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**Working Paper**

## Tax loss offset restrictions: Last resort for the treasury? An empirical evaluation of tax loss offset restrictions based on micro data

arqus Discussion Paper, No. 44

**Provided in Cooperation with:**

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*Suggested Citation:* Dwenger, Nadja (2008) : Tax loss offset restrictions: Last resort for the treasury? An empirical evaluation of tax loss offset restrictions based on micro data, arqus Discussion Paper, No. 44, Arbeitskreis Quantitative Steuerlehre (arqus), Berlin

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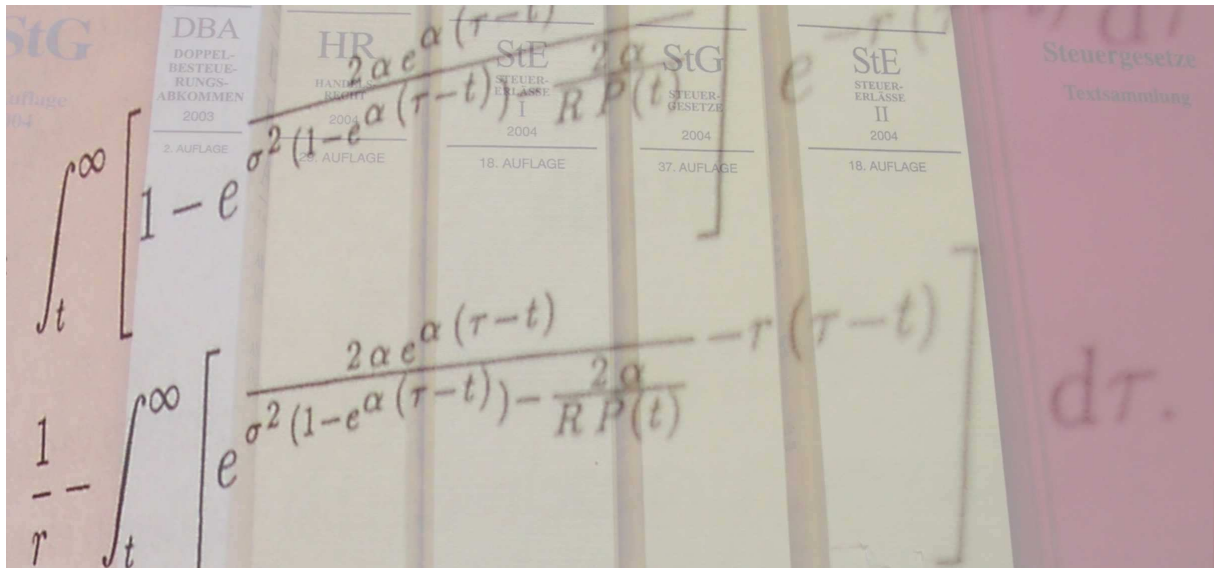
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## Arbeitskreis Quantitative Steuerlehre

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Diskussionsbeitrag Nr. 44

**Nadja Dwenger**

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Mai 2008

arqus Diskussionsbeiträge zur Quantitativen Steuerlehre  
arqus Discussion Papers in Quantitative Tax Research  
ISSN 1861-8944

## **TAX LOSS OFFSET RESTRICTIONS – LAST RESORT FOR THE TREASURY?**

An empirical evaluation of tax loss offset restrictions based on micro data.

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**May 28<sup>th</sup>, 2008**

### **Abstract:**

In Germany, the tax loss carry-forward of corporations significantly increased over the last decade. At the same time only a small percentage of losses have been effectively offset. One potential reason for this puzzle is that stricter loss offset restrictions have been introduced in recent years. I use a newly developed micro simulation model for the German corporate sector to evaluate the fiscal effects of these restrictions. Additionally, distributional breakdowns are provided. I find that the restrictions on the use of tax loss carry-back are rather ineffective while the newly introduced minimum taxation considerably increases yearly tax revenue by 1.1 billion €.

**JEL classification:** H25, C8

**Keywords:** micro simulation, loss offset restrictions, corporate taxation, tax loss carry-forward, tax loss carry-back

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\* **Acknowledgement:** I would like to thank Viktor Steiner, Stefan Bach, Michael Broer and Frank Fossen for valuable comments. The usual disclaimer applies.

## 1. Introduction

In Germany, corporations' tax loss carry-forward significantly increased during the last decade. In 2001<sup>1</sup>, losses which can offset future profits reached a volume of € 388 billion. At the same time adjusted gross income<sup>2</sup> of all corporations was € 91.9 billion. Hence, accrued tax losses from the past exceed adjusted gross income by the factor four. It amounts to 18 % of German GDP.

At present, the German statutory corporate tax rate is 25%. This means that this volume of tax-loss carry-forward is worth € 97 billion. With the 2008 reform of business taxation (*Unternehmensteuerreformgesetz 2008*) the tax base will be broadened and the statutory corporate tax rate will be cut to 15 % from 2008 on. Hence, effectively the reform devalues corporations' tax loss carry-forwards. Corporations may make use of their tax loss carry-forwards in the future, and thus unused losses from the past potentially lower corporate income by an amount of € 58.2 billion. As no provisions for this event have been included into the federal budget so far, potential tax deficits are hanging over the treasury like the sword of Damocles. Corporations' tax loss carry-forwards can cause substantial fiscal problems in the future.

In recent years, the government has reacted with several tax reforms restricting the use of losses from other periods. Since 1999 tax losses can only be carried back into the previous period. Furthermore the volume of the tax loss carry-back was limited to € 1.0 million in 1999 and 2000. Since 2001, its volume has been further restricted to € 0.5 million. Additionally, a minimum taxation (*Mindestbesteuerung*) restricting the use of tax loss carry-forwards was

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<sup>1</sup> This is the year of the latest data available.

