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ARTICLE

Tax rule changes and the timing of asset write-offs in loss firms

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Abstract

This paper examines the asset write-off behavior of loss firms in response to tax rule changes. In particular, we investigate two simultaneous changes in tax-loss carryforward offsetting in opposite directions in Germany and France. Understanding if and how tax losses affect firms' financial reporting is important because investors could receive a biased signal of the firm value without such knowledge. We hypothesize and find that following changes in tax-loss carryforward offsetting rules, loss firms adjust their financial reporting write-offs to avoid costly large book-tax differences. In particular, German loss firms reduce their financial reporting write-offs in the post-period by 0.61% of total assets, whereas French loss firms increase their write-offs by 0.15% of total assets as a response to changes in tax-loss offsetting rules in opposite directions. We contribute to the literature by shedding light on the under-researched question of how changes in tax rules affect the financial reporting of loss firms.

KEYWORDS
accounting choice, big bath, loss firms, tax-loss carryforwards, write-offs

1 | INTRODUCTION

Countries generally allow firms with negative taxable income in the current period to carry these losses forward to the next period(s) or carry back to the previous period(s). The negative taxable income, referred to as tax loss or net operating loss, lowers the taxable income of the period where it is offset. This reduces the tax burden in the respective period. While evidence suggests that following *tax rate* changes, firms with tax-losses have incentives to shift book income inter-temporarily (Guenther, 1994; Maydew, 1997), it is unclear whether and how changes in tax-loss offsetting rules affect financial reporting behavior.

With stricter offsetting rules, tax-losses may not be fully offset against positive taxable income, which directly affects firms' liquidity and also reduces the net present value of tax-loss carryforwards. For their *tax accounting*, firms have the incentive to reduce large discretionary expenses (e.g., write-offs) in loss years and postpone those expenses to profitable years when offsetting rules become stricter.[1] For their *financial reporting*, firms face a choice between adjusting their financial reporting to tax accounting or accepting differences between tax accounting and financial reporting (book-tax differences). On the one hand, the cost of adjusting financial reporting to minimize book-tax differences is that financial statements become less informative about economic performance.[2] On the other hand, high book-tax differences can be costly, because treating business transactions differently in tax accounting and financial reporting might make investors, auditors, and enforcement agencies suspicious about the quality of book earnings (Erickson et al., 2004). Therefore, this paper investigates whether and by how much financial reporting write-off behavior in firm-years with losses (hereafter: loss firms) changes in response to changes in tax-loss offsetting rules.[3]

Hanlon and Heitzman (2010) conclude in their overview article that we do not have a good understanding of how tax-loss carryforwards affect financial reporting. Understanding if and how tax losses affect firms' financial reporting in consolidated financial statements (hereafter, financial reporting) is important for investors and regulators for mainly two reasons. First, if tax-loss offsetting rules affect financial reporting, investors will receive a biased signal of the firm value. To correctly evaluate the write-off behavior of loss firms, financial statement users need to know when changes in the institutional environment affect the incentives to increase or decrease financial reporting write-offs in specific situations. Thus, understanding the link between tax-loss carryforwards and financial reporting helps to assess the underlying economics of a firm. Second, the goal of the International Financial Reporting Standards (IFRS) is to achieve financial reporting comparability across countries (International Accounting Standard Board [IASB], 2018). However, tax-loss carryforward rules differ across countries and thus potentially influence financial reporting differently. While some European countries (Bulgaria, Cyprus, Czech Republic, Greece, Hungary, Poland, Portugal, and Slovakia) are strict and only allow losses being carried forward for five years or less, other countries (Austria, Belgium, Denmark, France, Germany, Ireland, Italy, Lithuania, Malta, Norway, Slovenia, Spain, Sweden, and the United Kingdom) allow losses being carried-forward indefinitely.[4] Understanding how these differences affect financial reporting behavior is important not only for standard setters but also for investors comparing companies across countries, and for the compensation committee benchmarking their executives against international peers.

[1] We use the term "tax accounting" to refer to information provided to tax authorities and "financial reporting" to refer to public disclosure.

