

# Income determination for corporate tax purposes using IFRS as a starting point: evidence for listed companies within Austria, Germany, and The Netherlands

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**Abstract** The internationalisation of financial accounting and the European Commission's ambition to harmonise corporate taxation have raised the question whether IFRS accounts could be used for tax purposes. In order to quantify the effects of an IFRS-based taxation on corporate tax burdens in different EU member states, we estimate firms' tax equity using notes on income taxes in IFRS financial statements of companies listed in Austria, Germany, and The Netherlands. The difference between estimated tax equity and IFRS-equity, adjusted for the effect resulting from the recognition of deferred taxes, shows the effect of using IFRS as a tax base on the present value of corporate taxes. We find that estimated tax equity is mostly lower than IFRS-equity, indicating that an IFRS-based taxation would often increase the present value of corporate taxes. The median of estimated tax equity is 5.6 % (Austria), 6.4 % (Germany) and 9.0 % (The Netherlands) below IFRS-equity. However, an IFRS-based taxation does not always induce higher equity as often argued in the literature. In 307 of 1,113 totally analysed firm-years, estimated tax equity exceeds IFRS-equity. To find a further estimation for the effects of tax base reforms we also approximate the total stock of unused tax losses and the amount of useable tax losses. We find that deferred tax assets for unused tax losses are depreciated to a substantial extent.

**Keywords** Tax reform · IFRS · Deferred taxes · Common consolidated corporate tax base (CCCTB) · Book-tax differences

**JEL Classification** H25 · M41

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## 1 Introduction

The European Union goes for harmonisation and standardisation of bananas, yoghurts, truck drivers' breakfast, coffins, and corporate tax base. Whereas the banishment of crooked bananas from shop racks and the other above-mentioned regulation examples are only so-called euomyths, providing a harmonised corporate tax base has been actually an important aim of the European Commission for the past couple of decades. In fact, the efforts implementing common rules concerning company taxation started already in 1962 by presenting the Neumark-report. Due to reluctance of the member states, the initiatives designed to achieve a harmonisation of the corporate tax system were not crowned with much success. Aujean (2008) gives an overview of initiatives towards harmonised corporation taxation on EU level. European Commission (2001a) published another study on company taxation providing evidence that there are large differences in the EU corporations' effective level of taxation. The Commission concludes that the high variation of the effective tax burden can lead to an inefficient allocation of resources and, therefore, to welfare costs. Based on this result, another attempt to eliminate tax obstacles facing EU-wide economic activities was made by proposing several approaches on corporate taxation differing in the degree of harmonisation (European Commission 2001b). In the discussions following, particular attention was paid to the model of "Common Consolidated Corporate Tax Base (CCCTB)" according to which corporate groups should optionally be able to determine their taxable income on the basis of completely new harmonised EU taxation rules. The enduring timeliness of this issue is reflected in the fact that the European Commission (2011) has recently released a proposal for a Council Directive on a CCCTB including a complete set of rules for company taxation.

For the purpose of developing a common tax base, the European Commission suggested several times the IFRS as a starting point because they provide a common language and some common definitions (see e.g. European Commission 2001b, 2003). However, the Commission also pointed out that IFRS should be used only as a conceptual tool in designing the base, but do not represent the tax base itself. Because of some aspects of IFRS that would violate existing tax principles, adjustments would be required in order to arrive at the tax base. The European Commission's idea of devising harmonised tax rules on the basis of IFRS has given new impetus to the debate whether IFRS financial statements can be used for the determination of taxable income. Extensive theoretical and analytical research has been published on an IFRS-based taxation (e.g. Schön 2004; Haverals 2005; Essers 2008), but there exist few papers that quantitatively examine the potential effects of an application of IFRS for tax purposes (e.g. Oestreicher and Spengel 1999; Eberhartinger 2000, 2003; Spengel 2006; Eberhartinger and Klostermann 2007; Haverals 2007). Therefore, there is not much evidence of the real magnitude of accounting differences between IFRS and tax rules (IFRS-tax differences) because firms' tax accounts are generally unknown.

This research gap motivated us to conduct a study that quantifies the effect of an IFRS-based taxation on corporate tax burdens in different EU member states. For this purpose, we estimate firms' tax equity using notes on income taxes in IFRS

financial statements of companies listed in Austria, Germany, and The Netherlands. Comparison of a firms' estimated tax equity and IFRS-equity can indicate the effect of using IFRS as a tax base on corporate tax burden and, therefore, can contribute to the debate whether corporations would gain or lose due to the implementation of IFRS financial statements as a tax base. We also try to quantify IFRS-tax differences at a balance sheet item level by estimating tax values of corporate assets and liabilities. Comparison of these approximated tax values with the corresponding IFRS-book values can show for which balance sheet items adjustments would especially be required to arrive at an appropriate tax base. In view of prior literature on the topic of estimating IFRS-tax differences using notes provided by IFRS accounts, our sample is unique. Contrary to previous studies, we focus on firms with limited foreign activities. As in the previous literature (e.g. Zwirner 2007; Kager et al. 2011), we refer to total (i.e. domestic and foreign) deferred tax assets and liabilities from the consolidated IFRS statements, but use the parent company's statutory tax rate rather than a combined multinational tax rate for approximating the tax values. This approach permits, for the first time, to draw conclusions about accounting differences between IFRS and tax rules of a specific country. Our sample also excels through its size. We analyse all firms characterised by low foreign assets, defined as companies with a proportion of foreign assets of less than 20 %, which have been listed in Austria, Germany and The Netherlands in at least 1 year between 2004 and 2008. In detail, our sample is based on hand-collected data of 296 firms with 1,113 firm-years (observation of one firm in 1 year).

In addition to the approximation of tax equity we also estimate existing tax loss carry-forwards of the groups in the sample. Loss carry-forwards provide important information on the effectiveness of tax reforms. Firms with large loss carry-forwards temporarily do not pay taxes and are hence unaffected (or affected later) by tax reforms.

The remainder of this paper is organised as follows: Sect. 2 gives an overview of previous research on IFRS-based taxation and the general information content of tax values. In Sect. 3, the approach used for estimating tax values of corporate assets and liabilities is introduced. Due to the fact that the total stock of unused tax losses could offer information about a company's potential loss offsets and future tax payments and, therefore, could be important for financial statement users, we also present a model to approximate the total stock of unused tax losses. Furthermore, this section discusses methodological and practical restrictions of the approaches. The data analysed in the study are described in Sect. 4. Section 5 attends to the observed IFRS-tax differences on an aggregate and on an itemized level. Section 6 presents the results on loss carry-forwards. The paper concludes with a discussion of the findings and the indication of potential future research.

## 2 Background and prior research

The linkage between financial reporting and the determination of taxable income is subject to extensive debates all over the world. In the United States that are

characterised by separation of financial and tax reporting, a more comprehensive book-tax alignment has been considered in order to avoid further high-profile accounting scandals as Enron, Tyco, and Xerox (e.g. Yin 2001; Desai 2005; Hanlon and Shevlin 2005; Desai and Dharmapala 2009a; Hanlon and Maydew 2009). It has been argued that, facing a one-book system, managers would refrain from overstating income because this would cause a higher tax burden, and they would not be inclined to understate income because this would probably affect capital market pricing. However, the US academic literature has mainly prescinded from the idea of conforming financial and tax reporting, especially due to the potential information loss to investors as a consequence of greater book-tax conformity caused by managers' willingness to understate income in order to minimise tax payments (e.g. Guenther et al. 1997; Ali and Hwang 2000; Hanlon et al. 2005, 2008).

In the United Kingdom, taxable income has been measured without reference to financial accounting for a long time. In fact, tax legislation in the UK did not stipulate the rules to determine taxable profits. Considering UK courts' decisions of the past decades, that play a decisive role under common law system, a movement towards aligning tax and financial profits could be observed (for an overview, see e.g. Kersting 2005; Schön 2005), causing a debate on the alignment of tax with financial accounting rules in the UK (e.g. Freedman 1995, 2004; Whittington 1995; Porcano and Tran 1998; Macdonald 2002; Nobes 2003). Following the courts' way towards book-tax conformity, in 2004, the UK government enacted a regulation that links the determination of firms' taxable income to financial reporting standards (see Finance Act 2004, Section 50-54; available on [http://www.opsi.gov.uk/acts/acts2004/ukpga\\_20040012\\_en\\_1](http://www.opsi.gov.uk/acts/acts2004/ukpga_20040012_en_1)).

In Australia as another tax jurisdiction with separate accounting, there have been also calls for the adoption of accounting standards in determining taxable income (e.g. Taxation Review Committee 1975; Australian Taxation Office 1993; De Zilva 2003). These calls have largely failed to gain the support required to take the implementation of book-tax conformity seriously into consideration (see e.g. Westworth 1985, as an opponent of aligning accounting and tax rules in Australia).

In contrast to Anglo-Saxon countries, in several European countries with a strong linkage of financial reporting and taxation (e.g. Austria, Belgium, France, and Germany), the abolition of book-tax alignment has been discussed for many years (see e.g. Ballwieser 1990; Sigloch 2000; Weber-Grellet 2003). In view of numerous reforms by legislative authorities to modernise national accounting standards (e.g. BilMoG 2009 in Germany, RÄG 2010 in Austria, revision of Swiss "Obligationenrecht" in 2011), the discussion has recently been resumed (e.g. Theile 2009; Anzinger and Schleiter 2010; Prinz 2010; Wehrheim and Fross 2010; Böckli 2011; Marx 2011; Herzig 2012). The reduction of tax compliance costs is often mentioned as main advantage of book-tax conformity because, in an absolute one-book accounting system, firms only have to prepare one statement for the purpose of financial reporting and taxation. However, companies' financial statements often have to be adjusted in order to meet specific tax rules. For instance, in Austria and Germany, the number of modifications to firms' financial accounts for tax purposes has increased since the 1990s (for Austria, see e.g. Egger 2003; for Germany e.g.