<sup>2</sup> The profit as shown in a corporation's tax balance sheet minus certain expenses and other "adjustments" is called adjusted gross income. Subtracting a potential tax loss carry-back or carry-forward and allowable deductions for certain corporations results in "taxable income".

introduced in 2004. Furthermore, the use of losses acquired with the purchase of a corporate shell (*Mantelkauf*) has been severely restricted.

Restrictions on the use of tax losses from other periods possibly explain why only a small amount of profits have been offset against losses in the past. However, so far, empirical studies evaluating the effects of German loss offset restrictions have been rare. Müller (2006) have confined himself to identify the total amount of accumulated corporate losses. Other authors provided case studies and back-on-the-envelope calculations to determine the economic effects of German tax loss offset restrictions (e.g. Niemann, 2004). Present micro simulation studies of the corporate sector have concentrated on the consequences of different local business taxation systems (Fossen/Bach, 2007) and on the effects of corporate reform bills (Bach et al., 2007). Only for non-incorporated companies, Müller (2006) performed a micro simulation concerning the effects of the restricted use of losses.

For the German corporate sector, to my knowledge, there is no empirical analysis on the fiscal and distributional effects of the restrictions in the use of tax loss carry-forwards and the tax loss carry-back. This gap is mainly due to the difficulty to get access to detailed corporate tax information at the micro level which is needed to model the corporate taxation system.

In this paper, I make use of a newly developed micro simulation model for the German corporate sector<sup>3</sup> based on the corporate income tax statistics 1998 and 2001 (Gräb, 2006). This new model allows to shed light on the question whether it is because of fiscal law restrictions that losses are only used on a small scale. It also makes it possible to evaluate the fiscal and distributional effects of the tax reforms of 1999 and 2000, which tightened the offset of profits against losses.

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<sup>3</sup> This model is part of the business tax simulation model BizTax of the DIW Berlin.

The remainder of the paper is the following. In the next section, I describe the changes in the fiscal law concerning the use of tax loss carry-backs and carry-forwards that occurred in 1999/2000 and in 2004. Furthermore, the reforms are put into an international perspective and general developments are discussed from the point of view of public finance. In the third section, the data and some stylised facts are described. Section four contains a presentation of the new micro simulation model for the German corporate sector, which is used to estimate the fiscal effects of reforms concerning the offset of profits against losses from the past. In section five, the empirical results are presented and discussed regarding the effects on the fiscal tax revenue. Furthermore, I evaluate the reforms' distributional effects by size and industry. Section six concludes.

## **2. The fiscal framework of loss offset in international comparison**

### **2.1. German fiscal law and the offset of losses**

The German Corporate Income Tax Law refers to the loss offset regulations of the German Personal Income Tax Law. Offsetting losses from different investments or income sources within one period is unrestricted for corporations (*Verlustausgleich*). Furthermore, they are allowed to charge present profits against losses from other periods. Until 1999, profits could be offset up to a value of € 5.1 million per year against losses from the following two periods (loss carry-back)<sup>4</sup>; at the same time they could be offset without limit against losses from the past (loss carry-forwards). In recent years, these regulations have been tightened.<sup>5</sup> First of all, the **tax loss carry-back** has been considerably restricted since 2000. Since then, losses can be carried back one period only. Furthermore, the carry-back volume was gradually reduced to € 511,500 in 2001 (1999 and 2000: € 1 million).

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<sup>4</sup> §8 (1) Corporate Income Tax Law 1998 (*Körperschaftsteuergesetz*) in conjunction with §10d Income Tax Law (*Einkommensteuergesetz*)

<sup>5</sup> Steuerentlastungsgesetz 1999/2000/2002, BGBl I, 1999, no. 15, pp. 402-497.

The rules on offsetting profits against **tax loss carry-forwards** have been additionally restricted by the so-called minimum taxation (*Mindestbesteuerung*) since 2004. Before, the use of loss carry-forwards had not been restricted in time or volume. Since then, corporations can fully offset profits against loss carry-forwards in the amount of € 1 million. If profits exceed this threshold only 40 % of the exceeding amount can be deducted. This *de facto* capped the use of tax loss carry-forwards. Concerning time, the use of tax loss carry-forwards is still unlimited.

Table 1 summarises the changes in rules concerning the duration and volume of the tax loss carry-back and the loss carry-forward.

**Table 1: Rules for the inter-period use of tax losses**

	<b>carry-back volume</b>	<b>carry-back period</b>
1984 - 1998	DM 10 million (about € 5.1 million)	2 years
in 1999/2000	DM 2 million (about: € 1 million)	1 year
since 2001	€ 511.500	1 year

	<b>carry-forward volume</b>	<b>carry-forward period</b>
1984 - 2003	unlimited	unlimited
since 2004	€ 1 million	unlimited

## **2.2. International comparison and evaluation in terms of public finance principles**

Table 2 shows the rules for the inter-period use of tax losses in the member states of the European Union as well as in Canada, Japan and the United States. No country provides full immediate tax refund for all tax losses. An immediate tax refund is only ensured if the corporation had positive profits in the year(s) before and if an unlimited tax loss carry-back is allowed. There are only few countries that allow companies with positive taxes in the years prior to the loss to carry back the loss and to receive a tax refund: France, Great Britain, Ireland, Netherlands, Canada, Japan, the United States and Germany. In those countries permitting a tax loss carry-back, the time a loss carry-back can be used is very restricted. By

contrast, the possibility to make use of tax loss carry-forward is widespread among the presented countries' fiscal laws. However, many of them limit the use of loss carry-forward to a certain number of periods. In Germany and Austria the use is not restricted in time but in its volume ("minimum taxation"). Poland also has a minimum taxation and additionally limits the use of tax loss carry-forward to five years. These three countries introduced a minimum taxation in order to temporally stretch the use of losses.

