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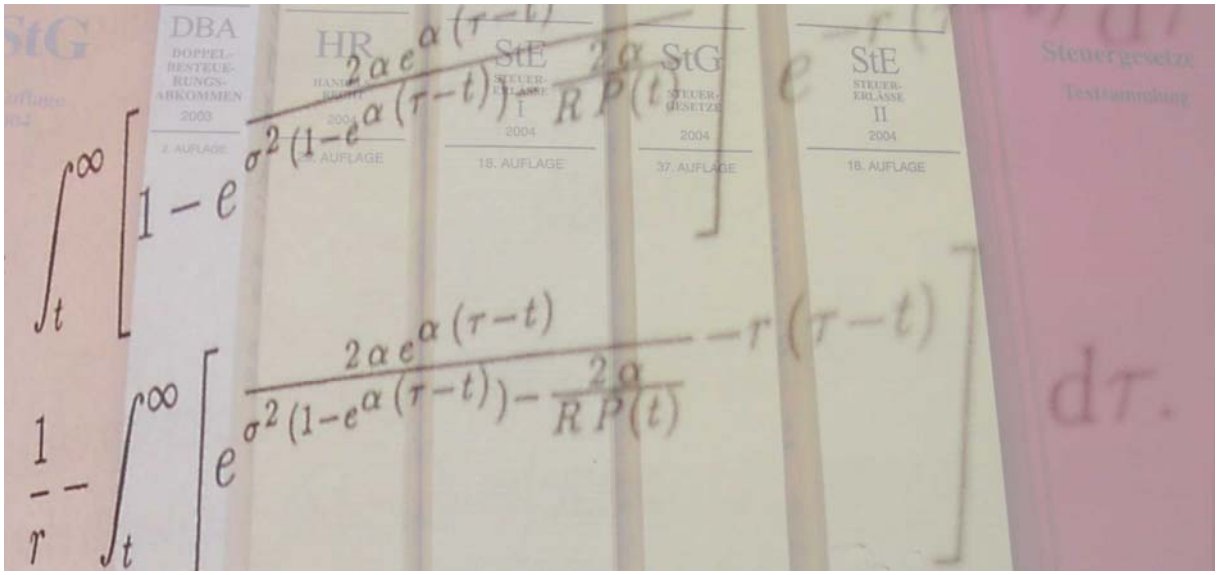

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Cross-Border Group-Taxation and Loss-Offset in the EU
- An Analysis for CCCTB (Common Consolidated Corporate Tax Base) and ETAS (European Tax Allocation System) -

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Cross-Border Group-Taxation and Loss-Offset in the EU - An Analysis for CCCTB (Common Consolidated Corporate Tax Base) and ETAS (European Tax Allocation System) -

Abstract

The European Commission proposed to replace the currently existing Separate Accounting by an EU-wide tax system based on a Common Consolidated Corporate Tax Base (CCCTB). Besides the CCCTB, there is an alternative tax reform proposal, the European Tax Allocation System (ETAS). In a dynamic capital budgeting model we analyze the impacts of selected loss-offset limitations currently existing in the EU under both concepts on corporate cross-border real investments of MNE. The analyses show that replacing Separate Accounting by either concept can lead to increasing profitability due to cross-border loss compensation. However, if the profitability increases, the study indicates that the main criteria of decisions on location are the tax rate divergences within the EU Member States. High tax rate differentials in the Member States imply significant redistribution of tax payments under CCCTB and ETAS. The results clarify that in both reform proposals tax payment reallocations occur in favor of the holding. National loss-offset limitations and minimum taxation concepts in tendency lose their impact on the profitability under both proposals. However, we found scenarios in which national minimum taxation can encroach upon the group level, although in our model the minimum taxation's impacts seem to be slight. Moreover, we identify harmful paradoxes in ETAS due to the tax credit mechanism. Our results can contribute to the current discussion on corporate group tax harmonization within the EU and other economic zones, e.g. the US, and help to anticipate the tax effects of loss-offset restrictions under the respective tax systems.

Keywords: Common Consolidated Corporate Tax Base, corporate taxation, European Tax Allocation System, Formula Apportionment, group taxation, investment, loss carry-forward, loss-offset, minimum taxation

JEL classification: H25, H21, G31

1 Introduction

The lack of cross-border loss-offset and the divergent tax loss-offset regulations of the 27 EU Member States were considered as one of the biggest constraints for multinationals in the European Single Market.[1] While several former proposals and studies of the European Commission favored a standardization of the loss-offset carry-over in the context of the EU-harmonization, current discussions focus on a standardization of the corporate taxation as well as on a standardization of the groups' cross-border loss-offset within the EU.[2] Therefore, working parties of the European Commission actually elaborate the design of a new harmonized corporate taxation concept.[3] Two systems are actually discussed; the Common Consolidated Corporate Tax Base (CCCTB) and the European Tax Allocation System (ETAS).[4]

Numerous descriptive and comparative articles illustrate advantages and disadvantages of the more noticed CCCTB [e.g., Plaesschaert (2005); Commission of the European Union (2003, 2005); Mintz/Weiner (2003); Sørensen (2004); Weiner (2002); Giannini (2002)]. As the allocation factor for the consolidated profits is inherent in the system of CCCTB another line of literature is based on formula apportionment (FA)[5] that consists especially of US-American analyses [e.g. Gordon/Wilson (1986); Musgrave (1984); Hellerstein (1968)]. Based on these experiences many recommendations are available, such as Hellerstein/McLure (2004) who implement a US-style enterprise tax law system in the EU. Several articles deal with distortions caused by a different weighting of the factors payroll, property and sales [e.g. McLure (1980); Goolsbee/Maydew (2000); Gordon/Wilson (1986); Anand/Sansing (2000); Nielsen/Raimondos-Møller/Schjelderup (2001)]. Using the European tax analyzer Jacobs et al. (2005) evaluate and compare effects of CCCTB under IFRS on the effective tax burden of 13 Member States. Fuest/Hemmelgarn/Ramb (2006) analyze the budgetary consequences of an EU-wide common tax base and investigate the effects of allocation to the EU Member States using empirical figures of the German Central Bank.

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[1] Cf. European Commission (2001), SEC (2001) 582, p. 242.
[2] Cf. e.g. European Commission (2007a), Taxud E1 OP/RP, 1st Mach 2007, p. 6. The Academic Advisory Council of the German Federal Ministry of Finance confirms the opinion for EU-wide, uniform loss-offset regulations under CCCTB. Cf. Scientific Advisory Council of the Federal Ministry of Finance (2007), p. 45. The advantages are also discussed; cf. Scientific Advisory Council of the Federal Ministry of Finance (2007), p. 68.
[3] Cf. European Commission (2007b), Taxud E1 FF, 28. June 2007, p. 6.
[4] Consequently ETAS has been included in the Commission's work programme. Cf. Commission of the European Communities (2003), p. 10.
[5] Formula apportionment (FA) became a part to US Tax Law in the early 20th century, Cf. Ford (1933); Hellerstein (1968), pp. 488-490; Hellerstein/McLure (2004), p. 208.

Another concept is the relatively unknown ETAS designed by Hernler (2004). In specific points similar to the proposal of the Home State Taxation[6], ETAS financial and tax autonomies of the states are maintained and therefore ETAS is considered to be a possible alternative for the transnational taxation of multinational corporations [e.g. Commission of the European Communities (2003)]. Hernler (2004) limits the research of ETAS to a comparative description with respect to different incomes. One recommendation; similar to the ETAS approach that is currently being discussed by the Academic Advisory Council of the German Federal Ministry of Finance; is the "principle of domicile with separate entity accounting" [Scientific Advisory Council of the Federal Ministry of (2007)].[7,8]

Analyses of loss-offset under CCCTB are performed by Gérard/Weiner (2003) and Oestreicher/Koch (2008). Gérard/Weiner (2003) analyze a cross-border loss-offset within the CCCTB under uncertainty and compare the occurring effects with the impacts of the current tax system. Inter alia, they find out that tax competition under formula apportionment increases with lower tax rates and decreases with higher tax rates, respectively. In their analysis they highlight that within a cross-border loss-offset under formula apportionment the effects due to the realization of investments are more sensitive with respect to the tax rates than under Separate Accounting. However, this analysis is limited to an interpersonal cross-border loss-offset. That is why the investigation neither considers inter-temporal loss-offset nor specific minimum taxation within a defined planning horizon. Oestreicher/Koch (2008) investigate the impact of an implementation of the CCCTB and of possible methods for achieving an EU-wide loss-offset for multinationals on effective corporate average tax rates. Therefore, they apply a comparative-static micro simulation approach within multi-period planning. The current existing loss-offset rules; as they are integrated in the tax systems in Denmark, Italy or Austria; are included in their analysis. However, temporal restrictions or minimum taxation concepts are not analyzed. For ETAS, an analysis with respect to loss-offset restrictions or considered minimum taxation regulations has not been provided.[9]

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[6] Cf. Lodin/Grammie (1999) and Lodin/Grammie (2001).
[7] Cf. further Schreiber, 2008, pp. 120-123.
[8] In comparison to the Separate Entity Accounting ETAS does not distinguish between residence principle and principle of source. That is why different effects occur under ETAS. Furthermore the national determination of the taxable income remains for all countries.
[9] The impact of investment incentives on loss-offset rules is discussed rather infrequently within an international context. Several papers analyze the impact of a limited loss-offset on the cost of capital, on investments and/or financial incentives [Barlev/Levy (1975), Auerbach (1986), Majd/Myers (1986), Auerbach/Poterba (1987), Lyon (1990), Lund (2000)]. Studies on American minimum taxation attest to their distortional and under certain circumstances inhibitory impact on investment [Schnee (2004), Dworin (1987), Chorvat/Knoll (2003), Lyon (1997), Bernheim (1989)].

A comprehensive economic analysis and quantitative investigation that integrates an intertemporal loss-offset in form of a limitation in time or a minimum taxation in a multi-periodic model for a group has neither been made for the CCCTB system nor for the ETAS. To close this gap, a comprehensive economic and quantitative investigation of CCCTB and ETAS including intertemporal cross-border loss-offset in contrast to selected loss-offset and minimum taxation regulations of the currently mandatory tax systems is subject of the following analysis. This analysis is not performed to emphasize weak points of ETAS or CCCTB. The aim of this investigation is to devise the effects of the analyzed tax reform systems as they are currently elaborated. We illustrate the two proposals in a formal and descriptive way in section 2. In section 3 we introduce our model framework and provide a multi-period analysis of marginal investment decisions of a multinational group in section 4. We use Separate Accounting as our reference system for the subsequent analysis in a dynamic capital budgeting model. We show that mandatory loss-offset limitations in either group taxation concept become less weighty, which is also a result of the cross-border loss-offset. In contrast to CCCTB under ETAS two possibly opposite tax effects and thus tax paradoxes can occur due to the tax credit mechanism.

Although cross-border group taxation is mandatory within the USA, the following results can contribute to US tax reform discussions as well, since such group taxation is only possible for federal tax purposes. On State level the tax payer has to face the same framework as the EU Member States and non-existing cross-border group taxation.

2 Group taxation proposals

2.1. Common Consolidated Corporate Tax Base (CCCTB)

CCCTB is a system based on one common consolidated tax base for multinational entities (MNE) operating transnationally in the European Union. European tax reformers intend to include a new tax base that is not founded on national tax law. All Member States have to cooperate on determining this tax base. The intention is to apply CCCTB uniformly in all Member States and to eliminate country-specific differences.[10]

Various working parties of the Commission are currently examining what conditions have to be met in order to qualify for CCCTB. However, it has already been agreed that it shall apply to the regulations for a group of qualified companies that are domiciled in the participating

[10] Cf. Cnossen (2001), pp. 532-535; European Commission (2001), p. 403; Mintz/Weiner (2003), pp. 695-697; Plasschaert (2005), pp. 64-67.