Loitz and Klein 2001; Weber-Grellet 2003; Herzig and Briesemeister 2009; Prinz 2010), derogating the administrative advantage of book-tax conformity. Opponents also reject book-tax alignment due to the different objectives of financial and tax reporting (e.g. Weber-Grellet 1999). Whereas financial reporting focuses on payout determination and creditor protection, tax accounting has to ensure a fair and correct taxation.

The internationalisation of European financial accounting over the last few decades has given new impetus to the debate whether the principle of book-tax conformity is obsolete and a separate determination of taxable income should be devised. Academic literature often proposes a stand-alone tax law with stronger orientation on cash flows (see e.g. Wagner 1998; Herzig and Hausen 2004; Knirsch 2006; Schanz and Schanz 2010). The widespread growth of IFRS and the European Commissions' idea of using IFRS as a starting point for designing a common tax base has raised the question whether IFRS statements could be used for tax purposes (apart from the literature mentioned in the introduction, the following articles and books can be named as examples: Conseil Supérieur des Finances 2001; Oestreicher and Spengel 2001, 2007; Delesalle 2003; Herzig 2004; Sanz Gadea 2004; Scheidegger and Lehmann 2004; Jacobs et al. 2005; Bruins Slot and Gerrits 2009). The academic research predominantly shows a dismissive attitude toward IFRS as a tax base. Amongst others, the differences in objectives and the national tax authorities' loss of fiscal sovereignty are often mentioned as arguments against an IFRS-based taxation. While there is a large number of theoretical papers dealing with this topic, few researchers try to quantify the possible effects of an IFRS-adoption for tax purposes on the tax burden of companies.

Several studies (Oestreicher and Spengel 1999, 2001, 2007; Jacobs et al. 2005; Spengel 2006; Haverals 2007) provide quantitative evidence by using the European Tax Analyser (ETA), a computer-based company model that simulates a company's development over a period of 10 years (for further explanations regarding ETA, see Jacobs and Spengel 1996; critical of ETA are e.g. Niemann et al. 2003). The ETA-based analyses lead to very different results. For instance, Oestreicher and Spengel (1999) find for the fiscal year 1998 that using IFRS accounts for tax purposes would increase the effective tax burden of German enterprises in the range of 3.2 % (service trade) and 24.1 % (transport). By contrast, in a follow-up examination for 2001, Oestreicher and Spengel (2001) find that a transition to tax accounting based on IFRS would reduce the effective tax burden of nearly all industries analysed for Germany. For their analyses covering several European countries, Jacobs et al. (2005) take into account that an IFRS-adoption has to be restricted to standards that are in accordance with the objectives of tax accounting. They find that the effective corporate tax burden in all countries (except Ireland) tends to increase slightly.

Using a business model simulation, Eberhartinger (2000, 2003) finds that a transition to tax accounting based on IFRS could substantially increase the present value of future tax payments of a typical Austrian manufacturing firm, especially in case of high fixed assets. Eberhartinger and Klostermann (2007) simulate the relevance of IFRS accounts for taxation based on original data of Austrian companies and conclude that the effects of an IFRS-based taxation on the discounted tax burden would be very small.

Most of the above-mentioned studies assess the effects of an IFRS-based taxation by considering only a few recognition and measurement rules for which differences between IFRS and tax law can be identified. By contrast, we determine the aggregate effect of accounting differences between IFRS and countries' tax law on firms' equity based on original financial statement data. Thus, we provide a more comprehensive insight into the consequences of using IFRS for tax purposes. Thereby, our results can serve as a plausibility check for the tax revenue effects derived in previous studies.

Academic literature also offers theoretical explanations for typical and essential accounting differences between IFRS and tax rules (e.g. Endres et al. 2007). However, there is not much evidence of the real magnitude of these differences because firms' tax accounts are generally unknown. By estimating tax values of corporate assets and liabilities, our study provides insights into the actual magnitude of IFRS-tax differences and, therefore, can contribute to the debate on using IFRS for the determination of taxable income. Based on estimated tax values of assets and liabilities, it is possible to examine which modifications to IFRS accounts are necessary for tax purposes. In the existing literature, there are hardly efforts to estimate tax values of corporate assets and liabilities based on publicly available information. Beer mann (2001) elaborates, only theoretically, how tax balance sheets can be approximated using notes on income taxes provided by IFRS accounts. Zwirner (2007) and Kager et al. (2011) use the classification of deferred taxes required by IAS 12.81 (g) to approximate IFRS-tax differences of German and Austrian firms. Whereas their samples mostly consist of internationally operating firms, we focus on firms that are characterised by limited foreign activities. Thus, the influence of foreign tax laws on firms' tax balance sheets can be considered as insignificant. In contrast to Zwirner (2007) and Kager et al. (2011), this approach permits to draw conclusions about accounting differences between IFRS and tax rules of a specific country. Moreover, by examining Dutch firms, we extend the analysis to another European country.

Our study also contributes to academic literature investigating differences between pre-tax financial reporting earnings and taxable income (i.e. book-tax differences) as an indicator of financial reporting aggressiveness and tax sheltering. For instance, Mills and Newberry (2001) find evidence of a positive relation between book-tax differences and firms' incentives to engage in earnings management activities. For instance, such incentives can be financial distress, bonus thresholds and prior earnings patterns. Hanlon (2005) observes a negative association between book-tax differences and the persistence of earnings. Furthermore, she finds that investors reduce their expectation of future earnings persistence, if book income exceeds taxable income. Investigating firms involved in tax shelter litigation, Desai and Dharmapala (2009b) demonstrate that book-tax differences are positively associated with the incidence of tax shelter activities. Additional support for this result is provided by Wilson (2009) who reports that firms publicly identified as tax shelterers exhibit significantly higher book-tax differences. By proposing a new method of estimating differences between financial and tax reporting, our study can provide a basis for further research on book-tax differences and reporting aggressiveness.

### 3 Approach to estimate tax values

#### 3.1 Tax values of corporate assets and liabilities

Under IFRS, companies have to report for each type of temporary difference, unused tax losses and unused tax credits the amount of deferred tax assets and liabilities that is recognised in the balance sheet [IAS 12.81 (g)]. Disclosure of deferred taxes can be structured according to balance sheet *items* or to *reasons* for the differences, such as consolidation measures or tax depreciation, without referring to single balance sheet items. Assuming that all deferred taxes reported in the classification according to IAS 12.81 (g) can be assigned to balance sheet items and that the tax rate used by the company for determining deferred taxes is known, tax values of corporate assets ( $TV_a$ ) and liabilities ( $TV_l$ ) can be calculated as follows (see Kager et al. 2011):

$$TV_a = BV_a + \left( \frac{DTA_a}{\tau} - \frac{DTL_a}{\tau} \right), TV_l = BV_l - \left( \frac{DTA_l}{\tau} - \frac{DTL_l}{\tau} \right), \quad (1)$$

where  $BV$  is the IFRS-book value of the asset ( $a$ ) or liability ( $l$ ).  $DTA$  and  $DTL$  denote deferred tax assets and deferred tax liabilities according to the classification under IAS 12.81 (g).  $\tau$  stands for the tax rate that is used for the company's deferred tax calculation (IAS 12.47).

Companies generally do not provide information about tax rates used for the measurement of deferred taxes. For the sake of simplicity, Zwirner (2007) calculates IFRS-tax differences for German listed multinationals by using the tax rate reported as applicable tax rate in the reconciliation statement under IAS 12.81 (c). Typically, this tax rate corresponds to the parent's domestic tax rate. Using only the parent's tax rate will yield measurement errors in estimated book-tax differences, if a firm has significant foreign activities. Therefore, Kager et al. (2011) develop an approach to determine average group tax rates that considers foreign tax rates and the international asset and liability allocation. Thus, their approach takes into account that the deferred tax calculation under IFRS is balance sheet oriented, implying that deferred taxes in IFRS financial statements are determined by comparing IFRS carrying amounts of assets and liabilities with corresponding values in the tax balance sheet. But even the approach of Kager et al. (2011) is afflicted with several restrictions because the calculation of multinational groups' average tax rates is based upon several simplifying assumptions. We obviate the problematic determination of appropriate tax rates for estimating IFRS-tax differences by analysing only corporations with low foreign assets. We assume that foreign deferred taxes are low, if a firm predominantly has domestic assets. Hence, it is justifiable to use only the domestic statutory tax rate for approximating IFRS-tax differences. We use total, i.e. domestic and foreign, deferred tax assets and liabilities from consolidated IFRS statements to derive the tax values. Although applying the domestic tax rate to the foreign deferred taxes might be slightly inaccurate, this procedure induces only marginal measurement errors, because the foreign assets are low. Moreover, most IFRS statements do not provide a regional classification of deferred taxes.