**Table 2: Rules for the inter-period use of tax losses within the European Union, Canada, Japan and the Unites States (in 2006)**

country	carry-back		carry-forward	
	volume	period	volume	period
Austria	-	-	75 % of profits	unlimited
Belgium	-	-	unlimited	unlimited
Cyprus	-	-	unlimited	unlimited
Czech Republic	-	-	unlimited	5 years
Denmark	-	-	unlimited	unlimited
Finland	-	-	unlimited	10 years
France	unlimited	3 years	unlimited	unlimited
<b>Germany</b>	<b>511,500 €</b>	<b>1 year</b>	<b>€ 1 million, above 40 % of the exceeding amount</b>	<b>unlimited</b>
Great Britain	unlimited	1 year	unlimited	unlimited
Greece	-	-	unlimited	5 years
Hungary	-	-	unlimited	unlimited
Ireland	unlimited	1 year	unlimited	unlimited
Italy	-	-	unlimited	5 years
Latvia	-	-	unlimited	5 years
Lithuania	-	-	unlimited	5 years
Luxembourg	-	-	unlimited	unlimited
Malta	-	-	unlimited	unlimited
Netherlands	unlimited	3 years	unlimited	unlimited
Poland	-	-	50 % of the annual loss	5 years
Portugal	-	-	unlimited	6 years
Slovakia	-	-	unlimited	5 years
Slovenia	-	-	unlimited	5 years
Spain	-	-	unlimited	15 years
Sweden	-	-	unlimited	unlimited
Canada	unlimited	3 years	unlimited	10 years (non-capital losses)
Japan	unlimited	1 year	unlimited	5 years
United States	unlimited	2 years	unlimited	20 years

Source: Bundesverband der Deutschen Industrie/PriceWaterhouseCoopers (2006).

In public finance theory it is common knowledge that imperfect loss offset rules in the corporate income taxation may seriously alter incentives. There is a wide literature on



“asymmetric taxation”, i.e. the asymmetric treatment of gains and losses: Gains are taxed immediately while losses do not necessarily lead to an instantaneous refund at the same rate. An immediate refund is only obtained if the current loss can be carried back because fiscal law allows for unlimited loss carry-back and because the corporation has had positive taxable income in the years prior to the loss. Any other losses that cannot be offset by loss carry-back must be carried forward. As there is no interest payment this renders loss carry-forwards and investments which initially lead to losses relatively unattractive. Note this is even more true in those countries that only allow losses to be carried forward for a certain time. Thus, corporations investing in risky projects, which may involve temporary losses, are subject to higher effective tax rates than they would be under symmetric taxation rules.

Several researchers used data from US corporations to analyse the impact of the imperfect loss offset on the user cost of capital and on the incentives to invest (among others Altshuler/Auerbach, 1990; Auerbach/Poterba, 1987; Auerbach, 1983 and 1986; Cooper/Franks, 1983; Cordes/Sheffrin, 1983; Mintz, 1988). They conclude that imperfect loss offset provisions discriminate against risky investments. Niemann (2004) used Monte-Carlo-simulations to determine the (negative) effects of the minimum taxation on investment.<sup>6</sup>

The empirical evidence on taxes and the financial structure of companies has been less conclusive. While earlier studies (e.g. Auerbach, 1985; Bradley et al., 1984; Titman/Wessels, 1988) have not found support for the theoretical prediction that leverage levels are related to firms' nondebt tax shields, Givoly et al. (1992) identify a substitution effect between debt and nondebt tax shields, such as tax loss carry-forwards. Graham (1996) and MacKie-Mason (1990) explicitly analyse the financing structure of companies in the presence of loss carry-

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<sup>6</sup> To account for these negative effects of asymmetric taxation on investment, Graham and Lemmon (1998) present the approach of a simulated marginal tax rate which explicitly accounts for tax loss offset. Ramb (2004) makes use of this method and estimates an investment function for Germany taking loss offset into account.

