in the medium term. This is significantly less than for the aggregated DTA account and suggests, thus, that DTA for tax loss carryforwards tend to translate more timely into cash flow than the other deferred tax components. Besides, I find that DTL from PPE are, with 53.1 percent of annual changes, far more concentrated in the interval of -10 to +20 percent than the other DTL components. This is in line with most of the firms maintaining quite stable, tendentiously growing PPE accounts and deferred taxes from PPE and supportive evidence for the literature that presents

DTL arising from depreciation differences as the prime example of nonreversing deferred taxes as a consequence of continuous reinvestment (see, for example, Amir et al. 1997, Chandra and Ro 1997).

23.1 (35.8) percent of the firms report continuously increasing DTA (DTL) balances during the observation period. Conversely, this means that 76.9 (64.2) percent of the firms show, at least once, a decreasing DTA (DTL) balance. Yet, decreases are rather small in magnitude, with up to 44.91 percent (67.44 percent) of the annual balance reductions being smaller than 10 (20) percent. To illustrate the economic significance of such reductions: for reductions of less than 20 percent, tax benefits (tax payments), as implied by reversing balances, amount to 2.57 (2.56) percent of total cash flow and 0.84 (1.11) percent of share price, on average. Median values are about 1 percent of cash flow and 0.3 percent of share price, which emphasizes that relative cash flow implications are only small. For decreases of more than 20 percent, though, deferred tax cash flow may amount to a substantial 10 percent of total cash flow and more than 4 percent of share price. However, median ratios are far below these values (about 1.4 percent of share price), suggesting that large implied cash flows are rare. If I further take into account that in 34 percent of the cases DTA and DTL reverse simultaneously, so that tax payments due to reversing DTL are offset – on group level at the latest – by realized deferred tax benefits, the net cash flow effect declines further. The average (median) net effect of simultaneously reversing deferred taxes is a net tax benefit of 16.71 (2.00) cents per share, which is 2.68 (0.54) percent of total cash flow per share and only 0.59 (0.10) percent of mean (median) share price. Accordingly, aggregated implied cash flows are quite negligible for the most part.

Hence, I do find evidence of reversing deferred tax balances, but the implied cash flows are only small, on average. The distributions peaking around zero point out that deferred tax balances do not change much on an annual basis, small changes rather being caused by the normal variability in operating activities, with small decreases in one year being offset by increases in the next years and the majority of firms featuring increasing deferred tax balances in the medium term. These findings are, on the one hand, consistent with lacking value relevance due to deferred taxes arising predominantly from recurring operating activities, larger reversals and associated cash flows, thus, being deferred into the remote future. On the other hand, the findings of DTA being more reversing than DTL and of net deferred tax assets being realized, on average, support the hypothesis of large net deferred tax assets being most likely to translate into actual cash flow and, therefore, being considered

value relevant. The results of the preceding analysis of value relevance are, hence, consistent with the actual development of deferred tax balances.

To further explore the relevance of reversal, I allow in the valuation model of Section 3 for asymmetric valuation coefficients depending on the development of the deferred tax balance. Specifically, I decompose the total deferred tax balance into its last year's value (*lagDT*) and current positive (*posΔDT*) and negative changes (*negΔDT*). Table II.7 Model (6) shows that all coefficients of the deferred tax variables are, again, not significantly different from zero.

In addition, I decompose deferred tax balances into a persistent part (*DT_persist*) being defined as the minimum amount of the balance within the four-year observation period, and a possibly less-persistent part (*DT_variable*) being defined as the residual of the actual balance amount of year *t* less the minimum amount, in order to investigate whether investors distinguish between a "hard core" of deferred tax balances arising from periodically recurring activities and a possibly more variable part. The persistent part represents effectively permanent differences that are not very likely to reverse in the near future as long as a certain minimum level of operating activities is maintained. Therefore, I expect this part to be of no value relevance. The nonpersistent part is more likely to translate into tax cash flow in the near future and, hence, might be valued positively in the case of DTA and negatively in the case of DTL.

On average, the DTA (DTL) balance never falls below 65.75 (63.46) percent of the current balance's amount, with *DTA* arising from pension and other provisions and DTL arising from PPE being the least variable components in terms of this measure, which is consistent with the underlying accounts being quite stable, tendentiously growing accounts. The regression analysis (Table II.7 Models (7) and (8)) shows that the valuation coefficients of the persistent, as well as of the variable, part are not significantly different from zero. Thus, the overall results of the value relevance analyses imply that investors assume deferred tax balances to be largely persistent/nonreversing. This seems to be a cost-beneficial generalization given the largely minor cash flow implications of reversing deferred tax balances.

Table II.7 – Value Relevance Analysis – Reversal

	intercept	*NOA*	*NFA*	*AOE*	*lagDTA*	*posΔDTA*	*negΔDTA*	*lagDTL*	*posΔDTL*	*negΔDTL*	within R^2	obs. / cross-sections
(6)	24.0420*** (3.87)	0.4894* (1.94)	0.7303*** (2.64)	1.6903*** (3.94)	-0.0001 (-0.02)	-0.9965 (-0.25)	1.5633 (0.38)	0.7933 (1.08)	3.0862 (0.87)	2.8212 (0.77)	0.5622	493 / 178
					DTA_var		***DTL_var***					
(7)	25.0350*** (8.69)	0.8357*** (4.15)	1.1372*** (4.51)	1.0872** (2.59)	-0.5028 (-0.44)		-0.8269 (-0.63)				0.4958	626 / 183
					DTA_var	***DTA_persist***	***DTL_var***	***DTL_persist***				
(8)	24.0718*** (14.29)	0.2644** (2.37)	0.4862*** (2.97)	1.0123*** (3.60)	-0.5414 (-0.70)	2.6842 (1.40)	1.2132 (1.43)	-0.3463 (-0.45)			0.4105	626 / 183

***, **, *: significantly different from zero at the 0.01, 0.05, and 0.1 level, respectively. Fixed effects estimation in Models (6) and (7). Since variables *DTA_persist* and *DTL_persist* are fixed over time, their coefficients are not estimable using fixed effects estimation, so that Model (8) is estimated using random effects estimation. t-statistics (reported in parentheses) are calculated using Huber-White robust standard errors clustered by firm. Year dummies not reported. $lagDTA_{it} = DTA_{it-1}$. $posΔDTA_{it} = DTA_{it} - DTA_{it-1}$, if $DTA_{it} - DTA_{it-1} > 0$, and 0 otherwise. $negΔDTA_{it} = DTA_{it} - DTA_{it-1}$, if $DTA_{it} - DTA_{it-1} < 0$, and 0 otherwise. *DTA_persist*: minimum amount of the DTA balance within the four-year observation period. $DTA\_variable_{it} = DTA_{it} - DTA\_persist_i$. Analogous for DTL. All variables are per share. For all other variable definitions, see Table II.1.

(6) $P_{it} = \beta_0 + \beta_1 NOA_{it} + \beta_2 NFA_{it} + \beta_3 AOE_{it} + \beta_4 lagDTA_{it} + \beta_5 posΔDTA_{it} + \beta_6 negΔDTA_{it} + \beta_7 lagDTL_{it} + \beta_8 posΔDTL_{it} + \beta_9 negΔDTL_{it} + \sum_{\tau=2007}^{2008} \delta_\tau year_\tau + e_{it}$

(7) $P_{it} = \beta_0 + \beta_1 NOA_{it} + \beta_2 NFA_{it} + \beta_3 AOE_{it} + \beta_4 DTA\_variable_{it} + \beta_5 DTL\_variable_{it} + \sum_{\tau=2006}^{2008} \delta_\tau year_\tau + e_{it}$

(8) $P_{it} = \beta_0 + \beta_1 NOA_{it} + \beta_2 NFA_{it} + \beta_3 AOE_{it} + \beta_4 DTA\_variable_{it} + \beta_5 DTA\_persist_i + \beta_6 DTL\_variable_{it} + \beta_7 DTL\_persist_i + \sum_{\tau=2006}^{2008} \delta_\tau year_\tau + e_{it}$

5. Robustness Tests and Supplemental Analysis

To check whether the regression results are robust to different variable definitions, model specifications, and estimation methods, I perform several robustness tests with largely unchanged results.

First, results are qualitatively unchanged if share price four months after fiscal year-end, instead of price three months after fiscal year-end, is used as dependent variable.

Second, the results are robust to different definitions of abnormal operating earnings. In detail, results are robust to abnormal operating earnings being derived by adding tax-adjusted net nonoperating interest expense back to earnings and subtracting expected normal operating earnings, to different forms of tax adjustment, as well as to different uniform expected rates of return (8, 10, and 14 percent). Since the sample firms likely have different expected rates of return, assuming a uniform rate may introduce measurement error. Therefore, I replicated the analysis using a firm-specific rate calculated as moving average of the firm's realized annual share returns of the preceding five years, with qualitatively same results.

Third, the results are robust to slightly different model specifications. Specifically, an Ohlson (1995)-based regression model that disaggregates book value of equity into total assets and total liabilities and includes an extension by expected next year's abnormal net income per share (defined as median analysts' EPS forecast from I/B/E/S less 12 percent of current book value of equity per share) leads to similar results, as well as a reduced model that includes only book equity before deferred taxes, deferred tax variables, and net income per share.

Fourth, regression results are similar to the results of the fixed effects estimation if I apply instead first differences estimation, OLS estimation, or random effects estimation including industry controls and heteroscedasticity-consistent standard errors clustered by firm. Moreover, while large net deferred tax assets are significantly related to share price if the regressions are run separately by year, *DTA*- and *DTL*-coefficients remain insignificant in each of the four yearly regressions.

Fifth, although the average amount of deferred taxes is quite heterogeneous across industries (see Figure II.1), the results are not industry-specific. This is additional evidence against deferred tax composition mattering to the market, since deferred tax composition differs across industries to the extent that asset composition differs.

Sixth, I distinguish between profit and loss firm-year observations. Hayn (1995) finds evidence consistent with her hypothesis that because of shareholders' liquidation option, investors perceive losses as being temporary, i.e., less persistent than positive earnings, resulting in a weaker association between negative earnings and returns as compared to the association between positive earnings and returns. Burgstahler and Dichev (1997) and Barth et al. (1998) report further evidence suggesting that valuation coefficients of book equity and earnings differ between profit versus loss observations. Besides, the market could assume loss-making firms to be less likely to realize deferred taxes because of lacking taxable income and cash inflow, possibly causing the insignificance of the deferred tax coefficients. Yet, if I exclude the sample's 84 loss observations (13.42 percent of total observations; loss being defined as pre-tax loss, i.e., EBT < 0), regression results are qualitatively unchanged. Hence, insignificant results are not attributable to loss observations.

To further investigate possible valuation differences of profit versus loss observations, I interact each independent variable with a dummy variable labeled $loss_{it}$ that takes a value of 1 if firm *i* reports a pre-tax loss (EBT < 0) at fiscal year-end *t*, and 0 otherwise. The results are reported in Table II.8. In line with the literature, the significantly negative coefficient of *loss*AOE* (Table II.8 Model (9)) shows that losses affect a firm's market value to a lesser extent than positive earnings. In addition, loss-making firms are generally of lower value than profitable firms, as indicated by the significantly negative *loss*-coefficient. Deferred tax valuation coefficients remain insignificant with one exception: DTA for tax loss carryforwards of loss-reporting firms (*loss*DTA_TLC*) are significantly negatively related to market value. Since *DTA* for tax loss carryforwards and the total amount of tax loss carryforwards are highly correlated, with a pairwise correlation coefficient of 0.7575 for all observations and of 0.4383 for loss observations, a significant *loss*DTA_TLC*-coefficient could capture the effect of the underlying tax loss carryforwards as correlated omitted variable.

Accordingly, if I additionally control for the total amount of tax loss carryforwards (*TLC*), which is only available for 333 of the 626 observations, its coefficient is significantly negative, in line with past tax losses, signaling a higher probability of future losses resulting in a lower market valuation, while the coefficients of *DTA* for tax loss carryforwards are insignificant (Table II.8 Model (10)). Conversely, *DTA* for tax loss carryforwards show significantly negative coefficients for this subsample if the total amount of tax loss carryforwards is not controlled for (Table II.8 Model (11)), as well as for the subsample with nondisclosed information on the total amount of tax loss carryforwards (Table II.8 Model

Table II.8 – Profit versus Loss Observations

	(9)	(10)	(11)	(12)
intercept	22.7433*** (11.47)	20.6136*** (8.90)	19.8034*** (8.59)	25.9517*** (8.48)
NOA	0.7664*** (6.21)	0.9577*** (6.18)	0.9701*** (6.33)	0.6524*** (4.24)
NFA	1.0457*** (5.42)	1.3101*** (7.23)	1.3334*** (7.43)	0.9091*** (3.69)
AOE	1.5589*** (3.44)	1.5069** (2.41)	1.3594** (2.17)	1.5433*** (2.92)
DTA_excl.TLC	0.6694 (1.50)	1.3836** (2.16)	1.4928** (2.34)	0.5355 (1.04)
DTA_TLC	-0.4699 (-0.30)	-0.3660 (-0.15)	-3.4109* (-1.67)	1.1054 (0.50)
DTL	0.4979 (1.40)	-0.1397 (-0.24)	-0.0736 (-0.13)	0.5498 (1.03)
loss	-3.3135** (-2.01)	-5.8144** (-2.03)	-5.3050* (-1.89)	-3.0177 (-1.19)
loss*NOA	-0.2255 (-1.58)	0.1370 (0.47)	0.1025 (0.35)	-0.1108 (-0.57)
loss*NFA	-0.3228 (-1.62)	0.2773 (0.79)	0.2357 (0.58)	-0.3595* (-1.70)
loss*AOE	-1.2223** (-2.11)	-1.2281* (-1.75)	-0.9908** (-2.03)	-1.7234** (-2.20)
loss*DTA_excl.TLC	1.6446 (1.44)	5.6145 (1.14)	5.6134 (1.03)	0.5933 (0.39)
loss*DTA_TLC	-3.3794* (-1.95)	-5.5132 (-1.31)	-1.2472 (-0.33)	-6.2241*** (-2.76)
loss*DTL	-0.3880 (-0.33)	-2.5163 (-0.92)	-2.8327 (-1.05)	-0.9005 (-0.48)
TLC		-0.2904** (-2.43)		
loss*TLC		0.2484 (1.45)		
within R^2	0.5016	0.6056	0.5962	0.5064
obs. / cross-sections	626 / 183	333 / 107	333 / 107	293 / 80

Table II.8 – Profit versus Loss Observations (continued)

***, **, *: significantly different from zero at the 0.01, 0.05, and 0.1 level, respectively. Fixed effects estimation with t-statistics (reported in parentheses) calculated using Huber-White robust standard errors clustered by firm. Year dummies not reported. Estimation of Models (10) and (11) uses only observations with available data on the total amount of tax loss and tax credit carryforwards. Estimation of Model (12) uses only observations without disclosed information on the total amount of tax loss and tax credit carryforwards. *DTA_excl.TLC*: gross DTA excluding DTA for tax loss and tax credit carryforwards. *DTA_TLC*: DTA for tax loss and credit carryforwards. *TLC*: total amount of tax loss and tax credit carryforwards (hand-collected). *loss*: dummy variable that takes a value of 1 if firm *i* reports a pre-tax loss (EBT < 0) in t, and 0 otherwise. All variables are per share. For all other variable definitions, see Table II.1.

(9, 11, 12)
$$P_{it} = \beta_0 + \beta_1 NOA_{it} + \beta_2 NFA_{it} + \beta_3 AOE_{it} + \beta_4 DTA\_excl.TLC_{it} + \beta_5 DTA\_TLC_{it} + \beta_6 DTL_{it} + \beta_7 loss_{it} + \beta_8 loss_{it}*NOA_{it} + \beta_9 loss_{it}*NFA_{it} + \beta_{10} loss_{it}*AOE_{it} + \beta_{11} loss_{it}*DTA\_excl.TLC_{it} + \beta_{12} loss_{it}*DTA\_TLC_{it} + \beta_{13} loss_{it}*DTL_{it} + \sum_{\tau=2006}^{2008} \delta_\tau year_\tau + e_{it}$$

(10)
$$P_{it} = \beta_0 + \beta_1 NOA_{it} + \beta_2 NFA_{it} + \beta_3 AOE_{it} + \beta_4 DTA\_excl.TLC_{it} + \beta_5 DTA\_TLC_{it} + \beta_6 DTL_{it} + \beta_7 loss_{it} + \beta_8 loss_{it}*NOA_{it} + \beta_9 loss_{it}*NFA_{it} + \beta_{10} loss_{it}*AOE_{it} + \beta_{11} loss_{it}*DTA\_excl.TLC_{it} + \beta_{12} loss_{it}*DTA\_TLC_{it} + \beta_{13} loss_{it}*DTL_{it} + \beta_{14} TLC_{it} + \beta_{15} loss_{it}*TLC_{it} + \sum_{\tau=2006}^{2008} \delta_\tau year_\tau + e_{it}$$

(12)).[55] Hence, the results indicate that DTA for tax loss carryforwards might serve as a proxy for the total amount of tax loss carryforwards in case the total amount is not disclosed. Besides, these findings are supportive evidence for the information effect of tax loss carryforwards as identified by Amir and Sougiannis (1999).[56]

[55] The significance of *DTA* excluding *DTA* for tax loss carryforwards (*DTA_excl.TLC*, Models (10) and (11)) is attributable to *netDT5* observations.

[56] Amir and Sougiannis (1999) identify two conflicting effects that determine the effect of tax loss carryforwards on market value. On the one hand, tax loss carryforwards may have a positive effect on market value to the extent that they represent future tax savings (*measurement effect*). On the other hand, the existence of tax loss carryforwards may signal a higher probability of future losses, implying a negative effect on market value (*information effect*). Hence, the significantly negative coefficient of tax loss carryforwards indicates a dominating information effect.

6. Conclusion

As acknowledged by the Commission of the European Communities (2007, p. 18), "*accounting for deferred taxes* […] *is very burdensome for companies in general*," whereas "*it has been confirmed by preparers and users, e.g. credit institutions and rating agencies, that deferred tax information (whether recognised in the balance sheet or provided in the notes) often is not considered a relevant input for the decisions to be taken*." This empirical analysis underlines the general lack of relevance of deferred tax information by revealing that investors – the primary financial statement addressees – do generally not consider deferred tax balances to provide relevant information for assessing firm value, i.e., to provide relevant information about future tax cash flow.

Lacking consideration may be due to uncertainties concerning timing and realization probability of deferred tax cash flow and the perception that the majority of deferred taxes arise from operating, and therefore recurring, activities, associated cash flows, hence, being deferred into the remote future, so that the balance sheet amount of deferred taxes bears hardly any relationship to the present value of what will ultimately be paid. In particular, the actual medium-term development of DTL balances is consistent with passed criticism on the liability view that deferred tax balances generally increase over time. Yet, the analysis also reveals that there is a nonnegligible rate of reversals present, which suggests at first glance that assuming no deferred tax cash flow in the near future underestimates actual cash flow. However, quantifications illustrate that the reversals' implied cash flows are minor for the most part.

All in all, the largely found value irrelevance of disclosed deferred tax balance information, in sum with the reported lack of consideration of disclosed deferred tax information for decision making by other external financial statement users and the numerous statements of practitioners who doubt any intrinsic value in deferred taxes, challenge the benefit of extensive deferred tax recognition and disclosure requirements. This should be particularly taken into consideration when amending IAS 12, since the IASB's latest amendment proposal, ED/2009/2, included, again, increased recognition and disclosure requirements compared to both current IFRS and US GAAP.

Appendix A

Feltham-Ohlson Firm Valuation Model

In order to assess whether and how investors consider disclosed deferred tax information, I base my regression model on the valuation model by Feltham and Ohlson (1995), which models linearly the relation between a firms' market value of equity and its accounting data.

Starting from the neoclassical standard model of security valuation, which states that a firm's equity value equals the net present value of expected dividends, Ohlson (1995) shows that under clean surplus accounting market value of equity equals book value of shareholders' equity plus net present value of expected future abnormal earnings, labeled as unrecorded goodwill.

Feltham and Ohlson (1995) refine the Ohlson (1995) model by distinguishing between financial and operating assets. Under the assumption that "perfect" accounting (i.e., the book value of an asset or a liability coincides with its market value) applies rather to financial than to operating assets, it is important to separate financial from operating assets in the valuation equation as they may have different valuation coefficients. Hence, Feltham and Ohlson decompose book value of equity into the sum of net operating assets and net financial assets (defined as marketable securities less debt). Incorporating the Modigliani-Miller theorem of capital structure irrelevance for firm value, they further assume that financing (borrowing and lending) activities yield zero net present value. Taken together with the "perfect"-accounting assumption, this implies that the difference between market and book value, i.e., a firm's unrecorded goodwill, is solely attributable to its operating activities, so that only net operating assets generate abnormal earnings. Therefore, unrecorded goodwill equals the present value of the firm's expected future abnormal operating earnings in their model, abnormal operating earnings being defined as actual operating income less an interest charge for the use of operating assets that equals the firm's cost of equity times lagged net operating assets.[57]

Consistent with Feltham and Ohlson, I relate market value of equity (*P*) to net operating assets (*NOA*), net financial assets (*NFA*), deferred tax assets (*DTA*), deferred tax liabilities (*DTL*), and current abnormal operating earnings (*AOE*), obtaining the following basic regression model:

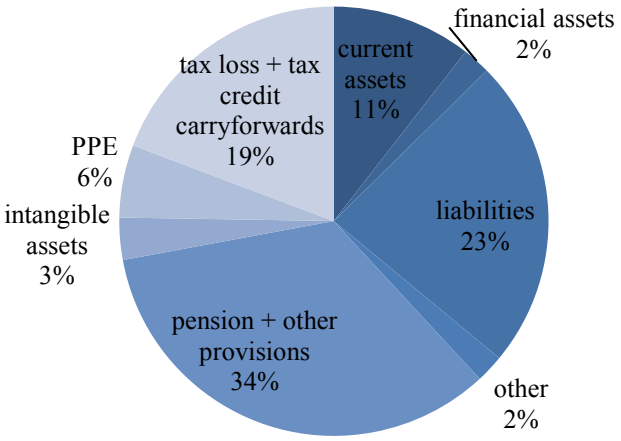
$$P_{it} = \beta_0 + \beta_1 NOA_{it} + \beta_2 NFA_{it} + \beta_3 AOE_{it} + \beta_4 DTA_{it} + \beta_5 DTL_{it} + \sum_{\tau=2006}^{2008} \delta_\tau year_\tau + e_{it}$$

[57] Since both valuation expressions originate from the neoclassical firm valuation model of discounted dividends, the Feltham-Ohlson model, expressing firm value as the sum of net operating assets, net financial assets, and the present value of expected abnormal operating earnings, is equivalent to firm value equaling the net present value of expected cash flows (see Feltham and Ohlson 1995).

Appendix B

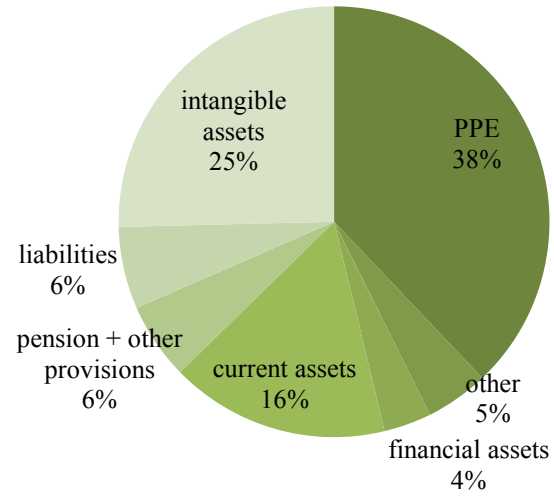
Deferred Tax Components

Panel A – Average Deferred Tax Assets Composition



Average composition of deferred tax assets, based on 544 observations.

Panel B – Average Deferred Tax Liabilities Composition



Average composition of deferred tax liabilities, based on 544 observations.