Apart from applying an appropriate tax rate, a reliable reconstruction of tax balance sheets presupposes that all existing book-tax differences are known to financial statement users and assignable to balance sheet items. In this context, some methodological and practical limitations arise that are described in detail by Kager et al. (2011). Reconstructed tax balance sheets are distorted by IFRS-tax differences that are not considered at companies' deferred tax calculation. There could be taxable temporary differences for which IFRS prohibit recognition of deferred taxes [e.g. temporary differences resulting from the initial recognition of goodwill, see IAS 12.15 (a)], deductible temporary differences for which no deferred tax asset is recognised due to insufficient future taxable income (IAS 12.56), and permanent IFRS-tax differences (e.g. non-deductible expenses, tax-exempt income) that are generally not subject to deferred tax calculation. Amongst others, the following expenses can be mentioned as non-deductible expenses causing permanent IFRS-tax differences (see Van Boeijen-Ostaszewska 2011): in The Netherlands, interest expenses and currency exchange losses concerning loans from related companies are not tax-deductible if the contract was not mainly based on business reasons. Expenses in respect of vessels used for business entertaining are also not deductible. In Austria, deductibility of supervisory board members' fees is restricted.

Intercorporate dividends are an example for tax-exempt income. Intercorporate dividends are fully (Austria, The Netherlands) or partially (Germany, 5 % of the gross dividends is considered as non-deductible business expenses) exempt from corporate income tax. In Austria and The Netherlands, participation conditions (e.g. degree of participation, holding period, and the source of domestic or foreign dividends) have to be met for tax exemption of dividends (for further details, see Van Boeijen-Ostaszewska 2011). Although the resulting permanent IFRS-tax differences may be substantial, implying significant IFRS-tax equity differences, it is unlikely that these differences correspond to any future additional tax burden. Even if IFRS would serve as a starting point for determining the tax base, it would still be necessary to avoid double taxation of inter-corporate dividends. Thus, a future tax base is likely to continue the exemption of inter-corporate dividends, like the CCCTB proposal does (see European Commission 2011, 12).

Apart from permanent differences, firms often report deferred taxes on temporary differences that cannot be assigned to balance sheet items. In case of non-assignable items (e.g. "consolidation measures", "exceptional tax depreciation", and "others"), only an increase or decrease in tax equity compared to the IFRS balance sheet can be identified. This problem is alleviated by our finding that non-assignable changes in tax equity are mostly insignificant compared to estimated tax equity. The median proportion of non-assignable equity changes calculated on the basis of absolute values is 0.1 % (Austria, Germany) and 0.0 % (The Netherlands).

### 3.2 Total stock of unused tax losses

Notes to income taxes in IFRS accounts also enable to approximate the total stock of unused tax losses (*TTL*), which offers information about a firm's potential loss offsets and future tax payments, as follows:



$$TTL = \frac{DTA_{TL}}{\tau} + UTL, \quad (2)$$

where  $DTA_{TL}$  denotes deferred tax assets for tax losses recognised in the balance sheet. As in the formula above,  $\tau$  is the tax rate that is used for the company's deferred tax calculation.  $UTL$  denotes the amount of unused tax losses for which no deferred tax asset is recognised because of insufficient future taxable income. According to IAS 12.81 (e), the amount of these tax losses has to be reported in a firm's financial statement.

The amount of useable tax losses that is approximated by grossing-up recognised deferred tax assets for tax losses, can provide additional information about the management's estimates of future earnings. Jung and Pulliam (2006) demonstrate that a change in the valuation allowance for deferred tax assets provides incremental information beyond publicly available information in predicting one- and two-year-ahead income and cash flows. They conclude that the valuation allowance may contain managers' private information about a firm's future income and, therefore, has the potential to make financial statements more informative, provided that managers do not opportunistically manipulate the valuation allowance. However, there is substantial discretion with respect to the recognition and depreciation of deferred tax assets because companies' assess the probability that future taxable profits exceed tax losses independently. Furthermore, IFRS do not regulate a time horizon for profit forecasts. Thus, the recoverability of tax losses for which deferred tax assets are recognised should always be critically scrutinised.

#### 4 Investigation data and period

We gathered data from listed firms in Austria, Germany, and The Netherlands that were obliged to prepare their consolidated financial statements in accordance with IFRS since 2005 [Regulation (EC) No 1606/2002]. Member states could defer application of IFRS to consolidated accounts until 1 Jan 2007 for those publicly traded companies that are listed both in the EU and elsewhere and that have been previously using other internationally accepted standards like US-GAAP as their primary basis of accounting, as well as for companies that have only publicly traded debt securities. We excluded those companies that, according to the transitional provision, reported in compliance with US-GAAP until 2007. Furthermore, we excluded financial service companies because of their specific accounting rules. Due to their specific characteristics, investment and real estate companies are also not analysed. The investigation period covers the financial years from 2004 to 2008. For accounting periods, for which a company's financial statement has been prepared according to US-GAAP or local GAAP, we use the previous year information in the financial statement of the following period, if this has been prepared under IFRS. Table 1 shows the number of analysed firms and firm-years for Austria, Germany, and The Netherlands.

We examine companies that focus on the domestic market because of the problems arising when determining an appropriate tax rate for the estimation of multinationals' tax values. Kager et al. (2011 p 100–101) discuss this restriction in detail. Moreover, analysing domestic-oriented firms enables to draw conclusions about accounting

**Table 1** Investigation data

	Firms	Firm-years					Total
		2004	2005	2006	2007	2008	
Austria	20	17	16	12	15	11	71
Germany	257	169	202	211	199	183	964
The Netherlands	19	15	16	16	16	15	78
Total	296	201	234	239	230	209	1,113

differences between IFRS and tax rules of a specific country. Under IFRS, deferred taxes are determined by comparing the tax base of an asset or liability and its carrying amount in the IFRS balance sheet. Taking this balance sheet orientation of deferred tax calculation into account, we assume that foreign deferred taxes are low and a firm's tax values can be approximated using the domestic income tax rate, if a firm predominantly has domestic assets. Hence, our sample consists of companies that are characterised by low foreign assets, defined as companies with a proportion of foreign assets of less than 20 %. Using a lower critical threshold of foreign assets of, for instance, 10 % would further increase the likelihood that only companies operating predominantly domestically are considered. However, such a restriction would dramatically reduce the sample size. Given this trade-off, a threshold of 20 % seems reasonable.

The sample selection is based on all Austrian, German and Dutch listed firms, for which the databases Thomson Reuters Datastream and Bureau van Dijk's Osiris record the proportion of foreign assets for at least one investigation year. We pre-selected firms that, according to the databases, exhibit a proportion of foreign assets below 20 % in at least one firm-year relevant for our analyses. In the course of examination, it turned out that the figures in the databases, in particular in Thomson Reuters Datastream, are often incorrect. That is why our analyses do not include all firm-years that, according to the databases, meet the criterion of low foreign assets because the actual proportion of foreign assets, calculated on the basis of firms' segment information by geographical areas, is higher than 20 %. On the other hand, we analyse several firm-years for which the proportion of foreign assets exceeds, as per database, the threshold, though the actual proportion of foreign assets is less than 20 %. Some firms have not been listed over the whole investigation period. Provided that IFRS financial statements are available, we also examine firm-years in which firms were not listed. By using two databases for the pre-selection of firms and including firm-years regardless of whether the firm is listed or not, a large sample of firm-years with low foreign assets is ensured.

## 5 Presentation of approximated tax values

### 5.1 General comments

In this section we approximate the tax values of Austrian, Dutch, and German firms to get an indication whether a switch to IFRS-based taxation would increase or

decrease the tax burden of these firms compared to current tax law. This approach does not permit a judgement whether a tax reform would be desirable, because we compare the current tax systems with a reform proposal. Neither the national status quo nor the CCCTB reform proposal are neutral tax systems that could serve as a theoretical benchmark. We compare an existing with a hypothetical tax system to estimate the potential revenue effects, which is in line with the CCCTB literature [see, e.g., Spengel (2006) for a business model simulation and Fuest et al. (2007), Devereux and Loretz (2008) for empirical studies using firm-level financial reporting databases]. By contrast, our approach relies neither on databases with very limited tax information nor on simulations for average firms within an industry. By using original data on a balance sheet item level, our model extends prior research and provides a plausibility check for the results of simulations and database studies.

To analyse the aggregate effect of accounting differences between IFRS and countries' tax law on equity, we estimate a firm's tax equity and compare it with the IFRS-equity adjusted for the effect resulting from the recognition of deferred taxes. The difference between estimated tax equity and adjusted IFRS-equity indicates the effect of using IFRS as a tax base on corporate tax burden. If a firm's adjusted IFRS-equity is higher (lower) than the estimated tax equity, an IFRS-based taxation would increase (decrease) the firm's tax burden. In this paper, an increased tax burden means a higher present value of tax payments. However, it is not possible to compute exact present values, because the dissolution of deferred taxes over time cannot be inferred from IFRS statements. If, for instance, adjusted IFRS-equity exceeds tax equity by 10 %, this does not imply that the present value of tax payments would increase by exactly 10 % under IFRS-based taxation. There are timing effects inducing differences between these measures. Given sufficiently low interest rates (as currently) and sufficiently short useful lives of deferred taxes, these timing effects are small. Therefore, the IFRS-tax equity differences should be interpreted as a rough quantitative indicator for the extent of an additional or a reduced present value of taxes if IFRS were taken as tax base. In any case, the revenue results of business model simulations and database studies should be carefully interpreted as well due to their restrictive assumptions.

Following prior research on book-tax differences and reporting aggressiveness, IFRS-tax differences regarding a firm's equity may also be used as an indicator of earnings management and tax sheltering.