Member States. One working group is currently discussing the requirements that have to be fulfilled by participating corporations and which subsidiaries will be apportioned to the consolidated companies.[11] The EU Commission favors the introduction of an option to be taxed under CCCTB. In any case, the corporations that are eligible must be defined.[12]

To determine the proportionate tax base, the profits are calculated according to uniform European regulations for each affiliate.[13] Subsequently, the affiliates' profits are consolidated to yield an amalgamated figure. The next step is for this figure to be apportioned to the Member States using a yet to be defined key.[14] While this restricts the Member States' tax autonomy, they still determine their own tax rates. The tax burden is calculated by multiplying the tax rate with the proportionately apportioned CCCTB. The majority of issues specific to CCCTB, notably consolidation and apportionment, have not been resolved so far. Should US-style formal apportionment be implemented, the factors payroll, property and sales would become very significant.[15] Consolidation is expected to be based on IFRS, modified by tax aspects. Working groups have been established at the EU level to focus exclusively on drafting components of CCCTB. [16]

Besides the general requirements some specific questions remain unanswered. Amongst these questions e.g. is the treatment of losses. In a meeting of the “Common Consolidated Corporate Tax Base Working Party” (CCCTB WP) the following procedures were discussed:[17]

a) Losses from periods before the entry to the CCCTB-multinational can only be offset pro-rata against group gains. The maximum clearable loss is the apportioned part of the common tax base.

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[11] Cf. European Commission (2006), p. 6.
[12] Cf. European Commission (2007), p. 2.
[13] Moreover, it is still unclear whether “non-business income” (e.g., interest or dividends) is supposed to be included in the loss compensation or taxed separately. Several authors discuss the differentiation between business and non-business and their eventually negative effects. Cf. Weiner (2005), p. 22, Agúndez-García (2006), pp. 17-18, Spengel/Wendt (2007), Sureth/Üffing (2008). For the following consideration we assume non-business income is included in the consolidated business income so that it is not allocated directly to the respective business entity. This proceeding avoids distortions caused by different tax treatment of interests within the different tax reform proposals. The working group for the elaboration of formula apportionment also tends towards a unique tax treatment of business and non-business income due to the increase of the proposal’s complexity and the possibilities of profit shifting. Cf. European Commission (2007c), p. 7. Furthermore, we avoid another assumption about the height of the interests that are included in the assumed cash flow. Due to the research question and the former explained assumptions we can abstract from a differentiation of the business and the non-business income.
[14] Cf. European Commission (2006), pp. 7-9.
[15] E.g., cf. Goolsbee/Maydew (2000), p. 125; European Commission (2001), p. 51; Eggert/Schjelderup (2003), pp. 439-446; Wellisch (2004), pp. 24-41. See section 3.2.
[16] Cf. European Commission (2006), pp. 4-5.
[17] Cf. European Commission (2007a), p. 6.

b) Group-losses remain in the group level and are not apportioned to the companies. Therefore, remaining losses have to be carried forward on the group level.
c) In case of a leaving company, the pro-rata remained losses cannot be apportioned to the company but remain on the group level. (This was the tendency of the discussion, but still two experts vetoed.)
d) How to deal with remaining losses in case of a liquidation of the group has not yet been clarified. Whereas few experts are pro-apportionment of the final loss to the diverse companies, others favor an addition to the parent company.

According to these and other documents, we will close further loopholes with assumptions.

2.2 European Taxation Allocation System (ETAS)

The European Tax Allocation System is a proposal to harmonize the European Union's international corporate taxation.[18] The system is based on the current tax systems across the EU and in specific points similar to the Home State Taxation. If a group of affiliated companies satisfy certain conditions, the ETAS holding can opt to include its subsidiary or subsidiaries in the ETAS group. As fundamental prerequisites the parent company and subsidiaries have to be domiciled in and managed from an EU Member State. In addition, the companies must prepare their financial statements by the same closing date. Also, the parent company must hold; indirectly or directly; at least 50% of equity or voting rights in the subsidiary.[19]

In the first step the taxable income and corporate tax liability are determined by the legal tax requirements of the Member State of domicile. In the second step the business incomes, which are separately determined in each country in accordance with national tax law, are added.[20] This so-called "EU tax base" represents the total tax base of the group for the considered tax assessment period, and multiplying this amount with the respective tax rate of the state of domicile leads to the multinational corporation's EU base tax. The corporate tax the subsidiaries have to pay to the respective Member State has to be imputed against the EU Base Tax. Any shortfall in taxes must be paid to the parent company's country of domicile. Any excess tax paid forms what is known as an EU tax credit carry-forward (TCCF), which is credited towards the corporation's tax burden in subsequent years. As this

[18] Cf. European Commission (2003), p. 10.
[19] Cf. Hernler (2004), p. 247.
[20] Cf. Hernler (2004), p. 247.

TCCF can be carried forward unlimitedly within the affiliated group, it can be entirely compensated by national corporate taxes of the following years.[21,22]

Generally, the Member States' diverse loss-offset rules remain due to the legislative autonomy of the respective Member State. Under ETAS, losses have to be differentiated with respect to the date and to the place of origin. If losses occur before the subsidiary opts to ETAS, the losses will not be included in the EU tax base, but carried forward under the carry-forward provisions of the subsidiary's Member State. In contrast, prior losses at the holding's level encroach upon the EU tax base. Subsequent occurring losses of the subsidiary are determined in accordance to the mandatory tax law of the state of residency.[23] As only the local total income of the subsidiary and likewise of the holding is considered in the EU tax base, no local loss-offset regulation affects the EU tax base directly. From the local loss-offset regulations detached EU loss-offset is the next step for the calculation of the EU tax base.

As this proposal is not elaborated in full detail, some questions remain unanswered. One example of a moot question is the treatment of the loss-offset on EU tax base level. E.g., how are losses and loss carry-forwards going to encroach upon the calculation of the EU tax base? One possibility is an unlimited loss carry-forward offset of both the subsidiary and the parent company. Another option could be to adopt the respective loss-offset regulation of the holding's Member State.[24] In both cases revenue offices have to record the loss carry-forwards of each company and each country separately, because the offset-regulations are not necessarily identical.

3 Model

The simulation model focuses on tax effects on a cross-border real investment of multinationals under the actual tax regimes with Separate Accounting and under the two aforementioned group taxation proposals. Under the assumption that multinationals have to accept the mandatory tax regulations, we do not focus on possible adjustment activities within the company as investing in another project; but on the impact of taxation on the

[21] Cf. Hernler (2004), p. 248; Hernler (2004), p. 394.
[22] By this design the calculation of an apportionment formula is unnecessary since no tax base needs to be apportioned.
[23] Hernler only mentions loss carry forwards in his papers. However, due to the maintaining of the respective national tax law, we assume that different loss offset rules – and thus also minimum taxation concepts – are also applied under ETAS.
[24] Cf. Hernler (2004), p. 250. This is the mentioned option of Hernler.

profitability of this chosen real investment.[25] Furthermore, we refer to the impact of the concepts on the tax burden of the holding and subsidiary and analyze a possible tax payment reallocation between both entities. Therefore, we use a multi-period dynamic capital budgeting model which allows us to investigate different settings of group taxation as well as diverse loss-offset regulations.

In the following analysis, we assume a multinational corporation which consists of a parent company that intends to invest a certain amount of money (equity), denoted by I_0 in a real investment project in the form of a foreign subsidiary. The subsidiary domiciles in an EU Member State denoted by S whereas the parent company´s domicile is in another EU Member State denoted by P. Both companies are separately incorporated and we assume both companies meet the demands for an option for either group taxation concept.

The multinational entity (MNE) earns cash flows from the investment in each period of the considered planning horizon. While the holding earns constant positive cash flows the subsidiary generates increasing cash flows starting with negative cash flows. To cover various time structures of cash flows but keep comparable investment scenarios we assume identical pre-tax future values. Under these assumptions, the analysis provides in-depth insight into the interdependencies of cash flow pattern, loss-offset restrictions and group taxation.

For the sake of simplicity we assume that the determination of the business income corresponds to the business income under current tax law, so that there are no valuation differences.[26,27,28]

The depreciation serves as proxy for all non-cash accruals in each tax system, so no further non-cash accruals have to be considered. Moreover, we assume identical depreciation regulation in all countries over the time horizon T. Precisely, we assume linear depreciation and abstract from country-specific rules for the determination of taxable income.

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[25] The impact on corporate investment decisions is beyond the papers topic. But based on the results of the profitability changes conclusions about changes in the investment decisions can be assumed with reservations.

[26] Jacobs et al. (2005) analyze that the tax bases will be broadened in the Member States, if IFRS apply. Cf. Jacobs et al. (2005).

[27] Interrelationships between the holding and the subsidiary are not presumed, so that consolidation has not been taken into consideration.

[28] For an implementation of either proposal unique financial reporting standards need to be integrated. Whereas under CCCTB one tax base is calculated at group level under ETAS tax competition by tax base designs is possible. The consideration of this aspect is beyond the papers topic.

Moreover, we abstract from taxation at shareholder level of the parent company in our analysis and focus on the corporate level only. As we assume heterogeneous shareholders (individual and institutional) of the investing corporation, it is not possible to find one representative tax rate. Instead, the shareholder will have various personal tax rates. Against this background, abstracting from the shareholder level is a justified simplification for our research question and enables us to concentrate on major impact of minimum taxation at the corporate level. We also exclude dividend distributions to the holding and disregard further economic integration between holding and subsidiary. This approach allows us to abstract from further aspects of financial decisions such as thin capitalization rules or transfer pricing within related firms and to isolate effects from loss-offset restrictions in groups.

As a perfect capital market is assumed, the pre-tax debit interest rate for borrowing is identical to the pre-tax credit interest rate i.[29] The return from the real investment is reinvested at the pre-tax market rate of return in the subsidiary. Thus, the decision is assumed to be irreversible. We assume that both the investment (subsidiary) as well as the holding will be liquidated at the end of the time horizon t = T. Furthermore, we presume the multinational's liquidation at the carrying value and therefore abstract from capital gains taxation. Additionally, as stated under the EU Parent/Subsidiary Directive, withholding tax is not deducted from earnings distributed by the subsidiary to the holding, and we abstract from withholding tax in T.[30]

As a criterion for identifying tax effects we chose the Baldwin yield,[31] which allows us to draw conclusions about the profitability (discrimination) of the real investment under the analyzed group taxation and diverse loss-offset concepts. For the calculation both future values from the capital budgeting technique will be added.

Furthermore, Separate Accounting (SA) is chosen as the comparison value and reference system to evaluate possible distortions caused by the respective tax proposal concept. Due to the fact that currently cross-border loss-offset possibilities between the business entities

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[29] Hence, interest income is fully taxable.

[30] See Section 5 (1) of the Parent/Subsidiary Directive.

[31] Cf. Baldwin (1959), pp. 98-104. The Baldwin yield is denoted by $r = \left(\sqrt[T]{\frac{FV_{cash\_inf\,low}}{PV_{cash\_outflow}}} - 1 \right) * 100$ with r : Baldwin rate, T : time horizon, FV : future value and PV : present value.

only exist in a few Member States[32], an interpersonal loss-offset is not assumed under Separate Accounting.

We start with the following setting:

Interest rate	$i = 0.1$
Investment amount = own means	I_o = €8,000,000
Tax rate in the holding's country of domicile	$\tau_P = 0.3$
Tax rate in the subsidiary's country of domicile	$\tau_S = 0.3$
Depreciation	D_t^S = €800,000, linear
Cash flow generated in the holding in t=1	$CF_{P,t=1}$ = €1,300,000
Cash flow generated in the subsidiary in t=1	$CF_{S,t=1}$ = -€500,000
Periodic alteration in cash flows (holding)	g^P = €0
Periodic growth amount of cash flows (subsidiary)	g^S = €500,000

Table 1: Overview of the assumptions of the deterministic analysis

3.1 Considered loss-offset concepts

As we have a variety of loss-offset limitation rules in the EU, we focus on the following major concepts in the subsequent analysis:

i) Unlimited loss-offset - loss-offset to a tax base of zero, unlimited loss carry-forward.[33]

ii) German minimum taxation - unlimited loss-carry-forward, limited loss offset to the maximum of €1 million plus 60% of the positive income.[34] The possibility of loss carry-backs, as implemented in Germany, is ignored for reasons of simplicity. It can be easily shown that its impact on the profitability of an investment is very low[35] and only a few countries use this type of loss-offset rule.