CHAPTER III

On the Relation of Deferred Taxes and Tax Cash Flow

Using panel data over 16 years of observations, this study investigates whether deferred tax information serves its main purpose: to inform about future tax cash flow. The results show that deferred taxes in fact have short-term cash flow implications. Yet, the estimated magnitude of these implied cash flows is rather small. While the model explains 86.53 percent of the variation in cash taxes paid, inclusion of deferred tax information adds only negligible 0.14 percent in explanatory power. Furthermore, deferred tax coefficients are insignificant for explaining future tax cash flow for 67.25 percent of the sample firms. Consistently, MAPE, RMSE, and differences in forecast errors suggest that the model excluding deferred tax information outperforms the model including deferred tax information in terms of average forecast accuracy. Overall, the economic significance of deferred tax cash flow seems to be very small.

1. Introduction

Accounting for the (estimated) future tax effects attributable to temporary book-tax differences, tax loss and tax credit carryforwards, deferred taxes are supposed to represent part of future tax cash flow. Yet, critics argue that disclosed deferred tax balances lack timely cash flow implications as a consequence of predominantly arising from periodically recurring operating activities, so that reversals and, therefore, deferred tax cash flow are continuously deferred in the aggregate as long as the firm is at least maintaining its operating capacity.
In this case, disclosed amounts of deferred tax balances would hardly bear any relationship to the present value of what will ultimately be paid, so that the decision and value relevance of disclosed deferred taxes would be only minimal because of not providing relevant and reliable information concerning future tax cash flow. Accordingly, anecdotal as well as empirical evidence suggest that deferred tax information is considered irrelevant for decision making by analysts and lenders.[58]

The empirical relation of deferred taxes and tax cash flow is still an open question, though. Therefore, this study investigates whether disclosed deferred taxes serve their primary purpose: to provide useful information with respect to future tax cash flow. The results of this study should be of interest for at least two groups. For one thing, the findings of this study should help standard setters to assess the usefulness of inter-period tax allocation and of the currently required method of accounting for deferred taxes. For another thing, the results of this study should be helpful for financial statement users. The knowledge whether and how disclosed deferred tax balances are related to actual future tax cash flow, i.e., to what extent deferred taxes will translate into actual cash flow in the near future, is important to assess whether deferred taxes should be considered the decision making process.

Moreover, by determining the exact cash flow implications of disclosed deferred tax balances, this study provides a basis for the ongoing debates concerning (lacking) value relevance of deferred taxes. Besides, this study provides additional insights concerning the predictive ability of financial reporting.

In order to investigate, whether deferred tax balances provide useful information on future tax cash flow and how disclosed deferred tax balances are related to actual future tax cash flow, this study examines (a) whether deferred tax information is significantly related to actual future tax cash flow as measured by cash taxes paid and (b) whether consideration of deferred tax information decreases forecast error of future tax cash flow forecasts.

[58] See Beechy (2007), Carnahan and Novack (2002), and Cheung et al. (1997) for anecdotal evidence and Chen and Schoderbek (2000), Amir and Sougiannis (1999), and Chattopadhyay et al. (1997) for empirical evidence.

Descriptive results, based on panel data over fiscal years 1994 to 2009, reveal that deferred tax balances do indeed increase consistently over time, yet not proportionally to firm growth, with about 40 percent of the observations exhibiting a decreasing ratio of deferred taxes to total assets over time.

Estimating static as well as dynamic models, I find that only deferred tax balances lagged by one and two years, respectively, are significantly related to current tax cash flow as measured by cash taxes paid; farther lags are insignificant. Consistently, deferred taxes are only incrementally useful in predicting future tax cash flow up to two years ahead. While the model explains 86.53 percent of the variation in cash taxes paid, inclusion of deferred tax information adds only negligible 0.14 percent in explanatory power.

The estimated coefficients suggest that, on average, 2 percent of the disclosed deferred tax balance amount translates into tax cash flow on an annual basis, which implies that deferred tax cash flow constitutes less than 5 percent of actual tax cash flow for the majority of observations. The economic significance of deferred tax cash flow is, thus, rather moderate.

Furthermore, deferred taxes are not significantly related to actual tax cash flow for 67.25 percent of the sample firms. Firms with significant deferred tax information tend to be underperformers in terms of showing, on average, less growth (of sales, operating cash flow, and total assets), lower ROA, and significantly less multinational activity (as measured by percent of foreign to total pre-tax income) as compared to the total sample. Moreover, results of industry-specific analyses suggest that deferred tax information is relatively more informative about future tax cash flow for firms belonging to the Industrial, Financial, IT, or Telecommunication Services sector (for Financials, particularly deferred tax asset information is useful).

Regarding forecasting performance, I find only limited evidence for deferred tax information improving tax cash flow forecasts. For one thing, MAPE, RMSE, and rank tests suggest that the forecast model that excludes deferred tax information outperforms the model that includes deferred tax information in terms of average forecast accuracy. For another thing, consideration of deferred tax information does not decrease the forecast error for the majority of forecasts, and observed reductions are rather small for their most part: 75 percent of the observed reductions in forecast error due to deferred tax consideration are smaller than 10 percent.

Using a dynamic model, I confirm in a multivariate setting Dyreng et al.'s (2008) observation that low CASH ETR are more persistent than high CASH ETR, so that, overall, this study also adds to the emerging stream of research focusing on actual tax payments.

Moreover, this study confirms that current tax expense is highly correlated with actual tax cash flow and may therefore serve as a reasonable proxy for tax cash flow (see also Frank, 2009). In addition, findings support the usefulness of the required "*more likely than not*"-realization adjustment of deferred tax assets by a valuation allowance. The adjustment definitely increases the informativeness of disclosed deferred tax assets (i.e., it improves their relation to future tax cash flow).

The proceeding of this chapter is organized as follows: The second section motivates the research question and reviews related research. Section 3 presents the models and estimation methods. Subsequently, Section 4 describes the sample and presents descriptive and multivariate findings. Section 5 presents the forecast analysis. Section 6 provides robustness tests and supplemental analyses. Section 7 finally concludes.

2. Motivation and Literature Review

According to ASC 740-10 (formerly SFAS No. 109), deferred tax assets and liabilities are recognized for the estimated future tax effects of events that have been recognized differently in a firm's financial statements than in its tax returns. Specifically, deferred tax liabilities (DTL) are recognized for temporary differences between book value and tax basis of assets and liabilities, which will result in taxable amounts in future years. Deferred tax assets (DTA) are recognized for temporary differences that will result in tax deductible amounts in future years as well as for tax loss and tax credit carryforwards. Hence, deferred taxes are supposed to inform about future tax payments. Yet, it is not clear to what extent recognized deferred tax balances are actually related to future tax payments.

Critics argue that the informative value of deferred taxes is only low due to highly uncertain cash flow implications. Specifically, it is argued that the major part of deferred taxes is not expected to be realized in the near future as a consequence of arising from operating and, therefore, periodically recurring activities, which results in an effectively permanent deferral of the associated tax cash flow.[59] Lacking relevance of deferred tax information as a consequence of lacking cash flow implications would challenge the usefulness of deferred tax accounting, which is routinely named by accountants as one of the most complex and costly provisions to comply with.[60]

Although the tax cash flow implications of deferred taxes are crucial for the value and decision relevance of deferred taxes, research directly addressing the cash flow implications of deferred taxes is scarce. Instead, research focuses on whether financial statement users consider deferred taxes in their decision making process, thereby implicitly deducing (by financial statement users presumed) cash flow relevance from decision relevance. Regarding analysts and lenders, empirical as well as anecdotal evidence concludes that these do not consider deferred tax information in their decision making process (see Chen and Schoderbek 2000, Amir and Sougiannis 1999, and Chattopadhyay et al. 1997 for empirical and Beechy 2007, Carnahan and Novack 2002, and Cheung et al. 1997 for anecdotal evidence), which implies no relevant (information about) deferred tax cash flows.

[59] See Beechy (2007), Colley et al. (2009), or Johnson (2010).

[60] The relatively high costs arise due to the fact that accounting for deferred taxes is complex and requires a high level of coordination. It is necessary, for instance, to prepare the tax report within a narrow time frame and to assess the future realizability of deferred tax assets. The latter includes, among other things, estimating future taxable income. Moreover, it is necessary to determine the expected manner of recovery/settlement if the manner of recovery/settlement affects the applicable tax rate. Accordingly, accountants name deferred tax allocation as one of the most complex and costly provisions to comply with, so that there is an ongoing controversy about whether there is adequate benefit that justifies the high accounting costs involved.

With respect to deferred tax consideration by investors (value relevance studies), empirical results are mixed. While early studies, based on the first fiscal years after implementation of SFAS No. 109, find significant valuation coefficients of deferred taxes (Amir et al. 1997 and Ayers 1998), more recent studies based on US GAAP-data (Raedy et al. 2011) as well as studies based on non-US GAAP-data (Citron 2001, Chang et al. 2009, and Chludek 2011) find no consistent evidence for value relevance.

Research directly addressing the relation of deferred taxes and future tax payments is scarce, however, so that there is hardly any evidence on (a) the actual relation of deferred taxes and tax cash flow and (b) whether the required method of accounting for deferred taxes is informative about future tax cash flows. Cheung et al. (1997) report that deferred tax information improves the prediction of one-period-ahead tax payments by decreasing the mean absolute percentage error (MAPE) of their forecasts by roughly 2.78 percent. Moreover, they report that deferred tax information reduces average forecast error of forecasting operating cash flow for 16 of 30 industries. Yet, the study has several shortcomings concerning data, estimation method, and variables.[61]

Using the actual U.S. tax liability as it is reported on the corporate tax return Form 1120, Lisowsky (2009) finds that deferred tax expense is not related to the actual U.S. tax liability.

In contrast to these two studies, which basically analyze the relation of deferred tax expense and tax payments, Legoria and Sellers (2005) focus in cross-sectional regression analyses on the effect of deferred taxes on operating cash flow of up to four periods ahead. Inclusion of deferred tax balance information increases the explanatory power of their model, as measured by adjusted R-squared, by 0.49 to 1.42 percentage points. They report a significantly positive (negative) relation of deferred tax assets (the valuation allowance for deferred tax assets) and future operating cash flow. The effect of the valuation allowance, however, is dominating. Moreover, deferred tax liabilities show an unexpectedly significantly positive coefficient estimate in their basic model specification, which becomes insignificant

[61] First, by using data of years 1975 to 1994, their sample covers a period when a total of three different accounting standards on deferred taxes were in force – APB No. 11, SFAS No. 96, and SFAS No. 109 –, which might cause some inconsistency in the data. Second, Cheung et al. (1997) do not comment at all on the estimation method used to estimate their dynamic panel models, for which estimation issues might arise easily, possibly biasing their results. Third, by including either deferred tax expense or the annual change in noncurrent deferred tax liabilities in their models, they only take into account changes in deferred tax balances, thus ignoring significant parts of deferred tax information. Because of the high degree of aggregation in their deferred tax variables, they can neither distinguish between deferred tax expense due to reversing versus growing accounts, nor between possible asymmetric effects of deferred tax assets versus deferred tax liabilities, nor do they investigate the long-term information embedded in deferred tax balances, which should be of most interest with regards to the concept, idea, and purpose of deferred tax accounting. Fourth, they only approximate actual tax cash flow by using current tax expense less the annual change in income taxes payable.

as soon as other financial statement information is controlled for. Hence, their findings rather suggest a future performance indicating effect of deferred taxes (this is, deferred taxes anticipating future firm performance via underlying assets and recognition constraints), than a tax cash flow effect.[62]

This study, by contrast, has the advantage that it uses a direct measure, to assess the relation of deferred taxes on future tax payments, by focusing on the implications of recognized deferred tax balances for (future) cash taxes paid. Furthermore, I am able to analyze a considerably longer time-period than most prior studies. Time-series data of up to 16 observation years allow to estimate models by firm, which is very important, since deferred tax composition, reversal behavior and, therefore, translation into tax cash flow may be very firm-specific. Moreover, the long time-series enable to assess whether deferred tax balances contain long-term information about future tax payments.

[62] A significant relation between deferred taxes and future operating cash flow does not necessarily have to stem from tax cash flow. Instead, deferred taxes may be related to future cash flow via underlying assets and recognition constraints. On the one hand, deferred taxes increase in their underlying assets. To the extent that growing operating assets produce higher operating cash flow, deferred taxes are positively related to future operating cash flow via the underlying assets, if other factors are not controlled for. In line, Legoria and Sellers (2005) report a significantly positive coefficient estimate also for deferred tax liabilities, which contradicts the tax effect and which becomes insignificant as soon as other financial statement information is controlled for.
On the other hand, deferred tax assets are reduced by a valuation allowance to the amount that is more likely than not to be realized. Thus, a *ceteris paribus* larger deferred tax asset balance (larger valuation allowance) suggests management expectations of higher (lower) taxable income, so that deferred tax assets (the valuation allowance) may be positively (negatively) related to future operating cash flow because of anticipating improved (decreased) future firm performance, instead of being related via lower (higher) tax payments. In particular the finding of a dominating influence of the valuation allowance by Legoria and Sellers (2005) may be a hint that their model rather captures performance indicating effects than tax cash flow effects of deferred taxes. Empirical results by Gordon and Joos (2004), showing that basically only changes in unrecognized deferred taxes are significantly related to future firm performance, while changes in recognized deferred taxes are largely insignificant, suggest a dominance of the performance over the tax effect on total cash flow.

3. Regression Models and Estimation Methods

3.1. Models

The main regression analysis is based on two models – a basic model and its extended version. The basic model relates cash taxes paid (*tax_paid*) to the main determinants of the current amount of cash taxes paid – current tax expense (*curr_tax_exp*) and the annual change in income taxes payable (Δ*tax_payable*) – as well as to the variables of interest – deferred tax assets (*DTA*) and deferred tax liabilities (*DTL*).

Basic Model:

(1) $$tax\_paid_{it} = \beta_0 + \beta_1 * curr\_tax\_exp_{it} + \beta_2 * curr\_tax\_exp_{it-1} + \beta_3 * \Delta tax\_payable_{it} +$$

$$\beta_4 * DTA_{it-1} + \beta_5 * DTL_{it-1} + \beta_6 * DTA_{it-2} + \beta_7 * DTL_{it-2} + \sum_k \delta_k * Year_k + \varepsilon_{it}$$

Variable definitions are given in Table III.1.

Current tax expense (*curr_tax_exp*) should be the main explanator of cash taxes paid (*tax_paid*). Estimating taxes payable or refundable on tax returns for the current year, current tax expense should exhibit a strong positive relation to actual cash taxes paid. Including lagged current tax expense accounts for timing differences between the recognition of current tax expense and the assessment of the actual tax liability. The annual change in the income tax liability (Δ*tax_payable*) is directly negatively related to current tax payments.

The focus of this paper is on the relationship of deferred tax information and actual tax cash flow. Since deferred tax assets (DTA) account for temporary book-tax differences that will results in tax deductible amounts in future years, *DTA* should be negatively related to future tax payments, while deferred tax liabilities (DTL), being recognized for temporary book-tax differences that will result in taxable amounts in future years, should be positively related to future tax payments.[63] Yet, if recognized deferred tax balances lack (systematic) cash flow implications, *DTA*- and *DTL*-coefficient estimates should turn out to be insignificant. Inclusion of DTA and DTL lagged by up to ten periods in the model shows that only deferred tax information of the previous two periods is significantly related to current tax

[63] In case of a dominating performance effect, coefficient estimates of both, *DTA* and *DTL*, should show positive signs. This is because, for one thing, a higher ratio of recognized deferred tax assets implies positive performance expectations and, consequently, possibly higher tax payments. For another thing, deferred tax assets as well as deferred tax liabilities increase in their underlying assets. To the extent that these underlying assets produce taxable income, deferred taxes should be positively related to future tax cash flow. Controlling for performance and deflating by total assets, though, should mitigate performance effects captured by deferred taxes.

cash flow. Thus, only deferred tax balances lagged by one and two periods are included in the model.[64]

Additional controls are included in the extended version of the model. The choice of these additional controls is mainly based on work by Dyreng et al. (2008, 2010) and Lisowsky (2009).

Extended Model:

(2a) $$tax\_paid_{it} = \beta_0 + \beta_1 * curr\_tax\_exp_{it} + \beta_2 * curr\_tax\_exp_{it-1} + \beta_3 * \Delta tax\_payable_{it} + \beta_4 * DTA_{it-1} + \beta_5 * DTL_{it-1} + \beta_6 * DTA_{it-2} + \beta_7 * DTL_{it-2} + \beta_8 * PI_{it} + \beta_9 * CF_{it} + \beta_{10} * \Delta sales\_pos_{it} + \beta_{11} * capex_{it} + \beta_{12} * ESO\_exp_{it} + \beta_{13} * R\&D\_exp_{it} + \beta_{14} * AD\_exp_{it} + \beta_{15} * lev_{it} + \beta_{16} * size_{it} + \beta_{17} * FO_{it} + \beta_{18} * TLC_{it} + \sum_k \delta_k * Year_k + \varepsilon_{it}$$

(2b) $$tax\_paid_{it+n} = \beta_0 + \beta_1 * curr\_tax\_exp_{it} + \beta_2 * curr\_tax\_exp_{it-1} + \beta_3 * \Delta tax\_payable_{it} + \beta_4 * DTA_{it} + \beta_5 * DTL_{it} + \beta_6 * DTA_{it-1} + \beta_7 * DTL_{it-1} + \beta_8 * PI_{it} + \beta_9 * CF_{it} + \beta_{10} * \Delta sales\_pos_{it} + \beta_{11} * capex_{it} + \beta_{12} * ESO\_exp_{it} + \beta_{13} * R\&D\_exp_{it} + \beta_{14} * AD\_exp_{it} + \beta_{15} * lev_{it} + \beta_{16} * size_{it} + \beta_{17} * FO_{it} + \beta_{18} * TLC_{it} + \sum_k \delta_k * Year_k + \varepsilon_{it}, \quad n = 1, \ldots, 5$$

Variable definitions are given in Table III.1.

[64] Inclusion of several consecutive lags could cause multicollinearity problems. Yet, variance inflation factors (VIF) do not exceed the common critical value of 10 (Greene 2003), so that multicollinearity should not be a problem in the models. Moreover, VIF of the models with significant deferred tax coefficients are not different from VIF of models with insignificant deferred tax coefficients, so that there is no indication for multicollinearity causing insignificant results.

Table III.1 – Variable Definitions

tax_paid	cash taxes paid (TXPD) divided by total assets (AT)
curr_tax_exp	current income tax expense (TXC) divided by total assets (AT); if TXC is missing, *curr_tax_exp* is calculated as total income tax expense less deferred income tax expense divided by total assets ((TXT-TXDI)/AT)
DTA	deferred tax assets (hand-collected) divided by total assets (AT)
DTL	deferred tax liabilities (hand-collected) divided by total assets (AT)
Δ*tax_payable*	annual change in income taxes payable (TXP) divided by total assets (AT)
PI	pre-tax book income (PI) divided by total assets (AT)
CF	operating cash flow (OANCF) divided by total assets (AT)
Δ*sales_pos*	= 1 if the annual change in net sales (SALE) is positive; = 0 otherwise
capex	capital expenditure (CAPX) divided by gross property, plant, and equipment (PPEGT); = 0 if missing
ESO_exp	implied stock option expense (XINTOPT) divided by total assets (AT); = 0 if XINTOPT is missing
R&D_exp	R&D expense (XRD) divided by total assets (AT); = 0 if XRD is missing
AD_exp	advertising expense (XAD) divided by net sales (SALE); = 0 if XAD is missing
lev	sum of long-term debt (DLTT) and long-term debt in current liabilities (DLC) divided by total assets (AT)
size	natural logarithm of market value (ln(price*CSHO))
FO	= 1 if foreign pre-tax income (PIFO) is non-zero and non-missing; = 0 otherwise
TLC	= 1 if the firm has non-missing, non-zero tax loss carryforwards (TLCF); = 0 otherwise
cashETR	= cash taxes paid divided by pre-tax income less special items (TXPD/(PI-SPI)); observations with negative nominator or denominator and with *cashETR* greater than 1 are excluded
*Li.*variable	= $variable_{t-i}$, variable lagged by *i* periods

Compustat mnemonics are in parentheses.

The additional controls are particularly included for forecasting purposes, to control for performance effects and general trends in tax cash flow, but also for capturing tax effects (for example arising from permanent book-tax differences) that are not included in current tax expense and deferred taxes.

Pre-tax income (*PI*) and operating cash flow (*CF*) are included to control for performance effects. To the degree that these are persistent, I expect positive coefficients for both variables in regressions on future cash taxes paid. In the same vein, growth indicators like sales growth (Δ*sales_pos*) and capital expenditure (*capex*) should be positively related to future tax payments. Yet, a negative relation of *capex* and *tax_paid* may also be possible due to investment tax credits and accelerated tax depreciation. Therefore, I leave the expected coefficient sign of *capex* open. R&D expense (*R&D_exp*) is included to control for the *Research & Experimentation Tax Credit* in accordance with I.R.C. §41, which has a tax reducing effect.

Another factor which causes the actual tax liability to differ from current tax expense are employee stock options (ESOs), which are treated differently for tax than for financial reporting purposes. While tax code differentiates between two classes of options – non-qualified stock options (NQSOs), which are tax-deductible when *exercised*, and incentive stock options (ISOs), which are not deductible –, accounting standards do not differentiate these two classes of options. Instead, options granted to employees were generally not required to be expensed for fiscal years beginning before June 2005 (SFAS No. 123). Currently, they have to be expensed (over the vesting period, if applicable, starting) in the fiscal year the options are *granted* (ASC 718, formerly SFAS No. 123(R)). These different treatments, resulting in permanent differences in the case of ISOs and in temporary book-tax differences in the case of NQSOs and, give rise to DTA for NQSOs. Thus, differences between the actual tax liability and current tax expense due to NQSOs are controlled for by *DTA* for fiscal years 2006 to 2009.

Before 2006, only few firms made use of expensing stock option compensation voluntarily at fair value (see Hanlon, 2003), but rather applied APB No. 25, according to which compensation expense equals the intrinsic value of the option (which is zero for most firms), so that ESOs caused effectively permanent book-tax differences for most of the firms before fiscal year 2006. Controlling for the tax benefits of NQSOs for fiscal years before 2006 is difficult, in general.[65] Several approximations have been used in the literature (see, for

[65] See Hanlon and Shevlin (2002) for a discussion. Yet, NQSO tax benefits have also been included in DTA before 2006 if the NQSO tax deduction resulted in a tax loss carryforward (Hanlon and Shevlin, 2002). Furthermore, APB No. 25 (para. 16, 17) required that the tax benefits related to NQSOs are accounted for as a

example, Lisowsky 2009 and Blouin and Tuna 2009). All of these approximations, however, have to rely on various assumptions and may introduce measurement error. Therefore, I only include implied stock option expense (*ESO_exp*), which represents the amount that would have been expensed if the company had reported under the fair value method before 2006.[66]

Advertising expense (*AD_exp*) is included because findings of Dyreng et al. (2008) suggest that firms that spend more on advertising (thus being more susceptible to public perception and, therefore, punishment in case of excessive tax avoidance) seem to avoid taxes to a lesser extent, exhibiting a higher CASH ETR. Leverage (*lev*) is included to control for the tax advantages of higher leverage (debt tax shield), implying a negative coefficient. Multinational activity, as implied by the existence of foreign income (*FO*), may have a decreasing effect on tax payments due to multinationals being able to distribute their activities across jurisdictions so as to minimize their overall tax burden (via cross-jurisdictional interest stripping, income shifting, transfer pricing schemes, etc.; see Rego 2003 and Lisowsky 2009).[67] Findings on the relation of firm size and effective tax rates, tax avoidance, and tax planning behavior are highly mixed across studies.[68] Therefore, I make no prediction with respect to the sign of the *size*-coefficient. The existence of tax loss carryforwards (*TLC*) should be negatively related to tax payments.

Variables are deflated by total assets because total assets are the basis for producing taxable income as well as for the book-tax differences that give rise to deferred taxes.

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credit to *Additional Paid-in Capital* with an offsetting debit to income taxes payable, so that controlling for changes in income taxes payable includes this effect.