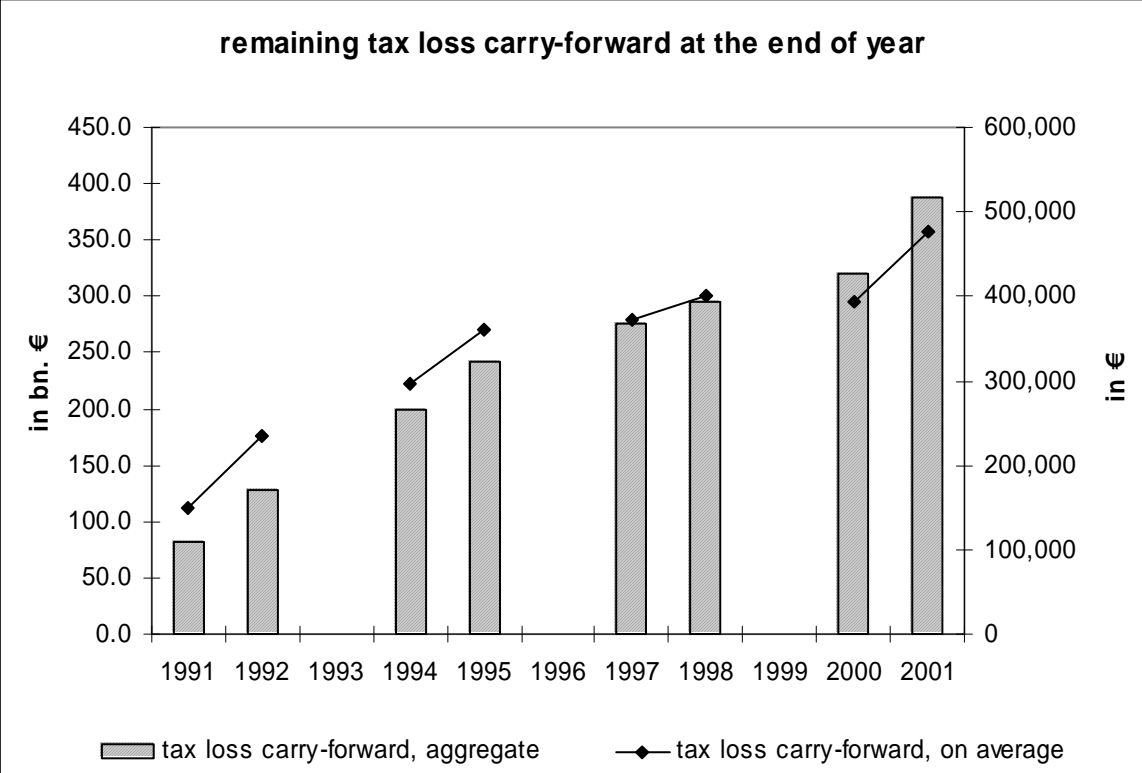
forwards. They also discern a significant negative effect of tax loss carry-forwards on financing with debt.

In a nutshell, imperfect loss-offset provisions substantially distort corporations' investment and financing decisions. Whose decisions will mostly be affected by the reforms tightening the tax loss offset? To answer this question, section five complements the reforms' fiscal effects by a distributional analysis of the legal changes in the use of tax losses. Before coming to the empirical results, let us first have a look on the stylised facts on loss offset and on a short description of the micro simulation model for the German corporate sector.

### **3. Does the tax loss carry-forward go berserk?**

For the last decade we have seen the tax loss carry-forward volume skyrocketing in Germany (Bach and Dwenger, 2007). Corporations' tax loss carry-forward increased from € 81.8 billion in 1991 to € 388 billion in 2001 (figure 1); the volume of losses from the past that can be offset against future profits more than quintupled within a decade. About 54 % (405,560 corporations) of all companies subject to the corporate income tax had a tax loss carry-forward at the end of 2001.

**Figure 1: Corporations' tax loss carry-forward that can be offset against future profits.**

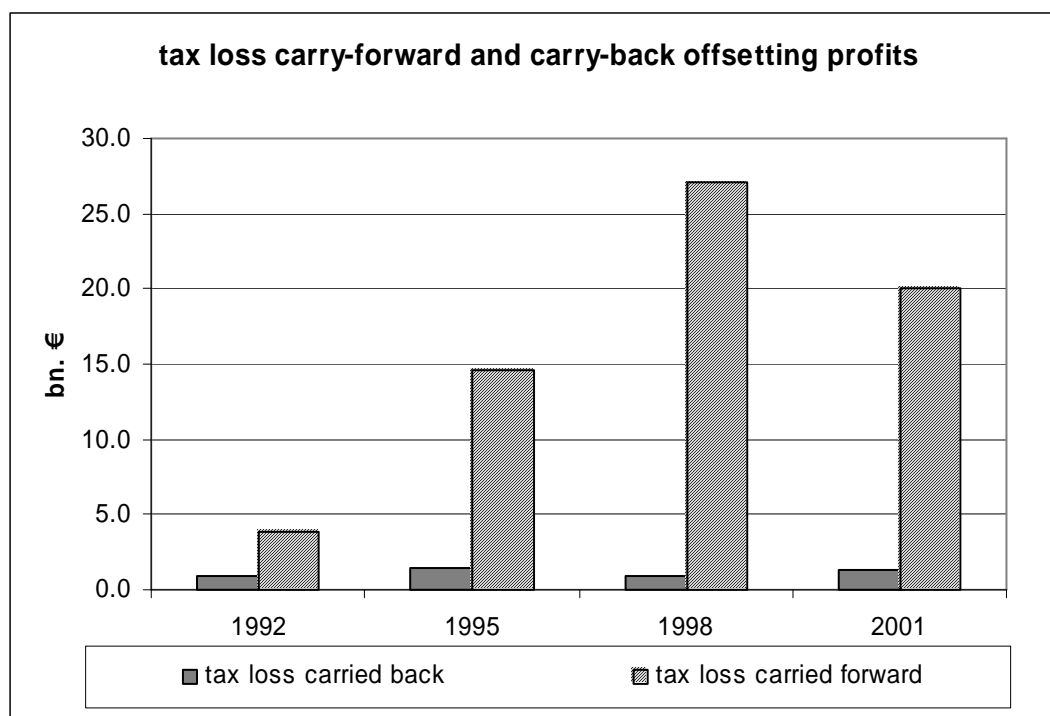


Source: German Federal Statistical Office, corporate income tax statistics, own calculations.

The increasing number of corporations from 546,420 to 813,017 (increase by 49 %) in the same period cannot be the only reason: The increase in the tax loss carry-forward on average runs parallel to the increase in the tax loss carry-forward on aggregate (figure 1). Hence, one would expect that companies offset a large share of present profits against losses from the past every year.