Adjusted IFRS-equity ( $EQ_{adjIFRS}$ ) and estimated tax equity ( $EQ_{Tax}$ ) are determined as follows:

$$\begin{aligned} EQ_{adjIFRS} &= EQ_{IFRS} - (DTA - DTL), \\ EQ_{Tax} &= EQ_{adjIFRS} - (TTD - DTD), \\ TTD &= \frac{DTL}{\tau}, \\ DTD &= \frac{DTA}{\tau} + DTD_{unrec} \end{aligned} \quad (3)$$

where  $EQ_{IFRS}$  is the equity reported in a firm's IFRS balance sheet.  $DTA$  and  $DTL$  denote recognised deferred tax assets and liabilities.  $TTD$  and  $DTD$  stands for

taxable and deductible temporary differences that are considered when estimating tax equity regardless of whether deferred taxes have been recognised in firm's balance sheet for these differences. *TTD* is computed by grossing-up recognised deferred tax liabilities by the tax rate used for firm's deferred tax calculation ( $\tau$ ). *DTD* consists of the grossed-up amount of recognised deferred tax assets and the amount of deductible temporary differences for which no deferred tax asset is recognised (*DTD<sub>unrec</sub>*) because of insufficient future taxable income. According to IAS 12.81 (e), the amount of *DTD<sub>unrec</sub>* has to be reported in a firm's financial statement. Appendix 3 provides an example of how to compute firms' tax equity based on IFRS financial statements.

Tax equity as well as adjusted IFRS equity are less likely to be manipulated than unadjusted IFRS equity, because the estimated probability of sufficient future taxable profits and hence the recognition of deferred tax assets is subject to managerial discretion. Therefore, we do not simply refer to total deferred taxes or the balance of deferred tax assets and liabilities. By computing the differences of estimated tax equity and *adjusted* IFRS equity, we get a reasonable proxy for the combined additional tax burden after a switch to IFRS-based taxation. Nevertheless, this proxy can be disaggregated and the total effect can be traced back to individual balance sheet items.

In contrast to deferred taxes, we do not include current tax assets and liabilities in our tax equity calculation because data acquisition is fraught with difficulties. The databases Thomson Reuters Datastream and Bureau van Dijk's Osiris used for this study do not record current tax assets and liabilities. Furthermore, manual collection of these data is laborious because current tax assets and liabilities are frequently not reported as separate items in the IFRS balance sheet. Nevertheless, there is some evidence that the balance of current tax assets and liabilities is of minor importance for the firms under consideration. For each country, we analyse the most recent IFRS statement of the largest (measured by average total assets) 20 % of the firms in our sample with available current tax assets/liabilities. We find that the balance of current tax assets and liabilities is, in the median, 0.9 % (Austria), 0.5 % (Germany) and 0.0 % (The Netherlands) of total assets. We consider these levels negligible.

We use statutory corporate income tax rates for estimating temporary differences; the shareholders' tax rates must not be taken into account. For German firms, we additionally consider the solidarity surcharge that amounts to 5.5 % of a firm's corporate income tax liability, and the local business tax rate dependent on the municipal multiplier applicable. According to IAS 12.47, deferred taxes should be measured at the tax rates that are expected to apply to the period in which the temporary differences reverse, based on tax rates that have been enacted or substantively enacted by the balance sheet date. Therefore, we consider tax reforms enacted during our investigation period. Second, we analyse IFRS-tax differences on the basis of single balance sheet items like fixed assets, intangibles, and provisions. We do not discuss in detail possible reasons for the observed IFRS-tax differences because there is extensive literature identifying accounting differences between IFRS and tax rules (e.g. Endres et al. 2007). Moreover, we demonstrate the results relating to unused tax losses.

For discussing the aggregate equity effect of accounting differences between IFRS and tax rules, we use IFRS-tax equity differences scaled by firm's adjusted IFRS-equity ( $ITED_{EQ\_adjIFRS}$ ) as main measure:

$$ITED_{EQ\_adjIFRS} = \frac{EQ_{Tax} - EQ_{adjIFRS}}{EQ_{adjIFRS}} \quad (4)$$

Since this measure might be biased in case of very small equity levels we additionally provide IFRS-tax equity differences as a percentage of the respective total assets TA ( $ITED_{TA}$ ):

$$ITED_{TA} = \frac{EQ_{Tax} - EQ_{adjIFRS}}{TA} \quad (5)$$

We use the median as main measure for presenting our results due to the asymmetric distribution of IFRS-tax differences. Mean values are calculated as unweighted average of the relative differences of all firm years. It should be noted that this paper gives an overview of our analyses. For further firm-level information about the observed IFRS-tax differences and unused tax losses, see Kager and Niemann (2011).

## 5.2 Aggregate equity effect

In 57 firm-years (Austria: 3; Germany: 54), firm's IFRS-equity is negative after its adjustment for the effect resulting from the recognition of deferred taxes. For median and mean calculations concerning the IFRS-tax equity scaled by adjusted IFRS-equity ( $ITED_{EQ\_adjIFRS}$ ) as well as for histograms of these differences, we do not consider firm-years with negative adjusted IFRS-equity. Presented results regarding IFRS-tax equity differences scaled by total assets ( $ITED_{TA}$ ) include all 1,113 analysed firm-years because the denominator cannot be negative.

An interesting finding is that, 16 firm-years (Austria: 2; Germany: 14) exhibit negative adjusted IFRS-equity, whereas the IFRS-equity reported in the financial statement is positive. This indicates that the recognition of deferred tax assets sometimes prevents firms from reporting a negative IFRS-equity to the capital market.

Negative IFRS-tax differences regarding firms' equity imply that estimated tax equity is lower than adjusted IFRS-equity. Positive differences indicate that approximated tax equity exceeds adjusted IFRS-equity.

As can be seen from Figs. 1 and 2, estimated tax equity usually differs from adjusted IFRS-equity. In only 37 (Austria: 6; Germany: 22; The Netherlands: 9) of 1,113 totally analysed firm-years, estimated tax equity is consistent with adjusted IFRS-equity. 769 firm-years (Austria: 44; Germany: 672; The Netherlands: 53) exhibit higher adjusted IFRS-equity than estimated tax equity, indicating that an IFRS-based taxation would often increase the corporate tax burden. The median of estimated tax equity is 5.7 % (Austria), 6.4 % (Germany) and 9.0 % (The Netherlands) below IFRS-equity. As a percentage of firms' total assets, estimated tax equity is, in the median, 3.9 % (Austria), 2.6 % (Germany) and 4.0 % (The Netherlands) below IFRS-equity. However, an IFRS-based taxation does not always

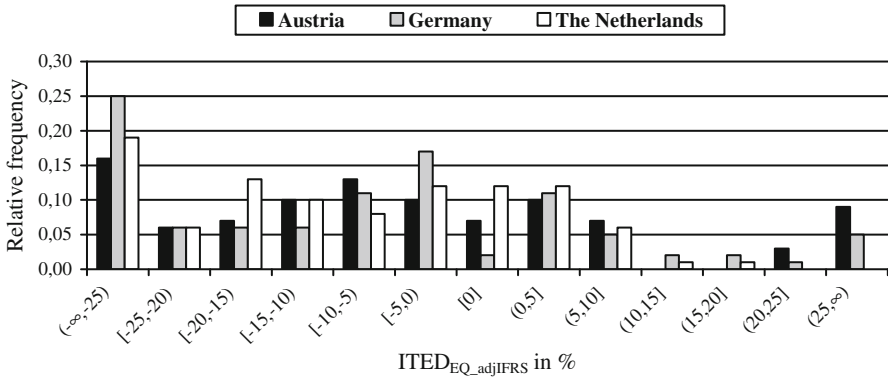


Fig. 1 Histogram of ITED<sub>EQ\_adjIFRS</sub> in %

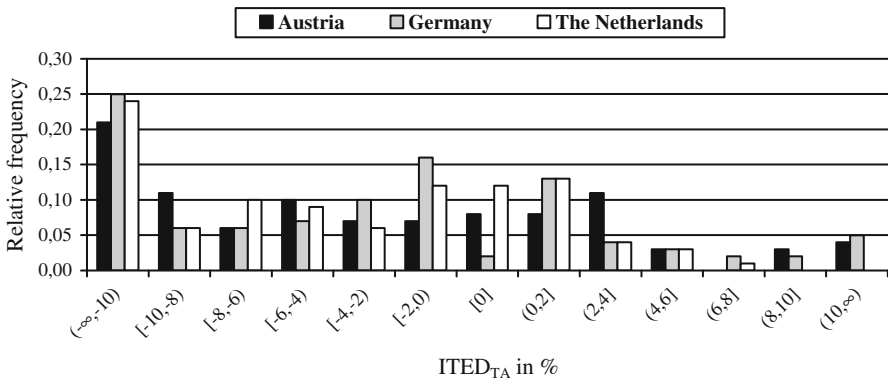


Fig. 2 Histogram of ITED<sub>TA</sub> in %

induce higher equity as often argued in the literature. In 307 firm-years (Austria: 21; Germany: 270; The Netherlands: 16), estimated tax equity exceeds IFRS-equity.

Table 2 summarises the observed relative differences between adjusted IFRS-equity and estimated tax equity for each country.

As can be seen from Figs. 1, 2 and Table 2, the relative differences between adjusted IFRS-equity and estimated tax equity are asymmetrically distributed. It stands out that, in each country, between 16 and 25 % of analysed firm-years show ITED<sub>EQ\_adjIFRS</sub> exceeding 25 %. A similar picture can be observed for ITED<sub>TA</sub>, for which between 21 and 25 % of analysed firm-years show ITED<sub>TA</sub> higher than 10 %. These results raise the question whether these high IFRS-tax differences result from the fact that firms manage book income upward without likewise increasing taxable income.