[66] Actually, implied stock option expense represents an after-tax amount, since it is equal to the difference in actual net income less net income if ESOs had been expensed. Grossing up to get the pre-tax value and subsequently multiplying with the statutory tax rate to get the tax benefit amount, like it is done by Lisowsky (2009) for example, is not necessary, since this factor (0.35/0.65) is constant across firms and time and, therefore, included in the coefficient estimate.

Using only implied stock option expense actually equals the approximation employed by Lisowsky (2009) under the assumption that either the relation of ISO- to NQSO-expense is constant across firms and time or that virtually all options granted are NQSOs. Since, first, "*it is tax-favored to grant ISOs over NQOs to individuals whose personal income tax rates and capital gains rates are higher than the corporation's tax rate*" (Lisowsky 2009, p. 40), such that executives should be the main receivers of a firm's ISOs, and since, second, Hall and Liebman (2000) report that still about 95 percent of ESOs granted to CEOs are NQSOs, it is not unreasonable to assume that the percentage of granted ISOs is negligibly small.

Yet, to ensure that employee stock options do not drive the inferences, I additionally estimate the models separately on pre- versus post-2006 observations and estimate the models excluding *ESO_exp*. Both robustness checks lead to unchanged inferences.

[67] Leverage and foreign operations will probably not be incrementally informative as far as current tax cash flow is concerned, since tax deductible interest expense and lower foreign tax rates are already included in current tax expense. Yet, current capital structure as well as multinational activity may be informative with respect to future tax payments.

[68] For an excellent summary of the divergent findings, see Rego (2003). Even the latest studies based on actual tax cash flow show divergent results with respect to firm size: While descriptive statistics by Dyreng et al. (2008) suggest a negative relation of firm size and CASH ETR, that is, long-run tax avoiders tend to be larger firms, Lisowsky (2009) reports a positive relation of firm size and the actual tax liability reported on the tax return.

Alternative deflators do not affect the inferences (see the robustness tests in Section 6). Moreover, year- and firm-fixed effects are controlled for.

3.2. Estimation Methods

The static models are estimated using fixed effects estimation with Huber-White robust standard errors clustered at firm level.[69] By this, standard error estimation is adjusted for potential serial correlation between multiple observations per firm. Moreover, correlated omitted variable bias in the estimated coefficients is mitigated by controlling for unobserved heterogeneity by using firm-fixed effects.

In addition to the static models, I estimate dynamic models, including the lagged dependent variable as explanatory variable, to further control for unobserved differences in tax cash flow levels. Since OLS estimation yields biased and inconsistent estimates in such a case (Nickell 1981, Stocker 2007), the dynamic models are estimated using Arellano-Bover/Blundell-Bond two-step system GMM (Arellano and Bover 1995, Blundell and Bond 1998). Windmeijer (2005) finite-sample correction is employed to obtain accurate two-step standard error estimates that are robust to heteroskedasticity and serial correlation in the errors.[70]

System GMM estimates a system of the regression equation in first differences and the regression equation in levels. For the regression equation in first differences, endogenous explanatory variables (here: the lagged dependent variable) are instrumented with second and higher lags of their own levels, while the levels equation employs instruments in lagged differences.[71] For system GMM estimators to be consistent, the chosen instruments have to be exogenous, i.e., uncorrelated with the error term. Two tests are performed to check the validity of the instruments used in the estimation: the Arellano-Bond test for zero autocorrelation and the Hansen test of overidentifying restrictions.

Lags of the endogenous variable greater than or equal to two are valid instruments for the differenced equation if they are not correlated with the first-differenced errors. This is the

[69] The Hausman test approves the choice of fixed effects estimation.

[70] While the one-step GMM estimator uses the identity matrix as weighting matrix, the two-step estimator weights the instruments asymptotically efficient using the residuals of the one-step estimation to construct a sandwich proxy, so that two-step GMM performs somewhat better than one-step GMM in estimating coefficients, with lower bias and standard errors (Windmeijer 2005). Yet, two-step standard error estimates are downward biased (Blundell and Bond 1998). Therefore, Windmeijer (2005) finite-sample correction is employed.

[71] The Difference-in-Hansen test does not reject the null hypothesis of valid additional moment conditions imposed by the system estimator. Besides, estimation with Arellano-Bond (1991) difference GMM does not change the inferences.

case if there is no autocorrelation in the idiosyncratic errors. By construction, the residuals of the differenced equation should exhibit first-order autocorrelation. Yet, if the assumption of serial independence in the idiosyncratic errors is warranted, the differenced errors should not exhibit second-order autocorrelation. Otherwise, second lags of the dependent variable are not appropriate instruments and the instrument set has to be restricted to levels deeper than the second lag (Arellano and Bond 1991, Roodman 2006).[72] The results of the Arellano-Bond test for zero autocorrelation show that the first-differenced errors of the models used in this study are consistently negatively first-order autocorrelated, while the null hypothesis of no second-order autocorrelation cannot be rejected.

The Hansen test of overidentifying restrictions tests the null hypothesis that the instruments are jointly exogenous. Except for one model specification, the null cannot be rejected. Thus, the instruments used are generally valid.[73]

[72] The error term ε_{it} is composed of a fixed firm effect α_i and the idiosyncratic error term u_{it} ($\varepsilon_{it} = \alpha_i + u_{it}$). The full error term ε_{it} is presumed to be autocorrelated because of the fixed effect. The idiosyncratic term u_{it} is assumed to be independently and identically distributed (i.i.d.). First-differencing eliminates the fixed effect, leaving $\Delta\varepsilon_{it} = u_{it} - u_{it-1}$. Since $\Delta\varepsilon_{it-1} = u_{it-1} - u_{it-2}$, $\Delta\varepsilon_{it}$ and $\Delta\varepsilon_{it-1}$, the residuals of the first-differenced equation, are mathematically related via the shared u_{it-1}-term. Therefore, negative first-order serial correlation in the first-differenced errors is expected. But first-differenced errors are not second-order autocorrelated as long as the idiosyncratic errors u_{it} are serially independent.

[73] The Sargan test of overidentifying restrictions, not robust to heteroskedasticity but, in contrast to the Hansen test, not weakened by many instruments, leads to qualitatively identical results.

4. Empirical Evidence

4.1. Data and Sample Selection

Data are obtained from Compustat, except for the deferred tax data, which are hand-collected from the firms' 10-K SEC filings. Matches are validated by using firm name, fiscal year, ticker code, total assets, and deferred tax balances if available on Compustat.

Deferred tax data are hand-collected because of two reasons: First, Compustat provides deferred tax balances as they are disclosed on the balance sheet, i.e., amounts netted by tax jurisdiction, so that 15.72 (25.91) percent of the provided DTA (DTL) equal zero as a consequence of netting. Furthermore, annual amounts can change only due to netting, distorting the development of deferred taxes and the empirical analysis. Second, the time series provided by Compustat are rather incomplete. While complete deferred tax data, covering the total observation period of 16 years, are only available for 200 of the 500 sample firms, hand-collecting provides complete time series for 359 of the 500 firms.

Hand-collected data, yet, has the drawback that sample size is limited. Therefore, I conduct the analyses using data of the S&P 500 firms.[74] Replicating the economy's sector composition of companies with market cap in excess of $3.5 billion, the S&P 500's sector-balanced composition facilitates industry-specific analysis and offers the advantage that sector effects reflected in the empirical results replicate sector effects as present in the total economy.

Since SFAS No. 109 (ASC 740, according to FASB's new codification system), in effect since 1992, modified and extended the requirements for deferred tax accounting and disclosures considerably, I allow a time lag of two years for firms to adapt to the modified accounting requirements. The observation period covers therefore fiscal years 1994 to 2009. Table III.2 Panel A summarizes the sample selection procedure. Starting from a sample of 500 firms and 7985 firm-year observations over fiscal years 1994 to 2009, I lose 606 observations either due to missing deferred tax disclosures or due to only net deferred tax balances being disclosed.[75] Furthermore, I exclude 356 observations with pre-merger data or lacking match validation. All in all, gross deferred tax data are available for 474 firms and 7023 firm-year observations.

[74] Studies analyzing the value relevance of deferred taxes use generally similar data by using data of Fortune 500 firms (Amir et al., 1997, Raedy et al., 2011) and large Industrial firms listed on NYSE and AMEX (Ayers, 1998).

[75] The reasons for missing deferred tax disclosures are lacking materiality of deferred taxes or income-tax exempt operations. Among others, 12 real estate investment trusts (GICS 40401010) are dropped from the sample.

Table III.2 - Sample

Panel A: Sample Selection

	firms	observations
S&P 500, years 1994-2009	500	7985
gross deferred tax data not available	(14)	(606)
excluded: pre-merger data or lacking match validation	(12)	(356)
Observations with available gross deferred tax data	**474**	**7023**
missing variable data for estimation of the basic model	(20)	(881)
lost due to inclusion of lagged variables	(5)	(798)
excluded: 1st and 99th percentile of dependent variable, 99th percentile of deferred tax variables		(288)
excluded: observations with an R-student statistic of larger than |3|		(100)
Observations for basic regression analysis	**449**	**4956**
missing variable data for extended model	(1)	(29)
Observations for extended model estimation	**448**	**4927**

Panel B: Sector Composition

GICS	code	% of observations	observations (firms)
Energy	10	8.91	439 (38)
Materials	15	6.43	317 (30)
Industrials	20	13.68	674 (57)
Consumer Discretionary	25	17.54	864 (76)
Consumer Staples	30	9.74	480 (39)
Health Care	35	11.61	572 (51)
Financials	40	8.12	400 (43)
Information Technology	45	15.59	768 (73)
Telecommunication Services	50	1.56	77 (9)
Utilities	55	6.82	336 (32)
Total		**100%**	**4927 (448)**

The number of available observations for the regression and forecasting analyses is further reduced due to missing variable data and inclusion of lagged variables in the models. The dependent variable is truncated at 1st and 99th percentile and the deferred tax variables, being naturally truncated at zero, are truncated at 99th percentile of their respective distributions to minimize the effect of outliers on the inferences (288 observations). Additionally, observations with an absolute value of the R-student statistic of larger than 3 are excluded (100 observations),[76] so that the basic regression and forecasting analyses are based on 4956 firm-year observations across 449 firms.

Table III.2 Panel B displays the sector composition of the sample, showing that firms and observations are distributed quite evenly on industries; only one sector (Telecommunication Services) is underrepresented with 77 observations and no sector features more than 864 observations for the main analysis.

4.2. Descriptive Statistics

Table III.3 Panel A presents descriptive statistics of the regression variables. In line with the findings by Lisowsky (2009), mean as well as median current tax expense exceed cash taxes paid, indicating that, in a multivariate setting, the coefficient of current tax expense (*curr_tax_exp*) should be less than 1. Moreover, mean and median total tax expense (significantly) exceed both, cash taxes paid and current tax expense, implying considerable permanent differences as well as non-reversing temporary differences.

DTA (DTL) represent 4.83 (5.86) percent of total assets on average. While mean DTA are quite homogenous across industries, mean DTL are more diverse. Particularly PPE-intensive sectors like Energy, Telecommunication Services, and Utilities feature significantly larger mean DTL balances (Figure III.1), which is consistent with DTL largely arising from book-tax depreciation differences in PPE.

[76] Inferences are basically unchanged if these observations are included.

Table III.3 – Descriptive Statistics

Panel A: Descriptive Statistics

	mean	median	std. dev.	min	max	obs.
tax_paid	0.0266	0.0206	0.0239	-0.0106	0.1285	4956
curr_tax_exp	0.0304	0.0245	0.0271	-0.0770	0.1657	4956
tot_tax_exp	0.0315	0.0280	0.0298	-0.2889	0.4386	4956
DTA	0.0483	0.0415	0.0335	0	0.2098	4956
DTL	0.0586	0.0420	0.0526	0	0.2599	4956
Δ*tax_payable*	0.0004	0	0.0090	-0.0942	0.0827	4956
PI	0.0867	0.0864	0.1547	-5.7760	0.5337	4927
CF	0.1102	0.1065	0.0827	-2.4167	0.4803	4927
Δ*sales_pos*	0.7749	1	0.4177	0	1	4927
capex	0.0542	0.0403	0.0542	0	0.7362	4927
ESO_exp	0.0086	0.0025	0.0230	0	0.2969	4927
R&D_exp	0.0420	0	0.2484	0	15.4902	4927
AD_exp	0.0128	0	0.0285	0	0.2763	4927
lev	0.2401	0.2265	0.1700	0	0.9888	4927
ln(MV)	8.9936	8.9336	1.3545	3.1669	13.0417	4927
ln(TA)	8.9309	8.8394	1.4481	2.4789	14.5983	4927
FO	0.6359	1	0.4812	0	1	4927
TLC	0.6627	1	0.4728	0	1	4927
cashETR	0.2418	1	0.2446	0	0.9721	4525

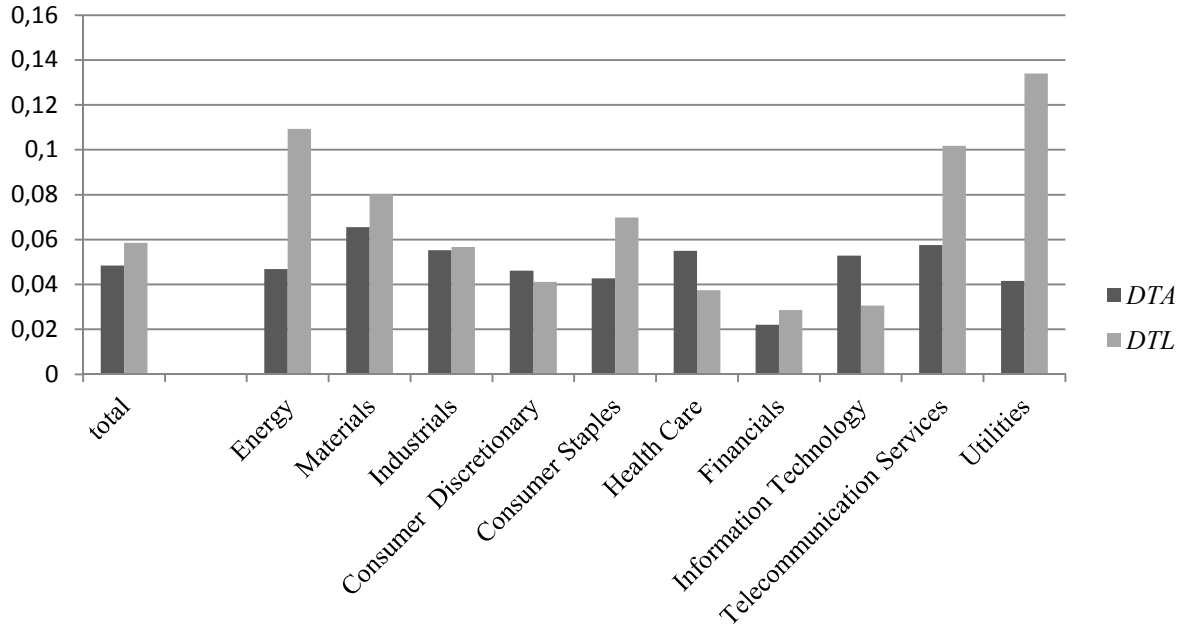
Variable definitions are given in Table III.1.

Panel B: Pairwise Correlation Coefficients

	tax_paid	*curr_tax_exp*	*L1.curr_tax*	Δ*tax_payable*	*L1.DTA*	*L1.DTL*	*L2.DTA*
tax_paid							
curr_tax_exp	**0.889**						
L1.curr_tax_exp	**0.814**	**0.805**					
Δ*tax_payable*	**-0.095**	**0.166**	-0.012				
L1.DTA	-0.005	-0.001	0.012	-0.009			
L1.DTL	**-0.164**	**-0.198**	**-0.218**	-0.001	**0.103**		
L2.DTA	0.012	0.020	0.001	0.011	**0.851**	**0.108**	
L2.DTL	**-0.148**	**-0.189**	**-0.201**	-0.008	**0.089**	**0.946**	**0.133**

Based on 4956 observations. Coefficients significant at 5 percent level are in **bold face**. Variable definitions are given in Table III.1.

Figure III.1 – Average Deferred Taxes relative to Total Assets by Sector



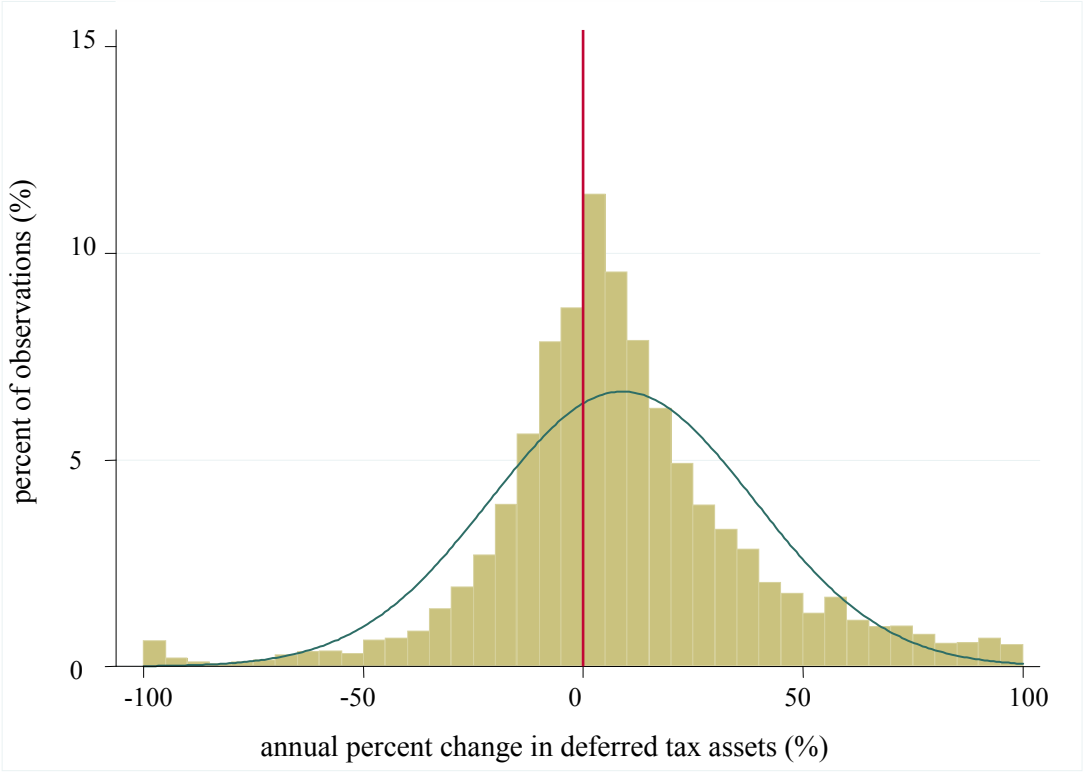
The exceptionally long-time series of deferred tax data available for this study allow an investigation of the short- as well as long-term development of deferred tax balances. Regarding the long-term development of deferred tax balances, analysis reveals that 92.1 (87.0) percent of the DTA (DTL) balances increase over a 13-year horizon. This confirms the core proposition of the equity view, postulating a continuous deferral of deferred tax related cash flows. Growth of deferred tax balances, however, is not consistently linked to firm growth: While mean and median of deferred taxes relative to total assets increase over time, 36.3 (41.1) percent of the observations exhibit a decreasing DTA (DTL) to total assets ratio over the 13-year horizon.

Displaying annual changes in deferred tax balances, Panel A and B of Figure III.2[77] show that – consistent with in the long-run increasing balances – the majority of annual changes in deferred tax balances are positive. Yet, there is, in fact, a considerable rate of reversal present on an annual basis, with 34.41 (32.58) percent of annual changes in DTA (DTL) being negative. Annual reversals are rather small, though, with nearly 50 percent of annual

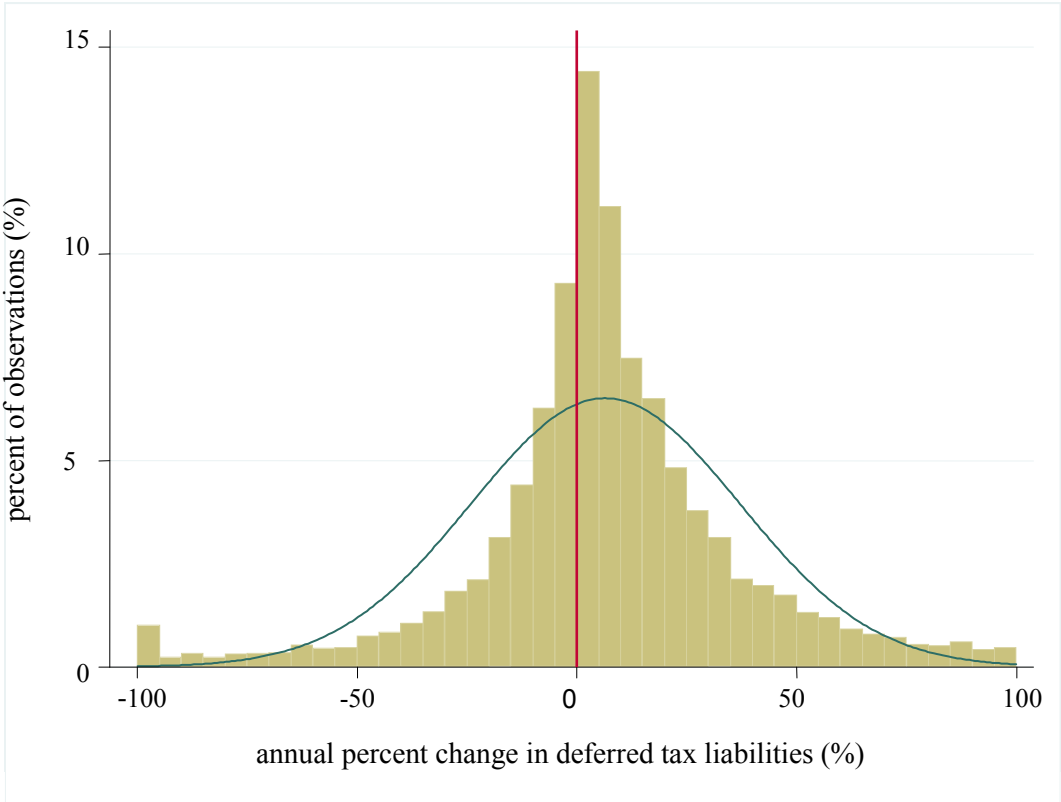
Figure III.2 – Annual Changes in Deferred Taxes

[77] The Figure 2, Panel A and B, are based on 6735 observations. Graphs are truncated at 100% (6.84 percent [7.81] of annual changes in deferred tax assets [deferred tax liabilities] are larger than 100%). Interval length: 5 percentage points. Blue line: Normal distribution based on mean and standard deviation of the distribution of annual changes.

Panel A: Annual Change in Deferred Tax Assets



Panel B: Annual Change in Deferred Tax Liabilities



reductions being smaller than 10 percent. The annual oscillation in the balances is presumably caused by normal variation in operating activities and accrual reversals.

With regards to sector differences in reversal rates, descriptive statistics reveal that frequency as well as average magnitude of reversal is quite homogenous across sectors. While the sectors Consumer Discretionary, Information Technology, and Telecommunication Services show a higher percentage of reversing deferred tax balances as well as a higher average reduction in the accounts, Energy and Industrial firms show reversal rates that are significantly below average.