However, this did not happen: Corporations do not really seem to use their tax loss carry-forwards as a large share of these potential tax credits remains unused (figure 2). In 2001, only about € 20 billion out of € 388 billion, i.e. 5 % of the tax loss carry-forwards were used to offset profits. Thus, about 17 % of the total of profits was offset against a tax loss carry-forward in 2001. This is less than in 1998 when 21 % of profits were offset against losses from the past (volume of about € 27.1 billion or 10 % of the accumulated tax loss carry-forward). The use of the tax loss carry-back remained stable at around € 1 billion.

**Figure 2: The use of corporations' tax loss carry-forward and carry-back.**



Source: German Federal Statistical Office, corporate income tax statistics, own calculations.

How can the puzzle of unused tax loss carry-forwards be explained? One potential reason are restrictions in tax loss offset rules that have been introduced recently. In the following each restriction will be scrutinized for its fiscal and distributional effects. All analyses will be based on comprehensive tax data sets on German corporations for the years 1998 and 2001<sup>7</sup> and the newly developed micro simulation model for the German corporate sector, which allows for the great heterogeneity between corporations.

#### **4. The micro simulation model for the German corporate sector**

Micro simulations have become an increasingly popular instrument for the *ex ante* analysis of policy reforms and for their *ex post* evaluation. They are a method to estimate the outcome of tax and social policy reform projects: In the first step, reform effects are estimated for every single agent (i.e. company). As a second step, these individual effects are aggregated to calculate the overall fiscal and distributional consequences of the reform.

<sup>7</sup> Researchers can use these data sets in the *Forschungsdatenzentrum* of the German Statistical Offices.

By this method, heterogeneous characteristics of the agents (size, region, legal form, industry, income etc.) can be taken into account. However, micro simulations require a representative data set with detailed statistical information for every single agent. This may explain why micro simulation models evaluating changes in corporate income taxation are still rare. In Europe, models have been developed within the DIECOFIS project for Italy and the UK (Bardazzi et al., 2004 and Parisi, 2003). Furthermore, the micro simulation model BizTax has been developed for business taxation in Germany (Bach et al., 2007; Fossen/Bach, 2007). As all analyses in the following are run with a newly developed model for the German corporate sector based on corporation tax data, the model is briefly described.

The corporate micro simulation model used here is part of the business taxation model BizTax and is based on company's tax returns data. Among other declarations, detailed information on the potential and realised volume of tax loss carry-forward and of carry-backward is available. Furthermore, the data set contains the individual tax return for the corporate income tax and the official corporate income tax. Thus, it is possible to recalculate the corporate income tax and to compare it to the official one. After correcting some obvious errors in the data the simulated corporate income tax liability for 2001 corresponds to the amount actually assessed by the tax authorities for 99.2 % of all corporations (1998: 99.9 %). These companies accounted for 99.6 % (1998: 99.4 %) of the whole corporate income tax revenue. Hence, one can be confident that the micro simulation model BizTax successfully reflects the fiscal regulations applicable in the different years.

As denoted above there is not only detailed information on the *realised* tax loss carry-forward and carry-back, i.e. on the offset of profits against losses that was possible under the effective legislation, but also on the *potential* tax loss carry-forward and carry-back. This allows me to simulate the reform scenarios before they became effective and to compare them with the

before-reform state. These comparisons provide the possibility to estimate the effects of the changes in the loss-offset provisions for all corporations that are subject to corporate income tax. As changes in behaviour which may be triggered by the reform are not represented in the model, the estimated effects can be regarded as short-run or first round effects. The analysis of the restrictions in volume of the tax loss carry-back is based on data for the year 1998 – the year before the reform of tax loss-offset provisions was adopted and became effective. Micro simulations evaluating the effects of the minimum taxation are based on data for the year 2001, which precedes the discussion about the minimum taxation.<sup>8</sup> By resting my analyses on data sets before the reform became publicly known, I exclude fiscal effects of behavioural or long-term responses to the reform.

In 1999 and 2000, the **loss carry-back**<sup>9</sup> was restricted from € 5.1 million to € 1 million (€ 511,500 in 2001). At the same time the possibility to carry tax losses back was moderated from two years to one period. Unfortunately, there is no information about the tax loss carry-back over two periods in the data set. Hence, it is not possible to empirically disentangle the effects of the cut in the number of periods a loss may be carried back and in the amount of the tax loss potentially carried back. As a result, the micro analysis in the following concentrates on the restriction in *volume*. *Scenario 1* simulates the loss offset provisions that became effective in 1999 and 2000. *Scenario 2* reflects the regulations in volume that have been effective since 2001. The simulated corporate income tax for 1998 will serve as a *reference scenario*. Since 2004, legal provisions for the use of **loss carry-forwards** have been additionally tightened by the minimum taxation, which is evaluated in *scenario 3*.

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<sup>8</sup> Note that up to now the data on corporate income taxation are available every three years. So far, data for 2004 have not been available.

<sup>9</sup> Note the tax loss carry-back may be lowered or suspended at the request of the company. Empirically, this option is not very interesting as nearly no corporation makes use of this choice.

For all scenarios, not only the fiscal but also the distributional effects are presented: Corporations are very heterogeneous and not all of them have been affected in the same way. In order to analyse the distributional effects of the tightening of tax-offset provisions, I break down the reform's fiscal effects along subgroups, i.e. along size (adjusted gross income) and industries.

## 5. Empirical results

### 5.1. The effects of the restriction in the use of a tax loss carry-back

The restriction to carry tax losses back to a volume of € 1 million only (*scenario 1*) did not have large effects on the corporation tax assessed. Tax revenues increased by € 10 million, i.e. less than 0.05 % of total corporate tax revenue.