Furthermore, for several companies, estimated IFRS-tax differences regarding firms' equity fluctuate substantially over the investigation period. High variations often arise from changes in the scope of consolidation and substantial changes in a firm's IFRS-equity due to profits and losses. Moreover, high variations may also

**Table 2** IFRS-tax equity differences in %

	ITED <sub>EQ_adjIFRS</sub>			ITED <sub>TA</sub>		
	Austria	Germany	The Netherlands	Austria	Germany	The Netherlands
Min	-80.4	-1,834.1	-133.9	-25.4	-577.3	-33.4
Lower quartile	-18.2	-24.5	-21.1	-8.9	-9.8	-9.6
Median	-5.7	-6.4	-9.0	-3.9	-2.6	-4.0
Upper quartile	2.5	0.4	0.0	1.2	0.4	0.0
Max	318.1	127.8	17.5	29.1	282.0	6.1
Mean	5.0	-21.9	-15.0	-3.2	-5.9	-5.6

**Table 3** Relative IFRS-tax equity differences in % across all analysed countries

	ITED <sub>EQ_adjIFRS</sub>					ITED <sub>TA</sub>				
	2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Median	-3.8	-5.3	-5.5	-8.8	-10.0	-1.1	-2.0	-2.4	-3.8	-4.2
Mean	-9.6	-9.9	-23.6	-31.7	-22.7	-3.4	-4.4	-8.2	-6.1	-6.1

indicate that firms exploit accounting discretion for earnings management and tax sheltering. The finding that IFRS-tax equity differences have significantly increased over the investigation period (see Table 3) provides additional support for the assumption that IFRS-tax differences could be an indicator for earnings management. From 2004 to 2006, the median of IFRS-tax equity differences regarding firms' equity across all analysed countries ranges between 3.8 and 5.5 %. In the financial year 2008 that was strongly affected by the recent financial and economic crisis, the median of IFRS-tax equity differences has substantially increased to 10.0 %. Scaled by total assets, the increase is similar. This finding suggests that, in economic slump, firms have an incentive to engage in earnings management inducing higher IFRS-tax differences. These observations may provide a basis for further research on book-tax differences and reporting aggressiveness.

### 5.3 Itemized IFRS-tax difference analysis

In contrast to database studies measuring the impact of CCCTB our approach not only approximates the total effect of IFRS as a tax base. Rather, we can identify the main sources of an increased or decreased tax burden on a balance sheet item level. Since tax data are not publicly available database-oriented studies have to refer to financial reporting data. As a result, these studies focus on the consolidation and formula apportionment effects of CCCTB and cannot assess the impact of reforming single elements of the tax base.

As can be seen from Table 4, we find that estimated tax values of assets and liabilities are generally lower than IFRS-book values, except for inventories (Austria, Germany), receivables (Austria, The Netherlands) and liabilities (The

**Table 4** Observed IFRS-tax differences regarding single balance sheet items in %

	Austria		Germany		The Netherlands	
	Median	Mean	Median	Mean	Median	Mean
Fixed assets	-0.1	-3.2	-9.4	-15.5	-8.5	-10.0
Intangibles	-30.7	124.2	-14.1	12.7	-12.7	-17.8
Inventories	2.0	178,833.0	0.4	288.1	-1.4	-26.5
Receivables	0.0	-1.0	-1.8	-7.5	2.1	1.9
Provisions	-19.9	-27.3	-12.1	-5.3	-34.8	-34.3
Liabilities	-0.5	2.0	-0.9	-3.7	3.0	2.4

Netherlands). For all three analysed countries, the largest IFRS-tax differences can be observed for intangible assets and provisions. Carrying amounts attributed to intangibles in IFRS accounts exceed approximated tax intangibles by a median of 30.7 % (Austria), 14.1 % (Germany) and 12.7 % (The Netherlands). In Austria and Germany, a main reason for lower intangibles in reconstructed firms' tax balance sheets is the fact that tax law prohibits the recognition of internally generated intangibles. The financial statements of the analysed firms often inform about capitalisation of development costs that cannot be recognised under Austrian and German tax law (Endres et al. 2007). By contrast, Dutch tax law similar to the treatment under IFRS provides for the recognition of internally created intangible assets. For Dutch firms, amongst others, possible causes for lower tax intangibles are shorter useful lives or different depreciation methods for tax accounting and different valuation of goodwill.

The median of approximated tax provisions is 19.9 % (Austria), 12.1 % (Germany) and 34.8 % (The Netherlands) below corresponding IFRS-book value. IFRS-tax differences relating to provisions mainly result from different methods with respect to the measurement of post-employment benefit obligations like pension obligations and severance payments. Employee benefits relating to defined benefit plans (e.g. pension obligations, severance payments) are included in estimated tax provisions regardless of whether they are shown as provisions or liabilities in firms' financial statements.

In Germany and The Netherlands, large IFRS-tax differences also occur relating to fixed assets. Fixed assets in reconstructed tax balance sheets are lower than IFRS-book values by a median of 9.4 % (Germany) and 8.5 % (The Netherlands). For instance, lower tax values of fixed assets can result from using shorter useful lives for tax reporting and, during the initial consolidation process, from the fair value measurement of assets in the purchase price allocation. For Austrian firms, we find only small IFRS-tax differences in case of fixed assets. In all three analysed countries, IFRS-tax differences for inventories, receivables, and liabilities are of little importance.

Comparing our findings with the results derived by Kager et al. (2011) for Austrian and German multinationals, there are many similarities but also a few distinctions. Whereas we identify diverging IFRS and tax rules relating to intangibles as main cause for IFRS-tax differences in Austria, Kager et al. (2011)



observe that the median of tax intangibles is only 2.8 % lower than IFRS-book value. This diverging result could be due to the above-mentioned prohibition of recognising internally created intangibles under Austrian tax law. Our findings suggest that Austrian firms that focus on the domestic market are more severely affected by this prohibition than internationally operating corporations. Kager et al. (2011) report that IFRS-tax differences especially occur for fixed assets and provisions. Considering the median, their estimated fixed assets and provisions in tax accounts are 11.1 and 23.5 %, respectively, below IFRS-book values. Hence, we find much smaller IFRS-tax differences for fixed assets. For German multinationals, Kager et al. (2011) also find that the largest IFRS-tax differences occur for intangibles, provisions, and fixed assets. Our results only differ from the findings of Kager et al. (2011) with regard to the extent of IFRS-tax differences, especially in case of provisions and receivables. Thus, they find that the median values of estimated tax provisions and receivables are 29.6 and 10.3 %, respectively, lower than IFRS-book values. We find much smaller IFRS-tax differences for these balance sheet items, indicating that German multinationals, as analysed by Kager et al. (2011), exhibit substantially more provisions and receivables that cannot be recognised under tax law than firms with limited foreign activities. Another reason for the differing results could be that foreign tax rules concerning the recognition of provisions and receivables are more restrictive than domestic rules.

We are not aware of any studies estimating tax values of assets and liabilities for Dutch firms. Thus, we cannot compare our results with those of others. Compared to Austrian and German firms, Dutch firms' classification of deferred taxes is less detailed. Whereas the classification of Austrian and German firms contains, on average, seven and six items, respectively, Dutch firms report, on average, only four items.

## 6 Unused tax losses

The existence and the level of tax loss carry-forwards can be a crucial determinant of the effectiveness of tax reforms. Firms with substantial loss carry-forwards are temporarily tax-exempt. It is therefore likely that loss firms and profitable firms react differently on tax base reforms. Anticipating the impact of tax reforms requires knowledge of firms' loss status. High levels of loss carry-forwards might induce weaker reactions of taxpayers and other tax revenue effects than expected. Therefore, we estimate the unused tax losses of Austrian, Dutch, and German firms in order to assess whether these firms would face a full-scale or a reduced revenue effect of IFRS-based taxation. To do so we need the actual level of tax loss carry-forwards, not the hypothetical level that would have occurred if taxable income was derived on IFRS basis already in the past.

As far as companies report the total amount of tax losses in their financial statements, estimated amounts of tax losses can be verified by a comparison with the reported amounts of tax losses. Estimated values of tax losses often differ only slightly from the reported amounts. For instance, we find that the estimated total stock of Dutch firms' unused tax losses usually deviates from the amount of tax losses reported in the firms financial statement by 2.0 % or less, implying that our estimation method is quite

accurate. Higher deviations are frequently caused by imprecise notes to the companies' financial statements. For instance, large differences between reported and estimated tax losses often result from the fact that firms do not report unused tax losses for which no deferred tax asset is recognised. Thus, the total stock of tax losses cannot be estimated but only the amount of useable tax losses. In Germany, higher deviations between estimated total stock of unused tax losses and the amount of tax losses reported in the financial statement are observed. This is caused by the fact that German firms' total stock of tax losses often consists of corporate income tax losses and local business tax losses. Due to different tax bases of these two tax types, the levels of loss carry-forwards may differ.

In general, deferred tax assets for these tax losses should be measured at different tax rates. However, German firms often use a combined tax rate including corporate income and local business tax for deferred tax calculation. In such cases, our estimate of tax losses calculated by using a combined domestic tax rate differs only slightly from the reported amount. If a company, however, separately uses the corporate income and local business tax rate when calculating deferred tax assets for tax losses and does not split recognised deferred tax assets into those for corporate income tax losses and those for local business tax losses, estimated tax losses can differ significantly from the reported amount.