Pairwise correlation coefficients are presented in Panel B of Table III.3. The correlation coefficient between cash taxes paid and current tax expense is 0.889. Hence, current tax expense approximates actual tax payments very well, suggesting that *curr_tax_exp* should be the main explanator of *tax_paid* in the multivariate setting. High correlation coefficients between lagged values of deferred taxes confirm high persistence in deferred tax balances. Moreover, significantly positive correlation between DTA and DTL confirm that DTA and DTL develop synchronously to a certain extent.[78]

4.3. Regression Results

4.3.1. Regression Results - Pooled Sample

Estimation results based on the pooled sample are presented in Table III.4 (basic model) and Table 5 (extended model). The basic model has considerable explanatory power with an adjusted R-squared of 0.8641 if deferred tax variables are excluded and of 0.8653 if deferred tax variables are included (Table III.4 Models (2) and (3)). Thereby, variation in current tax expense alone explains the major share of variation in cash taxes paid (adjusted R-squared of 0.8175, see Model (1)). Moreover, the dynamic versions of the basic model, including one to two lags of the dependent variable as explanatory variables, reveal that time-series information on tax cash flow does not add incremental information beyond current tax expense, leaving past tax cash flow insignificant as soon as current tax expense is controlled for (Table III.4 Models (7) and (8)). According to the regression results, every reported dollar of current tax expense corresponds to approximately $0.65 paid in taxes.[79]

[78] One reason for synchronous development is that the probably realizable (and, therefore, recognized) amount of DTA depends positively on the amount of existing DTL (see ASC 740-10-30-18 (formerly SFAS No. 109, para. 21) and Behn et al., 1998, for empirical evidence).

[79] The findings are highly consistent with findings reported by Lisowsky (2009), who reports an adjusted R-squared of 0.88 and a highly significant coefficient estimate of current tax expense of 0.727 for his model, explaining the actual tax liability as reported on the tax return.

Table III.4 – Regression Results – Basic Model

	predicted sign	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
constant		0.0015*** (4.25)	0.0049*** (5.08)	0.0047*** (4.44)	0.0064*** (3.72)	0.0045*** (4.17)	0.0005 (0.59)	-0.0001 (-0.02)	-0.0042 (-0.22)
L1.tax_paid	+							0.0436 (1.58)	0.5042*** (11.32)
L2.tax_paid	+								0.0991*** (3.57)
curr_tax_exp	+	0.5857*** (33.55)	0.6496*** (34.71)	0.6482*** (34.91)	0.6426*** (33.36)	0.6393*** (32.50)	0.6395*** (30.87)	0.6548*** (30.32)	
L1.curr_tax_exp	+	0.2417*** (15.92)	0.1416*** (8.66)	0.1416*** (8.58)	0.1457*** (8.48)	0.1418*** (7.64)	0.2081*** (8.67)	0.1149*** (4.88)	
Δtax_payable	-		-0.5554*** (-21.19)	-0.5552*** (-21.23)	-0.5551*** (-20.57)	-0.5407*** (-20.46)	-0.6387*** (-17.36)	-0.5776*** (-18.06)	-0.4384*** (-13.93)
L1.DTA	-			-0.0194** (-2.17)	-0.0195** (-2.03)	-0.0161* (-1.93)	-0.0367** (-2.45)	-0.0322*** (-2.75)	-0.0559*** (-2.81)
L1.DTL	+			-0.0092 (-1.15)	-0.0093 (-1.05)	-0.0076 (-0.95)	0.0046 (0.45)	0.0114 (1.35)	0.0243 (1.35)
L2.DTA	-			0.0029 (0.35)	0.0036 (0.41)	-0.0135* (-1.67)	-0.0117 (-0.89)	-0.0071 (-0.53)	0.0132 (0.77)
L2.DTL	+			0.0258*** (3.03)	0.0236** (2.42)	0.0158** (2.38)	0.0462*** (4.72)	0.0273*** (3.06)	0.0538*** (3.32)
adj. R^2		0.8175	0.8641	0.8653	0.8514	0.7252	0.4800		
adj. R^2 excl. DT [a]				0.8641	0.8498	0.7244	0.4763		
F-test [b]				4.48***	3.13**	4.49***	9.58***	26.65***	25.06***

Table III.4 – Regression Results – Basic Model (continued)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
# IV								156	154
AR(1) [c]								-9.83***	-8.13***
AR(2) [d]								-0.82	-1.52
Hansen test [e] (p-value)								110.00 (0.69)	136.68 (0.11)
obs./cross-sections		4956 / 449	4956 / 449	4956 / 449	4216 / 374	4486 / 445	4396 / 443	4891 / 448	4945 / 448
fixed effects		none	firm- and year-fixed effects	firm- and year-fixed effects	firm- and year-fixed effects	firm- and year-fixed effects	sector- and year-fixed effects	sector- and year-fixed effects	sector- and year-fixed effects

***, **, and * indicate significance at 0.01, 0.05, and 0.1 level, respectively. Dependent variable is *tax_paid*. See Table III.1 for variable definitions. The prefix *Li.* denotes that the variable is lagged by *i* periods. Model (4) excludes Financials and Utilities (GISC 40 and 55). Model (5) uses changes in deferred taxes instead of levels. Model (6) uses first differences of the variables instead of levels. For Models (1) to (6), t-statistics calculated using Huber-White robust standard errors clustered at firm level are reported in parentheses. Models (7) and (8) are estimated using two-step system GMM with z-statistics, calculated using Windmeijer-corrected robust standard errors, reported in parentheses.

[a] Adjusted R^2 of model excluding deferred tax variables.

[b] F-test of joint significance of the deferred tax variables.

[c] The Arellano-Bond test tests the null hypothesis of no first-order autocorrelation in first-differenced errors.

[d] The Arellano-Bond test tests the null hypothesis of no second-order autocorrelation in first-differenced errors.

[e] The Hansen test tests the null hypothesis that the instruments are jointly exogenous.

Table III.5 – Regression Results – Extended Model

		(1)	(2)	(3)	(4)	(5)	(6)
tax_paid_{t+n}		+0	+1	+2	+3	+4	+5
constant		0.0140***	0.0134***	0.0027	0.0251***	0.0052	0.0132**
		(4.66)	(3.45)	(0.50)	(4.21)	(0.83)	(2.14)
curr_tax_exp	+	0.6522***	0.4178***	0.2062***	0.0574**	-0.0045	0.0114
		(31.94)	(13.00)	(8.51)	(2.54)	(-0.21)	(0.57)
L1.curr_tax_exp	+	0.1478***	0.0204	-0.0274	-0.0025	-0.0033	-0.0241
		(8.42)	(1.09)	(-1.45)	(-0.12)	(-0.16)	(-1.45)
Δtax_payable	-	-0.5497***	-0.1457***	-0.0457	0.027	0.0305	-0.0113
		(-21.50)	(-3.94)	(-1.64)	(0.92)	(1.04)	(-0.32)
DTA	-		-0.0561***	-0.0477***	-0.0198	-0.0081	-0.0125
			(-4.31)	(-3.23)	(-0.99)	(-0.44)	(-0.69)
DTL	+		-0.0148	0.0273*	0.0084	0.0024	0.0099
			(-1.20)	(1.76)	(0.51)	(0.13)	(0.48)
L1.DTA	-	-0.02139**	0.0208	0.0301*	0.0149	0.0124	0.0221
		(-2.44)	(1.53)	(1.67)	(0.99)	(0.82)	(1.29)
L1.DTL	+	-0.0049	0.0232**	-0.0211	-0.0141	-0.0046	-0.0062
		(-0.62)	(2.06)	(-1.24)	(-0.94)	(-0.26)	(-0.37)
L2.DTA	-	0.0050					
		(0.61)					
L2.DTL	+	0.0257***					
		(3.19)					
PI	+	-0.0001	-0.0013	-0.0013	-0.0015	0.0009	0.0030*
		(-0.06)	(-0.80)	(-0.74)	(-0.97)	(0.57)	(1.85)
CF	+	-0.0030	0.0238***	0.0329***	0.0249***	0.0189***	0.0010
		(-0.69)	(4.29)	(3.50)	(3.49)	(2.74)	(0.15)
Δsales_pos	+	-0.0006	0.0003	0.0010*	0.0015**	0.0016**	0.0006
		(-1.38)	(0.59)	(1.74)	(2.16)	(2.50)	(0.94)
capex	?	0.0035	-0.0323***	-0.0329***	-0.0242***	-0.0127	-0.0072
		(0.68)	(-4.73)	(-3.50)	(-2.80)	(-1.29)	(-0.87)
ESO_exp	-	-0.0226	-0.0518*	-0.0570*	-0.0551*	-0.0652**	-0.0350
		(-1.18)	(-1.79)	(-1.77)	(-1.70)	(-2.03)	(-1.14)
R&D_exp	-	0.0120	0.0298***	0.0403***	0.0383***	0.0260**	-0.0054
		(1.45)	(3.15)	(3.15)	(2.80)	(2.18)	(-0.42)
AD_exp	+	0.0321**	-0.0047	0.0118	0.0041	0.0240	0.0124
		(2.23)	(-0.21)	(0.42)	(0.15)	(0.65)	(0.29)
lev	-	-0.0025	-0.0028	0.0002	0.0009	0.0072	0.0076
		(-1.27)	(-1.05)	(0.07)	(0.22)	(1.62)	(1.57)
size	?	-0.0012***	0.0007**	0.0018***	0.0013**	0.0011**	0.0005
		(-3.88)	(2.16)	(3.46)	(2.44)	(2.05)	(0.92)

Table III.5 – Regression Results – Extended Model (continued)

		(1)	(2)	(3)	(4)	(5)	(6)
tax_paid_{t+n}		+0	+1	+2	+3	+4	+5
FO	-	0.0001 (0.14)	-0.0005 (-0.42)	-0.0004 (-0.28)	0.0007 (0.45)	0.0001 (0.08)	0.0011 (0.57)
TLC	-	0.0009* (1.94)	0.0009 (1.20)	-0.0003 (-0.27)	-0.0003 (-0.25)	0.0006 (0.51)	0.0009 (0.86)
obs./cross-sections		4927 / 448	4923 / 448	4521 / 448	4122 / 440	3731 / 438	3345 / 428
adj. R^2		0.8711	0.6994	0.5533	0.4721	0.1074	0.1107
adj. R^2 excl. DT [a]		0.8706	0.6981	0.5519			
F-test [b]		5.26***	6.83***	2.99**	0.50	0.18	0.46

***, **, and * indicate significance at 0.01, 0.05, and 0.1 level, respectively. Dependent variable is current *tax_paid* (Model (1)) and *tax_paid* of one (+1) to five (+5) periods ahead (Models (2) to (6)), respectively. Variable definitions are given in Table III.1. The prefix *Li.* denotes that the variable is lagged by *i* periods. All models include firm- and year-fixed effects. t-statistics calculated using Huber-White robust standard errors clustered at firm level are reported in parentheses.
[a] Adjusted R^2 of model excluding deferred tax variables.
[b] F-test of joint significance of the deferred tax variables.

The deferred tax variables show the expected coefficient signs across all model specifications. Consistent with the tax effect, the coefficient of DTA lagged by one period (*L1.DTA*) is significantly negative, in line with deferred tax benefits reducing future tax payments, and the coefficient of DTL lagged by two periods (*L2.DTL*) is significantly positive, in line with deferred tax liabilities increasing future tax payments. F-tests confirm joint significance of the deferred tax variables across all model specifications. Deferred tax variables lagged by more than two periods are insignificant, though. The results are unaffected by excluding Financials and Utilities (GISC 40 and 55) from the sample (Table III.4 Model (4)), by examining changes in deferred taxes (Table III.4 Model (5)), by using first-differenced variables instead of levels (Table III.4 Model (6)), by using a dynamic model specification (Table III.4 Models (7) and (8)), and by including additional control variables into the model (Table III.5 Model (1)).

The estimated coefficients of the control variables generally show the expected signs. While income (persistence) effects are fully captured by current tax expense, operating cash flow (*CF*) is incrementally useful to explain future tax payments, with more profitable firms, i.e., firms with higher operating cash flow exhibiting *c.p.* higher tax payments for the next

four periods. Furthermore, growing sales (Δ*sales_pos*) also imply *c.p.* higher tax payments for the next years. Capital expenditure (*capex*) is significantly negatively related to future tax payments, indicating that (tax reducing) investment credits and accelerated tax depreciation effects dominate (tax increasing) growth effects. Implied stock option expense (*ESO_exp*) is, as expected, negatively related to future tax payments, accounting for tax deductions occurring when respective non-qualified stock options are exercised. In contrast to expectations, R&D expense (*R&D_exp*) is positively related to future tax payments, possibly also capturing growth effects. Moreover, advertising expense (*AD_exp*) is positively related to current tax payments as suggested by Dyreng et al. (2008). Reflecting the divergent results with respect to the effect of firm size on tax burden, size is negatively related to current cash taxes paid, while it is positively related to future cash taxes paid. I do not find significant effects of leverage (*lev*), foreign operations (*FO*), or the presence of tax loss carryforwards (*TLC*).[80]

The core purpose of inter-temporal tax allocation is to inform about future tax payments and tax benefits. Therefore, the inclusion of deferred tax information should improve the explanatory power and forecasting ability of a model explaining (future) tax cash flow. Although deferred tax balance information is indeed significantly related to actual tax cash flow, the increase in explanatory power of the models due to deferred tax inclusion is rather negligible: Inclusion of deferred tax information leads to an increase in explanatory power of only 0.05 to 0.37 percentage points.[81] Hence, the benefit of deferred tax information consideration is considerably low in statistical terms.

Therefore, I additionally try to assess the economic significance of deferred tax-related cash flow. According to the regression results, every additional dollar of DTA results in a tax benefit of approximately 1.61 to 3.67 cents in the next year, while every additional dollar of DTL will translate into additional tax payments of approximately 1.58 to 4.62 cents within the next two years, assuming constant total assets. Since almost all of the estimated deferred tax coefficients are not significantly different from 0.02 in absolute values, this implies that roughly 2 percent of the disclosed deferred tax balances translate into actual tax cash flow within the next two years.

[80] Since *lev* exhibits relatively low within-firm variation, its effect on future tax cash flow is probably included in current tax expense and the firm-fixed effects. Likewise, exhibiting low within-firm variation, the effects of *FO* and *TLC* may also be captured by firm-fixed effects. Moreover, indicator variables might be a very imprecise measure to control for multinational activity and the effects of tax loss carryforwards. If I use instead the percentage of foreign to total pre-tax income and changes in the total amount of tax loss carryforwards, respectively, inferences with respect to deferred tax effects are unchanged.

[81] Reported differences in R-squareds are significantly different from zero at 10 percent level at least.

However, since DTA and DTL coefficients are not significantly different from each other in all of the specifications and since DTA and DTL tend to develop synchronously, the net effect on cash taxes paid is smaller. Multiplying absolute values of netted deferred tax balances by 0.02 gives an estimated median deferred tax cash flow of $3.64 million, which is opposed to median cash taxes paid of $110 million. Relating the estimated net effect of deferred taxes to cash taxes before estimated deferred tax cash flow results for 50 (65) percent of the observations in an estimated net effect of deferred taxes on actual cash taxes paid of less than 3 (6) percent.[82] Hence, estimated net effects of deferred taxes on actual tax payments are small for the majority of firms.

4.3.2. Regression Results - By Industry

I additionally estimate the models separately by industry because of possible industry-specific tax incentives and reporting practices. On the one hand, Dyreng et al. (2008) report some evidence of industry effects in cash effective tax rates and, on the other hand, deferred tax cash flow might be industry-specific, too, since book-tax differences and reversal behavior are likely to vary by industry as a consequence of industry-specific production and operating cycles, asset compositions, tax rules, and accounting conventions (Dyreng et al., 2010).

For parsimony, only the industry-specific coefficient estimates of the deferred tax variables are displayed in Table III.6.[83] The model explains tax cash flow well for each industry, with adjusted R-squareds ranging from 0.6581 to 0.8973. Deferred tax information is relevant (as indicated by F-tests of joint significance at a significance level of 5 percent) for explaining variation in cash taxes paid for four of the ten sectors (Industrials, Health Care, Financials, and Telecommunication Services). Coefficient estimates show generally the expected signs. Only two sectors (Consumer Staples and Health Care) show coefficient estimates of single deferred tax variables that are significant at 5 percent level or better. Deferred tax information lagged by more than two periods is only significant for Financials. Similar to the results based on pooled estimation, the increase in explanatory power due to deferred tax information inclusion ranges from low 0.13 to 0.81 percentage points.

[82] Specifically, I calculate (0.02*(|*L1.DTA-L2.DTL*|))/(|*tax_paid* + 0.02*(*L1.DTA-L2.DTL*)|).

[83] Firms are classified into sectors according to S&P's Global Industry Classification Standard (GICS). Classifying by the North American Industry Classification System (NAICS) does not lead to substantially different results for similar industries.

Table III.6 – Regression Results – By Industry

	Energy	Materials	Industrials	Consumer Discretionary	Consumer Staples	Health Care	Financials	Information Technology	Telecom. Services	Utilities
L1.DTA (-)	-0.0140 (-1.21)	0.0087 (0.51)	-0.0531* (-1.96)	0.0563* (1.67)	-0.0965** (-2.68)	-0.0504 (-1.33)	0.0107 (0.39)	-0.0301* (-1.87)	0.0144 (0.32)	-0.0136 (-0.79)
L1.DTL (+)	0.0033 (0.26)	-0.0222 (-0.98)	-0.0153 (-0.82)	-0.0446 (-1.30)	0.0374 (1.59)	0.0077 (0.29)	-0.0017 (-0.11)	0.0225 (1.00)	-0.0603* (-2.15)	-0.0106 (-0.45)
L2.DTA (-)	0.0060 (0.50)	-0.0001 (-0.01)	0.0196 (0.75)	-0.0579* (-1.98)	0.0436 (1.46)	-0.0148 (-0.46)	-0.0019 (-0.05)	0.0220 (1.57)	0.0339 (0.68)	-0.0059 (-0.33)
L2.DTL (+)	0.0064 (0.55)	0.0421* (1.77)	0.0168 (0.89)	0.0450 (1.48)	0.0148 (0.06)	0.0489** (2.09)	0.0379* (1.85)	0.0141 (0.59)	0.0156 (0.36)	0.0304 (1.23)
obs./cross-sections	439 / 38	317 / 30	674 / 57	864 / 76	480 / 39	572 / 51	400 / 43	768 / 73	77 / 9	336 / 32
adj. R^2	0.8973	0.8607	0.7864	0.6956	0.6581	0.7708	0.7608	0.7291	0.7005	0.7905
adj. R^2 excl. DT [a]			0.7836		0.6500	0.7649	0.7578	0.7278	0.6991	
F-test [b]	0.59	0.99	3.29**	1.10	2.59*	5.02***	4.03**	2.24*	6.75**	1.13

***, **, and * indicate significance at 0.01, 0.05, and 0.1 level, respectively. Variable definitions are given in Table III.1. The prefix *Li.* denotes that the variable is lagged by *i* periods. Estimations are based on the extended model (including firm- and year-fixed effects), but for parsimony only the estimation results with respect to deferred tax information are presented. t-statistics calculated using Huber-White robust standard errors clustered at firm level are reported in parentheses.

[a] Adjusted R^2 of model excluding deferred tax variables.

[b] F-test of joint significance of the deferred tax variables.

4.3.3. Regression Results - By Firm

Since the development of deferred taxes and tax cash flow may be very firm-specific, I additionally estimate the basic model by firm.[84] While for 67.25 percent of the firms all deferred tax coefficients are insignificant, 25.73 percent (21.05 percent) of the firms exhibit DTA (DTL) coefficients that are significantly different from zero at 5 percent level.[85]

The sector distribution of significant deferred tax coefficients confirms that DTA are, in general, of higher cash flow relevance than DTL: Within each sector, a higher percentage of firms exhibit significant *DTA*-coefficients than *DTL*-coefficients. In particular for Financial and Utility firms, primarily DTA are cash flow-relevant, which might be due to specific regulation requirements. Moreover, while deferred taxes are significantly related to actual tax cash flow for about 30 percent of Industrial, IT, and Telecommunication Services firms, virtually no Energy firm shows significant deferred tax coefficients. Likewise, firms in the Consumer Staples sector show substantially less than the average percentage of significant deferred tax coefficient estimates (see Table III.7).

Table III.7 – Sector Distribution of Significant Deferred Tax Coefficients of Firm-Specific Regressions

Sector	Percent (%) of firms with significant [a]	
	DTA-coefficients	DTL-coefficients
Energy	13.33	3.33
Materials	28.57	23.81
Industrials	29.17	29.17
Consumer Discretionary	20.00	20.00
Consumer Staples	17.65	11.76
Health Care	22.50	22.50
Financials	40.74	14.81
Information Technology	28.30	28.30
Telecommunication Services	33.33	33.33
Utilities	39.13	26.09
Total	25.73	21.05

[a] Significance at 5 percent level.

[84] For most of the firm-specific regressions, error terms are not autocorrelated. In case of detected autocorrelation, Newey-West standard errors are employed.

[85] 34.21 percent (31.58 percent) of the firms show DTA (DTL) coefficient estimates that are significant at 10 percent level, while for 54.39 percent of the firms deferred tax information is insignificant at this level of significance.

With regard to other firm characteristics, firms with significant deferred tax information tend to be underperformers in terms of showing, on average, less growth (of sales, operating cash flow, and total assets), lower ROA, and significantly less multinational activity (as measured by percent of foreign to total pre-tax income) as compared to the total sample. Yet, these firms do not show a higher amount of reversal – neither in terms of frequency of reversals nor in terms of average magnitude of reversal – in deferred tax balances.

In sum, the regression results show that deferred taxes have indeed timely tax cash flow implications. Yet, inclusion of deferred tax information increases explanatory power only to a very small extent, and is only significant for 32.75 percent of the sample firms. Besides, firm- as well as industry-specific estimation results suggest that deferred tax information is particularly not useful for firms belonging to the Energy sector, while it is more informative for Industrial, Financial, IT, or Telecommunication Services firms. To better assess the usefulness of deferred tax information with respect to future tax cash flow, I analyze in the following section whether inclusion of deferred tax information decreases forecast error of forecasting tax cash flow up to five periods ahead.

5. Forecast Analysis

The model used for forecasting is established based on the regression results of the preceding section. In particular, using the extended model for forecasting purposes as opposed to the basic model results in lower MAPE and RMSE. Hence, incorporation of additional variables does increase the forecast accuracy of the model.

Forecast model:[86]

(3) $$tax\_paid_{it+n} = \beta_0 + \beta_1 * curr\_tax\_exp_{it} + \beta_2 * curr\_tax\_exp_{it-1} + \beta_3 * DTA_{it} + \beta_4 * DTL_{it} + \beta_5 * DTA_{it-1} + \beta_6 * DTL_{it-1} + \beta_7 * CF_{it} + \beta_8 * \Delta sales\_pos_{it} + \beta_9 * capex_{it} + \beta_{10} * ESO\_exp_{it} + \beta_{11} * R\&D\_exp_{it} + \beta_{12} * size_{it} + \sum_k \delta_k * Year_k + \varepsilon_{it},$$
$$n = 1, \ldots, 5$$

One-period-ahead forecasts are obtained by using the first 11 observation years (1994 to 2004) to generate predictions of cash taxes paid for fiscal year 2005. Next, the model is subsequently re-estimated by adding 2005-data to generate one-year-ahead predictions for 2006, and so forth. Likewise, two-year-ahead forecasts are obtained by first using data of fiscal years 1994 to 2003 to generate two-year-ahead predictions of cash taxes paid for fiscal year 2005. Subsequently, 2004-data is added to generate 2006-predictions. This procedure is repeated until the end of the sample and for predictions up to five periods ahead. Firm-specific forecasts are only computed for up to three periods ahead in order to have sufficient observations per firm for model estimation.

Three error metrics are employed to compare the predictive ability of the model including versus excluding deferred tax information: mean absolute percentage error (MAPE), root mean squared error (RMSE), and the difference in absolute forecast errors (rank tests).[87]

Analysis of forecast errors shows that, in general, estimated cash taxes paid slightly tend to overstate actual cash taxes paid, which is in line with current tax expense generally overstating actual tax payments and the model not capturing all tax deductions and permanent differences (see also Lisowsky, 2009).

[86] For forecasts based on the pooled sample, industry controls are additionally employed. The model used for by-firm forecasts excludes the variables *ESO_exp*, *R&D_exp*, and *size* because exclusion improves the average forecast accuracy of the model on a by-firm basis and increases degrees of freedom.

[87] MAPE is computed as the mean of the absolute value of the forecast error relative to the realized cash taxes paid to total assets. RMSE is computed as root of the mean of squared forecast errors. MAPE of larger than 100% are truncated to 100%.