While 11,999 corporations had an adjusted gross income of € 1 million or more, only 49 corporations reported a loss above this threshold in 1999 and would hence have been hampered in their use of tax loss carry-back under the new regulation. These companies could partly compensate for a lower tax loss carry-back by offsetting the remaining profit against a potential tax loss carry-forward. Thus, a minor sum of tax loss carry-forward is used as a compensation for a lower tax loss carried back. Tables A.1 and A.2 in the appendix contain more details concerning the distributional effects of *scenario 1*.

Capping the use of tax loss carry-back to € 511,500 is more effective, as *scenario 2* shows. The simulated aggregate corporate income tax increases by € 55 million (0.5 % of corporation tax assessed in 1998). Compared to *scenario 1* the additional income tax more than quintupled. Nevertheless, the number of firms which are affected by this new regulation still remains small: Effectively, only 366 corporations suffer a loss of more than € 511,500 in 1999, which they could offset against profits in 1998. Hence, less than 0.05% of all corporations liable for corporate income tax are limited in the use of their tax loss carry-back. Some of these corporations can compensate the limited use of a tax loss carry-back by a tax

loss carry-forward. The profit which exceeds € 511,500 and cannot be offset against a potential tax loss carry-back is then offset against a tax loss carry-forward. As shown in table 3, the tax loss carry-forward, which compensates the tighter restrictions on the loss carry-backs in *scenario 1*, amounts to 9 million €. As expected, the restrictions in the tax loss carry-back are only relevant in those three categories that contain the companies with the largest adjusted gross income (exceeding € 511,500). Table 4 shows that the effects also differ strongly across industries. Those industries, which traditionally contain large players, such as producer goods, financial intermediation or wholesale and retail trade, are especially affected by the reform of the tax loss carry-back.

For both scenarios, simulation results show that past restrictions in the use of the tax loss carry-back had a rather small effect on the overall corporation tax assessed. This is true because only few corporations have a tax loss carry-back and an adjusted gross income in the previous year that exceeds the limit up to which gains can be fully offset. In addition, some of these corporations can offset the exceeding amount against a tax loss carry-forward.

**Table 3: Effects of the restrictions on the use of tax loss carry-back on corporation tax assessed along adjusted gross income (*scenario 2*)**

adjusted gross income	number of taxpayers	use of tax loss carry-back			use of tax loss carry-forward			fiscal effect of the restriction
		tax loss carry-back up to 5 million Euro permitted	tax loss carry-back restricted to 511,500 Euro	effect of the restriction	tax loss carry-back up to 5 million Euro permitted	tax loss carry-back restricted to 511,500 Euro	effect of the restriction	
in million Euro								
below 0	327 317	0	0	0	0	0	0	0
0 - 50 000	308 784	181	181	0	1 380	1 380	0	0
50 000 - 100 000	37 179	104	104	0	783	783	0	0
100 000 - 250 000	31 248	151	151	0	1 126	1 126	0	0
250 000 - 500 000	14 036	110	110	0	913	913	0	0
500 000 - 1 000 000	8 445	122	103	- 20	1 022	1 022	0	9
1 000 000 - 5 000 000	8 800	195	114	- 82	3 171	3 173	2	36
5 000 000 and above	3 199	60	28	- 32	19 767	19 773	7	11
total	739 008	923	789	- 133	28 161	28 169	9	55

Source: German Federal Statistical Office, corporate income tax statistics, own calculations with the micro simulation model for the German corporate sector.



**Table 4: Effects of the restrictions on the use of tax loss carry-back on corporation tax assessed along industries (*scenario 2*)**

industry	number of taxpayers	use of tax loss carry-back			use of tax loss carry-forward			fiscal effect of the restriction
		tax loss carry-back up to 5 million Euro permitted	tax loss carry-back restricted to 511,500 Euro	effect of the restriction	tax loss carry-back up to 5 million Euro permitted	tax loss carry-back restricted to 511,500 Euro	effect of the restriction	
		in million Euro						
agriculture, forestry, fishery	8 270	6	6	0	136	136	0	0
mining, quarrying	1 567	2	1	- 1	362	362	1	0
consumer goods / goods for intermediate consumption goods industry	50 514	97	80	- 17	3 845	3 846	1	7
producers goods	59 454	133	105	- 28	8 993	8 994	1	12
electricity and water supply	6 595	14	9	- 5	629	629	0	2
construction	89 206	102	98	- 5	889	889	0	2
wholesale and retail trade, repair of goods	163 163	162	151	- 11	2 875	2 876	1	5
hotels and restaurants	19 951	4	4	0	136	136	0	0
transport, storage and communication	26 304	36	30	- 5	1 292	1 294	2	1
financial intermediation	11 778	74	49	- 25	1 704	1 704	0	11
real estate and renting	58 977	81	77	- 4	1 312	1 312	0	2
services for private sector	184 607	165	142	- 23	5 676	5 679	3	9
services for public sector and households	58 622	46	37	- 9	871	872	1	4
<b>total</b>	<b>739 008</b>	<b>923</b>	<b>789</b>	<b>- 133</b>	<b>28 720</b>	<b>28 729</b>	<b>9</b>	<b>55</b>

Source: German Federal Statistical Office, corporate income tax statistics, own calculations with the micro simulation model for the German corporate sector.

## 5.2. The effects of the minimum taxation

By contrast, we will see that the introduction of the minimum taxation had a strong fiscal impact. The micro simulation (*scenario 3*) shows that although the minimum taxation only affected 180 corporations, the overall effect on the corporation tax assessed is rather strong and increased corporate tax revenue by € 1.1 billion. This exceeds the effect that was expected by the German Federal Ministry of Finance. They expected a rise of € 0.5 billion.<sup>10</sup>

Table 5 shows that, as expected, companies with large adjusted gross income (more than € 1 million) are affected within their use of losses from the future. Potentially 11,243 companies could have been subjected to the minimum taxation in 2001 as they reported an adjusted gross income exceeding € 1 million. As only few corporations (180 corporations) are

<sup>10</sup> This figure includes higher tax revenue out of the local business tax that is not considered here.

effectively limited in their loss offset behaviour, the impact on these companies is considerable: on average, each of them has to spend an additional sum of € 6.1 million on corporate income tax.