[32] Interpersonal loss offset possibilities exist in Austria, Denmark, Italy and France. The prerequisites differ and to some extent are highly very restrictive.
[33] Actually 12 member states of the EU use this regulation for their treatment of losses. Among these are Belgium, Cyprus Republic, Denmark, France, Great Britain, Greece, Hungary, Ireland, Luxemburg, Malta, Sweden and Romania.
[34] Cf. § 10d (2) EStG (German income tax code).
[35] According to the analysis by Haegert, L./Kramm, R. (1977), p. 209 as well as Dwenger (2008), p. 20.

iii) Austrian minimum taxation - loss-offset limit of 75% of the positive income.[36] We abstract from the corporate minimum tax [e.g. €6,000 for a Societas Europaeas (SE)] since the small amount barely affects our results.
iv) Polish minimum taxation - 50% of the originally incurred loss can be offset, losses expire after five years.[37] Since we include and analyze loss expirations in cases v) and vi) we isolate the minimum taxation from the loss expiration and consider only the loss-offset limitation.
v) Loss expiration after five years.[38]
vi) Loss expiration after eight years.[39]

Integrating all mentioned regulations into our basic tax framework, we can identify the effects of selected types of loss-offset regulations and minimum taxation concepts as well as group taxation. Thereby, we simultaneously abstract from the effects of further tax rules in the corresponding national tax codes, which enables us to concentrate on the mechanisms caused by loss offset restrictions within multinational groups.[40]

In the literature a valuation of a remaining loss carry-forward is discussed in detail.[41] In contrast to these approaches we abstract from a positive valuation of the remaining loss at the end of the planning horizon and set it equal to zero. Evaluating the remaining loss carry-forward with 0% is possible due to a termination of economic activity. Facing a tightening of

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[36] § 2 (2b) ÖEStG (Austrian income tax code) distinguishes between an offset limit and a carry-forward border. The former is applied to non-compensable losses (§ 2 (2b) no. 2 ÖEStG), where 75% of these losses can only be offset with positive earnings from the same income source. The rest must be carried forward. All compensable losses are clearable against 75% of the positive income (Section 2 para 2b no. 1 ÖEStG). This is referred to as the carry-forward border. In the following analysis only compensable losses are considered.

[37] As the loss carry-forward limitation is considered separately, the Polish system is reduced to the minimum taxation only.

[38] Eight Member States limit the loss carry-forward to five years; Bulgaria, Czech Republic, Italy, Latvia, Lithuania, Poland, Slovakia and Slovenia.

[39] Eight years serve as a proxy for the remaining countries with different limitation of expiration years; Portugal 6 years, Estonia 7 years, Netherlands 9 years, Finland 10 years and Spain 15 years.

[40] To be able to isolate effects due to the minimum concepts we ignore that a loss offset-limitation may be interdependent with other tax rules of the respective country. E.g., the level of the American Corporate Alternative Minimum Tax (CAMT) is influenced by factors such as engaged subsidies, depreciation and others.

[41] E.g. Niemann (2004c), pp. 376-377 Knirsch (2005), pp. 70-74, Haegert/Kramm (1977), p. 205, Barlev/Levy (1975), p. 178, Mintz (1988), p. 227, Schneider (1988). Although these studies use different valuations, e.g. 20% of the remaining loss carry-forward, these analyses always assume a constant fraction that reflects possible future tax saving and do not illustrate the impact of different final tax values for diverse loss-offset or minimum taxation concepts. Assuming a fixed value for all considered concepts i) to vi) would neglect this important aspect as the different los-offset regulations lead to different purchase prices that a potential buyer is willing to pay for a remaining loss. Then, therefore we would have to build a rank order of the impacts of the respected loss-offset regulation. Without any data this assumption can´t be made. Furthermore an evaluation of 0% for all concepts seems to be the simplest and non-distortive solution.

the shell purchase regulations in several countries[42] it is appropriate to refrain from a positive valuation of remaining loss carry-forwards.[43]

3.2 Allocation Factor

Under CCCTB, it remains unclear how in the end the consolidated business income will be allocated to the Member States. A presumable proposal for formula apportionment in the EU is based on the Canadian or US tax law, so that the allocation depends on sales, property and (or) payroll.[44] Currently authorities of the European Commission are discussing the form of allocation of the tax base to the EU Member States. A definite decision has not yet been reached. A promising approach is a formula based on company-specific data and on the three factors payroll, property and sales.[45,46,47] The weighting of the factors is not defined by the authorities. However, an equal weighting of each factor seems to be appropriate for the working group specially founded to elaborate the allocation for a CCCTB.[48] Therefore, we choose the following formula apportionment for the investigation of the different scenarios:

(1.1) $$\theta^{P} = \left(\frac{1}{3} \frac{\text{sales}^{P}}{\text{sales}^{PS}} + \frac{1}{3} \left(\frac{1}{2} \frac{\text{payroll}^{P}}{\text{payroll}^{PS}} + \frac{1}{2} \frac{\text{employees}^{P}}{\text{employees}^{PS}} \right) + \frac{1}{3} \frac{\text{property}^{P}}{\text{property}^{PS}} \right)$$

(1.2) $$\theta^{S} = \left(\frac{1}{3} \frac{\text{sales}^{S}}{\text{sales}^{PS}} + \frac{1}{3} \left(\frac{1}{2} \frac{\text{payroll}^{S}}{\text{payroll}^{PS}} + \frac{1}{2} \frac{\text{employees}^{S}}{\text{employees}^{PS}} \right) + \frac{1}{3} \frac{\text{property}^{S}}{\text{property}^{PS}} \right)$$

with

θ^{P} : allocation factor for the holding,
θ^{S} : allocation factor for the subsidiary,

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[42] E.g. § 8b KStG (German Corporate Income Tax Act). Further shell acquisition regulations can be found in Belgium, Denmark, Great Britain and Netherlands, see Mennel/Domann (2008).
[43] To abstract from effects caused by remaining loss carry-forwards in T in a deterministic analysis the relevant parameters (cash flow time structure, time horizon etc.) have to be set correspondingly.
[44] In the US tax law the factors payroll, property and sales are of particular importance. The common "Massachusetts Formula" provides a valuation of these three factors in equal parts. In contrary the Canadian tax law only integrates the factors payroll and sales. However, the respective factors may depend on the branch of industry. Cf. Weiner (2005), p. 25. Whereas the Canadian tax law provides a unique approach of formula apportionment, the American UDITPA (Uniform Division of Income for Tax Purpose Act) that regulates the apportionment is not obligatory. The states can autonomously decide about the weighting of formula apportionment, so that it is possible only to opt for one factor. Some US-States use sales as single allocation factor. Cf. Wildasin (2000), p. 429. Several authors analyze the effects and distortions due to the weighting of the different factors [e.g., McLure (1980), Goolsbee/Maydew (2000); Wellisch (2004)].
[45] Cf. European Commission (2007c), (CCCTB/WP060\docen, Taxud TF1/GR/FF, 13. November 2007, p. 6.
[46] Eichner/Runkel (2008) show in their Paper, that including the sales factor weakens the sum of fiscal external effects and improves the efficiency of corporate tax rates by decreasing the distortions of the international taxation, p. 586.
[47] The working group for the elaboration of the allocation factor proposes the factors that should be integrated in the formula apportionment for CCCTB in detail. Cf. European Commission (2007c), pp. 7-15.
[48] Cf. European Commission (2007c), p. 6.

P : holding's factor,
S : subsidiary's factor.

Within the following investigation we use the data of large manufacturing companies (viz., turnover in excess of €50M) chosen from the BACH database.[49] To analyze the different scenarios initially two EU Member States; Germany and France; are selected.[50] The BACH database is based on national databases and contains some disadvantages for reasons of comparability and for analyzing the CCCTB.[51] However, for simplicity reasons the database allows us to draw general and approximate conclusions about the discriminating and subsidized effects of CCCTB in comparison to Separate Accounting and ETAS. Inserting the data generated from the BACH database we obtain the following allocation factors for the Member States Germany ($\theta^P = 0.5562$)[52] and France ($\theta^S = 0.4438$).[53] For simplicity reasons, these amounts of weighting are assumed for the overall planning horizon and for all considered loss-offset limitations.[54] In the analyses' results we refer briefly to a change in this parameter.[55]

3.3 Considered Basic Scenarios

In the following analysis, we investigate the selected loss-offset regulations i) to vi) in two different basic scenarios.

Scenario I:

In the holding's Member State we do not presume any loss-offset limitations or minimum taxation. Occurring losses do not lead to an immediate tax refund but can be carried forward unlimited into future periods. However, in the subsidiary's Member State we integrate the selected loss-offset rules i) to vi).

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[49] BACH is a database containing harmonized annual accounts statistics of non-financial enterprises for 11 European countries, Japan and the US. Cf. http://ec.europa.eu/economy_finance/db_indicators/db_indicators8648_en.htm.

[50] Within the sensitivity analysis we investigate further Member States, whose data is available in the BACH database. The data can be seen in Appendix 1.

[51] E.g., the database principally includes non-consolidated, national data; the national balance sheets are harmonized, but not determined according to uniform taxable income; the selected companies do represents neither a complete survey nor a statistically representative sample.

[52] $\left(\frac{1}{3}*\frac{497{,}186}{801{,}537}+\frac{1}{3}*\left(\frac{1}{2}*\frac{15.6}{28.3}+\frac{1}{2}*\frac{1{,}117}{1{,}843}\right)+\frac{1}{3}*\frac{13.1}{27.9}\right)= \theta^P = 0.5562.$

[53] $\left(\frac{1}{3}*\frac{304{,}351}{801{,}537}+\frac{1}{3}*\left(\frac{1}{2}*\frac{12.7}{28.3}+\frac{1}{2}*\frac{725}{1{,}843}\right)+\frac{1}{3}*\frac{14.8}{27.9}\right)= \theta^S = 0.4438.$

[54] A shifting of the weighting is imaginable. For simplicity reasons we assume an identical allocation factor for the considered planning period.

[55] Since the research question is not to find the best allocation factor, it is appropriate to assume a fix formula for the time horizon and refer to possible impacts in case of a parameter change.

Scenario II:

In a second scenario the effects of the considered loss-offset limitations and minimum taxation concepts are applied at the holding's level, whereas no loss-offset limitation is integrated in the tax law of the subsidiary's domicile. We therefore assume that occurring losses at the subsidiary's level can be carried forward unlimitedly into subsequent periods.

Since full details of both proposals have not been outlined yet, further fundamental components of the concepts remain unknown. We therefore make appropriate assumptions that allow us to identify and generalize the effects from loss offset restrictions.

- **CCCTB:** If the subsidiary opts for CCCTB, the applicable national loss-offset regulations are not applied, but the unitary loss-offset rules at group level are adopted. We therefore include a loss-offset at the group level that is currently favored by the European Commission and the Academic Advisory Council of the German Federal Ministry of Finance.[56] Thus, the tax base calculated by the group's business income less an EU-wide unitary, clearable group loss-offset is then apportioned to the business entities.

  For our analysis of basic scenario II we presume diverse loss-offset regulations at the holding's level and an unlimited loss carry-forward in the subsidiary´s state of domicile. Therefore, we investigate the selected concepts i) to vi) for the CCCTB-group.
- **ETAS:** Under ETAS, the different national tax systems of the EU Member States are maintained, so that it is necessary to differentiate between the holding's and the subsidiary's level with respect to the loss-offset regulations. The treatment of the prepaid local tax of the subsidiary has not been detailed until now. Hernler assumes the prepaid local taxes of the subsidiaries to be credited entirely against the EU Base Tax. However, Hernler also mentions a limitation of the EU tax credit.[57] For simplicity reasons, we assume an unlimited credit against the EU base tax. In our scenarios we also presume an unlimited EU tax credit carry-forward. We additionally assume that in the following year the EU tax credit carry-forward can be credited initially against the subsidiary's local tax burden.

  Thus, the tax credit is

[56] Whereas the European Commission proposes a loss-offset at group level, the Scientific Advisory Council of the Federal Ministry of Finance approves EU-wide unitary loss-offset regulations. Cf. European Commission (2007), p. 6; Scientific Advisory Council of the Federal Ministry of Finance (2007), p. 45.

[57] Cf. Hernler (2004), p. 250. If the taxes the subsidiary paid to its country of domicile cannot be credited entirely against the group's tax burden, the multinational's tax burden would generally be higher.

a) either fully utilized and leads to a remaining positive tax liability that has to be paid to the holding's Member State,
b) exactly 0, or
c) partly utilized and the remainder can be carried forward.