Table III.8 – Forecast Analysis

Panel A: Pooled Sample

	obs.	MAPE		RMSE		Rank		Percent (%) change in forecast error[a]	
		excl. DT	incl. DT	excl. DT	incl. DT	excl. DT	incl. DT	mean	median
+1	2045	0.4533***	0.4657	0.0137	0.0139	1.4057***	1.5943	2.42	5.48
+2	2015	0.5128***	0.5179	0.0176	0.0175	1.3949***	1.6051	2.25	3.82
+3	1978	0.5339	0.5334	0.0191	0.0185	1.5024	1.4976	-4.54	-5.22
+4	1926	0.5335	0.5321	0.0200	0.0191	1.4369***	1.5631	-1.10	3.69
+5	1885	0.5357***	0.5416	0.0206	0.0199	1.4804*	1.5196	-0.84	-0.38

Panel B: By Firm

	obs.	MAPE		mean RMSE[b]		Rank	
		excl. DT	incl. DT	excl. DT	incl. DT	excl. DT	incl. DT
+1	1180	0.4687**	0.4901	0.0417***	0.0761	1.4992	1.5008
+2	1136	0.5923***	0.6889	0.0468***	0.1005	1.3538***	1.6462
+3	1071	0.5864***	0.7088	0.0370***	0.1015	1.3378***	1.6622

MAPE and RMSE for tax cash flow forecasts of one (+1) to five (+5) periods ahead. ***, **, and *: MAPE/RMSE/rank of model including deferred tax information is significantly different from MAPE/RMSE/rank of model excluding deferred tax information at 0.01, 0.05, and 0.1 level, respectively. MAPE of larger than 100% are truncated to 100%.

[a] Percent change in forecast error due to deferred tax inclusion. Positive values imply increasing forecast error as a consequence of deferred tax inclusion. Changes are truncated at 100% for mean computation to prevent scarce large changes driving mean results. If these deleted observations are included, mean is positive for all 5 forecast horizons.

[b] Means of RMSE that are calculated by firm are displayed. Squared forecast errors of larger than 2 are excluded to reduce the influence of outliers (in total 17 of the observations: 1 (16) of the forecast errors based on the model excluding (including) deferred tax information.

Table III.8 presents error metrics of forecasts based on the pooled sample (Panel A) as well as of forecasts based on by-firm regressions (Panel B). The model captures less variation with increasing forecast horizon, so that forecast errors increase in the forecast horizon. MAPE and RMSE are either not significantly different or significantly smaller for the model excluding deferred tax information. Hence, the model excluding deferred tax information outperforms the model including deferred tax information in terms of average forecast accuracy.

This is confirmed by the results of the rank tests, comparing absolute percentage errors (this is, the absolute value of the forecast error relative to the realized cash taxes paid) of the model including versus excluding deferred tax information. For each forecast, the model yielding the smaller absolute percentage error (i.e., the better performing model in terms of forecast accuracy) is given a rank of one and the remaining model is given a rank of two. The average ranks of the models are displayed in Table III.8, showing that, likewise, excluding deferred tax information results in either not significantly different or significantly lower average rank.[88] Hence, rank tests indicate that the model provides significantly more often the more accurate forecast, if deferred tax information is **not** included in the model.

The right column of Table III.8 Panel A displays mean and median percent change in forecast error due to deferred tax inclusion, showing that the mean (median) change in forecast error is positive for two (three) of the five forecast horizons.[89] Since positive values imply that deferred tax inclusion increases forecast error, these results further support the model exclusive of deferred tax information for forecasting purposes.

In line, inclusion of deferred tax information lowers forecast error for about 40 percent of the forecasts. Regarding the subgroup of forecasts for which inclusion of deferred tax information does indeed decrease forecast error, I find that the reduction in forecast error is not material, i.e., less than 5 percent of forecast error, for about 20 percent of these forecasts, and less than 10 percent for 75 percent of the reductions.

Results are highly consistent across error metrics if forecasts are generated based on regressions estimated separately by sector. Consistent with the regression results presented in the preceding section, inclusion of deferred tax information improves tax cash flow forecasts of the sectors Industrials, Consumer Staples, IT, and Telecommunication Services, while the industry-specific forecasting results suggest that deferred tax information is particularly not

[88] Significance of difference in average ranks is assessed by using Friedman's ANOVA rank test and Wilcoxon's sum rank test.

[89] Changes are truncated at 100% for mean computation to prevent scarce large changes driving mean results. If these deleted observations are included, the means are positive for all 5 forecast horizons.

useful for firms belonging to the Energy and Materials sector. Apart from industry, less multinational activity, and marginally higher growth ratios, firms for which deferred tax information reduces forecast error are not significantly different, on average, from firms for which deferred tax inclusion does not reduce forecast error. Summarizing, there is only limited evidence for consideration of deferred tax information reducing forecast error of future tax cash flow forecasts. Moreover, observed reductions are rather small for their most part.

6. Robustness Tests and Supplemental Analyses

To ensure the robustness of the results, I conduct several additional tests. First, I drop negative cash taxes paid from the sample (169 observations) because these might exhibit a different behavior. Yet, results are qualitatively unchanged. Cash taxes paid likely do not only include tax payments for the current year, but also tax payments settling tax issues of prior years. Furthermore, they include the effects of tax loss carrybacks and carryforwards. To account for tax effects of prior and future years and to smooth possibly very variable cash tax payments, I employ different long-term metrics (sum and moving average of cash taxes paid over three to five years) as dependent variable. The significance of deferred tax coefficients generally decreases in these models. Yet, significant coefficient estimates show consistently expected signs in accordance with the tax effect.

Second, current tax expense is incorporated into the dependent variable, i.e., the difference in cash taxes paid less current tax expense is regressed on the change in income taxes payable and deferred tax variables. This is done to analyze more directly the incremental information in deferred tax balances to current tax expense in explaining cash taxes paid. Again, inclusion of deferred tax information results in an increase in explanatory power of only marginal 0.26 percentage points.

Third, I replicate the analysis excluding Financial companies as well as Utilities (GSIC 40 and 55) because of their regulated nature, specific accounting and taxation rules. Exclusion of these firms does not change the inferences.

Fourth, alternatively deflating by common shares outstanding does not affect the results. Likewise, deflating the control variables of the extended model by either total assets, sales, or pre-tax income does not affect the main inferences. Besides, MAPE and RMSE of the deflated models are far lower than of a model using non-deflated variables, which supports the choice of the deflated model.

Fifth, instead of deferred tax balance information, I include deferred tax expense in the models. Consistent with findings reported by Lisowsky (2009), current tax expense performs significantly better than total tax expense in explaining cash taxes paid. Moreover, current deferred tax expense is insignificant, while deferred tax expense lagged by one and two periods is significantly positively related to cash taxes paid. Yet, in line with the overall results of this study, inclusion of lagged deferred tax expense adds only negligible 0.06 percent in explanatory power.

Sixth, discretion exercised in the recognition of DTA does not distort the results. If I adjust DTA for discretionary changes in the valuation allowance, using a model developed by Frank and Rego (2006), to obtain "nondiscretionary" DTA, results are qualitatively unchanged.[90] In general, inclusion of the valuation allowance into a regression model employing gross DTA (i.e., DTA before valuation allowance) instead of net DTA (i.e., DTA after valuation allowance) increases the explanatory power of the model. The coefficient estimates of the (lagged) valuation allowance variables are significantly positive (at 3 percent level and better). Thus, the results (not tabulated) provide supportive evidence of the usefulness of the "probability"-adjustment of DTA as it is required by ASC 740-10 (formerly SFAS No. 109) in form of the valuation allowance, since the adjustment clearly increases the informativeness of disclosed DTA. These findings indicate furthermore that the valuation allowance is largely set in accordance with the expected utilizability of deferred tax benefits and not extensively determined by discretion, e.g., earnings management purposes.[91]

Seventh, DTA recognized for tax loss carryforwards might have different, more direct cash flow implications than other deferred tax components. This might be the case because tax losses are not expected to persist, so that tax benefits from tax loss carryforwards should be realizable rather timely. Decomposing DTA into *DTA for tax loss carryforwards* and *other DTA* reveals that both components feature significant coefficient estimates that are not significantly different from each other. Hence, DTA for tax loss carryforwards do not exhibit a different cash flow behavior according to the results.

Eighth, coefficient estimates of current versus noncurrent deferred taxes are not significantly different from each other. The break-down in current versus noncurrent deferred taxes is insignificant for the respective cash flow implications, since classification as current or noncurrent is based on the classification of the underlying asset or liability. Yet, the time to reversal of the aggregate deferred taxes is largely independent of the maturity of the single underlying positions. For example, inventory is a current item, but since inventory is permanently replaced, the associated deferred tax component is persistent in the aggregate as

[90] Frank and Rego (2006) develop a model to determine (non)discretionary changes in the valuation allowance. Specifically, the annual change in the valuation allowance is regressed on annual changes of DTA for tax loss carryforwards, other DTA, DTL, previous, current, and next year's pre-tax income, and the market-to-book ratio. Variables are deflated by total assets and regressions are estimated by GICS sector. Fitted values of the model represent expected changes. These estimated (nondiscretionary) changes in the valuation allowance are added to previous year's valuation allowance, which is subsequently subtracted from current gross DTA, obtaining DTA adjusted for discretion in recognition.

[91] See Frank and Rego (2006) and Graham et al. (2011) for an overview of research on earnings management by means of the valuation allowance.

long as the firm is maintaining its operating capacity, resulting in an effectively long-term deferral and, therefore, noncurrent.

Ninth, I replicate the analysis using only non-growth observations, i.e., firm-year observations featuring decreasing total assets. Since the sample firms are overall growing firms, lacking relation of deferred taxes to cash taxes paid could be due to growth, i.e., lacking reversal. Although the sample firms are growing over the total observation period, a substantial part of the firm-year observations (1178 observations) fall in the category of non-growth. Regression results (not tabulated) show that deferred tax coefficients are insignificant for non-growth observations, while they remain unchanged for growth firm-year observations. Moreover, if the analysis is replicated exclusively based on recession years (which, consistently, exhibit a considerably higher percentage of non-growth observations), significance levels of the deferred tax coefficients decrease. Thus, low usefulness of deferred tax information does not seem to be attributable to continuous growth.

Tenth, I deflate cash taxes paid by pre-tax income less special items, obtaining the cash effective tax rate (CASH ETR), as it is introduced by Dyreng, Hanlon, and Maydew (2008, abbreviated as DHM in the following). To be in line with DHM, I exclude observations with negative nominator or denominator and CASH ETRs of greater than 1 (402 observations).

Estimation results of using CASH ETR as dependent variable are displayed in Table III.9. In this case, the additional controls included in the extended version of the model add considerably more to the explanatory power of the model (11.93 percentage points).[92] The unexpectedly negative coefficient estimates of operating cash flow (*CF*) and sales growth (Δ*sales_pos*) are attributable to operating cash flow and sales growth being more highly correlated with pre-tax income, which is part of the denominator of the dependent variable, than with the nominator, cash taxes paid. The positive relation of *CF* and Δ*sales_pos* to the dependent variable's denominator dominates, resulting in negative coefficient estimates. Moreover, the significantly negative size coefficient confirms, in a multivariate setting, DHM's observation based on descriptive statistics that CASH ETR is inversely related to firm size (Table III.9 Model (1)).

[92] This is because the additional variables are useful to explain variation in pre-tax income. The independent variable *PI* (pre-tax income deflated by total assets) is omitted in these regressions, since the dependent variable is divided by pre-tax income less special items.

Table III.9 – CASH ETR

	predicted sign	static model	dynamic model			
				cashETR ≤ 0.2	**0.2 < cashETR ≤ 0.4**	**cashETR > 0.4**
		pooled	**pooled**	**low**	**mid**	**high**
		(1)	(2)	(3)	(4)	(5)
constant		0.3722***	0.2512	0.3333*	-0.5049	0.2576
		(7.54)	(1.61)	(1.66)	(-1.22)	(0.21)
L1.cashETR	+		0.0743**	0.1589***	0.1008***	-0.0992
			(2.53)	(2.83)	(3.93)	(-0.92)
curr_tax_exp	+	2.0049***	1.8530***	2.8485***	1.7587***	1.1586*
		(11.37)	(10.02)	(9.72)	(9.58)	(1.87)
L1.curr_tax_exp	+	0.5005***	0.3758***	1.4090***	0.0437	-1.0831*
		(5.11)	(2.65)	(4.54)	(0.24)	(-1.96)
Δtax_payable	-	-2.9463***	-3.0266***	-2.4743***	-2.8876***	-2.8016***
		(-14.43)	(-16.33)	(-8.29)	(-11.59)	(-5.35)
L1.DTA	-	-0.4346***	-0.5229***	-0.3137	-0.7956***	-1.6110*
		(-4.23)	(-3.30)	(-1.59)	(-3.82)	(-1.85)
L1.DTL	+	-0.0600	0.2591*	0.1657	0.5321***	0.1742
		(-0.59)	(1.84)	(0.72)	(2.87)	(0.43)
L2.DTA	-	-0.0487	-0.1523	-0.1035	0.0066	-0.8842
		(-0.48)	(-1.07)	(-0.50)	(0.04)	(-1.16)
L2.DTL	+	0.3936***	0.3026**	0.1890	0.3409*	-0.2907
		(3.72)	(2.57)	(0.84)	(1.75)	(-0.43)
CF	+	-0.4745***	-0.4049***	-0.4487***	-0.3580***	-0.5808**
		(-10.01)	(-6.58)	(-4.62)	(-5.31)	(-2.21)
Δsales_pos	+	-0.0205***	-0.0215***	-0.0037	-0.0157**	-0.0472*
		(-4.02)	(-3.78)	(-0.46)	(-2.55)	(-1.78)
capex	?	-0.0766**	0.0871*	0.1168	0.0527	0.1363
		(-2.04)	(1.67)	(1.22)	(1.02)	(0.82)
ESO_exp	-	-0.2298	0.2667	0.6134	-0.4820	-3.9552
		(-1.03)	(0.72)	(0.97)	(-0.46)	(-0.59)
R&D_exp	-	-0.0907	-0.1084	-0.1873	-0.0465	-1.1692
		(-1.01)	(-0.92)	(-1.10)	(-0.34)	(-0.99)
AD_exp	+	0.0161	-0.1169	0.1555	0.4676	1.0642
		(0.08)	(-0.31)	(0.23)	(1.34)	(1.15)
lev	-	0.0111	0.0264	0.0160	-0.0114	-0.0754
		(0.56)	(0.96)	(0.29)	(-0.31)	(-0.46)
size	?	-0.0156***	-0.0073	-0.0029	-0.0005	-0.0477
		(-3.04)	(0.22)	(-0.60)	(-0.05)	(-1.07)

Table III.9 – CASH ETR (continued)

	predicted sign	static model	dynamic model			
				cashETR ≤ 0.2	0.2 < cashETR ≤ 0.4	cashETR > 0.4
		pooled	pooled	low	mid	high
		(1)	(2)	(3)	(4)	(5)
FO	-	0.0202** (2.27)	-0.0002 (-0.02)	0.0176 (0.74)	-0.0062 (-0.58)	0.0714 (0.85)
TLC	-	0.0108* (1.69)	0.0078 (0.97)	0.0058 (0.34)	0.0022 (0.27)	0.0656 (1.24)
obs./cross-sections		4474 / 448	4249 / 446	1495 / 369	2358 / 403	396 / 203
adj. R^2		0.3146				
F-Test [a]		9.18***	23.73***	3.50	23.27***	5.67
# IV			166	166	166	166
AR(1) [b]			-9.942***	-4.263***	-6.409***	-1.425*
AR(2) [c]			-0.438	1.185	0.599	-0.011
Hansen test [d] (p-value)			121.90 (0.54)	151.42* (0.05)	145.52 (0.11)	120.87 (0.49)

***, **, and * indicate significance at 0.01, 0.05, and 0.1 level, respectively. Dependent variable is *cashETR*: cash taxes paid (TXPD) divided by pre-tax income (PI) less special items (SPI). All other variables are as defined in Table III.1. The prefix *Li.* denotes that the variable is lagged by *i* periods. Models include firm- and year-fixed effects. Static Model: t-statistics calculated using Huber-White robust standard errors clustered at firm level are reported in parentheses. Dynamic Model: Model is estimated using two-step system GMM with z-statistics, calculated using Windmeijer-corrected robust standard errors, reported in parentheses.

[a] F-test of joint significance of the deferred tax variables.

[b] The Arellano-Bond test tests the null hypothesis of no first-order autocorrelation in first-differenced errors.

[c] The Arellano-Bond test tests the null hypothesis of no second-order autocorrelation in first-differenced errors.

[d] The Hansen Test tests the null hypothesis that the instruments are jointly exogenous.

DTA- as well as *DTL*-coefficients are again highly significant and show signs in accordance with the tax effect (Table III.9 Models (1) and (2)). Deferred tax variables lagged by more than two periods are again insignificant.

Partitioning the sample into three tax groups in accordance with DHM – firm-years exhibiting a CASH ETR greater than 40 percent (high), between 20 and 40 percent (mid), and smaller or equal to 20 percent (low) –,[93] confirms in a multivariate setting DHM's finding that

[93] Since DHM's sample is based on the total Compustat population, the sample used in this study features on average larger firms. In line with DHM's finding that long-run tax avoiders tend to be larger firms, only 9.32 percent of my sample's observations show a CASH ETR of greater than 40 percent whereas 18.96 percent of DHM's observations exhibit a high CASH ETR.

high CASH ETR are less persistent than low CASH ETR. In line with the findings reported by DHM, the persistence coefficient (i.e., the coefficient of *L1.cashETR*) is insignificant for firm-years exhibiting a high CASH ETR, while low CASH ETR show a significantly higher persistence than mid CASH ETR (Table III.9 Models (3) to (5)).

Interestingly, deferred tax information is only significant for the mid tax group (Model (4)). Comparing firm characteristics across tax groups shows, in line with DHM, that firms in the mid tax group exhibit, on average, higher ROA, lower R&D-expense, and higher advertising expense. Moreover, firms in the mid tax group show, on average, a considerably higher variation and less persistence in their deferred taxes balances.

7. Conclusion

The analyses show that deferred taxes indeed may have timely cash flow implications, even in the case of growing firms. Inclusion of deferred tax information, however, results only in an increase in explanatory power of marginal 0.05 to 0.37 percentage points. Furthermore, deferred taxes are only significantly related to actual tax cash flow for about 32.75 percent of the sample firms, and the economic significance of deferred tax cash flow seems to be rather negligible for the majority of firms. The results of the forecasting analysis, which investigates the information content of deferred taxes with respect to future tax cash flow, show that consideration of deferred tax information does not improve tax cash flow forecasts for the majority of firms. Moreover, observed reductions in forecast errors due to deferred tax consideration are quite moderate.

Thus, although the core purpose of inter-temporal tax allocation is to inform about future tax payments and tax benefits, the overall results of this study rather indicate lacking relevance of recognized deferred taxes for (future) tax cash flow. Hence, the results of this study provide an empirical rationale for deferred taxes being not considered decision-relevant by financial statement users. Moreover, since the estimated coefficients imply only small tax cash flow effects of deferred taxes for the majority of the sample firms, this study provides in particular empirical support for the equity view of deferred tax value relevance, which attributes only low present value to deferred tax cash flows.

Overall, the benefit of deferred tax balance information in terms of informing about future tax cash flow seems to be rather low, so that the findings of this study further contribute to questioning the usefulness of (extensive) recognition and disclosure requirements for deferred taxes.

The findings of this study are basically of descriptive nature, assessing the general importance of deferred tax cash flow and showing that there are no substantial industry effects in deferred tax cash flow. The path for future research is to analyze causal relations, investigating the reasons for the observed differences in tax cash flow relevance of deferred taxes across firms. Financial statements users should be particularly interested in being able to identify firm characteristics and events that might cause substantial deferred tax cash flow in the near future.

CHAPTER IV

The Impact of Corporate Governance on Accounting Choice

- The Case of Deferred Tax Accounting under IFRS

Astrid K. Chludek and Duc Hung Tran[94]

This is the first study trying to capture the general subjective influence determining the recognized amount of deferred tax assets apart from situational incentives for earnings management. Therefore, we extend possible determinants of recognized deferred tax assets beyond the criteria provided by accounting standard IAS 12 and earnings management incentives, controlling for corporate governance attributes, like executive compensation schemes and ownership, as well as for the overall transparency and quality of the firm's financial statements. Our findings suggest that executives' compensation schemes, blockholder ownership by the founding family, and audit firm significantly influence disclosure behavior as well as the recognized amounts of deferred tax assets. These results highlight the complexity of the financial reporting process and importance of other underlying effects beyond rules and criteria provided by accounting standards.

[94] Seminar of Financial Accounting & Auditing, University of Cologne

1. Introduction

Research in financial accounting concludes that accounting standards alone do not determine financial reporting outcomes (see Leuz and Wysocki 2008, for an overview). A variety of underlying forces also shape the quality of the financial reporting outcome. As long as managers can elect to use their discretion over financial reporting, the effect of accounting standards alone may turn out to be weak relative to the effects of forces such as managerial incentives, auditor quality, enforcement, internal and external governance structures, and other institutional features of the economy (Holthausen 2009).

Leuz (2006), for example, suggests that the degree of concentration in ownership leads to systematic differences in earnings management and the overall financial reporting outcome, even if enforcement and other country-related attributes are held constant. Consistently, Ball and Shivakumar (2006) and Burgstahler et al. (2006) document that changes in accounting standards alone will not result in comparable financial reporting outcomes, thereby providing evidence for the importance of other institutional features in the process generating the financial reporting outcome.

Set against this background, this paper examines the underlying factors of the financial reporting outcome with regard to deferred tax assets along two dimensions: disclosure and recognition. Deferred tax assets account for the amounts of future tax benefits that will arise from deductible temporary book-tax differences and the carryforward of unused tax losses and tax credits. Yet, according to IAS 12.24, a deferred tax asset shall only be recognized to the extent that it is *probable* that the related tax benefit will be realized. Though IAS 12 provides several guidelines for assessing the probably realizable amount of future tax benefits, the accounting standard still allows significant subjectivity in assessment. Therefore, we focus in our empirical analysis on the determinants of deferred tax asset recognition. While prior (predominantly US GAAP-based) research on recognition of deferred tax assets has primarily investigated whether discretion in recognition is used for earnings management purposes, we extend possible determinants of recognized deferred tax assets beyond recognition guidelines, provided by the accounting standard (IAS 12, in this case), and earnings management incentives, by relating corporate governance as well as transparency variables to the recognized amount of deferred tax assets for tax loss carryforwards.

Using German firm data, we find that deferred tax assets for tax loss carryforwards are generally recognized in accordance with IAS 12. In detail, the amount of deferred tax liabilities, past and current profitability are significantly related to recognized amounts, while

future performance indicators are insignificant. Regarding corporate governance attributes, we find that firms with large shares of the firm held by the founding family tend to recognize a *c.p.* lower amount of deferred tax assets for tax loss carryforwards, which is in line with family firms setting less incentives to report overoptimistically and improved monitoring. Effects of managers' compensation schemes, though, are only rather modest.

Overall transparency and quality of disclosure is highly significantly related to the disclosed amount of deferred tax assets for tax loss carryforwards. Moreover, there are some auditor effects on recognized amounts. The audit firm may significantly affect recognized amounts due to firm-specific internal guidelines and due to the overall quality of the audit.

Since **un**recognized amounts of deferred taxes are relevant for an analysis of recognition determinants but income tax disclosures under IFRS (IAS 12) concerning these unrecognized amounts of deferred tax assets are currently characterized by a high degree of heterogeneity,[95] we investigate in a first step determinants of disclosure of unrecognized amounts. Namely, we focus on disclosure of a valuation allowance or of the total amount of tax loss carryforwards. Regression analysis reveals that disclosure practice is significantly influenced by whether the firm has once reported under US GAAP, by manager compensation (whether managers are compensated on a share-basis), by firm size, as well as by the auditing firm (Non-Big4 vs. Big4 audit firms).