Unused tax losses are of particular importance for firms' deferred tax calculation. Considering the median, 56.0 % (Austria), 77.8 % (Germany) and 91.6 % (The Netherlands) of total deferred tax assets (i.e. deferred tax assets for all temporary differences and unused tax losses regardless whether or not they are recognised in the balance sheet) fall upon unused tax losses. 11 firm-years (Germany: 9; The Netherlands: 2) are not included in the calculation of the proportion of deferred tax assets for tax losses because no deferred tax assets at all are reported in these years. In 122 firm-years (Austria: 12; Germany: 84; The Netherlands: 26), the firm's deferred tax assets are entirely due to unused tax losses. In 108 firm-years (Austria: 9; Germany: 86; The Netherlands: 13), no deferred tax assets at all arise from unused tax losses.

As mentioned above, the amount of useable tax losses can provide additional information about a company's expected future earnings. In 244 firm-years (Austria: 30; Germany: 198; The Netherlands: 16), the amount of useable tax losses is consistent with the total stock of tax losses, indicating that companies assume sufficient future taxable income to utilise the total stock of tax losses. For the remaining firm-years, companies make valuation allowances against deferred tax assets for tax losses to a significant extent (Austria: 51.1 %; Germany: 84.7 %; The Netherlands: 77.2 %).

As can be seen from Table 5, which provides an overview of our results relating to unused tax losses, depreciations of deferred tax assets for tax losses have increased from 41 % (2004) to 76 % (2007). This upward trend means that firms increasingly assume expiration of tax losses due to insufficient future taxable income. An interesting finding is that, despite the height of the crisis, depreciations have slightly decreased to 66 % from 2007 to 2008, raising the question whether firms try to disguise bad business by non-depreciation of deferred tax assets for tax losses. Comparing the median of depreciation in each investigation period for each analysed country (see Appendix 2), it can be observed, that German firms generally make larger valuation allowances against deferred tax assets for unused tax losses than Austrian and Dutch firms, indicating that German firms more often assume

**Table 5** Unused tax losses across all analysed countries

	2004		2005		2006		2007		2008	
	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean
Reported or estimated total stock of tax losses in million €	12	90	14	70	17	77	19	152	17	87
Amount of useable tax losses in million €	4	37	3	20	3	16	3	23	3	16
Depreciation of deferred tax assets for tax losses in %	41	43	57	52	66	55	76	59	66	56
Reported or estimated total stock of tax losses scaled by total assets	0.11	1.16	0.14	1.23	0.13	1.31	0.14	1.26	0.12	1.43
Amount of useable tax losses scaled by total assets	0.03	0.14	0.02	0.12	0.03	0.10	0.03	0.12	0.03	0.12
Reported or estimated total stock of tax losses scaled by revenues	0.10	3.65	0.13	4.47	0.12	7.47	0.13	9.14	0.10	10.86
Amount of useable tax losses scaled by revenues	0.03	0.20	0.03	0.35	0.03	0.28	0.03	0.55	0.03	1.40
Reported or estimated total stock of tax losses scaled by EBT	0.33	3.78	0.38	1.85	0.26	-8.88	0.26	10.66	0.18	6.33
Amount of useable tax losses scaled by EBT	0.06	2.02	0.04	1.37	0.06	-1.84	0.06	1.87	0.03	5.24

insufficient future taxable income to utilise tax losses. We also find that, for Dutch firms, the extent of depreciations fluctuates substantially over the investigation period. Moreover, it stands out, that the median of depreciations in 2008 (35 %) was rather low in view of the global financial crisis. This may indicate that especially Dutch firms' managers use the discretion relating to the recognition and depreciation of deferred tax assets to manage earnings.

Across the analysed countries, the median of the reported or estimated total stock of tax losses scaled by EBT is between 0.18 and 0.38. The median of useable tax losses scaled by EBT is between 0.03 and 0.06. 23 % (Austria), 32 % (Germany) and 32 % (The Netherlands) of analysed firm-years show total tax losses scaled by EBT exceeding 2.5. These high tax loss carry-forwards indicate that the respective firms are likely to be affected by the implementation of IFRS-based taxation in the distant future only. As can be seen from Figs. 3 and 4, where the stocks of tax losses are scaled by revenues, useable tax losses are distributed similarly to total tax losses.

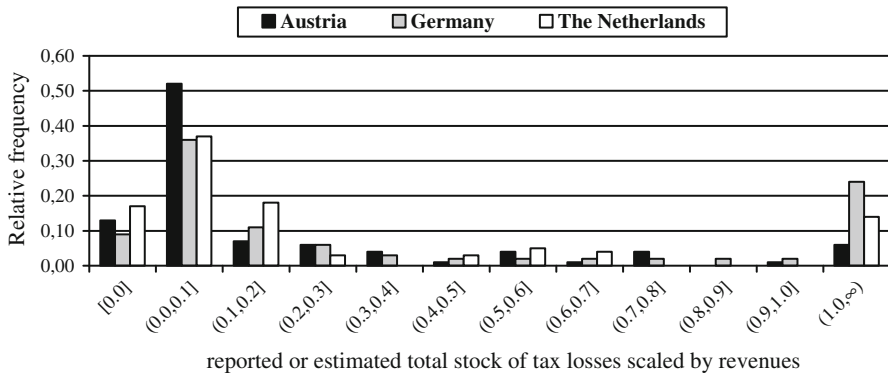


Fig. 3 Histogram of reported or estimated total stock of tax losses scaled by revenues

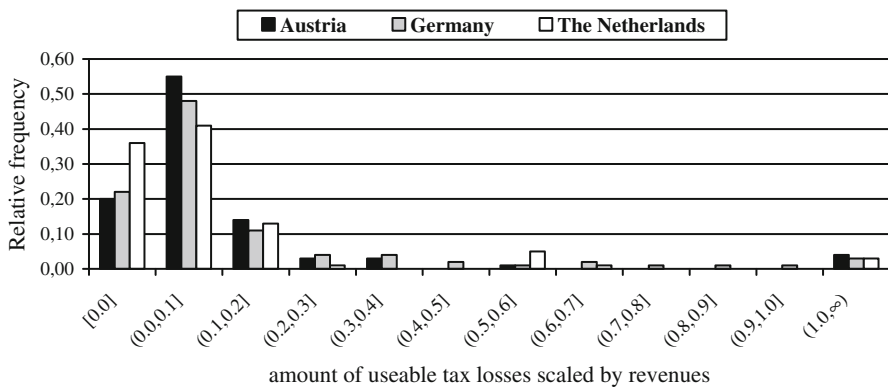


Fig. 4 Histogram of useable tax losses scaled by revenues

## 7 Conclusion

Internationalisation of financial reporting as well as the European Commission's idea of using IFRS as a starting point for designing a common corporate tax base have caused extensive discussions about the pros and cons of an IFRS-based taxation. In order to extend quantitative research on this topic, we try to quantify the effect of an IFRS-based taxation on corporate tax burdens in different EU member states. For this purpose, we estimate firms' tax equity using notes on income taxes in IFRS financial statements of companies listed in Austria, Germany, and The Netherlands. If a firm's estimated tax equity is lower (higher) than IFRS-equity, adjusted for the effect resulting from the recognition of deferred taxes, an IFRS-based taxation would increase (decrease) the firm's tax burden. Whereas the hitherto literature on the tax revenue effects of CCCTB is based on either business model simulations or database studies, we use actual IFRS financial reports and analyse IFRS-tax differences on a balance sheet item level. This additional approach provides a plausibility check for the earlier tax revenue results.

We find that estimated tax equity is mostly lower than IFRS-equity. The median of estimated tax equity is 5.7 % (Austria), 6.4 % (Germany) and 9.0 % (The Netherlands) below IFRS-equity. Scaled by total assets estimated tax equity is 3.9 % (Austria), 2.6 % (Germany) and 4.0 % (The Netherlands) below IFRS-equity. However, an IFRS-based taxation does not always induce higher equity as often argued in the literature. In 307 of 1,113 totally analysed firm-years, estimated tax equity exceeds IFRS-equity. This heterogeneity indicates that a switch to IFRS-based taxation would yield ambiguous tax revenue effects across as well as within countries.

Analysing IFRS-tax differences on a balance sheet item level, we find that IFRS-tax differences especially occur in case of intangibles and provisions. In all three analysed countries, IFRS-tax differences relating to inventories, receivables, and liabilities are of little importance. From a tax reform perspective, these results indicate that a switch to IFRS-based taxation might not be enacted at once for all balance sheet items. Rather, transition rules for the treatment of intangibles and provisions could be necessary to avoid an excessive additional tax burden for the affected firms.

Unused tax losses are very important for deferred tax calculation in all three analysed countries. Thus, a major portion of total deferred tax assets is attributable to unused tax losses. By approximating the useable amount of tax losses that can provide additional information about the management's estimates of future earnings, we, however, find that deferred tax assets for unused tax losses are depreciated to a substantial extent. This indicates that companies often assume insufficient future taxable income to utilise the total stock of tax losses. The estimation of future loss-offset potential obviously enables the management to manipulate financial reporting income. Apart from earnings management, the level of unused tax losses is also relevant for the effectiveness of a tax reform. Very high existing loss carry-forwards may induce taxpayers to neglect taxation due to their temporary tax-exempt status.

By focussing on firms with mostly domestic activities we can draw conclusions about IFRS-tax differences of specific countries. We analyse all firms that have been listed in Austria, Germany and The Netherlands in at least 1 year between 2004 and 2008 and have a proportion of foreign assets of less than 20 %. Our unique sample is based on hand-collected data of 1,113 firm-years and 296 firms.