If the amount that may be carried forward cannot be entirely offset, the remainder can be compensated in a further step up to the amount of the EU base tax at group level. The remaining tax burden has to be paid to the holding's Member State of domicile. Otherwise, if the remainder exceeds the group's tax burden, the remaining amount is carried forward to the following periods until the tax credit carry forward is fully utilized.[58]

4 Analysis

4.1 Analysis of Basic Scenario I

Determining the Baldwin yields under the given set of assumptions, we achieve increasing profitability (+0.32%) for CCCTB and ETAS in comparison to SA due to the transnational loss-offset, whereas the considered loss-offset limitation rules become less important within the proposals.[59]

Under SA the different loss-offset regulations in the subsidiary´s state have an impact on the subsidiary's future value and hence, on the group Baldwin yield. A minimum taxation or loss-offset limitation decreases the future value and therefore the Baldwin yield of the subsidiary. The most significant negative impact can be seen in case of loss expiration after 5 years (-0.261% in comparison to asymmetric taxation), followed by the Austrian concept (-0.018%) and the German concept (-0.01%).[60,61]

Furthermore, in case of identical tax rates both proposals show identical Baldwin yields for all considered loss offset designs.[62] The reasons for these outcomes differ depending on the considered tax reform proposal. Based on our assumptions of an unlimited loss-offset in the holding´s state and with an option for CCCTB, the holding's state rules are mandatory for the

[58] This proceeding corresponds to the proposal of ETAS. Cf. Hernler (2004), p. 249.
[59] See Appendix 2.1 for Baldwin yields.
[60] See Appendix 2.1 for Baldwin yields.
[61] Since the research question of this paper is not the impact of the different loss-offset regulations itself, no further consideration of the difference is made. But for information about diverse impacts of the respective concepts on corporate investment decisions see Dahle/Sureth (2008).
[62] See Appendix 2.1 for Baldwin yields.

affiliate as well. Therefore, only national regulations of the holding affect the result and no loss-offset limitation occurs at all. In contrast, under ETAS the subsidiary's national loss-offset or minimum taxation regulations are of importance, as the overall tax burden can be affected by the taxes the subsidiary has to pay to its Member State (EU tax credit). Due to the EU tax credit the taxes the subsidiary already paid are credited against the group's tax burden.[63] This result shows that it is in fact possible for the multinational corporation to avoid harmful minimum taxation concepts or prejudicial loss-offset regulations at the subsidiary's level by opting for either unitary group taxation concept.

4.2 Analysis of Basic Scenario II

In the second scenario, no loss-offset limitation applies in Separate Accounting because only positive cash flows are assumed at the holding's level. Therefore, all concepts achieve the same results and the determined Baldwin yield is identical to the unlimited loss-offset limitation (11.867%)[64]. The Baldwin yields under ETAS and CCCTB are also identical as seen in scenario I already and thus, are greater than under Separate Accounting due to the transnational loss-offset (12.187%).[65]

Under CCCTB a loss-offset limitation is generally possible due to the holding´s tax regulation that is mandatory for the whole group. However, under the given assumptions for CCCTB the mandatory loss-offset limitation does not apply due to the fact that the high holding´s cash flow can be offset within the initial periods of our planning horizon against the subsidiary´s loss.

Hence, no limited loss carry-forward emerges at all [concepts v) und vi)] or the business income is too small to release a minimum taxation [concepts ii) and iii)]. In this regard all considered concepts achieve an identical Baldwin yield of 12.187%. The Polish concept's design linked to the initially occurring loss instead of the business income leads to a small negative impact on the Baldwin yield (-0.003%). Only a closer look at the following decimal places indicates another minimal negative impact of the Austrian concept (-0.00027%).

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[63] Relating to our made assumptions the EU base tax is greater than the minimum taxation that has to be paid to the subsidiary's Member State. In case that the EU base tax is lower than the minimum taxation concepts, it can prejudicially affect the multinational's tax burden and can also lead to discriminating interest effects. Hence, the multinational corporation has to pay higher taxes.
[64] See Appendix 2.1 for Baldwin yields.
[65] See Appendix 2.1 for the analysis results of scenario II.

The same results can be found for ETAS. Since no loss-offset limitation in the subsidiary´s state of domicile is ruling, the EU tax credit for all considered concepts are the same and can be fully credited against the group's tax burden.

We can state that with identical tax rates and losses in the subsidiary both proposals lead to identically increasing profitability in contrast to SA. Depending on the chosen parameter, loss-offset limitations loose their impact irrespective of where they are mandatory.

4.3 Influence of the group taxation proposals on the tax allocation

As the tax reform proposals will be under a severe inspection of all EU Member States, another aspect that has to be considered is the tax allocation between holding and subsidiary and a possible impact on national tax revenue. Although this consideration is limited on the made assumptions, especially in terms of the formula apportionment, first insights can be recovered by analyzing the tax burden and payments for our modeled multinational. By analyzing the tax liability in the partial model and assuming that the investors do not adjust their investment decisions in face of the tax reform we can draw conclusions about a possible tax reallocation. We therefore investigate the shift of tax payments between the holding's and the subsidiary's country for basic scenario I.[66]

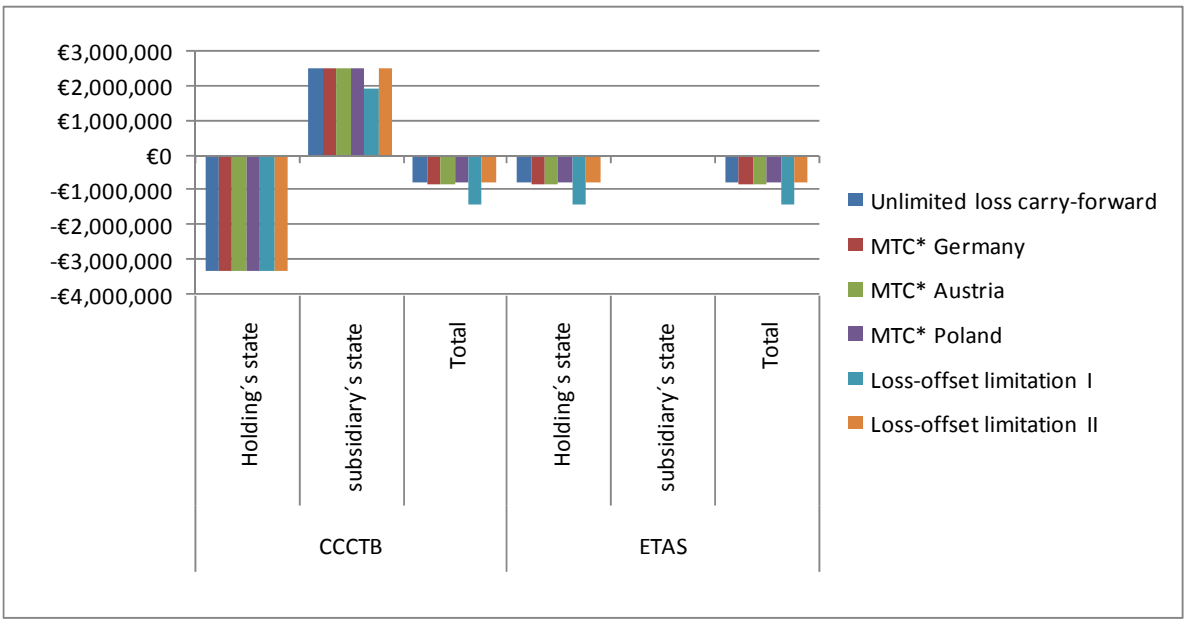
In both scenarios ETAS and CCCTB achieve identical Baldwin yields but show different tax payment allocation of holding and subsidiary. In comparison to SA the Baldwin yields increase, due to decreasing tax liabilities.[67] Figure 1 shows the difference in tax payments in comparison to SA for the holding, the subsidiary and the total tax burden of scenario I.

The figure shows, the multinational's total tax burden decreases under both proposals and with regard to the different loss-offset limitations from approximately €0.784M to €1.4M.[68]

Under CCCTB the subsidiary pays considerably more taxes in comparison to SA, whereas the holding´s tax liability decreases (cf. figure 1). This result significantly depends on the chosen allocation factor.[69] By choosing another allocation formula the differences could

[66] Identical main results are true for basic scenario II.
[67] This result is restricted by our assumptions, especially by the chosen identical tax rates.
[68] For absolute numbers see Appendix 2.2.
[69] For a further consideration of an impact of the chosen allocation factor see sensitivity analysis in chapter 3.3.

decrease, but since the factor and the calculated tax base are not similar a reallocation is very likely. In tendency, the holding´s state receives less tax payments than under SA.



*with MTC denoting minimum taxation concept

Figure 1: Tax payment differences in comparison to SA in scenario I

The same overall result can be seen for ETAS, where the subsidiary´s tax liability stays identical due to the maintained national tax rules. Here, the only difference to SA occurs for the holding´s tax burden. The decreased total tax liability reduces the holding´s tax liability to one hundred percent and therefore also reduces the tax revenue of the holding´s state. Under both proposals the differences to SA vary depending on the loss-offset limitation. Therefore, countries with higher tax revenue caused by a loss-offset limitation under national law receive less tax payments under CCCTB. This effect is due to the group loss-offset and the allocated consolidated tax base. Under ETAS the loss-offset limitations encroach upon the holding´s tax liability although no limitation is mandatory. Here, the prepaid subsidiary´s tax reduces the group´s tax liability and therefore, the holding´s tax payment. Although loss-offset limitations lose their overall impact on the MNE´s Baldwin yields, it subsequently can be concluded that the shift of tax burden can significantly depend on these regulations or minimum taxation concepts.

4.4 Sensitivity Analyses

The model used in this paper is restricted by the underlying set of assumptions. The following analyses clarify the consequences of the changes in the model parameters and thereby allow us to draw more general conclusions. Before two major assumptions, the cash

flow CF_t and the tax rates τ_P and τ_S are analyzed in detail we briefly refer to the chosen allocation factors.

In our model the resulting allocation factor for the two business entities is based on data generated from the BACH database for the countries Germany and France. A consideration of other countries in the EU; while the holding remains resident in Germany; shows a range of allocation factors between $\theta^P = 0.5029 / \theta^S = 0.4971$ (Germany/Spain) and $\theta^P = 0.6284 / \theta^S = 0.3716$ (Germany/Belgium).[70,71] It is perspicuous that a change in the allocation factor does not lead to different determined Baldwin yields for the selected cases i) to vi) as the determination of taxable income and the tax rates (0.3%) apply as presumed in the basic scenarios. Whereas a shifting in the holding's and the subsidiary's tax burden consequently occurs due to the varying allocation factor and thus, a shifting in tax revenue each Member State receives. Therefore, effects on the tax allocation to the member states depend on the ratio of allocation formula and calculated tax base since both values are not necessarily identical. The bigger the gap between these two values, the greater is the shift of the tax payments under CCCTB in comparison to SA. In combination with different tax rates among the EU the impact on the tax revenue can even increase. Moreover, varying tax rates also affect the Baldwin yields. In case of greater tax rates in the holding´s state for both basic scenarios the following statement applies: The greater the allocated amount to the holding is the greater is the tax liability in total and the greater is the tax burden in the holding´s state.[72] Vice versa, if an increase of the allocation factor for the holding is assumed; with a decreasing tax rate in the holding's domicile while the tax rate in the subsidiary's domicile stays constant; the Baldwin yields increase in the considered concepts due to lower tax liabilities for the multinational corporation. Decreasing tax liabilities are amplified by interest effects and lead to increasing Baldwin yields. As aforementioned, these elaborated effects do not predominantly depend on the allocation factor alone, but also on the tax rate combinations. Therefore a further consideration of changing tax rates for all tax systems follows in the next chapter.

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[70] $\theta^P = 0.5240 / \theta^S = 0.4760$ (Germany/Poland), $\theta^P = 0.5900 / \theta^S = 0.4100$ (Germany/Italy), $\theta^P = 0.5349 / \theta^S = 0.4651$ (Germany/Austria), $\theta^P = 0.5864 / \theta^S = 0.4136$ (Germany/Portugal), $\theta^P = 0.6284 / \theta^S = 0.3716$ (Germany/Netherlands). In general the BACH database contains non-consolidated data. However, due to national regulations the data available for the Netherlands is the only consolidated data.

[71] See Appendix 1 for the generated data from the BACH database.