Taken together, our findings provide additional evidence that underlying factors, such as governance structures and auditor effects, play a role in shaping the outcome of the financial reporting process.

The proceeding of this chapter is organized as follows: The second section motivates the research question, reviews briefly related research, and develops the model and the hypotheses. Section 3 describes the sample and Section 4 analyses the heterogeneity of income tax disclosures under IAS 12. Section 5 presents the empirical results focusing on the determinants of recognized deferred tax assets for tax loss carryforwards. Section 6 briefly summarizes the results and finally concludes.

[95] The IASB plans to make establishment and disclosure of a valuation allowance analogue to ASC 740 (formerly SFAS No. 109) mandatory (see exposure draft ED/2009/2). This amendment will decrease heterogeneity in disclosure and, hence, substantially improve inter-firm comparability and informativeness of income tax disclosures relating to unrecognized amounts of deferred taxes.

2. Motivation, Model, and Hypotheses

According to IAS 12.34 "A deferred tax asset shall be recognized for the carryforward of unused tax losses and unused tax credits to the extent that it is probable that future taxable profit will be available against which the unused tax losses and unused tax credits can be utilized". Since this requires from firms as well as from auditors to determine the amount of unused tax loss carryforwards that is probable to be realized, IAS 12.36 declares four criteria to be considered when assessing the probably realizable amount: (1) reversing deferred tax liabilities, (2) expected future taxable income, (3) the sources of the unused tax losses, and (4) available tax planning strategies.

On the one hand, these four criteria provide a quite objective guideline for assessing the probably realizable amount of tax loss carryforwards. On the other hand, management yet has still significant scope within the range of these four criteria to determine the amount of recognized deferred tax assets. Therefore, research on recognition of deferred tax assets has primarily focused on whether discretion in recognition is used for earnings management purposes. These studies are largely based on US GAAP data, typically investigating whether earnings management variables and objectives are significantly related to (changes in) the valuation allowance for deferred tax assets.[96]

Visvanathan (1998), Bauman et al. (2001), Burgstahler et al. (2002), Schrand and Wong (2003), Frank and Rego (2006), and Christensen et al. (2008) examine whether the valuation allowance is used for earnings management purposes. The results of these studies, however, provide no conclusive evidence that the valuation allowance is systematically used for earnings management (see Graham et al. 2011, for a survey on these studies). Besides, this research suggests that the valuation allowance is generally set in accordance with the criteria and guidelines provided by SFAS No. 109.[97] Specifically, the underlying deductible temporary differences (total deferred tax assets and net operating loss carryforwards), deferred tax liabilities, and past and current firm performance (EPS, ROA) are significantly related to (changes in) the valuation allowance and the amount of recognized deferred tax assets. Future performance indicators like market-to-book ratio, realized future ROA, or

[96] According to ASC 740 (formerly SFAS No. 109), deferred tax assets are in a first step recognized in full, i.e., for all deductible temporary differences, tax loss and tax credit carryforwards. In a second step, a valuation allowance is established against this account, reducing the full deferred tax asset to the amount that is "*more likely than not*" to be realized by subsuming the portion of the deferred tax asset that is "*more likely than not*" not to be realized. The subjectivity in the determination of the valuation allowance, combined with the fact that changes in the valuation allowance generally flow directly through income tax expense, suggest that it may be an attractive account for managing earnings.

[97] Guidelines provided by ASC 740 are very similar to the guidelines given by IAS 12.

analysts' EPS forecasts are largely insignificant, though (see also Behn et al. 1998 and Miller and Skinner 1998).

This, by contrast, is the first study trying to capture the general subjective influence determining the recognized amount of deferred tax assets apart from situational incentives for earnings management. Therefore, we extend possible determinants of recognized deferred tax assets beyond the criteria provided by the accounting standard IAS 12 and earnings management incentives. Specifically, we control for corporate governance attributes, like executive compensation schemes and ownership, as well as for the overall transparency and quality of the firm's financial statements, in order to differentiate between different types of managers and their differing incentives, which possibly systematically affect the discretion exercised. Hence, we relate recognized amounts of deferred tax assets for tax loss carryforwards to four types of variables – variables controlling for the guidelines provided by IAS 12.36, earnings management variables, corporate governance variables, and transparency indicators – obtaining the following regression model:[98]

$$(1) \quad DTA\_TLC_{it} = \beta_0 + \sum \beta * IAS\text{-}12\text{-}criteria + \sum \beta * EM + \sum \beta * CG + \sum \beta * Transparency + \varepsilon_{it}$$

$$(2) \quad DTA\_TLC_{it} = \beta_0 + \beta_1 * DTL_{it} + \beta_2 * EBT_{it} + \beta_3 * loss\_history_{it} + \beta_4 * MtB_{it} + \beta_5 * FEPS_{it} + \beta_6 * GAAP\_ETR_{it} + \beta_7 * EM_{it} + \beta_8 * Bonus\_perc_{it} + \beta_9 * Share\_perc_{it} + \beta_{10} * Block\_Fam_{it} + \beta_{11} * IR\_Score_{it} + \beta_{12} * Aud\_Deloitte_{it} + \beta_{13} * Aud\_E\&Y_{it} + \beta_{14} * Aud\_PwC_{it} + \beta_{15} * Aud\_other_{it} + \varepsilon_{it}$$

Detailed variable definitions are given in Table IV.1.

[98] Industry- and year-fixed effects are not included in the model since these are insignificant and their inclusion does not affect the results.

Table IV.1 – Variable Definitions

DTA_TLC	recognized deferred tax assets for tax loss carryforwards divided by the total amount of tax loss carryforwards (hand-collected form notes to financial statements)
recTLC_TLC	recognized amount of tax loss carryforwards divided by the total amount of tax loss carryforwards (hand-collected form notes to financial statements)
DTL	deferred tax liabilities per share (hand-collected form notes to financial statements)
EBT	earnings before taxes (01401) per share
loss_history	= 1 if EBT < 0 in the current or previous fiscal year; = 0 otherwise
MtB	market-to-book ratio (market value of equity/book value of equity (03501))
FEPS	median one-year-ahead analysts' EPS forecast (I/B/E/S) (fyr1)
GAAP_ETR	= current tax expense (18186 + 18187) / earnings before taxes (01401). Observations with earnings before taxes < 0 are omitted.
EM	= 1 if per-share earnings before current change in deferred tax assets for tax loss carryforwards below median analysts' EPS forecast and actual EPS larger than median analysts' EPS forecast; = 0 otherwise
Bonus_perc	percent of bonus compensation in overall executive's compensation package (hand-collected from financial statements)
Share_perc	percent of share-based compensation in overall executive's compensation package (hand-collected from financial statements)
Block_Fam	= 1 if founding-family holds equal or more than 25 percent of shares; = 0 otherwise (hand-collected from Hoppenstedt AG / annual reports)
IR_Score	independent disclosure score (scaled from 0 to 1) extracted from the yearly annual report contest "Deutsche Investor Relations Preis" of the German business magazine *Capital*. The contest is conducted in collaboration with the *German Society of Investment Professionals* (DVFA) and evaluates the quality of a firm's investor relations.
Aud_Deloitte	= 1 if auditor is Deloitte; = 0 otherwise.
Aud_E&Y	= 1 if auditor is Ernst&Young; = 0 otherwise.
Aud_KPMG	= 1 if auditor is KPMG; = 0 otherwise.
Aud_PwC	= 1 if auditor is PwC; = 0 otherwise.
Aud_other	= 1 if auditor is not a Big4; = 0 otherwise.
VA_discl	= 1 if a valuation allowance is disclosed in income tax notes (hand-collected form notes to financial statements); = 0 otherwise
TLC_discl	= 1 if the total amount of tax loss carryforwards is disclosed in income tax notes (hand-collected form notes to financial statements); = 0 otherwise
unrecTLC_discl	= 1 if the amount of unrecognized tax loss carryforwards is disclosed in income tax notes (hand-collected form notes to financial statements); = 0 otherwise
USGAAP	= 1 if firm prepared financial statements in accordance with US GAAP before 2005; = 0 otherwise
lnMV	natural logarithm of market value
lev	total debt (03255) divided by total assets (02999)

Numbers in parentheses refer to Worldscope item numbers.

DTA_TLC denotes recognized deferred tax assets for tax loss carryforwards relative to the total amount of tax loss carryforwards. We focus on deferred tax assets for tax loss carryforwards (hereafter DTA for TLC) for several reasons. First, DTA for TLC constitute an excellent case to analyze systematic discretion exercised on a regular basis,[99] which is possibly incentivized by certain corporate governance attributes. Following Frank and Rego (2006), exercised discretion can be identified by determining the non-discretionary amount of DTA for TLC using the guidelines provided by IAS 12.36 and attributing residual amounts to subjectivity and discretion. Second, since changes in the underlying differences constitute the main determinant of changes in deferred tax accounts (92.51 percent of the variation in DTA for TLC is explained by variation in the underlying tax loss carryforwards alone), it is crucial to control for the underlying differences or, alternatively, to know recognized versus unrecognized amounts. The component DTA for TLC offers the advantage over total DTA that the underlying book-tax difference, i.e., the total amount of tax loss carryforwards, is disclosed and can therefore be controlled for.[100] The underlying differences for the total DTA account, by contrast, are hardly determinable, and unrecognized amounts in form of a valuation allowance are only scarcely disclosed.[101] Besides, DTA for TLC constitute the major part of unrecognized deferred tax benefits,[102] so that effects regarding DTA for TLC recognition should represent main recognition effects.

The first six explanatory variables control for the recognition criteria provided by IAS 12.36. According to IAS 12.36, a firm should consider (1) the reversal of deferred tax liabilities, (2) expected future taxable profit, (3) the sources of the unused tax losses, and (4) tax planning opportunities to assess the probably realizable amount of unused tax loss carryforwards. Since it is hardly possible to control for criterion (3) based on only publicly available data, we address only criteria (1), (2), and (4). Hence, we relate the recognized amount of DTA for TLC to the amount of deferred tax liabilities (*DTL*), and control for management's expectations of future taxable income by resorting to persistence in current profitability (*EBT*), median one-year-ahead I/B/E/S analysts' EPS forecast (*FEPS*), and market's growth expectations as captured by the market-to-book ratio (*MtB*). All four variables should be positively related to the realization probability of future tax benefits and,

[99] This is opposed to discretion exercised for earnings management purposes, for example, which is not exercised on a regular basis, but dependently on a certain situation, e.g., missing the analysts' forecast.
[100] This is done in our model by deflating the dependent variable, DTA for TLC, by the total amount of tax loss carryforwards.
[101] A valuation allowance is disclosed for only 27.52 percent of the observations in our sample. The total amount of tax loss carryforwards, however, is available for 51.28 percent of the observations.
[102] See Miller and Skinner (1998) as well as Section 3.

therefore, should be positively related to the recognized amount of tax loss carryforwards. A history of recent losses, however, might indicate future losses, thereby implying that (sufficient) future taxable profit may not be available (IAS 12.35). Thus, we include a dummy variable taking a value of 1 if the firm reports a pre-tax loss (EBT < 0) for the current or previous fiscal year and expect a negative coefficient sign.

Since overall tax planners, i.e., firms with a low effective tax rate, should rather be able to use tax planning strategies to utilize otherwise unused tax losses, we use GAAP ETR, defined as current tax expense divided by pre-tax income, to measure availability of tax planning strategies, and expect a negative relation.[103]

We control for earnings management incentives by including the indicator variable *EM* that takes a value of 1 if the annual increase in DTA for TLC allows the firm to meet/beat the otherwise missed median EPS analyst forecast. We focus on the incentive to meet/beat analysts' forecasts because prior research on earnings management via the valuation allowance provides only for this earnings management incentive consistent evidence (Graham et al. 2011). If firms use DTA for TLC to meet/beat analysts' forecasts, *EM* should show a positive coefficient sign.

We additionally include corporate governance and transparency variables to control for differing management types, on the one hand, and for the overall disclosure practice of the firm, on the other hand. With respect to corporate governance, we use executive compensation to differentiate between different types of managers and their respective incentives as they are set by different compensation packages.[104] Regarding manager remuneration, we differentiate between three components of typical compensation packages: fixed salary, performance-related bonus, and equity-based incentive components (e.g., stock options). Setting "fixed salary" as reference, *Bonus_perc* (*Share_perc*) denotes the percentage of bonus compensation (equity-based compensation) relative to the executive's total annual compensation.

The following hypotheses generally rest on the proposition that, within the scope of the guidelines provided by IAS 12.36, managers have an incentive to recognize rather more deferred tax assets than less, i.e., to recognize overoptimistically. This proposition comes from two reasons. First, a higher recognition ratio should be a positive signal to providers of capital by implying a higher utilizable tax benefit (and thus *c.p.* lower tax payments) and

[103] We use current rather than total tax expense for GAAP ETR computation to exclude the effect of deferred taxes. Moreover, we prefer GAAP ETR over CASH ETR (this is, cash taxes paid divided by pre-tax income less special items; see Dyreng et al. 2008) to exclude the effect of tax loss carryforwards on ETR.
[104] See Jensen (2000) for effects of different forms of compensation on manager incentives.

more positive future performance expectations. Second, recognition of DTA results in deferred tax benefit which increases net income in the fiscal year of recognition. Hence, managers have incentives to recognize rather more deferred tax assets than less.

Jensen (2000) refers, inter alia, to two sources of conflicts between managers and owners that can be mitigated by compensation plans: (1) choice of effort (additional effort increases firm value, but is bad to managers) and (2) differential horizons (manager's claims are limited to their tenure in the firm, whereas stockholders' claim is indefinite). Accounting-based performance measures (e.g., bonus plans) allow a disaggregation of the firm's total performance among divisions, thereby associating the managers' compensation directly to an accounting metric of the respective change in firm value. This leads to a reduction of agency costs resulting from the conflicts over effort and horizon. This alignment of interests might result in managers feeling more responsible for performance and less likely to recognize DTA overoptimistically. Therefore, we expect a negative relation between *DTA_TLC* and *Bonus_perc*.

An increasing ratio of recognized DTA for TLC might affect a firm's market value positively, since it implies a higher amount of realizable future tax benefits and signals positive future firm performance expectations on the part of the management (Ayers 1998, Amir and Sougiannis 1999, Kumar and Visvanathan 2003, Gordon and Joos 2004, Herbohn et al. 2010). In such a case, a higher percentage of equity-based compensation in a manager's compensation package should increase his/her incentive to recognize overoptimistically. Thus, we expect a positive relation between *DTA_TLC* and *Share_perc*.

Furthermore, we use the existence of blockholders to differentiate between firms with different ways and objectives of entrepreneurship, thus setting different incentives for recognition and disclosure. Large investors have a big enough stake in the firm that it pays for them to spend private resources to monitor management. Moreover, their voting power enables them to put pressure on managers, such that managers are likely to be replaced soon if they repeatedly act against the wishes of the large investor (Shleifer and Vishny 1986). Since different types of blockholders are likely to have different incentives and expertise, managers are confronted with different objectives depending on the main owner of the firm. Therefore, we include a dummy variable (*Block_Fam*) that takes a value of 1 if the founding family holds a share in the firm of at least 25 percent, and 0 otherwise. [105] The threshold is set equal

[105] Founding family is the largest blockholder group in our sample with 22.96 percent of the observations. Other large blockholder groups are financial institutions and corporations. 52 percent of the observations record no block ownership, i.e., no single shareholder holding a share of more than or equal to 25 percent.

to 25 percent because a blocking minority requires a share of 25 percent, according to the German Stock Corporation Act (AktG), allowing to block all significant decisions and resolutions.

We focus on family blockholders because these investors typically pursue interests in line with long-term family commitment. Furthermore, firms with a family blockholder are associated with more effective monitoring and better knowledge of the firms' business, leading to lower agency cost on the firm-level. Thus, their earnings might be less likely to be affected by managerial opportunistic behavior (e.g., signaling overoptimistic numbers). Consistent with this notion, Ali et al. (2007) provide empirical evidence that family firms report better quality earnings. We therefore expect a negative relation.

In addition, we control for the overall transparency and quality of the firm's financial statements by including a disclosure measure of financial transparency (*IR_Score*) that is akin to the rating by the *Association of Investment Management and Research* (AIMR). The score is extracted from the yearly annual report contest *Deutsche Investor Relations Preis* (German Investor Relations Award) of the German business magazine *Capital*. In collaboration with the *German Society of Investment Professionals* (DVFA), *Capital* evaluates the quality of a firm's investor relations by surveying financial analysts and institutional investors of German and other European banks – an essential target group of corporate disclosure – across four dimensions:

(1) Target group orientation: Pro-activity of information provision by the board to financial analysts and institutional investors.
(2) Transparency: Provision of relevant information in appropriate form and frequency.
(3) Track record: Provided reports are sufficiently up-to-date, continuous, and precise to allow a high level of quality forecast.
(4) Extra financial reporting: Reports of non-financial information on corporate governance, social and environmental assets, etc.

Based on these four dimensions, a total summary score (ranging from 0 to 500) is constructed for every firm listed in *DAX30*, *MDAX*, *TecDAX*, *SDAX*, and *Dow Jones Euro STOXX 50*.[106] We divide the original score by 500 to obtain values between 0 and 1, which allows a more intuitive interpretation of the empirical results. Since greater transparency of financial information facilitates monitoring of managements' actions, thereby setting

[106] Daske (2005) and Noelte (2008), for instance, use this summary score in a German capital market context to measure reporting quality. They find statistically significant effects of this metric on the properties of financial analysts' earnings forecasts and cost of capital, respectively.

constraints on management's opportunistic behavior (e.g., too optimistic recognition), we expect a negative relation.

Besides, recognition might be influenced by auditor, since each audit firm has its own guidelines, possibly putting different emphasis on specific recognition criteria. Therefore, we differentiate between the individual Big4 audit firms (*Aud_Deloitte*, *Aud_E&Y*, *Aud_KPMG*, and *Aud_PwC*) and non-Big4 audit firms (*Aud_other*).[107] We do not make any prediction about the direction of possible differences between the Big4. Since larger audit firms have client-specific quasi-rents that they try to secure (DeAngelo, 1981), the Big4 auditors are supposed to practice higher quality audits, so that it might be easier for firms audited by a non-Big4 firm to recognize overoptimistically. Therefore, we hypothesize a negative relation for non-Big4 audit firms (*Aud_other*) and *DTA_TLC*.

[107] KPMG is chosen as reference auditor and, therefore, *Aud_KPMG* is omitted in the regression model.

3. Data and Sample

Since information on corporate governance, transparency, auditor, deferred taxes, and tax loss carryforwards is not available in databases, we resorted to hand-collect this information. Specifically, information on governance, auditor, deferred taxes, and tax loss carryforwards is extracted from the firms' annual reports, while our transparency score, *IR_Score*, is collected from the German business magazine *Capital*. All other data are taken from Thomson's Worldscope database.

Yet, our data requirements restrict our sample. For one thing, *IR_Score* covers only firms listed in the indices *DAX30*, *MDAX*, *TecDAX, SDAX*, and *Dow Jones Euro STOXX 50*. For another thing, disclosure of individual board members' compensation packages is mandatory in Germany since 2006. Thus, to ensure consistent blockholder regulation as well as compensation disclosure rules, our initial sample comprises all firms listed in the German stock market indices *DAX30*, *MDAX*, *TecDAX*, or *SDAX* over fiscal years 2006 to 2009, all in all 187 firms and 600 firm-year observations.[108] Nine firms (15 observations) are excluded from the sample due to either income tax-exempt operations or financial statements being not available in €uro. For additional 15 observations, there information on DTA for TLC is missing. This leaves the sample with 575 firm-year observations.

Disclosures concerning the unrecognized amount of deferred tax assets are quite heterogeneous across firms. This is because, in contrast to ASC 740 (formerly SFAS No. 109), IAS 12 does not require to disclose the unrecognized amount of deferred tax assets in form of a valuation allowance.[109] Instead, IAS 12.81(e) instructs to disclose the underlying differences of the unrecognized amounts, i.e., "*the amount (and expiry date, if any) of deductible temporary differences, unused tax losses, and unused tax credits for which no deferred tax asset is recognized in the statement of financial position*." Combined with the fact that major parts of unrecognized deferred tax assets usually arise from unused tax loss carryforwards,[110] this results in firms disclosing either a valuation allowance analogue to ASC

[108] *DAX30*, *MDAX*, *TecDAX*, and *SDAX* indices comprise the shares of the largest corporations in terms of order book volume and free float market capitalization listed on *FWB Frankfurter Wertpapierbörse* (Frankfurt Stock Exchange).

[109] The IASB plans to make establishment and disclosure of a valuation allowance mandatory, similar to ASC 740 (see IASB exposure draft ED/2009/2, becoming effective at January 1, 2012). This amendment will enhance comparability and information content of income tax disclosures under IFRS considerably.

[110] We can relate the amount of unrecognized DTA for TLC to the total amount of unrecognized DTA for 78 observations. We find that for 80 percent of these 78 observations the valuation allowance comprises to at least 75 percent of unrecognized DTA for TLC. For 49 percent, the valuation allowance is established exclusively for DTA for TLC, i.e., consists to 100 percent of unrecognized DTA for TLC.

740, the amount of unrecognized unused tax loss carryforwards, the total amount of unused tax loss carryforwards, or a mixture of these values.

The descriptive statistics on disclosure behavior illustrate the heterogeneity. While a valuation allowance, i.e., the total amount of unrecognized DTA, is only disclosed for 27.52 percent of the observations in our sample, the total amount of tax loss carryforwards is disclosed for 51.28 percent, and the amount of tax loss carryforwards for which no deferred tax asset is recognized is disclosed for 72.14 percent of the sample's observations (see Table IV.2 Panel A). For 43.93 percent (7.01 percent) of the observations, two of these (all three) items are disclosed. As a consequence of this heterogeneous disclosure practice, our dependent variable (DTA for TLC relative to the total amount of tax loss carryforwards) is only available for 259 observations.[111] Missing data of the model's independent variables lead to a final sample of 238 firm-year observations (across 80 firms) for the main regression analysis.[112]

Table IV.2 – Descriptive Statistics

Panel A: Disclosure According to Auditor

	Disclosure of		
	valuation allowance	**unrecognized tax loss carryforwards**	**total tax loss carryforwards**
Deloitte	36.21	77.59	31.03
Ernst & Young	25.56	77.78	51.11
KPMG	39.23	67.96	65.19
PwC	20.13	81.21	43.62
Other	13.11	51.64	43.44
Total	27.52	72.14	51.28

Percent of observations for which a valuation allowance, the amount of unused tax loss carryforwards for which no deferred tax asset is recognized, and the total amount of unused tax loss carryforwards, respectively, is disclosed in the notes to financial statements.

[111] DTA for TLC are disclosed for 529 observations since disclosure of material DTA for TLC is mandatory according to IAS 12.81(g). The total amount of tax loss carryforwards, in contrast, is only disclosed for 259 of these observations.

[112] Potential outliers do not affect the results. Dropping the 1st and 99th percentile of the main variables or observations with an absolute value of the R-student statistic of larger than the common critical value of 3 does not lead to substantially different results.

Table IV.2 – Descriptive Statistics (continued)

Panel B: Analysis of Disclosure of Valuation Allowances and/or Tax Loss Carryforwards

	Obs.	Mean	Median	Std. Dev.	Min.	Max.
VA_discl	575	0.2783	0	0.4485	0	1
TLC_discl	575	0.5113	1	0.5003	0	1
unrecTLC_discl	575	0.7235	1	0.4477	0	1
USGAAP	575	0.2122	0	0.4092	0	1
Share_perc	575	0.1066	0	0.1552	0	0.7045
Block_Fam	575	0.2296	0	0.4209	0	1
IR_Score	575	0.5964	0.6140	0.1460	0.0458	0.9022
Aud_Deloitte	575	0.1009	0	0.3014	0	1
Aud_E&Y	575	0.1635	0	0.3701	0	1
Aud_KPMG	575	0.3200	0	0.4669	0	1
Aud_PwC	575	0.2643	0	0.4414	0	1
Aud_other	575	0.1652	0	0.3717	0	1
lnMV	575	7.2810	7.0469	1.6884	2.740.195	1.1521
lev	575	0.7516	0.7919	0.1944	0	0.8785

See Table IV.1 for variable definitions. Means of the auditor variables (*Aud_*) sum up to more than 1 because some firms are audited by more than one audit firm.