**Table 5: Effects of the minimum taxation on corporation tax assessed along adjusted gross income (scenario 3)**

adjusted gross income	number of taxpayers	use of tax loss carry-forward			fiscal effect of the restriction
		without minimum taxation	with minimum taxation	effect of the restriction	
in million Euro					
below 0	342 003	0	0	0	0
0 - 50 000	363 467	1 453	1 453	0	0
50 000 - 100 000	39 576	783	783	0	0
100 000 - 250 000	33 493	1 111	1 111	0	0
250 000 - 500 000	14 593	913	913	0	0
500 000 - 1 000 000	8 642	992	992	0	0
1 000 000 - 5 000 000	8 475	3 094	2 539	- 555	134
5 000 000 and above	2 768	12 484	8 346	- 4 139	968
total	813 017	20 830	16 137	- 4 693	1 103

Source: German Federal Statistical Office, corporate income tax statistics, own calculations with the micro simulation for the German corporate sector.

Before analysing the distributional effects of the minimum taxation across industries, it is rewarding to have a look at the unused tax loss carry-forward by industry. Table 6 displays the volume of unused tax loss carry-forwards in absolute terms and as a share per corporation. It shows that considerable differences in the volume of unused losses from the past arise between industries. In absolute terms, corporations manufacturing producer goods and corporations providing services for the private sector account for most of the unused tax loss carry-forward. In the latter this large share corresponds to the significant number of corporations within this industry. This becomes obvious when looking at the average tax loss carry-forward within an industry. While companies in the industry with services for the private sector have a tax loss carry-forward of € 26 thousand on average, other industries have considerably more tax loss carry-forwards on average (financial intermediation:

€ 1.5 million, transportation or electricity/water supply: € 1.2 million and mining/quarrying: € 1.1 million).

**Table 6: Unused tax loss carry-forward by industry at the end of year 2001**

industry	unused tax loss carry-forward	average unused tax loss carry-forward
	in million €	in thousand €
agriculture, forestry, fishery	3 683	445
mining, quarrying	1 734	1 107
consumer goods / goods for intermediate consumption goods industry	40 880	809
producers goods	55 098	927
electricity and water supply	7 738	1 173
construction	17 850	200
wholesale and retail trade, repair of goods	37 431	229
hotels and restaurants	3 413	171
transport, storage and communication	31 129	1 183
financial intermediation	17 646	1 498
real estate and renting	49 628	841
services for private sector	97 117	526
services for public sector and households	24 587	419
<b>total</b>	<b>387 935</b>	<b>.</b>

Source: German Federal Statistical Office, corporate income tax statistics, own calculations.

As expected, these industries are mostly affected by the minimum taxation (table 7). In relative terms, mining and quarrying companies are most likely to be affected by the minimum taxation (below 1 % of companies within this industry). In absolute terms, it is the industry providing services for the private sector where most corporations fall upon the minimum taxation (39 corporations). As we have seen, this industry accounts for most companies so that this is not surprising. More interesting is to consider the increase in the corporation tax assessed: Companies in the industry of transport, storage and communication confront a sharp increase of 29 % of their corporation tax burden. This implies strong distributional effects of the minimum taxation.

**Table 7: Effects of the minimum taxation on corporation tax assessed along industries (scenario 3)**

industry	number of taxpayers	use of tax loss carry-forward			fiscal effect of the restriction	
		without minimum taxation	with minimum taxation	effect of the restriction		
		in million Euro				in %
agriculture, forestry, fishery	8 608	193	184	- 8	2	3.8%
mining, quarrying	1 567	166	108	- 59	15	13.9%
consumer goods / goods for intermediate consumption goods industry	50 822	2 213	1 738	- 475	117	3.4%
producers goods	63 225	3 685	2 637	- 1 048	254	8.3%
electricity and water supply	7 015	1 110	810	- 300	40	3.6%
construction	92 339	757	688	- 68	17	3.2%
wholesale and retail trade, repair of goods	162 906	2 425	2 064	- 362	88	3.8%
hotels and restaurants	21 174	221	193	- 28	6	7.3%
transport, storage and communication	28 305	2 016	1 376	- 640	160	29.1%
financial intermediation	12 051	1 153	793	- 359	88	2.4%
real estate and renting	65 016	1 404	1 178	- 225	55	6.1%
services for private sector	230 268	4 615	3 623	- 992	231	3.8%
services for public sector and households	69 721	871	744	- 128	31	4.2%
<b>total</b>	<b>813 017</b>	<b>20 830</b>	<b>16 137</b>	<b>- 4 693</b>	<b>1 103</b>	<b>4.9%</b>

Source: German Federal Statistical Office, corporate income tax statistics, own calculations with the micro simulation for the German corporate sector.

## 6. Conclusion

In recent years we have seen the tax loss carry-forward skyrocketing. In 2001, unused losses from the past attained a volume of € 388 billion. 443,076 corporations showed a tax loss carry-forward in 2001, i.e. 54 % of all companies subject to corporate income tax. Thus, one would expect that corporations extensively make use of these losses from the past. However, the data show that only a small share of tax loss carry-forwards is used every year.