[72] Again, for basic scenario II differences only apply with respect to the Austrian and Polish minimum taxation concepts due to the afore described reasons.

4.4.1 Tax rates

Baldwin yields

In the previous analysis identical tax rates in either country are assumed to identify the general mechanism of action of both proposals. In a first step within the sensitivity analysis of the tax rates we simultaneously decrease the tax rates in both countries. In a second step we decrease either the subsidiary´s tax rate or the holding´s tax rate. In case of identical but decreasing tax rates we receive the same results as in our previous analysis. For all considered tax rate combinations and both basic scenarios the multinationals' Baldwin yields under ETAS and CCCTB are identical and greater than under SA due to the transnational loss-offset. Moreover, with decreasing (but identical) tax rates the differences of the Baldwin yields between SA and both reform proposals decrease as well. This is the result of decreasing tax payments and the therewith interrelated interest effect which becomes less important.[73]

In basic scenario II the Austrian and Polish concept have a negative impact on the determined Baldwin yields under both proposals in comparison to an unlimited loss-offset, whereas under SA all results are identical. This is due to the assumption of mandatory loss-offset limitations in the holding´s state only. Although the Baldwin yields increase in comparison to SA, the occurring minimum tax decreases the Baldwin yield of the multinational due to the Polish and Austrian concepts' conditions.[74] In this consideration it becomes obvious that loss-offset limitations can have an impact in both proposals on the overall results, even though the impact is relatively small. Therefore, we can once more state that both proposals seem to decrease the negative impact of loss-offset limitations but they cannot eliminate them entirely. It hence plays a decisive role where the regulations are mandatory.

The assumption of identical tax rates in the considered Member States P and S is restrictive, as the tax rates within the EU differ from 10% to 40%.[75] The basic scenarios are therefore extended to include different combinations of tax rates. In the first step we consider decreasing tax rates in the subsidiary´s state of domicile.

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[73] In case of an unlimited loss carry-forward [concept i)] the difference decreases from 0.390% to 0.123% in both basic scenarios. For absolute numbers see Appendix 2.2.
[74] The conditions are the loss-offset rate in the Polish concept and the corporate minimum tax liability of Austria.
[75] E.g. in Bulgaria and Ireland the tax rate amounts to 10 percent in 2007, whereas the tax rate in Italy is 37.3 percent. Cf. Scientific Advisory Council of the Federal Ministry of Finance (2007), p. 7.

In all further considered tax rates combinations, the Baldwin yields under CCCTB are the highest due to the formula apportionment. The amount allocated to the subsidiary underlies a lower tax rate and therefore causes fewer tax payments than the overall applying "high" tax rate of the holding´s state under ETAS. Moreover, a lower tax burden can generate higher interest income under CCCTB which can even be increased under the assumption of different interest rates in the considered countries. Major fluctuations occur especially under ETAS. If the ETAS holding domiciles in a high-tax country, the Baldwin yields are significantly lower than under CCCTB or Separate Accounting due to the additive EU tax base. This tax base that is multiplied with a high tax rate of the holding´s state leads to a greater tax burden and vice versa.[76] Moreover, we can state that at a tax rate in the subsidiary's domicile less than 17.8% ($\tau_S \leq 0.178$ for both scenarios) and a constant tax rate in the holding's Member State ($\tau_P = 0.3$) the Baldwin yield under SA is even greater than in case of ETAS. Since this specific tax rate combination is actually possible in the EU, an implementation of ETAS would cause distortions with a negative impact on the profitability of the chosen real investment of the MNE.[77]

Therefore, we can state that the chosen allocation factor under CCCTB is of particular importance especially in the real world of unequal tax rates. Moreover, in both proposals the tax rate differences play an important role which leads to the assumption that the choice of location is of importance.

In case of a decreasing tax rate in the holding´s state of domicile, the Baldwin yields under all considered tax systems increase as a consequence of decreasing tax liabilities.[78] The ETAS achieves the highest Baldwin yields, followed by Separate Accounting. Whereas under ETAS the lower tax rate of the holding´s state is adopted for the whole group, the apportioned amount of the group´s tax base under CCCTB is more highly taxed in the subsidiary´s state. That is why the influence of the chosen allocation factor is once more obvious. With our assumption of an allocation of 44.38% of the multinational´s tax base to the subsidiary´s domicile the subsidiary's allocated amount is more highly taxed than under ETAS in all cases, no matter which factor is chosen. For a comparison with SA no general conclusions can be drawn as it is restricted to this assumption. However, in our selected scenarios SA

[76] For further investigations cf. Sureth/Üffing (2008), p. 19-21.

[77] E.g. a real constellation of Spain, Germany, Great Britain or Luxemburg as the holding´s state and Bulgaria, Cyprus Republic, Ireland, Latvia, Lithuania or Rumania as the subsidiary´s state these results would be true.

[78] As already mentioned the results are illustrated and described for Basis scenario I. Only slight modifications are derived for basic scenario II, the outcomes tend to be identical.

leads to higher Baldwin yields when the tax rate in the holding´s state is lower than 21.7% ($\tau_P \leq 0.217$ for both scenarios).[79]

In this consideration two paradox results occur in case of $\tau_P = 0.1$ and $\tau_S = 0.3$. Under ETAS the German and the Austrian minimum taxation concept increase the Baldwin yields in comparison to an estimated unlimited loss carry-forward (+0.004%).[80] This result is due to the minimum taxation that applies in the subsidiary´s state and is credited against the EU base tax in ETAS. Since the minimum taxation occurs in the country with the greater tax rate, this amount is credited against the EU tax base multiplied with the lower EU tax rate of the holding´s state and therefore produces this positive "ETAS credit effect".[81] This procedure leads to a decreasing tax liability of the holding. In turn, greater after-tax gains are enhanced by interest effects and increase the future value of the holding.[82] Therefore, under ETAS an existing minimum taxation in the subsidiary´s state can even increase the multinational´s Baldwin yield under special tax rate combinations.

Moreover, if tax rates between 12.4% and 16.9% are assumed in the holding's domicile, the loss expiration after five years produces a greater Baldwin yield than under unlimited carry-forward. In this case it depends on the tax rate combination as well as the height of the loss carry-forward expiration if this regulation has an impact on the EU tax base and if an "ETAS credit effect" occurs at all.[83] In case of $\tau_P \leq 0.123$ the expiration after five years leads to a greater national already paid tax in the subsidiary's state than the total EU base tax. The surplus of the EU base tax is not refundable, but must be carried forward in subsequent periods as EU tax credit carry-forward. Hence, this procedure leads to less cumulative liquidity and is intensified by the interest effect over time.

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[79] E.g. a real constellation of Spain, Germany, Great Britain or Luxemburg as the subsidiary´s state and Bulgaria, Cyprus Republic, Czech Republic, Estonia, Hungary, Ireland, Latvia, Lithuania, Poland, Rumania or Slovakia as the holding´s state these results would be true.

[80] In basic scenario I the threshold for this effect; when the concepts of Austria and Germany have a positive effect on the Baldwin yields; is 16.9% ($\tau_P \leq 0.169$). An overview of all results can be seen in the Appendix 2.1 and 2.3.

[81] Therefore, a different assumption for a flat tax rate in ETAS would change the results. But the general effect remains, that for special tax rate combination the "ETAS credit effect" can occur when minimum taxation is mandatory in the subsidiary´s state of domicile.

[82] E.g. in the German concept the occurring minimum taxation in period 7 leads to a by €52.5k greater cumulative liquidity of the holding compared to the assumed unlimited loss-offset. The complete amount is €52,523.92. In Austria the minimum taxation occurs in t = 5 and increases the cumulative liquidity by €4,230.00 in comparison to the unlimited loss carry-forward. In case of a loss-expiration after five years in period t = 8 a difference of €10,460.52 is achieved.

Tax allocation

In line with the aforementioned impact on the Baldwin yields we can state that decreasing tax rates decrease the tax liability. Moreover, under identical tax rates we show a reallocation of tax burden, whereas the holding´s country of domicile receives less tax payments under ETAS than under CCCTB, depending on the chosen allocation factor.

With decreasing tax rates in the subsidiary´s state the overall group's tax liability decreases and the Baldwin yield therefore increases in both proposals to different extents. As aforementioned, under CCCTB the holding has to pay fewer taxes in tendency than under SA due to the transnational loss-offset. Whereas under ETAS the tax payment of the subsidiary stays identical, the higher holding´s tax rate is adopted for the group's tax base and therefore causes higher tax payments of the holding for all considered tax rate combinations of $\tau_S \leq 0.178$ and $\tau_P = 0.3$.

Therefore, we can state that ETAS can discriminate cross-border real investments in case of greater tax rates in the holding´s state. In comparison to ETAS the implementation of CCCTB can foster cross-border real investments due to the allocated amounts. In case of a decreasing tax rate in the holding´s state we receive opposite results. Here, the adopted lower tax rate under ETAS leads to a lower tax burden than under CCCTB. An implementation of CCCTB in this case would lead to the greatest tax liability for the multinational and simultaneously to the greatest tax reallocation. A further decrease of the holding´s tax rate leads to decreasing tax burden in the holding´s state, but to increasing payments of the subsidiary, although no change in the subsidiary's tax rate takes place. Again, these effects significantly depend on the chosen allocation factor.

Therefore, we found that ETAS is tax favored since the lower tax rate of the holding's state is applied on the EU base tax and hence, is adopted for the whole group. Moreover, since the tax liability under CCCTB is greater than under SA[84] we can state that CCCTB can discriminate cross-border real investments in case of greater tax rates in the subsidiary´s state. However, this conclusion depends on the tax rate differences between the EU Member States the multinational corporation is operating in.

Consequently, we can state that ETAS can discriminate cross-border real investments in case of greater tax rates in the holding´s state whereas CCCTB can foster them, depending

[84] E.g. +€181,111.18 for case i) and $\tau_P = 0.2$ and $\tau_S = 0.3$ and +€1,340,218.33 for $\tau_P = 0.1$ and $\tau_S = 0.3$.

on the allocation factor.[85] Vice versa, in case of lower tax rates in the subsidiary´s state CCCTB can discriminate and ETAS can foster the considered real investments in case of start-up losses in the subsidiary. In both proposals the decreasing tax burdens are in tendency to the account of the holding´s state.

4.4.2 Cash flow

So far, we presumed an exogenously predetermined cash flow parameter. For the first period the cash flow was predetermined exogenously at the subsidiary's (€1M) and the holding's level (€1.3M), whereas a periodic growth of the cash flow amounting to €500k is only assumed at the subsidiary's level. In this section we analyze how modifications of these exogenously predetermined cash flows affect the different tax concepts.

Based on the aforementioned impacts under ETAS for the tax rate combination of $\tau_P = 0.169$ and $\tau_S = 0.3$ (section 4.4.1) we now decrease the subsidiary´s first-period cash flow to investigate further effects of all occurring loss-offset limitations.[86] Therefore, we obtain the following parameter changes, other parameters stay identical:

Tax rate in the holding's country of domicile	τ_P = 0.169
Tax rate in the subsidiary's country of domicile	τ_S = 0.3
Cash flow generated in the subsidiary in t=1	$CF_{S,t=1}$ = -€1,100,000

Table 2: Overview of parameter change

Since the general allocation effects are already described in section 4.4.1 we now focus on the Baldwin yields under ETAS and CCCTB in this section. With a decrease of the subsidiary's first cash flow by €100k to $CF_1^S = -€1.1M$ it is obvious that all selected loss-offset concepts lead to identical Baldwin yields under ETAS and CCCTB. This result is due to the fact that under ETAS the growth rate leads to subsequent occurring gains in the subsidiary that can be offset against the loss carry-forward. This offset itself leads to a lower minimum taxation impact in total and hence, to a declining holding´s tax liability in comparison to the starting scenario. An increase by €0.1M (viz., $CF_1^S = -€0.9M$) instead remains the tax favored situation under ETAS for the German and the Austrian concept as well as for the loss

[85] In comparison to the actual situation (SA).
[86] Therefore, the subsequent cash flows decrease respectively, since we keep the growth amount of €0.5M.

expiration after five years. Therefore, the ETAS tax credit mechanism in combination with additional interest effects can cause these distortions.