Panel C: Analysis of Determinants of DTA for TLC

	Obs.	Mean	Median	Std. Dev.	Min.	Max.
DTA_TLC	238	0.1259	0.1078	0.1003	0	0.5156
DTL	238	17.1064	0.7826	67.1013	0	825.5714
EBT	238	6.7062	0.9988	21.4543	-61.0795	175.6053
loss_history	238	0.1933	0	0.3957	0	1
MtB	238	2.3000	1.9000	1.7000	-0.4000	11.4000
FEPS	238	2.3734	1.5100	3.1688	-3.7300	18.5100
EM	238	0.0252	0	0.1571	0	1
Bonus_perc	238	0.4251	0.4307	0.2042	0	0.8080
Share_perc	238	0.0836	0	0.1373	0	0.6107
Block_Fam	238	0.2059	0	0.4052	0	1
IR_Score	238	0.5737	0.5853	0.1445	0.0458	0.8666
Aud_Deloitte	238	0.0588	0.0000	0.2358	0	1
Aud_E&Y	238	0.1639	0	0.3709	0	1
Aud_KPMG	238	0.3908	0	0.4889	0	1
Aud_PwC	238	0.2437	0	0.4302	0	1
Aud_other	238	0.1765	0	0.3820	0	1
recTLC_TLC	176	0.4421	0.4424	0.3118	0	0.9947
GAAP_ETR	185	0.2378	0	0.4269	0	1

See Table IV.1 for variable definitions. Means of the auditor variables (*Aud_*) sum up to more than 1 because some firms are audited by more than one audit firm.

Table IV.2 – Descriptive Statistics (continued)

Panel D: Pairwise Pearson Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1:TLC_discl	1.00																							
2:VA_discl	**0.17**	1.00																						
3:DTA_TLC	**0.12**	-	1.00																					
4:recTLC_TLC	0.07	-	**0.82**	1.00																				
5:unrecTLC_discl	**-0.34**	-0.05	0.01	-	1.00																			
6:USGAAP	**0.31**	**0.19**	0.03	0.05	**-0.15**	1.00																		
7:IR_Score	**0.12**	-0.05	**0.24**	**0.20**	-0.06	**0.13**	1.00																	
8:Bonus_perc	-0.01	**0.07**	0.04	0.10	**0.09**	-0.05	**0.24**	1.00																
9:Share_perc	0.01	-0.05	0.05	0.01	0.01	**0.09**	**0.12**	**-0.29**	1.00															
10:Block_Fam	-0.04	-0.04	-0.09	-0.06	0.00	0.06	**0.10**	**0.14**	**-0.09**	1.00														
11:Aud_Deloitte	0.06	**-0.13**	-0.07	0.01	0.04	-0.03	**-0.09**	-0.06	0.01	**-0.07**	1.00													
12:Aud_E&Y	0.05	0.02	0.03	0.00	0.04	**0.14**	-0.06	-0.09	-0.05	0.06	**-0.15**	1.00												
13:aud_KPMG	**0.20**	**0.20**	-0.07	**-0.21**	**-0.09**	**0.20**	**0.15**	0.03	**0.20**	0.00	**-0.23**	**-0.26**	1.00											
14:Aud_PwC	**-0.09**	**-0.08**	**0.13**	**0.26**	**0.11**	**-0.21**	**-0.06**	-0.04	-0.03	**-0.16**	**-0.20**	**-0.22**	**-0.41**	1.00										
15:Aud_other	**-0.19**	-0.03	0.07	-0.02	**-0.10**	**-0.14**	0.01	0.05	**-0.20**	**0.18**	**-0.19**	**-0.20**	**-0.31**	**-0.27**	1.00									
16:lnMV	**0.23**	-0.01	**0.32**	**0.22**	0.05	**0.09**	**0.36**	**0.24**	**0.28**	-0.06	**-0.09**	**-0.09**	**0.32**	**0.09**	**-0.27**	1.00								
17:lev	0.00	-0.06	0.00	**0.13**	-0.05	**-0.20**	**-0.20**	-0.02	**-0.08**	-0.05	-0.03	-0.01	-0.01	-0.03	0.07	**-0.08**	1.00							
18:DTL	**0.18**	0.02	**0.30**	**0.20**	0.01	0.03	0.03	**0.12**	0.04	-0.06	**-0.09**	-0.01	**0.10**	**0.15**	**-0.13**	**0.49**	**0.12**	1.00						
19:MtB	**-0.09**	-0.01	0.04	**0.12**	0.07	**0.09**	**0.19**	**0.11**	**0.07**	**0.12**	0.03	0.04	-0.03	**-0.09**	**0.07**	**0.09**	**-0.27**	**-0.14**	1.00					
20:EBT	**0.13**	-0.01	**0.33**	**0.26**	0.06	0.04	**0.17**	**0.30**	**0.11**	-0.03	-0.04	-0.06	**0.12**	**0.05**	**-0.14**	**0.53**	0.01	**0.57**	0.01	1.00				
21:loss_history	0.07	-0.04	**-0.23**	**-0.30**	0.03	0.03	**-0.36**	**-0.39**	0.03	**-0.13**	0.03	0.05	0.01	0.02	**-0.10**	**-0.39**	**0.15**	-0.03	**-0.19**	**-0.27**	1.00			
22:FEPS	**0.07**	-0.03	0.10	0.08	**-0.08**	**-0.07**	**0.15**	**0.15**	**0.13**	-0.05	-0.05	**-0.09**	**0.15**	0.05	**-0.14**	**0.38**	**-0.13**	**0.29**	**-0.09**	**0.31**	**-0.13**	1.00		
23:GAAP_ETR	0.00	0.08	0.03	0.01	**0.09**	0.04	**-0.02**	-0.01	0.04	**0.16**	0.02	-0.04	0.04	0.00	-0.05	0.03	0.00	**0.12**	0.03	-0.01	-0.03	0.07	1.00	
24:EM	0.03	0.01	-0.01	0.02	0.06	-0.01	**-0.01**	0.01	0.01	-0.02	-0.05	0.01	0.07	0.00	-0.06	0.03	**0.12**	**0.09**	**0.11**	-0.05	**0.12**	0.01	0.04	1.00

Pearson correlation coefficients are presented. Correlation coefficients that are significant at 0.1 level are presented in **bold** face. See Table IV.1 for variable definitions.

4. Analysis of Disclosure

In order to investigate to what extent disclosing firms differ from non-disclosing firms, i.e., to what extent firms included in our main analysis differ from firms that drop out of the sample because of missing disclosure,[113] we investigate in a first step the determinants of disclosure using the following models:

(3) $$VA\_discl_{it} = \beta_0 + \beta_1 * unrecTLC\_discl_{it} + \beta_2 * TLC\_discl_{it} + \beta_3 * USGAAP_{it} + \beta_4 * Share\_perc_{it} + \beta_5 * Block\_Fam_{it} + \beta_6 * IR\_Score_{it} + \beta_7 * Aud\_Deloitte_{it} + \beta_8 * Aud\_E\&Y_{it} + \beta_9 * Aud\_PwC_{it} + \beta_{10} * Aud\_other_{it} + \beta_{11} * lnMV_{it} + \beta_{12} * lev_{it} + \sum \delta_k * Ind\_k_i + \varepsilon_{it}$$

(4) $$TLC\_discl_{it} = \beta_0 + \beta_1 * unrecTLC\_discl_{it} + \beta_2 * TLC\_discl_{it} + \beta_3 * USGAAP_{it} + \beta_4 * Share\_perc_{it} + \beta_5 * Block\_Fam_{it} + \beta_6 * IR\_Score_{it} + + \beta_7 * Aud\_Deloitte_{it} + \beta_8 * Aud\_E\&Y_{it} + \beta_9 * Aud\_PwC_{it} + \beta_{10} * Aud\_other_{it} + \beta_{11} * lnMV_{it} + \beta_{12} * lev_{it} + \sum \delta_k * Ind\_k_i + \varepsilon_{it}$$

See Table IV.1 for variable definitions.

The dependent variable *VA_discl* (*TLC_discl*) is an indicator variable taking a value of 1 if the valuation allowance (the total amount of tax loss carryforwards) is disclosed, and 0 otherwise. Indicator variables *unrecTLC_discl* and *TLC_discl* (*VA_discl*) are included, taking a value of 1 if the unrecognized amount and the total amount of tax loss carryforwards (the valuation allowance), respectively, is disclosed, and 0 otherwise. This is to observe whether there is a substituting relation (firms choose to disclose one of the three items to satisfy disclosure requirements) or a complementary relation between the three items.

Since fiscal year 2005, German firms are required to prepare their consolidated financial statements in accordance with IFRS. Before 2005, listed German firms were allowed to prepare their consolidated financial statements according to either US GAAP, IFRS, or German Commercial Code (HGB). Since, in contrast to IFRS, disclosure of the valuation allowance as well as of the total amount of tax loss carryforwards is mandatory under US

[113] This different disclosing behavior is not relevant for intra-firm comparison because disclosures are consistent over time within a firm. During our sample period, 18 (28) firms switched from non-disclosure to disclosure of the valuation allowance (the total amount of tax loss carryforwards), while virtually no firm switched from disclosure to non-disclosure. Yet, heterogeneous disclosure practice constrains inter-firm comparison. Therefore, we investigate in a first step the determinants of disclosure.

GAAP,[114] we expect that firms that prepared their financial statements according to US GAAP before 2005 (indicated by *USGAAP*) are also more likely to disclose a valuation allowance and the total amount of tax loss carryforwards in their financial statements prepared under IFRS.[115]

Research suggests that the market values valuation allowance and tax loss carryforwards negatively, since these are rather negative performance indicators.[116] Thus, managers with rather equity-based compensation might be more likely to refrain from disclosing the valuation allowance and the amount of tax loss carryforwards, respectively.

Wang (2006) and Ali et al. (2007) document, based on S&P 500-firms, that firms with a block ownership by the founding family are associated with a more transparent information environment, i.e., these firms have better financial reporting quality, larger analyst following, and smaller bid-ask spreads as compared to non-family firms.[117] Based on this evidence, we expect firms with a family blockholder to exhibit a higher likelihood of disclosing a valuation allowance and/or the total amount of tax loss carryforwards.

Since more transparent firms are supposed to disclose more information, we expect a positive coefficient of *IR_Score*. Moreover, we include auditor-fixed effects to investigate whether disclosure behavior is significantly influenced by auditor (internal guidelines, etc.).

Besides, we control for size, measured by the natural logarithm of market value (*lnMV*), and leverage (*lev*), which might influence disclosure. Concerning size, as there are firm-specific costs of corporate disclosure, including the preparation and dissemination of financial reports, fixed disclosure costs result in economies of scale and can make certain disclosures particularly burdensome for smaller firms (Leuz and Wysocki 2008). Consistent with this conjecture, Chow and Wang-Boren (1981) find that larger firms disclose more information. Therefore, we expect a positive relation between size (*lnMV*) and disclosure of a valuation allowance and/or the total amount of tax loss carryforwards. Concerning leverage,

[114] See ASC 740-10-50-2 and 50-3 (formerly SFAS No.109, para. 43 and 48).

[115] We also controlled for firms being cross-listed on a non-German stock exchange, potentially requiring preparation of additional financial statements in accordance with US GAAP. The cross-listing variable turns out to be insignificant as soon as the variable *USGAAP* is included in the model.

[116] Ayers (1998), Amir and Sougiannis (1999), and Kumar and Visvanathan (2003) find negative valuation coefficients and return effects of the valuation allowance under US GAAP, and Chludek (2011) reports a negative valuation coefficient for the total amount of tax loss carryforwards based on German data. Moreover, Legoria and Sellers (2005) report a significantly negative relation of the valuation allowance and future operating cash flow.

[117] Notably, prior research provides mixed evidence with respect to the reporting quality of family firms. Anderson et al. (2009), for example, find by contrast that the family firms among the top 2000 US industrial firms are less transparent than the non-family firms. Taken together, this research indicates systematic size differences (S&P 500 vs. 2000 US industrial firms). Consistently, Cheng et al. (2010) find that small family firms are more opaque than their non-family owned counterparts. Since our sample consists of the largest German firms in terms of market capitalization and order book volume, we refer to the results from Wang (2006) and Ali et al. (2007).

we predict a negative coefficient of *lev*, since increased leverage is expected to reduce overall corporate disclosure, because agency problems of debt are controlled through substitute channels (e.g., restrictive debt covenants) rather than increased disclosure of information in annual reports (Jensen 1986).

Since, furthermore, accounting conventions may be industry-specific due to a demand for intra-industry comparability by external financial statement users, we also include industry-fixed effects.

Panel B of Table IV.2 provides descriptive statistics on the variables used in the disclosure analysis. 21.22 percent of the sample firms prepared their consolidated financial statements in accordance with US GAAP before 2005. Regarding the governance variables, share-based compensation accounts, on average, for 10.66 percent of the total board compensation. In 22.96 percent of the cases, the founding family has a share in the firm of at least 25 percent. Mean firm size (financial leverage) is 7.2810 (0.7516) with a standard deviation of 1.6884 (0.1944). The average *IR_Score* is 0.5964 with a standard deviation of 0.1460.

The majority of the audits (83.48 percent) are handled by a Big4 auditor, which reflects the fact that our sample comprises of large firms. Regarding the Big4 auditors, KPMG provides almost one third of the audits in our sample, followed by PwC, Ernst & Young, and Deloitte.

Regarding auditor effects on disclosure, the descriptive statistics, displayed in Panel A of Table IV.2, reveal that KPMG provides overall the most extensive footnote information, followed by Ernst&Young, PwC, and Deloitte. Smaller audit firms provide the least footnote information. Nevertheless, there is no definitive auditor effect visible in descriptive statistics.

Marginal effects as obtained by probit estimation (see Table IV.3) show that disclosure of the valuation allowance substitutes for disclosure of the amount of unrecognized tax loss carryforwards, which is in line with IAS 12.81(e).[118] Moreover, as expected, disclosure is highly determined by whether the firm has once prepared financial statements in accordance with US GAAP. According to the estimation results, the likelihood to disclose a valuation allowance (the total amount of tax loss carryforwards) increases by 33.10 (23.83) percentage points if the firm prepared financial statements according to US GAAP before 2005. This finding provides some evidence on inter-temporal consistency in reporting even across accounting standards.

[118] Marginal effects based on the average firm are similar using logistic estimation. Coefficients are estimated in both cases, logistic and probit estimation, using maximum likelihood. While logistic estimation assumes a logistic distribution of error terms, probit estimation assumes that error terms are normally distributed.

Table IV.3 – Determinants of Disclosure

	predicted sign	VA_discl	TLC_discl
TLC_discl	?	0.1161 (1.63)	
VA_discl	?		0.1871* (1.74)
unrecTLC_discl	?	-0.3763*** (-4.82)	0.0423 (0.43)
USGAAP	+	0.3310*** (3.11)	0.2383* (1.91)
Share_perc	-	-0.4268** (-2.34)	-0.3968* (-1.81)
Block_Fam	+	-0.0219 (-0.28)	-0.0932 (-0.99)
IR_Score	+	0.1364 (0.62)	-0.3797* (1.69)
Aud_Deloitte		0.1773 (1.42)	-0.3820*** (-2.65)
Aud_E&Y		0.0100 (0.11)	-0.1283 (-1.05)
Aud_PwC		-0.0651 (-0.66)	-0.1996* (-1.77)
Aud_other	-	-0.1944* (-1.88)	-0.1582 (-1.20)
lnMV	+	0.0567** (2.43)	-0.0190 (-0.68)
lev	-	0.2224 (1.40)	-0.1673 (-0.78)
Pseudo-R^2		0.3242	0.1344
obs. / firms		575 / 177	575 / 177

***, **, and * indicate significance at 0.01, 0.05, and 0.1 level, respectively. Reported: marginal effects the variables (in the case of indicator variables, the effect of a change from 0 to 1) according to a probit estimation. z-statistics concerning the significance of the underlying probit estimation coefficients are reported in parentheses. *Aud_KPMG* is taken as reference auditor and therefore omitted. Industry-fixed effects are included, but estimated coefficients are not reported. See Table IV.1 for variable definitions.

Results suggest furthermore that share-based compensation (*Share_perc*) incentivizes not to disclose a valuation allowance, in line with a negative valuation effect of the valuation allowance. By contrast, the existence of family blockholders does not affect disclosure choice.[119]

In contrast to expectations, there is hardly any significant relation between the disclosure of the two items and overall transparency as measured by *IR_Score*. Regarding auditor effects, there is only a marginally significant effect of firms audited by a non-Big4 audit firm being less likely (by 19.44 percentage points) to disclose a valuation allowance. Moreover, firms audited by Deloitte or PwC tend to be less likely (by 38.20 and 19.96 percentage points, respectively) to disclose the total amount of tax loss carryforwards.

Besides, we find that larger firms are significantly more likely to disclose a valuation allowance, which is in line with prior research on the relation of firm size and disclosure behavior (see, for example, Chow and Wang-Boren, 1981, and Leuz and Wysocki, 2008). By contrast, leverage level does not affect the disclosure decision.[120] Moreover, there is hardly any systematic industry-effect on disclosure choice with only two of ten industry-fixed effects being significant (coefficient estimates are not reported).

The results with respect to disclosure of the total amount of tax loss carryforwards hence suggest that the sample used for the following analysis of determinants of deferred tax asset recognition is based on a subsample of firms with a relatively lower share of equity-based compensation in executives' compensation packages, lower transparency in terms of *IR_Score*, and higher alignment with US GAAP as compared to the average firm of the total sample. Overall, identified differences in disclosure versus non-disclosure firms are far more significant regarding valuation allowance disclosure.

[119] Other blockholder groups than founding family are also insignificant.
[120] Likewise, performance related variables like ROE, pre-tax loss, or market-to-book ratio are insignificant for the analyzed disclosure decisions. Furthermore, the amount of DTA for TLC (per share or relative to the total amount of DTA) is also insignificant for the disclosure decision.

5. Analysis of Determinants of Deferred Tax Assets for Tax Loss Carryforwards

5.1. Empirical Results

Panel C of Table IV.2 displays the descriptive statistics on the variables used in the analysis of the determinants of DTA for TLC. Firms capitalize on average 12.59 percent of their tax loss carryforwards (with a standard deviation of 0.1003 and a median of 10.78 percent). With regard to compensation packages, the descriptive statistics reveal that bonus-based compensation components exceed equity-based components considerably (42.51 percent versus 8.36 percent of total annual compensation) for the majority of executives. This reflects the emphasis on fixed and bonus-related compensation components in compensation packages, which is typical for the German context. 20.59 percent of this subsample's observations feature a block ownership by the founding family. Consistent with the regression results of the previous section on disclosure behavior, the subsample used for the following analysis shows lower means of *Share_perc*, *IR_Score*, *Aud_Deloitte*, and *Aud_PwC*.

Panel D of Table IV.2 presents Pearson correlation coefficients. In particular the guideline variables, as provided by IAS 12.36, show coefficient signs in the predicted directions. These univariate results with respect to the guideline variables are replicated in the multivariate results.

Estimation results are presented in Table IV.4. The results show that DTA for TLC are generally recognized in accordance with the guidelines provided by IAS 12.36. For one thing, the amount of taxable temporary differences (*DTL*) is positively related to the amount of recognized DTA for TLC. For another thing, current positive (negative) performance (*EBT*) results in *c.p.* more (less) recognized DTA for TLC consistent with persistence of earnings entering expectations of future taxable income. Particularly recent pre-tax losses (*loss_history*) affect the recognition of DTA significantly negatively in line with past losses dampening future performance expectations and requiring more conservative recognition (see also IAS 12.35).

Table IV.4 – Determinants of Deferred Tax Assets for Tax Loss Carryforwards

	predicted sign	(1)	(2)	(3)	(4)	(5)
DTL	+	0.0003* (1.71)		0.0003* (1.95)	0.0003** (2.02)	0.0001* (1.82)
EBT	+	0.0008 (1.53)		0.0008* (1.70)	0.0008* (1.81)	0.0012** (2.06)
loss_history	-	-0.0485*** (-2.72)		-0.0265 (-1.45)	-0.0399** (-2.15)	-0.0412 (-1.29)
MtB	+	0.1443 (0.03)		0.1597 (0.03)	-1.0759 (-0.21)	-2.9791 (-0.53)
FEPS	+	-0.0013 (-0.66)		-0.0002 (-0.12)	0.0002 (0.13)	-0.0017 (-0.91)
GAAP_ETR	-					0.0070 (0.35)
EM	+	0.0240 (1.01)		0.03712* (1.70)	0.0384* (1.92)	0.0522 (1.65)
Bonus_perc	-		-0.0070 (-0.18)		-0.0669* (-1.78)	-0.0682 (-1.38)
Share_perc	+		0.0201 (0.33)		-0.0075 (-0.13)	-0.0356 (-0.53)
Block_Fam	-		-0.0435*** (-2.80)		-0.0312** (-2.10)	-0.0318* (-1.92)
IR_Score	-		0.1744*** (3.10)	0.1181** (2.17)	0.1369*** (2.58)	0.1860*** (2.84)
Aud_Deloitte			0.0097 (0.24)	0.0177 (0.42)	0.0137 (0.33)	-0.0395 (-0.83)
Aud_E&Y			0.0328 (1.23)	0.0295 (1.16)	0.0274 (1.11)	0.0262 (0.95)
Aud_PwC			0.0487** (2.40)	0.0240 (1.33)	0.0274 (1.65)	0.0291 (1.58)
Aud_other	+		0.0585** (2.26)	0.0445 (1.62)	0.0512** (2.03)	0.0366 (1.15)
constant		0.1271*** (7.28)	0.0079 (0.23)	0.0371 (0.87)	0.0605 (1.50)	0.0437 (0.86)
adj. R^2		0.1300	0.0857	0.1560	0.1778	0.1524
obs. / firms		238 / 80	238 / 80	238 / 80	238 / 80	185 / 71

***, **, and * denote significance at 0.01, 0.5, and 0.1 level, respectively. t-statistics, based on Huber-White standard errors clustered at firm level, are reported in parentheses. Dependent variable is *DTA_TLC*. *Aud_KPMG* is taken as reference auditor and therefore omitted. See Table IV.1 for variable definitions.

While past as well as current performance are taken into account for determining the recognizable amount of DTA, future performance expectations as measured by analysts' one-year-ahead earnings forecasts (*FEPS*) and growth opportunities as represented by the market-to-book ratio (*MtB*) are insignificant.[121] Furthermore, the availability of tax planning strategies as indicated by *GAAP_ETR* is also not relevant for determining the probably utilizable amount of tax loss carryforwards (Model (5)).[122]

With respect to earnings management via DTA for TLC, we find some limited evidence that firms might tend to recognize more if this helps them to meet the analysts' EPS forecast.[123]

The estimation results show further that transparency as well as governance variables are significantly related to the recognized amount of DTA for TLC. Inclusion of these variables increases the explanatory power of the model as measured by adjusted R-squared from 0.1300 to 0.1778 (Model (4)). Thus, we can identify other significant factors, beyond IAS-12-guidelines and earnings management incentives, that influence the recognition decision.

In particular, firms with large shares of the firm held by the founding family (*Block_Fam*) tend to recognize a *c.p.* lower amount of DTA for TLC, in line with family firms setting less incentives to report overoptimistically and improved monitoring in family firms.

Evidence with respect to management remuneration is only modest, though. The insignificant coefficient of the share-based compensation component (*Share_perc*) suggests that managers do generally not assume DTA for TLC to be considered value-relevant by investors.[124] Using the percentage of equity-based to total annual compensation, though, assumes in a linear model context that the inducement to recognize overoptimistically increases in the share of equity-based compensation. If we relax this assumption and

[121] If we assume perfect foresight on the part of the management and, therefore, include one-year-ahead realized ROA, its coefficient estimate is also insignificant.