A reliable reconstruction of tax balance sheets presupposes that all existing book-tax differences are known to financial statement users and assignable to balance sheet items. In this context, some methodological and practical limitations arise. Reconstructed tax balance sheets are distorted by IFRS-tax differences that are not considered at companies' deferred tax calculation. Second, due to the lack of a standardised display scheme, firms' classification of deferred taxes, as the basis for estimating tax values, contains items that cannot be assigned to balance sheet items. This problem is alleviated by our finding that non-assignable increases or decreases in tax equity are mostly very small compared to the firm's estimated tax equity. Finally, reconstruction of tax balance sheets is restricted by the fact that corporations often do not fully meet the disclosure requirements under IFRS or report figures imprecisely.

Another restriction of our study is that our investigation sample mainly consists of consolidated financial statements. To draw even more reliable conclusions about differences between IFRS and a country's tax law, analyses of individual financial statements would be promising. Unfortunately, many firms prepare their individual accounts in accordance with local GAAP. Typically, regulations on deferred taxes in local GAAP differ from IFRS rules. If individual IFRS accounts exist, financial statement users often do not have access to them.

An avenue for further research is to analyse the information content of the observed IFRS-tax differences and valuation allowances against deferred tax assets for tax losses. Due to the substantial discretion with respect to the recognition of deferred tax assets, firms may especially have incentives to manage earnings by (non-) depreciation of deferred tax assets in view of the recent financial and economic crisis.

## Appendix 1 Relative IFRS-tax differences regarding firms' equity for each analysed country and each analysed financial year

See Tables 6, 7, 8.

**Table 6** IFRS-tax differences regarding firms' equity in %—Austria

	2004	2005	2006	2007	2008
$ITED_{EQ\_adjIFRS}$					
Min	-76.6	-68.5	-69.4	-80.4	-59.5
Lower quartile	-18.3	-12.6	-12.4	-24.6	-16.3
Median	0.0	-4.2	-4.8	-10.9	-5.7
Upper quartile	5.6	8.6	3.3	-3.1	-1.5
Max	213.2	318.1	299.9	4.3	43.3
Mean	2.2	28.7	14.8	-18.5	-9.4
$ITED_{TA}$					
Min	-15.0	-25.4	-12.3	-18.8	-23.3
Lower quartile	-8.7	-8.9	-9.5	-7.9	-9.3
Median	0.0	-3.1	-3.3	-5.2	-4.4
Upper quartile	2.5	2.6	1.4	0.0	-1.1
Max	29.1	26.1	20.2	4.8	5.0
Mean	1.3	-2.0	-2.8	-4.7	-6.0

**Table 7** IFRS-tax differences regarding firms' equity in %—Germany

	2004	2005	2006	2007	2008
<b>ITED<sub>EQ_adjIFRS</sub></b>					
Min	-179.7	-210.8	-1,834.1	-1,784.5	-720.6
Lower quartile	-22.9	-24.1	-23.7	-25.6	-28.8
Median	-4.2	-5.3	-4.8	-8.0	-10.0
Upper quartile	2.4	0.9	0.7	0.0	-0.5
Max	127.8	99.1	84.3	77.6	72.0
Mean	-11.4	-12.9	-26.0	-33.8	-23.8
<b>ITED<sub>TA</sub></b>					
Min	-56.9	-83.1	-577.3	-245.2	-210.6
Lower quartile	-8.4	-8.3	-10.1	-11.3	-10.4
Median	-1.5	-2.0	-2.2	-3.6	-3.8
Upper quartile	1.0	0.5	0.4	0.0	-0.2
Max	39.8	46.6	36.0	250.2	282.0
Mean	-3.7	-4.6	-8.5	-6.2	-6.2

**Table 8** IFRS-tax differences regarding firms' equity in %—The Netherlands

	2004	2005	2006	2007	2008
<b>ITED<sub>EQ_adjIFRS</sub></b>					
Min	-53.4	-67.6	-133.9	-100.0	-93.8
Lower quartile	-8.1	-18.6	-28.7	-17.5	-26.2
Median	0.0	-6.1	-16.6	-12.2	-11.4
Upper quartile	4.2	-0.8	-2.9	0.1	0.8
Max	11.5	1.0	17.5	4.1	8.8
Mean	-4.9	-13.0	-21.3	-17.3	-18.2
<b>ITED<sub>TA</sub></b>					
Min	-33.4	-19.3	-20.1	-17.7	-23.0
Lower quartile	-2.4	-6.7	-14.6	-9.8	-10.7
Median	0.0	-3.3	-7.4	-5.7	-4.4
Upper quartile	0.9	-0.2	-1.4	0.1	-0.1
Max	4.2	0.6	4.9	2.8	6.1
Mean	-2.8	-4.8	-8.1	-6.2	-6.1

## Appendix 2 Unused tax losses for each analysed country and each analysed financial year

See Tables 9, 10, 11.

Table 9 Unused tax losses in Austria

	Reported or estimated total stock of tax losses (million €)	Amount of useable tax losses (million €)	Depreciation of deferred tax assets for tax losses (%)	Reported or estimated total stock of tax losses (scaled by total assets)	Amount of useable tax losses (scaled by total assets)	Reported or estimated total stock of tax losses (scaled by revenues)	Amount of useable tax losses (scaled by revenues)	Reported or estimated total stock of tax losses (scaled by EBT)	Amount of useable tax losses (scaled by EBT)
2004									
Min	0	0	0	0.00	0.00	0.00	0.00	-20.69	-20.69
Lower quartile	3	2	0	0.00	0.00	0.01	0.00	0.00	0.00
Median	13	5	0	0.05	0.02	0.05	0.04	0.15	0.07
Upper quartile	49	46	28	0.11	0.09	0.12	0.12	1.12	0.67
Max	399	326	96	0.58	0.20	0.61	0.57	7.22	6.11
Mean	68	51	19	0.09	0.05	0.13	0.09	-0.23	-0.35
2005									
Min	0	0	0	0.00	0.00	0.00	0.00	-3.88	-2.13
Lower quartile	1	0	0	0.00	0.00	0.01	0.00	0.00	0.00
Median	3	2	0	0.06	0.01	0.05	0.01	0.07	0.03
Upper quartile	25	12	53	0.13	0.10	0.26	0.10	1.06	0.18
Max	503	275	100	1.49	1.49	4.04	4.04	29.75	4.30
Mean	48	30	25	0.25	0.13	0.40	0.31	2.34	0.30
2006									
Min	0	0	0	0.00	0.00	0.00	0.00	-29.54	-13.43
Lower quartile	1	0	0	0.00	0.00	0.01	0.00	-3.21	-0.57



Table 9 continued

	Reported or estimated total stock of tax losses (million €)	Amount of useable tax losses (million €)	Depreciation of deferred tax assets for tax losses (%)	Reported or estimated total stock of tax losses (scaled by total assets)	Amount of useable tax losses (scaled by total assets)	Reported or estimated total stock of tax losses (scaled by revenues)	Amount of useable tax losses (scaled by revenues)	Reported or estimated total stock of tax losses (scaled by EBT)	Amount of useable tax losses (scaled by EBT)
2007									
Median	3	1	3	0.07	0.01	0.04	0.01	0.04	0.01
Upper quartile	17	3	51	0.15	0.10	0.14	0.09	0.24	0.07
Max	640	316	100	2.03	1.58	4.04	3.92	5.74	4.60
Mean	75	41	30	0.36	0.16	0.47	0.35	-3.43	-1.11
Min	0	0	0	0.00	0.00	0.00	0.00	-18.52	-2.48
Lower quartile	1	0	0	0.01	0.00	0.02	0.00	0.03	0.00
Median	3	1	44	0.10	0.02	0.08	0.03	0.40	0.23
Upper quartile	23	5	83	0.29	0.10	0.35	0.08	10.04	5.89
Max	843	402	100	2.64	0.78	2.70	1.63	300.89	143.54
Mean	77	36	46	0.37	0.09	0.36	0.15	28.70	12.26
2008									
Min	0	0	0	0.00	0.00	0.00	0.00	-4.43	-1.47
Lower quartile	0	0	0	0.00	0.00	0.01	0.01	-1.39	-0.31
Median	5	2	47	0.11	0.04	0.07	0.04	0.04	0.04
Upper quartile	80	44	50	0.22	0.11	0.34	0.11	1.89	1.37
Max	1,063	273	86	0.51	0.27	0.73	0.38	682.25	361.75
Mean	132	44	39	0.16	0.07	0.21	0.08	61.84	33.11

Table 10 Unused tax losses in Germany

	Reported or estimated total stock of tax losses (million €)	Amount of usable tax losses (million €)	Depreciation of deferred tax assets for tax losses (%)	Reported or estimated total stock of tax losses (scaled by total assets)	Amount of usable tax losses (scaled by total assets)	Reported or estimated total stock of tax losses (scaled by revenues)	Amount of usable tax losses (scaled by revenues)	Reported or estimated total stock of tax losses (scaled by EBT)	Amount of usable tax losses (scaled by EBT)
2004									
Min	0	0	0	0.00	0.00	0.00	0.00	-284.93	-221.70
Lower quartile	3	0	0	0.02	0.00	0.02	0.00	-0.09	0.00
Median	12	4	43	0.13	0.04	0.11	0.03	0.34	0.07
Upper quartile	41	13	88	0.72	0.16	0.84	0.14	4.67	1.86
Max	3,323	2,709	100	52.02	2.98	226.23	5.44	296.77	208.01
Mean	93	38	44	1.33	0.15	3.15	0.22	7.05	2.18
2005									
Min	0	0	0	0.00	0.00	0.00	0.00	-704.69	-287.64
Lower quartile	4	0	0	0.02	0.00	0.03	0.00	0.00	0.00
Median	15	3	62	0.14	0.03	0.15	0.03	0.40	0.05
Upper quartile	48	13	97	0.79	0.12	0.96	0.12	7.11	2.41
Max	1,764	1,296	100	66.56	1.26	264.21	37.13	388.62	253.50
Mean	72	19	54	1.36	0.12	3.03	0.37	1.86	1.46
2006									
Min	0	0	0	0.00	0.00	0.00	0.00	-5,624.75	-463.13
Lower quartile	3	0	14	0.03	0.00	0.02	0.00	0.00	0.00