A further increase of the initial cash flow of the subsidiary decreases the differences between the Baldwin yields of the loss-offset limitations and the unlimited carry-forward and leads to similar Baldwin yields. E.g. the impact of the loss expiration after five years decreases with a decreasing subsidiary´s first cash flow. At $CF_1^S < -€0.7M$ the tax beneficial impact on the Baldwin yield disappears since with decreasing cash flows the loss carry-forward decreases respectively and no further expiration occurs.[87] We can state once more that depending on the tax rate combination, as well as the cash flows, existing loss-offset limitations can lead to tax-favored cross-border real investments for multinationals under ETAS, due to the "ETAS tax credit effect".[88]

Another situation to be considered is the case when losses occur within the holding and profits are gained in the subsidiary. Therefore, in the next investigation we change the following parameters but keep the identical tax rates of 30%.[89]

Cash flow generated in the holding in t=1	$CF_{P,t=1}$ = -€1,000,000
Cash flow generated in the subsidiary in t=1	$CF_{S,t=1}$ = €1,000,000
Periodic alteration in cash flows (holding)	g^P = €500,000
Periodic growth amount of cash flows (subsidiary)	g^S = €0

Table 3: Overview of parameter change

In scenario I the loss-offset limitations do not affect the results because gains only are achieved in the country where they are mandatory. Therefore, within the respective tax system; SA, CCCTB and ETAS; all Baldwin yields are identical. In basic scenario I, CCCTB leads to greater Baldwin yields in comparison to SA [+0.055% for i)] and ETAS to lower ones [-0.145% for i)]. Under ETAS a new effect can be investigated in case that the already paid taxes of the subsidiary exceed the total tax liability of the group. Due to the EU tax credit carry-forward this tax backlog does not lead to an immediate tax refund. It is rather carried

[87] Similar results can be found for the German concept. In this case the effect disappears for $CF_1^S = €0.4M$.

[88] Different interest rates in the countries; depending on the combination; can increase or decrease these effects. If the tax rates in the holding´s country are greater than in the subsidiary and so are the interest rates the "EU tax credit effect" can be fortified and vice versa.

[89] All the not mentioned parameters remain due to the previous deterministic analysis.

forward and can be offset against the tax liability of the subsidiary in subsequent years.[90] This "ETAS tax credit carry-forward effect" in addition to the interest effect causes the lowest Baldwin yield for all considered loss offset cases.

In basic scenario II the respective loss-offset limitations are implemented in the holding´s state and therefore have an impact on the Baldwin yields. The overall result that CCCTB increases the Baldwin yields and ETAS decreases the Baldwin yields still remains and can be seen in Table 4. Here, the second and the third column show the Baldwin yield difference between both proposal and SA. The last two columns present the Baldwin yield differences between the respective loss-offset concepts and the unlimited loss carry-forward [concept i)] within the proposals.

Basic Scenario II	difference to SA		difference to i)	
	CCCTB	**ETAS**	**CCCTB**	**ETAS**
i) Unlimited loss carry-forward	0.055%	-0.145%	/	/
ii) Minimum taxation concept Germany	0.055%	-0.145%	0.000%	0.000%
iii) Minimum taxation concept Austria	0.055%	-0.097%	-0.005%	0.043%
iv) Minimum taxation concept Poland	0.051%	-0.103%	-0.004%	0.042%
v) Loss-offset limitation I (5 years)	0.055%	-0.145%	0.000%	0.000%
vi) Loss-offset limitation II (8 years)	0.055%	-0.145%	0.000%	0.000%

Table 4: Impact of the proposals on the Baldwin yield and impact of the loss-offset limitation concepts within the proposals

Whereas under SA only the Austrian concept causes a minimum taxation and decreases the Baldwin yield under CCCTB and ETAS, the Austrian as well as the Polish concept affects the Baldwin yields (column two and three). In this consideration we investigate those national minimum taxation regulations. Although they do not impact the national context (e.g. the Polish concept under SA), they could encroach upon the group level and affect the MNE´s Baldwin yield. While under CCCTB an existing minimum tax reduces the Baldwin yield of the multinational (-0.005%; -0.004%); under ETAS the paradox effect of an increased Baldwin yields occurs (0.043%; 0.042%).[91]

For the first time in our consideration both ETAS tax credit mechanism effects occur simultaneously. The "ETAS tax credit carry-forward effect" leads to a tax backlog that is not refundable and therefore increases the tax payments of the multinational. This effect can be considered as the obvious differences between SA and ETAS [-0.145% for concept i)]. The "ETAS tax credit effect" leads to an increase of the Baldwin yield instead because occurring minimum taxation can be credited against the group´s tax liability. This effect can be seen in

[90] For further investigations cf. Sureth/Üffing (2008).
[91] That can be seen in the fourth and fifth column, in the difference to the unlimited loss carry-forward.

the difference within ETAS and between the unlimited loss carry-forward and the Austrian (0.043%) or the Polish (0.042%) concept. Therefore, we can state, that the “negative affecting ETAS tax credit carry-forward effect” is more than three times greater than the “positive affecting ETAS tax credit effect”.

Finally, we can state that depending on the cash flow structure as well as on the origin of losses, discriminating and subsidized impacts on cross-border investment decisions of multinationals can occur. The following overview shows the gained analysis results.

4.4.3 Analysis results

Having conducted diverse parameter changes during our sensitivity analysis we can draw the following conclusions:

- Both considered group taxation proposals lead to an identical increase of the Baldwin yields (BY) and therefore to increasing profitability in comparison to SA in case of identical tax rates.
- Whereas under ETAS the determined Baldwin yield depends on the holding’s tax rate, under CCCTB the chosen allocation factor also plays a decisive role.
- CCCTB seems to be more susceptible for tax rate differences within the group than ETAS. In general the following effects occur (with BY: Baldwin Yield, τ: tax rate, H: holding, S: subsidiary):
  a) If $\tau_H < \tau_S$ then $BY_{CCCTB} < BY_{ETAS}$,
     and in some combinations even $BY_{CCCTB} < BY_{SA}$.
  b) If $\tau_H > \tau_S$ then $BY_{ETAS} < BY_{CCCTB}$,
     and in some combinations even $BY_{ETAS} < BY_{SA}$.
- ETAS can cause less tax payment redistributions than CCCTB, depending on the formula apportionment, since under ETAS the subsidiary´s state tax liability stays similar to SA. However, a decreasing tax liability in total has to be “borne” by the holding´s state only.
- If a national loss-offset limitation exists, the impact is minimized or at least reduced since the consolidation of the holding and the subsidiary achieves a cross-border offset. By contrast, mandatory minimum taxation concepts can encroach upon the group level under special circumstances, but the impact on the Baldwin yields seems to be slight. ETAS can cause a profitability increasing tax effect as well as a decreasing tax effect due to the EU tax credit mechanism.
  a) The profitability increasing tax effect in the form of a tax paradox follows from a minimum taxation (or loss expiration) in the subsidiary´s state while $\tau_H > \tau_S$. The

"ETAS credit effect" in conjunction with interest effects leads to increasing Baldwin yields. An identical effect can be observed for different negative cash flows within the holding.

b) The profitability decreasing tax effect is the "ETAS tax credit carry-forward effect" emerging when the subsidiary´s national tax liability exceeds the total tax liability of the group. Since this tax backlog is not refunded immediately but carried-forward, the tax payments in combination with the interest effect lead to decreasing Baldwin yields since this effect is greater than the aforementioned positive impact.

5 Conclusions

The focus of this paper was to analyze the effect of an implementation of two group taxation proposals, ETAS and CCCTB, on the profitability of a MNE's cross-border real investment. We integrated currently existing loss-offset regulations within the EU to enrich the partial analysis.

Our results provide first brief insights into the tax reform proposals' impacts in combination with existing national loss-offset and minimum taxation regulations. The analyses show that replacing Separate Accounting by either concept can lead to increasing profitability due to cross-border loss compensation. In line with former literature the paper indicates that if the profitability increases, the main criteria of decisions on location are the tax rate divergences within the Member States. High tax rate differentials in the Member States imply significant redistribution of tax payments under CCCTB and ETAS. Under ETAS, tax competition can distort the results through the tax rate as well as the tax base. Under CCCTB a second crucial impact, based on the chosen formula apportionment can cause severe distortions in combination with the tax rate differences. Moreover, both proposals cause tax payment redistributions in comparison to the status quo. The results indicate that this tax payment reallocation occurs at the expense of the holding´s state for both tax reform proposals.

We show that the tax effects from mandatory loss-offset limitations in either group taxation concept can lose their impact on the profitability. Moreover, ETAS can cause distortions due to the credit mechanism which has to be considered closely. In many countries, a method to prevent double taxation is the credit method that could also be an imaginable solution for EU-wide cross-border group taxation under ETAS and for ensuring EU Member States' tax revenue. Further analyses with a limited credit method for the tax credit of the subsidiary will be necessary for ETAS to analyze possible effects resulting from double taxation.

Against the expected decreasing impact of the national loss-offset regulations we found scenarios in which national loss-offset limitations in form of a minimum taxation can also encroach upon the group level. In a system of SA we identify prerequisites and assumptions in which loss-offset limitations do not affect the MNE's cross-border real investments, but in which a negative impact on cross-border real investments appears under the analyzed tax reform proposals. These effects depend on the choice of location and the mandatory loss-offset regulations. However, these impacts have to be considered closely, since they can have a severe impact on the tax liability.

The actual development of implementing EU-wide group taxation in form of a CCCTB seems to stagnate. Hence, it could be helpful to include elements of ETAS in further considerations. As the results show, the reallocation under CCCTB increases due to the chosen formula apportionment, whereas under ETAS the reallocation approximates more to SA. Furthermore, we identify that under ETAS harmful paradoxes can occur in case of mandatory minimum taxation concepts due to the credit mechanism. Therefore, it is helpful to identify advantages and disadvantages of the credit mechanism provided in ETAS and e.g., to elaborate the effects of a partly tax credit as Hernler also proposed. This investigation could also serve as support for the concept Separate Entity Accounting.[92]

Nevertheless, as our results confirm, the problems of non-uniform reporting standards and tax rate divergences remain in both tax reform proposals. Additionally, tax base differences under ETAS also persist and new distortions can occur due to formula apportionment (under CCCTB). The aforementioned obstacles of either new group taxation can only be overcome in case of a tax rate and tax base harmonization within the EU.

Although for both proposals several questions remain unclear our analysis has to be filled with numerous assumptions our results can contribute to an illuminative anticipation of the tax effects in the current discussion for a corporate group tax harmonization within the EU as well as other economic zones, e.g. the US.

[92] Cf. Scientific Advisory Council of the Federal Ministry of Finance (2007), pp. 28-34.