[122] Summing current tax expense over the four observation years and dividing by the sum of pre-tax income, by this means obtaining a smoothed measure of tax burden, also gives an insignificant coefficient estimate. Moreover, using an indicator variable instead, identifying firms with available tax planning strategies by using various thresholds, likewise results in insignificant coefficient estimates. Our insignificant findings are in line with Miller and Skinner (1998), who point out that tax planning opportunities are not likely to be important sources of generating taxable income for using otherwise unused tax loss carryforwards since such strategies are only limited in scope (see also ASC 740-10-30-18 through 30-19 and 740-10-55-39 through 55-48, formerly SFAS No. 109, para. 246-251). Consistently, Visvanathan (1998) reports that only very few firms acknowledge the use such strategies and even less show income effects of such strategies.

[123] Other earnings management incentives, like avoiding a loss or decline in earnings, are insignificant. Yet, our results with respect to earnings management have to be interpreted with caution. Due to the small sample size, only 2.52 percent of the observations meet the criterion to possibly shift their earnings from missing to meeting/beating the analyst forecast by the reported change in DTA for TLC and are therefore indicated as possible earnings manager.

[124] Consistently, Chludek (2011) shows that total DTA as well as DTA for TLC are not value-relevant for a similar sample.

hypothesize instead, by using an indicator variable, that the incentive to recognize overoptimistically in order to influence share price positively should be present as soon as the manager is compensated with at least one share, results are unchanged.

Bonus compensation (*Bonus_perc*) is only marginally related to the recognized amount of DTA for TLC. The coefficient estimate, however, shows the expected negative sign across all model specifications. The modest evidence on this variable might be attributable to the fact that bonus payments depend in many cases on pre-tax figures, thereby excluding the effect of changes in DTA for TLC (see Johnson 2010).

Transparency is highly significantly related to the disclosed amount of DTA for TLC. Yet, contrary to expectations, the coefficient estimate of our transparency score, *IR_Score*, is positive, i.e., firms with an overall higher transparency score tend to recognize *c.p.* more DTA for TLC. The unexpectedly positive coefficient might be due to correlated omitted variables, more transparent firms possible tending to be "better" firms, in the sense of having better and more persistent future performance prospects, therefore being able to recognize a higher amount of deferred tax benefits.[125]

As far as the role of auditors for differences in recognized amounts is concerned, there is some limited evidence that firms audited by smaller audit firms (*Aud_other*) and by PwC (*Aud_PwC*) are able to recognize higher amounts of DTA for TLC.

Overall, our significant findings give some insights into the financial reporting process, where not the accounting standard alone, but other factors such, as transparency as well as governance structures, shape the financial reporting outcome.

5.2. Sensitivity Analysis

5.2.1. Dependent Variable

To ensure that differences in expected tax rates, which are implicitly included in the ratio of recognized DTA for TLC relative to the total amount of tax loss carryforwards, do not drive the results, we replicate the analysis using the ratio of recognized tax loss carryforwards relative to the total amount of tax loss carryforwards (*recTLC_TLC*) as dependent variable (Model (1) in Table IV.5).[126] Results are generally confirmed. In particular, bonus compensation (*Bonus_perc*) and a family blockholder (*Block_Fam*), overall transparency

[125] Potential problems of correlated omitted variables are addressed in the following Section 5.2.2.

[126] Due to differences in disclosure (see above), this ratio is only computable for 199 observations. We eliminate 16 observations for which *recTL C_TLC* equals 1 because of lacking variation in the dependent variable for these observations. For additional 7 observations, other variable data are missing, so that the model estimation is based on 176 observations.

(*IR_Score*), and audit firm significantly affect the relative amount of recognized tax loss carryforwards.

5.2.2. Endogeneity

The empirical tests in the preceding section classify the transparency variable *IR_Score* as exogenously determined. Yet, there might arise a potential endogeneity problem (i.e., independent variables are correlated with the error term) due to two reasons. First, we cannot be sure of the direction of causality, since firms with higher *DTA_TLC* may opt for a higher transparency level. Second, *IR_Score* might be endogenously determined by a set of factors that have not been taken into account. In this case, endogeneity would come from uncontrolled confounding variables (omitted variable bias). In any case, if the assumption of exogeneity does not hold, the regression model is misspecified and leads to biased parameter estimates.

Following Hail (2002), we address the issue of potential endogeneity of *IR_Score* by employing linear instrumental variables regressions (2SLS), modelling in a first step a firm's transparency choice. This procedure will yield consistent and efficient coefficient estimates even in the presence of endogeneity. In the first-stage regression, a firm's transparency choice is analyzed by using the following model:

(5) $IR\_Score_{it} = \beta_0 + \beta_1 * lnMV_{it} + \beta_2 * ROA_{it} + \beta_3 * crosslist_{it} + \beta_4 * lev_{it} + \gamma_{it}$

We relate the transparency score *IR_Score* to size (*lnMV*), return on assets (*ROA*), leverage (*lev*), and cross-listing (*crosslist*) because these factors are supposed to mainly affect transparency according to prior literature (Jensen 1986, Leuz and Wysocki 2008). *lnMV* denotes the natural logarithm of market value and *lev* represents leverage. *ROA* equals the ratio of net income to total assets and *crosslist* is an indicator variable taking the value of 1 if the firm is cross-listed on a US stock exchange, and 0 otherwise. The explanatory power of this regression model is 30.20 percent (adjusted R-squared). Apart from *crosslist*, all coefficient estimates are significant at 7 percent level or better, and show the expected signs (not reported).

Table IV.5 – Sensitivity Analysis

	predicted sign	(1)	(2)
DTL	+	0.0003 (0.92)	0.0003*** (2.92)
EBT	+	0.0020 (1.49)	0.0007* (1.84)
loss_history	-	-0.1863** (-2.59)	-0.0197 (-0.78)
MtB	+	-0.7834 (-0.04)	-2.9704 (-0.56)
FEPS	+	0.0066 (0.47)	0.0004 (0.27)
EM	+	0.1927* (1.74)	0.0474** (1.97)
Bonus_perc	-	-0.2335* (-1.68)	-0.0916* (-1.91)
Share_perc	+	-0.1370 (-0.63)	-0.0377 (-0.63)
Block_Fam	-	-0.1214* (-1.85)	-0.0364** (-2.26)
IR_Score	-	0.4742** (2.44)	0.3496* (1.71)
Aud_Deloitte		0.3147*** (3.25)	0.0276 (0.54)
Aud_E&Y		0.0305 (0.35)	0.0318 (1.44)
Aud_PwC		0.1845** (2.52)	0.0328** (1.97)
Aud_other	+	-0.0610 (-0.70)	0.0592** (2.45)
constant		0.2358* (1.68)	-0.0514 (-0.48)
Hansen J Statistic (p-value)			4.631 (0.20)
adj. R^2		0.2337	0.1544
obs. / firms		176 / 61	238 / 80

***, **, and * denote significance at 0.01, 0.5, and 0.1 level, respectively. t-statistics, based on Huber-White standard errors clustered at firm level, are reported in parentheses. Dependent variable of Model (1) is *recTLC_TLC*. Dependent variable of Model (2) is *DTA_TLC*. The Sargan-Hansen test is a test of overidentifying restrictions, under the null hypothesis that the instruments satisfy the orthogonal condition, i.e., are uncorrelated with the error term. *Aud_KPMG* is taken as reference auditor and therefore omitted. See Table IV.1 for variable definitions.

In the second step, we re-estimate Model (4) (Table IV.4) replacing the original values of *IR_Score* by the fitted values obtained from the first-stage regression. The results of the 2SLS-estimation, presented in Table IV.5 Model (2), show that the association of *IR_Score* and *DTA_TLC* does not change qualitatively. The same applies to all other variables of interest, with the exception of *loss_history*, which loses its statistical significance.

The results of the Sargan-Hansen test, which examines the appropriateness of the instruments (i.e., whether they satisfy the orthogonal condition, thus being uncorrelated with the error term), shows that the validity of the selected instrumental variables cannot be rejected (Sargan-Hansen p-value is 0.20). Taken together, these findings provide some indication that the results regarding *IR_Score* are not attributable to endogeneity.

6. Summary and Conclusion

Using regression analysis, we examine in this paper the underlying factors of financial reporting outcome by focusing on deferred tax asset recognition and related disclosures under IAS 12. In a first step, we analyze the heterogeneity of income tax disclosures concerning unrecognized amounts of deferred tax assets under IFRS. According to the findings, the likelihood to disclose a valuation allowance and the total amount of tax loss carryforwards increases considerably if the firm prepared financial statements according to US GAAP before 2005. This finding documents inter-temporal consistency in reporting even across accounting standards. Besides, the results document that share-based compensation incentivizes not to disclose a valuation allowance, which is in line with a negative valuation effect of the valuation allowance (Kumar and Visvanathan, 2003). Regarding auditor effects, there is a marginally significant effect of firms audited by a non-Big4 audit firm being less likely to disclose a valuation allowance, while firms audited by Deloitte or PwC tend to be less likely to disclose the total amount of tax loss carryforwards.

In the second step, we identify possible determinants of recognized deferred tax assets beyond recognition criteria provided by accounting standards, namely governance and transparency variables. Our results document that, in line with the guidelines provided by IAS 12, firms take the amount of taxable temporary differences, past and current profitability into account when determining the probably utilizable amount of tax loss carryforwards. Regarding earnings management via DTA for TLC, we find some limited evidence that firms might tend to recognize more if this enables to meet the analysts' EPS forecast.

With regard to governance attributes, we find that firms with a block ownership by the founding family tend to recognize a *c.p.* lower amount of DTA for TLC. Furthermore, there is some evidence of compensation being systematically related to the recognized amount of DTA for TLC. Transparency is highly significantly related to the recognized amount of DTA for TLC. As far as the role of auditors is concerned, there is evidence that firms audited by smaller audit firms and PwC are able to recognize *c.p.* higher amounts of DTA for TLC, which corresponds to our previous results that these audit firms require less detailed disclosures.

Taken together, we can identify other significant factors, beyond IAS-12-guidelines and earnings management incentives, that influence the recognition decision of DTA. Hence, the results of this study provide some additional insights into the financial reporting process, where not the accounting standard alone, but other factors, such as transparency as well as governance structures, shape the financial reporting outcome.

However, our research has its limitations, and future avenues can be suggested. Since this study is based on firm's choices, the issues of self-selection and endogeneity are addressed by using instrumental variables (IV). Therefore, instrumental variables need to be identified that are correlated with the endogenous explanatory variables, but uncorrelated with the error in the structural equation. Unfortunately, these requirements are difficult to satisfy, since no well developed economic models exist that explain the determinants of corporate disclosure structures (Hermalin and Weisbach 2003).

A possibility for further investigation would be an exploration of the subjective factors (such as transparency and corporate governance) and whether they affect the credibility of the signal provided by the recognition ratio of DTA.

References

Ali, A., T.-Y. Chen, and S. Radkrishnan. 2007. Corporate disclosures by family firms. *Journal of Accounting and Economics*, 44 (1-2): 238-286.

Amir, E., M. Kirschenheiter, and K. Willard. 1997. The valuation of deferred taxes. *Contemporary Accounting Research*, 14 (4): 597–622.

Amir, E., and T. Sougiannis. 1999. Analysts' Interpretation and Investors' Valuation of Tax Carryforwards. *Contemporary Accounting Research* 16 (1): 1-33.

Anderson, R.C., A. Duru, and D.M. Reeb. 2009. Founders, heirs, and corporate opacity in the United States. *Journal of Financial Economics*, 92 (2): 205-222.

Arellano, M., and S. Bond. 1991. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies* 58 (2): 277-297.

Arellano, M., and O. Bover. 1995. Another look at the instrumental variables estimation of error-components models. *Journal of Econometrics* 68 (1): 29-51.

Ayers, B. C. 1998. Deferred tax accounting under SFAS No. 109: An empirical investigation of its incremental value-relevance relative to APB No. 11. *The Accounting Review* 73 (2): 195–212.

Ball, R., and **L.** Shivakumar. 2005. Earnings Quality in U.K. Private Firms. *Journal of Accounting and Economics*, 39 (1): 83-128.

Barth, M.E., W.H. Beaver, and W.R. Landsman. 1998. Relative valuation roles of equity book value and net income as a function of financial health. *Journal of Accounting and Economics* 25 (1): 1–34.

Bauman, C.C., M.P. Bauman, and R.F. Halsey. 2001. Do firms use the deferred tax asset valuation allowance to manage earnings? *Journal of the American Taxation Association*, 23 (Supplement): 27-48.

Beckman, J., C. Brandes, and B. Eierle. 2007. German reporting practices: An analysis of reconciliations from German Commercial Code to IFRS or U.S. GAAP. *Advances in International Accounting*, 20: 253–294.

Beechy, T.H. 2007. The Make-Believe World of Future Income Taxes. *Accounting Perspectives* 6 (3): 221-229.

Behn, B.K., T.V. Eaton, and J.R. Williams. 1998. The Determinants of the Deferred Tax Allowance Account Under SFAS No. 109. *Accounting Horizons* 12 (1): 63-78.

Blouin, J., and I. Tuna. 2009. Tax contingencies: Cushioning the blow to earnings? Working paper, University of Pennsylvania.

Blundell, R., and S. Bond. 1998. Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics* 87: 115-143.

Burgstahler, D.C., and I.D. Dichev. 1997. Earnings, adaptation and equity value. *The Accounting Review* 72 (2): 187–215.

Burgstahler, D., B.W. Elliott, and M. Hanlon. 2002. How Firms Avoid Losses: Evidence of Use of the Net Deferred Tax Asset Account. Working Paper SSRN.

Burgstahler, D., L. Hail, and C. Leuz. 2006. The Importance of Reporting Incentives: Earnings Management in European Private and Public Firms. *Accounting Review*, 81 (5): 983-1016.

Carnahan, I., and J. Novack, 03/04/2002. Two Birds, One Stone. *Forbes Magazine* 169 (5).

Chandra, U., and B.T. Ro. 1997. The association between deferred taxes and common stock risk. *Journal of Accounting and Public Policy* 16 (1): 6–13.

Chaney, P.K., and D.C. Jeter. 1989. Accounting for deferred income taxes: Simplicity? Usefulness? *Accounting Horizons* 3 (June): 6–13.

Chang, C., K. Herbohn, and I. Tutticci. 2009. Market's perception of deferred tax accruals. *Accounting and Finance* 49 (4): 645-673.

Chattopadhyay, S., F.J. Arcelus, and G. Srinivasan. 1997. Deferred Taxes and Bond Ratings: a Canadian Case. *Journal of Business Finance & Accounting* 24 (3&4): 541-557.

Chen, K.C.W., and M.P. Schoderbek. 2000. The 1993 Tax Rate Increase and Deferred Tax Adjustments: A Test of Functional Fixation. *Journal of Accounting Research* 38 (1): 23-44.

Chen, T.-Y., S. Dasgupta, and Y. Yu. 2010. Transparency and financing choices of family firms. Working Paper SSRN.

Cheung, J.K., G.V. Krishnan, and C. Min. 1997. Does Interperiod Income Tax Allocation Enhance Prediction of Cash Flows? *Accounting Horizons* 11 (4): 1-18.

Chludek, A.K. 2011. Perceived versus Actual Cash Flow Implications of Deferred Taxes – An Analysis of Value Relevance and Reversal under IFRS. *Journal of International Accounting Research* 10 (1): 1-25.

Chow, C.W., and A. Wong-Boren (1987): Voluntary financial disclosure by Mexican corporations. *The Accounting Review* **62** (3): 533-541.

Christensen, T., G.H. Paik, and E.K. Stice. 2008. Creating a bigger bath using the deferred tax valuation allowance. *Journal of Business Finance & Accounting* 35 (5&6): 601-625.

Citron, D.B. 2001. The Valuation of Deferred Taxation: Evidence from the UK Partial Provision Approach. *Journal of Business Finance & Accounting* 28 (7&8): 821-852.

Colley, R., J. Rue, and A. Volkan. 2009. Continuing Case Against Inter-Period Tax Allocation. *Journal of Business & Economics Research* 7 (6): 13-23.

Commission of the European Communities. 2007. Communication from the Commission on a simplified business environment for companies in the areas of company law, accounting and auditing. COM(2007) 394 final. Available at: http://ec.europa.eu/internal_market/company/docs/simplification/com2007_394_en.pdf.

Daske, H. 2005. *Adopting International Financial Reporting Standards in the European Union: Empirical Essays on Causes, Effects and Economic Consequences*. Frankfurt am Main.

DeAngelo, L.E. 1981. Auditor size and audit quality. *Journal of Accounting and Economics* 3 (3): 183-199.

Dyreng, S.D., M. Hanlon, and E.L. Maydew. 2008. Long-Run Coporate Tax Avoidance. *The Accounting Review* 83 (1): 61-82.

Dyreng, S.D., M. Hanlon, and E.L. Maydew. 2010. The Effects of Executives on Corporate Tax Avoidance. *The Accounting Review* 85 (4): 1163-1189.

Eierle, B., A. Haller, and K. Beiersdorf. 2007. *Final Report of the Survey on the ED-IFRS for SMEs among German SMEs*. Berlin, Germany: DRSC. Available at: http://www.standardsetter.de/drsc/docs/press_releases/071129FinalReport_SME.pdf.

Feltham, G. A., and J. A. Ohlson. 1995. Valuation and clean surplus accounting for operating and financial activities. *Contemporary Accounting Research* 11 (2): 689–731.

Frank, M.M., and S.O. Rego. 2006. Do Managers Use the Valuation Allowance Account to Manage Earnings Around Certain Earnings Targets? *Journal of the American Taxation Association* 28 (1): 43-65.

Frank, M.M. 2009. Discussion of Inferring U.S. Tax Liability from Financial Statement Information. *The Journal of the American Taxation Association* 31 (1): 65-74.

Gordon, E.A., and P.R. Joos. 2004. Unrecognized Deferred Taxes: Evidence from the U.K. *The Accounting Review* 79 (1): 97-124.

Graham, J.R., J. S. Raedy, and D.A. Shackelford. 2011. Research in Accounting for Income Taxes. Working Paper.

Greene, W.H., 2003. Econometric Analysis (5th ed). Prentice Hall, New Jersey.

Hail, L. 2002. The impact of voluntary corporate disclosure on the ex-ante cost of capital for swiss firms. *European Accounting Review* 11 (4): 741-773.

Hall, B.J., and J.B. Liebman. 2000. The Taxation of Executive Compensation. *Tax Policy and the Economy* 14. Cambridge, MA: MIT Press.

Haller, A., J.V. Löffelmann, K. Beiersdorf, M. Bolin, B. Etzel, and K. Haussmann. 2008. *Rechnungslegung aus Sicht von Kreditinstituten als Rechnungslegungsaddressaten—Empirische Ergebnisse und Implikationen für die Entwicklung der Nationalen und Internationalen Rechnungslegungsnormen für Mittelständische Unternehmen*. Berlin, Germany: DRSC.

Hanlon, M., and T. Shevlin. 2002. Accounting for Tax Benefits of Employee Stock Options and Implications for Research. *Accounting Horizons* 16 (1): 1-16.

Hanlon, M. 2003. What Can We Infer about a Firm's Taxable Income from Its Financial Statements? *National Tax Journal* 56 (4): 831-863.

Hayn, C. 1995. The information content of losses. *Journal of Accounting and Economics* 20: 125–153.

Huss, F.H., and J. Zhao. 1991. An investigation of alternative treatments of deferred taxes in bond raters' judgment. *Journal of Accounting, Auditing and Finance*: 53–73.

Herbohn, K., I. Tutticci, and P.S. Khor. 2010. Changes in Unrecognized Deferred Tax Accruals from Carry-Forward Losses: Earnings Management or Signalling? *Journal of Business Finance & Accounting* 37 (7&8): 763-791.

Hermalin, B.E., and M.S. Weisbach. 2003. Boards of Directors as an Endogenously Determined Institution: A Survey of the Economic Literature. *Economic Policy Review* 9 (1): 7–26.

Jensen, M.C. 1986. Agency costs of free cash flow, corporate finance, and takeovers. *American Economic Review* **76 (1):** 323-329.

Jensen, M.C. 2000. *A Theory of the Firm: Governance, Residual Claims, and Organizational Forms*. Harvard University Press: Cambridge.

Johnson, N.B. 2010. Residual Income Compensation Plans and Deferred Taxes. *Journal of Management Accounting Research* 22: 103-114.

Kumar, K.R., and G. Visvanathan. 2003. The Information Content of the Deferred Tax Valuation Allowance. *The Accounting Review* 78 (2): 471-490.

Legoria, J., and K.F. Sellers. 2005. The Analysis of SFAS No. 109's Usefulness in Predicting Future Cash Flows from a Conceptual Framework Perspective. *Research in Accounting Regulation* 18: 143-161.

Leuz, C. 2006. Cross Listing, Bonding and Firms' Reporting Incentives: A Discussion of Lang, Raedy and Wilson (2006). *Journal of Accounting and Economics* 42 (1-2): 285-299.

Leuz, C., and P.D. Wysocki. 2008. Economic Consequences of Financial Reporting and Disclosure Regulation: A Review and Suggestions for Future Research. Working Paper SSRN.

Lisowsky, P. 2009. Inferring U.S. Tax Liability from Financial Statement Information. *The Journal of the American Taxation Association* 31 (1): 29-63.

Lev, B., and D. Nissim. 2004. Taxable income, future earnings, and equity values. *The Accounting Review* 79 (4): 1039–1074.

Miller, G.S., and D.J. Skinner. 1998. Determinants of the valuation allowance for deferred tax assets under SFAS No. 109. *The Accounting Review* 73 (2): 213-233.

Mills, L., K. Newberry, and W. B. Trautman. 2002. Trends in book-tax income and balance sheet differences. *Tax Notes* 96 (19): 1109–1124.

Nickell, S. 1981. Biases in Dynamic Models with Fixed Effects. *Econometrica* 49 (6): 1417-1426.

Noelte, U. 2008. *Managementprognosen, Analystenschaetzungen und Eigenkapitalkosten: Empirische Analysen am deutschen Kapitalmarkt*. University of Bochum.

Ohlson, J.A. 1995. Earnings, book values, and dividends in equity valuation. *Contemporary Accounting Research* 11 (2): 661–687.

Plumlee, M. 2003. The effect of information complexity on analysts' use of that information. *The Accounting Review* 78 (1): 275–296.

Raedy, J. S., J. Seidman, and D.A. Shackelford. 2011. Is there Information Content in the Tax Footnote? Working Paper.

Rego, S.O. 2003. Tax-Avoidance Activities of U.S. Multinational Corporations. *Contemporary Accounting Research* 20 (4): 804-833.

Roodman, D. 2006. How to Do xtabond2: An Introduction to "Difference" and "System" GMM in Stata. Working Paper 103. Center for Global Development, Washington.

Schrand, Cathrine M. and Franco Wong (2003): Earnings management using the valuation allowance for deferred tax assets under SFAS No. 109, *Contemporary Accounting Research* 20 (3): 579-611.

Shleifer, A., and R.W. Vishny. 1986. Large Shareholders and Corporate Control. *The Journal of Political Economy* 94 (3): 461-488.

Stadler, C. 2010. Pension Accounting Choice in Germany: Pension Discount Rate and Actuarial Gains and Losses. Working Paper, University of London, School of Management.

Stocker, T. 2007. On the Asymptotic Bias of OLS in Dynamic Regression Models with Autocorrelated Errors. *Statistical Papers* 48 (1): 81-93.

Visvanathan, G. 1998. Deferred tax valuation allowances and earnings management. *Journal of Financial Statement Analysis* 3 (4): 6-15.

Wang, D. 2006. Founding family ownership and earnings quality. *Journal of Accounting Research* 44 (3): 619-656.

Weber, D. P. 2009. Do analysts and investors fully appreciate the implications of book-tax differences for future earnings? *Contemporary Accounting Research* 26 (4): 1175–1206.

Windmeijer, F. 2005. A finite sample correction for the variance of linear efficient two-step GMM estimators. *Journal of Econometrics* 126 (1): 25-51.

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