One potential reason for this puzzle is that tax offset restrictions have been tightened in the past. In this paper these new regulations are briefly explained and discussed. In an international perspective, German loss offset regulations are still rather generous as many

other countries do not allow for a tax loss carry-back at all. However, tax asymmetries, i.e. the unequal treatment of gains and losses in taxation, have been aggravated by the reforms. While corporate profits are immediately taxed, losses do not necessarily lead to an immediate tax refund. A form of immediate tax refund is only given if companies suffering losses can fully offset these losses against profits from the previous year. From a point of view of public finance, these tax asymmetries are undesirable because they lead to economic inefficiencies: Researchers empirically showed that they distort entrepreneurial decisions regarding e.g. investments or financing.

To evaluate whether it is due to the newly introduced tax loss offset restrictions that the tax loss carry-forward steadily increases, I have empirically analysed two major reforms. Both analyses are based on a newly developed model for the German corporate sector. The first reform concerns the tax loss carry-back, which was tightened in two steps. In this paper, it was shown that the restriction in the volume of the tax loss carry-back to € 1 million generated little additional fiscal revenue (+ € 10million). It became also clear that the further limitation of the tax loss carry-back to € 511,500 in 2001 was more effective. The latter generated a plus in fiscal revenue in the amount of € 55 million. As expected before the tightness of the tax loss carry-back has been relevant for large companies only. The percentage of companies affected by the restriction in the use of their tax loss carry-back is nevertheless surprisingly small (0.5 %, 366 companies).

As a second reform, the minimum taxation, which was introduced in 2004, was evaluated. It turned out that the minimum taxation is very effective in generating tax revenue: the micro simulations showed an increase of tax revenues by 1.1 billion €. Like the reform of the tax loss carry-back the minimum taxation only affects corporations with a large adjusted gross income (more than € 1 million). The distributionaleffects across industries show that those

industries with traditionally large players are mostly affected. These are mining and quarrying companies and the firms in the industry transport, storage and communication. On the whole, the minimum taxation is effective for no more than 180 companies (11,243 reported an adjusted gross income exceeding 1 million € and could potentially be subject to the minimum taxation in 2001). This means that these corporations face a much higher tax burden than before. On average, they pay an additional corporate income tax of € 6.1 million.

Even though the minimum taxation was more effective than expected both reforms can only partly explain why the volume of tax losses carried forward has been skyrocketing in recent years without being offset against present profits. Hence, the driving force of increasing tax loss carry-forwards remains in the dark.

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**Table A1: Effects of the restrictions on the use of tax loss carry-back on corporation tax assessed along adjusted gross income (*scenario I*)**

adjusted gross income	number of taxpayers	use of tax loss carry-back			use of tax loss carry-forward			fiscal effect of the restriction
		tax loss carry-back up to 5 million Euro permitted	tax loss carry-back restricted to 511,500 Euro	effect of the restriction	tax loss carry-back up to 5 million Euro permitted	tax loss carry-back restricted to 511,500 Euro	effect of the restriction	
		in million Euro						
below 0	327 317	0	0	0	0	0	0	0
0 - 50 000	308 784	181	181	0	1 360	1 360	0	0
50 000 - 100 000	37 179	104	104	0	779	779	0	0
100 000 - 250 000	31 248	151	151	0	1 116	1 116	0	0
250 000 - 500 000	14 036	110	110	0	902	902	0	0
500 000 - 1 000 000	8 445	122	122	0	1 001	1 001	0	0
1 000 000 - 5 000 000	8 800	195	182	- 13	3 065	3 065	0	6
5 000 000 and above	3 199	60	51	- 8	20 498	20 498	0	4
total	739 008	923	901	- 21	28 720	28 720	0	10

Source: German Federal Statistical Office, corporate income tax statistics, own calculations with the micro simulation model for the German corporate sector.

**Table A2: Effects of the restrictions on the use of tax loss carry-back on corporation tax assessed along industries (*scenario I*)**

industry	number of taxpayers	use of tax loss carry-back			use of tax loss carry-forward			fiscal effect of the restriction
		tax loss carry-back up to 5 million Euro permitted	tax loss carry-back restricted to 511,500 Euro	effect of the restriction	tax loss carry-back up to 5 million Euro permitted	tax loss carry-back restricted to 511,500 Euro	effect of the restriction	
		in million Euro						
agriculture, forestry, fishery	8 270	6	6	0	136	136	0	0
mining, quarrying	1 567	2	2	0	362	362	0	0
consumer goods / goods for intermediate consumption goods industry	50 514	97	95	- 2	3 845	3 845	0	1
producers goods	59 454	133	126	- 7	8 993	8 993	0	3
electricity and water supply	6 595	14	13	- 1	629	629	0	0
construction	89 206	102	102	0	889	889	0	0
wholesale and retail trade, repair of goods	163 163	162	162	0	2 875	2 875	0	0
hotels and restaurants	19 951	4	4	0	136	136	0	0
transport, storage and communication	26 304	36	36	0	1 292	1 292	0	0
financial intermediation	11 778	74	69	- 5	1 704	1 704	0	2
real estate and renting	58 977	81	81	0	1 312	1 312	0	0
services for private sector	184 607	165	163	- 2	5 676	5 676	0	1
services for public sector and households	58 622	46	42	- 4	871	871	0	2
total	739 008	923	901	- 21	28 720	28 720	0	10

Source: German Federal Statistical Office, corporate income tax statistics, own calculations with the micro simulation model for the German corporate sector.

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Herausgeber: Kay Blaufus, Jochen Hundsdoerfer,  
Dirk Kieseewetter, Deborah Knirsch, Rolf J.  
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ISSN 1861-8944