Appendix

App. 1: Retained Data from the BACH-Database (available year: 2006)

	Turnover -grand totals (€k)	Enterprises - grand totals (number of)	Turnover/ Enterprises (€k)	Tangible fixed assets (%)	Employment -grand totals (number of)	Employment/Enterprises (number of)	Staff Costs (%)
selected as factor:			**Sales**	**Property**		**Employee**	**Staff Costs**
Germany	827,317,910	1,664	497,186	13.1	1,859,306	1,117	15.6
France	549,962,004	1,807	304,351	14.8	1,310,587	725	12.7
Germany	827,317,910	1,664	497,186	13.1	1,859,306	1,117	15.6
Poland	104,908,327	512	204,899	39.1	528,732	1,032	6.5
Germany	827,317,910	1,664	497,186	13.1	1,859,306	1,117	15.6
Spain	150,481,248	311	483,863	19.5	278,333	895	8.6
Germany	827,317,910	1,664	497,186	13.1	1,859,306	1,117	15.6
Belgium	149,983,292	523	286,775	8.2	265,127	507	11.1
Germany	827,317,910	1,664	497,186	13.1	1,859,306	1,117	15.6
Italy	449,235,524	2.228	201,632	18.1	1,090,196	489	11.2
Germany	827,317,910	1,664	497,186	13.1	1,859,306	1,117	15.6
Netherlands	180,205,585	329	547,737	9.0	276,892	842	9.7
Germany	827,317,910	1,664	497,186	13.1	1,859,306	1,117	15.6
Austria	54,939,560	269	204.236	25.6	168,443	626	17.3
Germany	827,317,910	1,664	497,186	13.1	1,859,306	1,117	15.6
Portugal	29,379,014	174	168,845	24.8	88,693	510	8.5

App. 2.1: Table of the Baldwin yields of the sensitivity analysis of the tax rates

decreasing tax rate in the subsidiary´s state									
SCENARIO I									
	τ_P=0.3, τ_S=0.3			τ_P=0.3, τ_S=0.2			τ_P=0.3, τ_S=0.1		
	SA	CCCTB	ETAS	SA	CCCTB	ETAS	SA	CCCTB	ETAS
i)	11.867%	12.187%	12.187%	12.131%	12.746%	12.187%	12.391%	13.291%	12.187%
ii)	11.857%	12.187%	12.187%	12.124%	12.746%	12.187%	12.387%	13.291%	12.187%
iii)	11.849%	12.187%	12.187%	12.117%	12.746%	12.187%	12.384%	13.291%	12.187%
iv)	11.867%	12.187%	12.187%	12.131%	12.746%	12.187%	12.391%	13.291%	12.187%
v)	11.606%	12.187%	12.187%	11.959%	12.746%	12.187%	12.306%	13.291%	12.187%
vi)	11.867%	12.187%	12.187%	12.131%	12.746%	12.187%	12.391%	13.291%	12.187%
SCENARIO II									
	τ_P=0.3, τ_S=0.3			τ_P=0.3, τ_S=0.2			τ_P=0.3, τ_S=0.1		
	SA	CCCTB	ETAS	SA	CCCTB	ETAS	SA	CCCTB	ETAS
i)	11.867%	12.187%	12.187%	12.131%	12.746%	12.187%	12.391%	13.291%	12.187%
ii)	11.867%	12.187%	12.187%	12.131%	12.746%	12.187%	12.391%	13.291%	12.187%
iii)	11.867%	12.187%	12.187%	12.131%	12.746%	12.187%	12.391%	13.290%	12.187%
iv)	11.867%	12.184%	12.184%	12.131%	12.743%	12.184%	12.391%	13.288%	12.184%
v)	11.867%	12.187%	12.187%	12.131%	12.746%	12.187%	12.391%	13.291%	12.187%
vi)	11.867%	12.187%	12.187%	12.131%	12.746%	12.187%	12.391%	13.291%	12.187%

decreasing tax rate in the holding´s state									
SCENARIO I									
	τ_P=0.3, τ_S=0.3			τ_P=0.2, τ_S=0.3			τ_P=0.1, τ_S=0.3		
	SA	CCCTB	ETAS	SA	CCCTB	ETAS	SA	CCCTB	ETAS
i)	11.867%	12.187%	12.187%	12.954%	12.885%	13.427%	14.038%	13.562%	14.443%
ii)	11.857%	12.187%	12.187%	12.945%	12.885%	13.427%	14.029%	13.562%	14.447%
iii)	11.849%	12.187%	12.187%	12.937%	12.885%	13.427%	14.023%	13.562%	14.447%
iv)	11.867%	12.187%	12.187%	12.954%	12.885%	13.427%	14.038%	13.562%	14.443%
v)	11.606%	12.187%	12.187%	12.715%	12.885%	13.427%	13.819%	13.562%	14.442%
vi)	11.867%	12.187%	12.187%	12.954%	12.885%	13.427%	14.038%	13.562%	14.443%
SCENARIO II									
	τ_P=0.3, τ_S=0.3			τ_P=0.2, τ_S=0.3			τ_P=0.1, τ_S=0.3		
	SA	CCCTB	ETAS	SA	CCCTB	ETAS	SA	CCCTB	ETAS
i)	11.867%	12.187%	12.187%	12.954%	12.885%	13.427%	14.038%	13.562%	14.443%
ii)	11.867%	12.187%	12.187%	12.954%	12.885%	13.427%	14.038%	13.562%	14.443%
iii)	11.867%	12.187%	12.187%	12.954%	12.885%	13.426%	14.038%	13.562%	14.443%
iv)	11.867%	12.184%	12.184%	12.954%	12.882%	13.425%	14.038%	13.560%	14.442%
v)	11.867%	12.187%	12.187%	12.954%	12.885%	13.427%	14.038%	13.562%	14.443%
vi)	11.867%	12.187%	12.187%	12.954%	12.885%	13.427%	14.038%	13.562%	14.443%

App. 2.2: Table of the tax allocation of decreasing tax rates in the subsidiary´s state

	SCENARIO I								
	τP=0.3, τS=0.3								
	SA			CCCTB			ETAS		
	Holding´s state	subsidiary´s state	Sum	Holding´s state	subsidiary´s state	Sum	Holding´s state	subsidiary´s state	Sum
i)	€ 8,960,252.77	€ 1,946,324.14	€ 10,906,576.91	€ 5,630,334.13	€ 4,492,524.79	€10,122,858.92	€ 8,176,534.78	€ 1,946,324.14	€10,122,858.92
ii)	€ 8,960,252.77	€ 1,969,916.44	€ 10,930,169.21	€ 5,630,334.13	€ 4,492,524.79	€10,122,858.92	€ 8,152,942.47	€ 1,969,916.44	€ 10,122,858.91
iii)	€ 8,960,252.77	€ 1,989,918.69	€ 10,950,171.46	€ 5,630,334.13	€ 4,492,524.79	€10,122,858.92	€ 8,132,940.23	€ 1,989,918.69	€10,122,858.92
iv)	€ 8,960,252.77	€ 1,946,324.14	€ 10,906,576.91	€ 5,630,334.13	€ 4,492,524.79	€10,122,858.92	€ 8,176,534.78	€ 1,946,324.14	€10,122,858.92
v)	€ 8,960,252.77	€ 2,569,106.66	€ 11,529,359.43	€ 5,630,334.13	€ 4,492,524.79	€10,122,858.92	€ 7,553,752.25	€ 2,569,106.66	€ 10,122,858.91
vi)	€ 8,960,252.77	€ 1,946,324.14	€ 10,906,576.91	€ 5,630,334.13	€ 4,492,524.79	€10,122,858.92	€ 8,176,534.78	€ 1,946,324.14	€10,122,858.92
	τP=0.3, τS=0.2								
	SA			CCCTB			ETAS		
	Holding´s state	subsidiary´s state	Sum	Holding´s state	subsidiary´s state	Sum	Holding´s state	subsidiary´s state	Sum
i)	€ 8,960,252.77	€ 1,302,208.82	€ 10,262,461.59	€5,684,322.06	€ 3,023,735.02	€ 8,708,057.08	€ 8,820,650.09	€ 1,302,208.83	€10,122,858.92
ii)	€ 8,960,252.77	€ 1,320,371.49	€ 10,280,624.26	€5,684,322.06	€ 3,023,735.02	€ 8,708,057.08	€ 8,802,487.43	€ 1,320,371.49	€10,122,858.92
iii)	€ 8,960,252.77	€ 1,335,788.27	€ 10,296,041.04	€5,684,322.06	€ 3,023,735.02	€ 8,708,057.08	€ 8,787,080.64	€ 1,335,788.27	€ 10,122,868.91
iv)	€ 8,960,252.77	€ 1,302,208.82	€ 10,262,461.59	€5,684,322.06	€ 3,023,735.02	€ 8,708,057.08	€ 8,820,650.09	€ 1,302,208.82	€ 10,122,858.91
v)	€ 8,960,252.77	€ 1,723,736.28	€ 10,683,989.05	€5,684,322.06	€ 3,023,735.02	€ 8,708,057.08	€ 8,399,122.63	€ 1,723,736.28	€ 10,122,858.91
vi)	€ 8,960,252.77	€ 1,302,208.82	€ 10,262,461.59	€5,684,322.06	€ 3,023,735.02	€ 8,708,057.08	€ 8,820,640.09	€ 1,302,208.82	€ 10,122,848.91
	τP=0.3, τS=0.1								
	SA			CCCTB			ETAS		
	Holding´s state	subsidiary´s state	Sum	Holding´s state	subsidiary´s state	Sum	Holding´s state	subsidiary´s state	Sum
i)	€ 8,960,252.77	€ 653,434.11	€ 9,613,686.88	€ 5,738,951.51	€ 1,526,397.39	€ 7,265,348.90	€ 9,469,424.81	€ 653,434.11	€10,122,858.92
ii)	€ 8,960,252.77	€ 663,756.33	€ 9,624,009.10	€ 5,738,951.51	€ 1,526,397.39	€ 7,265,348.90	€ 9,459,102.59	€ 663,756.33	€10,122,858.92
iii)	€ 8,960,252.77	€ 672,516.85	€ 9,632,769.62	€ 5,738,951.51	€ 1,526,397.39	€ 7,265,348.90	€ 9,450,342.07	€ 672,516.85	€10,122,858.92
iv)	€ 8,960,252.77	€ 653,434.11	€ 9,613,686.88	€ 5,738,951.51	€ 1,526,397.39	€ 7,265,348.90	€ 9,469,424.81	€ 653,434.11	€10,122,858.92
v)	€ 8,960,252.77	€ 867,390.16	€ 9,827,642.93	€ 5,738,951.51	€ 1,526,397.39	€ 7,265,348.90	€ 9,255,468.75	€ 867,390.16	€ 10,122,858.91
vi)	€ 8,960,252.77	€ 653,434.11	€ 9,613,686.88	€ 5,738,951.51	€ 1,526,397.39	€ 7,265,348.90	€ 9,469,424.81	€ 653,434.11	€10,122,858.92
	SCENARIO II								
	τP=0.3, τS=0.3								
	SA			CCCTB			ETAS		
	Holding´s state	subsidiary´s state	Sum	Holding´s state	subsidiary´s state	Sum	Holding´s state	subsidiary´s state	Sum
i)	€ 8,960,252.77	€ 1,946,324.14	€ 10,906,576.91	€ 5,630,334.13	€ 4,492,524.79	€10,122,858.92	€ 8,176,534.78	€ 1,946,324.14	€10,122,858.92
ii)	€ 8,960,252.77	€ 1,969,916.44	€ 10,930,169.21	€ 5,630,334.13	€ 4,492,524.79	€10,122,858.92	€ 8,176,534.78	€ 1,946,324.14	€10,122,858.92
iii)	€ 8,960,252.77	€ 1,989,918.69	€ 10,950,171.46	€5,630,834.37	€4,492,923.94	€ 10,123,758.31	€ 8,177,434.16	€ 1,946,324.14	€ 10,123,758.30
iv)	€ 8,960,252.77	€ 1,946,324.14	€ 10,906,576.91	€ 5,634,576.11	€ 4,495,909.52	€10,130,485.63	€ 8,184,161.49	€ 1,946,324.14	€10,130,485.63
v)	€ 8,960,252.77	€ 2,569,324.14	€ 11,529,576.91	€ 5,630,334.13	€ 4,492,524.79	€10,122,858.92	€ 8,176,534.78	€ 1,946,324.14	€10,122,858.92
vi)	€ 8,960,252.77	€ 1,946,324.14	€ 10,906,576.91	€ 5,630,334.13	€ 4,492,524.79	€10,122,858.92	€ 8,176,534.78	€ 1,946,324.14	€10,122,858.92
	τP=0.3, τS=0.2								
	SA			CCCTB			ETAS		
	Holding´s state	subsidiary´s state	Sum	Holding´s state	subsidiary´s state	Sum	Holding´s state	subsidiary´s state	Sum
i)	€ 8,960,252.77	€ 1,302,208.82	€ 10,262,461.59	€5,684,322.06	€ 3,023,735.02	€ 8,708,057.08	€ 8,820,650.09	€ 1,302,208.82	€ 10,122,858.91
ii)	€ 8,960,252.77	€ 1,302,208.82	€ 10,262,461.59	€5,684,322.06	€ 3,023,735.02	€ 8,708,057.08	€ 8,820,650.09	€ 1,302,208.82	€ 10,122,858.91
iii)	€ 8,960,252.77	€ 1,302,208.82	€ 10,262,461.59	€ 5,684,867.57	€ 324,025.20	€ 6,008,892.77	€ 8,821,549.48	€ 1,302,208.82	€ 10,123,758.30
iv)	€ 8,960,252.77	€ 1,302,208.82	€ 10,262,461.59	€ 5,688,946.41	€ 3,026,194.91	€ 8,715,141.32	€ 8,828,276.80	€ 1,302,208.82	€10,130,485.62
v)	€ 8,960,252.77	€ 1,302,208.82	€ 10,262,461.59	€5,684,322.06	€ 3,023,735.02	€ 8,708,057.08	€ 8,820,650.09	€ 1,302,208.82	€ 10,122,858.91
vi)	€ 8,960,252.77	€ 1,302,208.82	€ 10,262,461.59	€5,684,322.06	€ 3,023,735.02	€ 8,708,057.08	€ 8,820,650.09	€ 1,302,208.82	€ 10,122,858.91
	τP=0.3, τS=0.1								
	SA			CCCTB			ETAS		
	Holding´s state	subsidiary´s state	Sum	Holding´s state	subsidiary´s state	Sum	Holding´s state	subsidiary´s state	Sum
i)	€ 8,960,252.77	€ 653,434.11	€ 9,613,686.88	€ 5,738,951.51	€ 1,526,397.39	€ 7,265,348.90	€ 9,469,424.81	€ 653,434.11	€10,122,858.92
ii)	€ 8,960,252.77	€ 653,434.11	€ 9,613,686.88	€ 5,738,951.51	€ 1,526,397.39	€ 7,265,348.90	€ 9,469,424.81	€ 653,434.11	€10,122,858.92
iii)	€ 8,960,252.77	€ 653,434.11	€ 9,613,686.88	€ 5,739,544.21	€ 1,526,555.03	€7,266,099.24	€ 9,470,324.19	€ 653,434.11	€ 10,123,758.30
iv)	€ 8,960,252.77	€ 653,434.11	€ 9,613,686.88	€ 5,743,974.27	€ 1,527,733.30	€ 7,271,707.57	€ 9,477,051.52	€ 653,434.11	€10,130,485.63
v)	€ 8,960,252.77	€ 653,434.11	€ 9,613,686.88	€ 5,738,951.51	€ 1,526,397.39	€ 7,265,348.90	€ 9,469,424.81	€ 653,434.11	€10,122,858.92
vi)	€ 8,960,252.77	€ 653,434.11	€ 9,613,686.88	€ 5,738,951.51	€ 1,526,397.39	€ 7,265,348.90	€ 9,469,424.81	€ 653,434.11	€10,122,858.92