Table 10 continued

	Reported or estimated total stock of tax losses (million €)	Amount of useable tax losses (million €)	Depreciation of deferred tax assets for tax losses (%)	Reported or estimated total stock of tax losses (scaled by total assets)	Amount of useable tax losses (scaled by total assets)	Reported or estimated total stock of tax losses (scaled by revenues)	Amount of useable tax losses (scaled by revenues)	Reported or estimated total stock of tax losses (scaled by EBT)	Amount of useable tax losses (scaled by EBT)
2007									
Median	18	4	73	0.13	0.03	0.13	0.03	0.30	0.08
Upper quartile	53	11	96	0.71	0.10	0.89	0.12	4.80	1.57
Max	2,284	617	100	53.50	1.28	210.63	29.33	3,486.35	68.80
Mean	76	13	58	1.43	0.10	2.90	0.28	-9.88	-2.06
Min	0	0	0	0.00	0.00	0.00	0.00	-325.25	-62.79
Lower quartile	5	0	18	0.03	0.00	0.02	0.00	-0.03	0.00
Median	20	3	78	0.17	0.03	0.16	0.03	0.26	0.06
Upper quartile	60	15	97	1.06	0.13	1.15	0.12	4.98	1.37
Max	12,697	1,054	100	70.78	2.47	1,045.90	95.03	907.78	172.32
Mean	163	22	60	1.40	0.12	9.01	0.61	9.96	1.19
2008									
Min	0	0	0	0.00	0.00	0.00	0.00	-193.30	-25.29
Lower quartile	4	0	19	0.02	0.00	0.02	0.00	-0.96	0.00
Median	17	3	71	0.13	0.03	0.12	0.02	0.20	0.03
Upper quartile	58	13	97	0.80	0.11	0.79	0.12	3.13	0.94
Max	3,267	344	100	77.16	2.13	1,018.83	257.32	730.00	591.16
Mean	84	13	58	1.58	0.12	10.45	1.60	7.33	3.96

Table 11 Unused tax losses in The Netherlands

	Reported or estimated total stock of tax losses (million €)	Amount of useable tax losses (million €)	Depreciation of deferred tax assets for tax losses (%)	Reported or estimated total stock of tax losses (scaled by total assets)	Amount of useable tax losses (scaled by total assets)	Reported or estimated total stock of tax losses (scaled by revenues)	Amount of useable tax losses (Scaled by revenues)	Reported or estimated total stock of tax losses (scaled by EBT)	Amount of useable tax losses (scaled by EBT)
2004									
Min	0	0	0	0.00	0.00	0.00	0.00	-472.97	-3.42
Lower quartile	8	0	0	0.03	0.00	0.02	0.00	-2.30	0.00
Median	21	2	73	0.24	0.00	0.12	0.01	0.10	0.00
Upper quartile	127	11	100	0.56	0.15	0.43	0.07	3.37	0.65
Max	564	137	100	3.33	0.70	192.96	0.56	38.89	38.89
Mean	88	18	59	0.54	0.13	13.21	0.07	-28.61	2.96
2005									
Min	0	0	0	0.00	0.00	0.00	0.00	-9.52	-1.51
Lower quartile	3	0	4	0.02	0.00	0.03	0.00	0.00	0.00
Median	20	3	49	0.18	0.02	0.10	0.02	0.60	0.16
Upper quartile	128	14	100	0.38	0.18	0.33	0.10	3.83	3.13
Max	311	122	100	4.92	0.60	419.75	0.58	10.92	6.28
Mean	68	17	50	0.57	0.12	26.48	0.08	1.27	1.35
2006									
Min	0	0	0	0.00	0.00	0.00	0.00	-9.11	-5.62
Lower quartile	3	0	1	0.05	0.00	0.03	0.00	-1.63	-0.02
Median	31	3	14	0.15	0.06	0.11	0.03	0.17	0.00

Table 11 continued

	Reported or estimated total stock of tax losses (million €)	Amount of useable tax losses (million €)	Depreciation of deferred tax assets for tax losses (%)	Reported or estimated total stock of tax losses (scaled by total assets)	Amount of useable tax losses (scaled by total assets)	Reported or estimated total stock of tax losses (scaled by revenues)	Amount of useable tax losses (Scaled by revenues)	Reported or estimated total stock of tax losses (scaled by EBT)	Amount of useable tax losses (scaled by EBT)
Upper quartile	135	35	93	0.57	0.12	0.28	0.14	3.37	0.97
Max	384	177	100	2.14	0.74	1,149.66	1.36	12.75	5.11
Mean	90	28	41	0.42	0.11	72.11	0.16	0.31	0.59
2007									
Min	0	0	0	0.00	0.00	0.00	0.00	-5.77	-2.92
Lower quartile	3	0	4	0.02	0.00	0.01	0.00	0.00	0.00
Median	35	1	46	0.06	0.01	0.06	0.01	0.14	0.00
Upper quartile	128	37	99	0.49	0.07	0.27	0.05	1.97	0.46
Max	325	149	100	1.81	0.48	300.00	1.86	32.55	5.10
Mean	84	21	52	0.36	0.08	18.96	0.17	2.43	0.63
2008									
Min	0	0	0	0.00	0.00	0.00	0.00	-757.43	-25.84
Lower quartile	2	0	5	0.04	0.00	0.03	0.00	-0.21	-0.04
Median	53	10	35	0.11	0.04	0.08	0.05	0.00	0.00
Upper quartile	128	42	73	0.46	0.09	0.32	0.06	3.99	2.85
Max	306	130	100	3.47	0.38	350.90	0.61	27.24	17.23
Mean	91	29	41	0.47	0.09	23.61	0.07	-46.62	0.54

### Appendix 3: Estimating firms' tax equity based on IFRS financial statements

This appendix contains a numerical example of how firms' tax equity can be estimated using information provided by IFRS financial statements. For explaining the approach, we focus on the balance sheet item "intangible assets".

Assume the following transactions for a firm that is subject to a (domestic) corporate income tax rate of 25 % and has IFRS-equity of EUR 49,875:

- (a) Purchase of software with acquisition costs of EUR 40,000. For IFRS purposes, a useful life of 5 years is used. Tax law requires depreciation over 8 years.
- (b) Development expenses of EUR 1,500 for a prototype that is internally created. For tax purposes, recognition of these expenses is prohibited, whereas IFRS require capitalisation because criteria according to IAS 38.8-23 and IAS 38.51-64 are met.

The above-mentioned transactions induce the following IFRS-tax differences and deferred taxes on a balance sheet item level:

A)	IFRS-book value:	EUR	32,000	(40,000 – (40,000/5))
	Tax value:	EUR	35,000	(40,000 – (40,000/8))
	Deductible temporary difference ( <i>DTD</i> ):	EUR	3,000	
	Deferred tax asset ( <i>DTA</i> ):	EUR	750	(3,000 × 0.25)
B)	IFRS-book value:	EUR	1,500	
	Tax value:	EUR	0	
	Taxable temporary difference ( <i>TTD</i> ):	EUR	1,500	
	Deferred tax liability ( <i>DTL</i> ):	EUR	375	(1,500 × 0.25)

Due to insufficient expected future taxable income, the firm recognises only for the portion of EUR 2,000 of the deductible temporary difference a deferred tax asset amounting to EUR 500 (2,000 × 0.25). For the remaining deductible temporary difference of EUR 1,000, no deferred tax asset is recognised (*unrec\_DTD*). According to IAS 12.81e, the firm has to disclose the amount of deductible temporary differences for which no deferred tax asset is recognised in the balance sheet. Firm's IFRS-equity after the recognition of deferred taxes is EUR 50,000 (49,875 + 500 – 375). Due to the above-mentioned deductible (EUR 3,000) and taxable (EUR 1,500) temporary differences, tax equity is EUR 51,375 (49,875 + 3,000 – 1,500). Recognition of deferred taxes does not affect firm's tax equity.

As a financial statement user, we find the following information in the firm's IFRS account:

Reported IFRS-equity ( $EQ_{IFRS}$ ):	EUR	50,000
Recognised deferred tax asset ( $DTA$ ):	EUR	500
Unrecognised deductible temporary difference ( $unrec\_DTD$ ):	EUR	1,000
Recognised deferred tax liability ( $DTL$ ):	EUR	375

We also know that the firm has limited foreign activities. Hence, we assume that deferred taxes are calculated using the domestic corporate income tax rate of  $\tau = 25\%$ .

Using the approach proposed in Sect. 5.1, the firm's tax equity is computed as follows:

$$\begin{aligned}
 adj\_EQ_{IFRS} &= EQ_{IFRS} - (DTA - DTL) = 50,000 - 500 + 375 = 49,875 \\
 EQ_{Tax} &= adj\_EQ_{IFRS} - (TTD - DTD) = adj\_EQ_{IFRS} - \left[ \frac{DTL}{\tau} - \left( \frac{DTA}{\tau} + unrec\_DTD \right) \right] \\
 &= 49,875 - \left[ \left( \frac{375}{0.25} \right) - \left( \frac{500}{0.25} + 1,000 \right) \right] = 51,375
 \end{aligned}$$

Estimated tax equity is EUR 51,375 and, therefore, consistent with firm's actual tax equity.

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