App. 2.3: Table of the tax allocation of decreasing tax rates in the holding´s state

	SCENARIO I								
	τP=0.3, τS=0.3								
	SA			CCCTB			ETAS		
	Holding´s state	subsidiary´s state	Sum	Holding´s state	subsidiary´s state	Sum	Holding´s state	subsidiary´s state	Sum
i)	€8,960,252.77	€ 1,946,324.14	€ 10,906,576.91	€ 5,630,334.13	€ 4,492,524.79	€10,122,858.92	€ 8,176,534.78	€ 1,946,324.14	€10,122,858.92
ii)	€8,960,252.77	€ 1,969,916.44	€ 10,930,169.21	€ 5,630,334.13	€ 4,492,524.79	€10,122,858.92	€ 8,152,942.47	€ 1,969,916.44	€ 10,122,858.91
iii)	€8,960,252.77	€ 1,989,918.69	€ 10,950,171.46	€ 5,630,334.13	€ 4,492,524.79	€10,122,858.92	€8,132,940.23	€ 1,989,918.69	€10,122,858.92
iv)	€8,960,252.77	€ 1,946,324.14	€ 10,906,576.91	€ 5,630,334.13	€ 4,492,524.79	€10,122,858.92	€ 8,176,534.78	€ 1,946,324.14	€10,122,858.92
v)	€8,960,252.77	€ 2,569,324.14	€ 11,529,576.91	€ 5,630,334.13	€ 4,492,524.79	€10,122,858.92	€ 7,553,752.25	€2,569,106.66	€ 10,122,858.91
vi)	€8,960,252.77	€ 1,946,324.14	€ 10,906,576.91	€ 5,630,334.13	€ 4,492,524.79	€10,122,858.92	€ 8,176,534.78	€ 1,946,324.14	€10,122,858.92
	τP=0.2, τS=0.3								
	SA			CCCTB			ETAS		
	Holding´s state	subsidiary´s state	Sum	Holding´s state	subsidiary´s state	Sum	Holding´s state	subsidiary´s state	Sum
i)	€ 6,217,889.72	€ 1,946,324.14	€ 8,164,213.86	€ 3,798,731.31	€ 4,546,593.73	€ 8,345,325.04	€ 4,949,145.18	€ 1,946,324.14	€ 6,895,469.32
ii)	€ 6,217,889.72	€ 1,969,916.44	€ 8,187,806.16	€ 3,798,731.31	€ 4,546,593.73	€ 8,345,325.04	€ 4,925,552.87	€ 1,969,916.44	€ 6,895,469.31
iii)	€ 6,217,889.72	€ 1,989,918.69	€ 8,207,808.41	€ 3,798,731.31	€ 4,546,593.73	€ 8,345,325.04	€ 4,905,550.63	€ 1,989,918.69	€ 6,895,469.32
iv)	€ 6,217,889.72	€ 1,946,324.14	€ 8,164,213.86	€ 3,798,731.31	€ 4,546,593.73	€ 8,345,325.04	€ 4,949,145.18	€ 1,946,324.14	€ 6,895,469.32
v)	€ 6,217,889.72	€ 2,569,106.66	€ 8,786,996.38	€ 3,798,731.31	€ 4,546,593.73	€ 8,345,325.04	€4,326,362.65	€2,569,106.66	€ 6,895,469.31
vi)	€ 6,217,889.72	€ 1,946,324.14	€ 8,164,213.86	€ 3,798,731.31	€ 4,546,593.73	€ 8,345,325.04	€ 4,949,145.18	€ 1,946,324.14	€ 6,895,469.32
	τP=0.1, τS=0.3								
	SA			CCCTB			ETAS		
	Holding´s state	subsidiary´s state	Sum	Holding´s state	subsidiary´s state	Sum	Holding´s state	subsidiary´s state	Sum
i)	€3,237,216.63	€ 1,946,324.14	€ 5,183,540.77	€ 1,922,290.11	€ 4,601,468.99	€ 6,523,759.10	€ 2,158,785.43	€ 1,841,285.69	€ 4,000,071.12
ii)	€3,237,216.63	€ 1,969,916.44	€ 5,207,133.07	€ 1,922,290.11	€ 4,601,468.99	€ 6,523,759.10	€2,018,989.37	€ 1,969,916.44	€ 3,988,905.81
iii)	€3,237,216.63	€ 1,989,918.69	€ 5,227,135.32	€ 1,922,290.11	€ 4,601,468.99	€ 6,523,759.10	€1,998,426.32	€ 1,989,918.69	€ 3,988,345.01
iv)	€3,237,216.63	€ 1,946,324.14	€ 5,183,540.77	€ 1,922,290.11	€ 4,601,468.99	€ 6,523,759.10	€ 2,158,785.43	€ 1,841,285.69	€ 4,000,071.12
v)	€3,237,216.63	€ 2,569,106.66	€ 5,806,323.29	€ 1,922,290.11	€ 4,601,468.99	€ 6,523,759.10	€ 1,745,562.48	€ 2,257,685.70	€ 4,003,248.18
vi)	€3,237,216.63	€ 1,946,324.14	€ 5,183,540.77	€ 1,922,290.11	€ 4,601,468.99	€ 6,523,759.10	€ 2,158,785.43	€ 1,841,285.69	€ 4,000,071.12
	SCENARIO II								
	τP=0.3, τS=0.3								
	SA			CCCTB			ETAS		
	Holding´s state	subsidiary´s state	Sum	Holding´s state	subsidiary´s state	Sum	Holding´s state	subsidiary´s state	Sum
i)	€8,960,252.77	€ 1,946,324.14	€ 10,906,576.91	€ 5,630,334.13	€ 4,492,524.79	€10,122,858.92	€ 8,176,534.78	€ 1,946,324.14	€10,122,858.92
ii)	€8,960,252.77	€ 1,969,916.44	€ 10,930,169.21	€ 5,630,334.13	€ 4,492,524.79	€10,122,858.92	€ 8,176,534.78	€ 1,946,324.14	€10,122,858.92
iii)	€8,960,252.77	€ 1,989,918.69	€ 10,950,171.46	€5,630,834.37	€4,492,923.94	€ 10,123,758.31	€ 8,177,434.16	€ 1,946,324.14	€ 10,123,758.30
iv)	€8,960,252.77	€ 1,946,324.14	€ 10,906,576.91	€ 5,634,576.11	€ 4,495,909.52	€10,130,485.63	€ 8,184,161.49	€ 1,946,324.14	€10,130,485.63
v)	€8,960,252.77	€ 2,569,324.14	€ 11,529,576.91	€ 5,630,334.13	€ 4,492,524.79	€10,122,858.92	€ 8,176,534.78	€ 1,946,324.14	€10,122,858.92
vi)	€8,960,252.77	€ 1,946,324.14	€ 10,906,576.91	€ 5,630,334.13	€ 4,492,524.79	€10,122,858.92	€ 8,176,534.78	€ 1,946,324.14	€10,122,858.92
	τP=0.2, τS=0.3								
	SA			CCCTB			ETAS		
	Holding´s state	subsidiary´s state	Sum	Holding´s state	subsidiary´s state	Sum	Holding´s state	subsidiary´s state	Sum
i)	€ 6,217,889.72	€ 1,946,324.14	€ 8,164,213.86	€ 3,798,731.31	€ 4,546,593.73	€ 8,345,325.04	€ 4,949,145.18	€ 1,946,324.14	€ 6,895,469.32
ii)	€ 6,217,889.72	€ 1,946,324.14	€ 8,164,213.86	€ 3,798,731.31	€ 4,546,593.73	€ 8,345,325.04	€ 4,949,145.18	€ 1,946,324.14	€ 6,895,469.32
iii)	€ 6,217,889.72	€ 1,946,324.14	€ 8,164,213.86	€ 3,799,102.82	€ 4,547,038.38	€ 8,346,141.20	€4,949,870.28	€ 1,946,324.14	€ 6,896,194.42
iv)	€ 6,217,889.72	€ 1,946,324.14	€ 8,164,213.86	€ 3,801,880.45	€ 4,550,362.85	€8,352,243.30	€ 4,955,289.55	€ 1,946,324.14	€ 6,901,613.69
v)	€ 6,217,889.72	€ 1,946,324.14	€ 8,164,213.86	€ 3,798,731.31	€ 4,546,593.73	€ 8,345,325.04	€ 4,949,145.18	€ 1,946,324.14	€ 6,895,469.32
vi)	€ 6,217,889.72	€ 1,946,324.14	€ 8,164,213.86	€ 3,798,731.31	€ 4,546,593.73	€ 8,345,325.04	€ 4,949,145.18	€ 1,946,324.14	€ 6,895,469.32
	τP=0.1, τS=0.3								
	SA			CCCTB			ETAS		
	Holding´s state	subsidiary´s state	Sum	Holding´s state	subsidiary´s state	Sum	Holding´s state	subsidiary´s state	Sum
i)	€3,237,216.63	€ 1,946,324.14	€ 5,183,540.77	€ 1,922,290.11	€ 4,601,468.99	€ 6,523,759.10	€ 2,158,785.43	€ 1,841,285.69	€ 4,000,071.12
ii)	€3,237,216.63	€ 1,946,324.14	€ 5,183,540.77	€ 1,922,290.11	€ 4,601,468.99	€ 6,523,759.10	€ 2,158,785.43	€ 1,841,285.69	€ 4,000,071.12
iii)	€3,237,216.63	€ 1,946,324.14	€ 5,183,540.77	€ 1,922,495.89	€ 4,601,961.58	€ 6,524,457.47	€ 2,159,224.76	€ 1,841,285.69	€ 4,000,510.45
iv)	€3,237,216.63	€ 1,946,324.14	€ 5,183,540.77	€ 1,924,033.72	€ 4,605,642.74	€ 6,529,676.46	€ 2,162,505.49	€ 1,841,285.69	€ 4,003,791.18
v)	€3,237,216.63	€ 1,946,324.14	€ 5,183,540.77	€ 1,922,290.11	€ 4,601,468.99	€ 6,523,759.10	€ 2,158,785.43	€ 1,841,285.69	€ 4,000,071.12
vi)	€3,237,216.63	€ 1,946,324.14	€ 5,183,540.77	€ 1,922,290.11	€ 4,601,468.99	€ 6,523,759.10	€ 2,158,785.43	€ 1,841,285.69	€ 4,000,071.12

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