[2] In theory, tax rules should not affect financial reporting in order to provide undistorted information to external stakeholders. It is beyond the scope of this paper to test whether changes in taxable income actually improve or deteriorate the signal from write-offs. If, for example, managers opportunistically delayed write-offs, tax incentives to write-off more could improve the information environment. Conversely, if the amount of write-offs reflected the underlying economics correctly, tax incentives to write-off more might deteriorate the signal provided through financial reporting. Either way, tax rules are not designed to alter the write-off behavior.

[3] We focus on financial reporting write-offs for two reasons. First, write-offs occur often in loss years (Elliott & Shaw, 1988; Moore, 1973; Pourciau, 1993). Thus, changes in financial reporting behavior in response to tax-loss offsetting are likely to manifest in write-offs. Second, the economic event causing a write-off likely applies to financial reporting and tax accounting equally.

[4] The remaining countries allow to carryforward losses between 7 and 17 years. Furthermore, some countries allow to carry-back losses for one year while others do not allow carrybacks. We present country-specific details in Appendix B.

In this paper, we compare the change in financial reporting write-off behavior in response to changes in tax-loss offsetting rules in Germany and France, as both countries changed their offsetting rules in 2004 in opposite directions. In Germany, where the 2004 reform *has restricted* tax-loss carryforward offsetting to 60% of taxable income, tax losses have become costlier and firms have a stronger incentive to postpone write-offs to profitable years. In contrast, in France, where the 2004 reform has *extended* tax-loss offsetting from five years to infinity, tax losses have become less costly and firms have a lower incentive to postpone write-offs to profitable years. In a nutshell, tax losses become costlier for German firms and less costly for French firms. If firms change the timing of the write-offs in their *tax accounts* accordingly, but leave their *financial reporting* unchanged, the gap between book income and taxable income will change.

We use two difference-in-differences analyses to examine firms' financial reporting write-off behavior before and after these two quasi-natural experiments of changes in tax-loss offsetting. First, we compare German loss firms with French loss firms pre and post the regulation changes. Second, we compare German (French) firm-years with losses with German (French) firm-years with profits (hereafter: profitable firms) pre and post the regulation changes. Since Germany and France changed their offsetting rules in opposite directions in 2004, we can largely rule out alternative explanations if the results on financial reporting write-off behavior go in the hypothesized direction in both countries. Using data on publicly listed firms from Thomson Reuters' Worldscope, I/B/E/S, supplemented with subsidiary information from the Orbis database (Bureau van Dijk), we find that German loss firms reduce their financial reporting write-offs in the post period by 0.61% of total assets, whereas French loss firms increase their write-offs by 0.15% of total assets. These results are in line with our predictions.[5]

We are not aware of any other concurrent changes in the *tax* institutional environment of Germany and France. Furthermore, both countries face the same European financial reporting environment and extensively trade with each other.[6] As our research design consists of simultaneous difference-in-differences analyses with opposite predictions, our results are not influenced by the 2005 introduction of the IFRS. To fully rule out concerns about the influence of the IFRS introduction, we control for the introduction of IFRS in our research design and rerun our tests in a sample of firms that did not have a GAAP change in our sample period.[7] The results remain qualitatively unchanged across these specifications. Thus, we are confident that no other concurrent macroeconomic factors affect our results.

Our results are robust to using various difference-in-differences designs, matching German and French loss firms based on observable characteristics, using a balanced panel, a Tobit regression instead of OLS, and time horizons of one (two, three) year(s) pre and post the 2004 regulation changes. Furthermore, we find the same results when focusing on extreme values of write-offs in the form of earnings big baths (i.e., when firms write-off more than one percentage of total assets). Furthermore, if write-offs were completely nondiscretionary, this would speak against our hypothesis and empirical findings. Thus, based on prior literature and our empirical results, we are confident that the timing of write-offs is at least partially at a managers' discretion.

In additional analyses, we conduct cross-sectional tests along the lines of domestic versus foreign business operations and the importance of financial reporting earnings. Consistent with the fact that tax-losses are tied to the unconsolidated tax accounts of the subsidiaries that incurred the loss, we find that firms with more foreign business operations are affected less than firms with predominantly domestic business operations. In addition, firms react less to the 2004 tax rule changes when they have more analysts following. These firms care more about the informativeness of their financial statements and are thus less likely to alter financial reporting due to changes in tax accounting. Overall, our results suggest that loss firms alter the timing of their asset write-offs following changes in offsetting rules.

[5] Changes in write-offs of 0.61% of total assets in Germany and 0.15% of total assets in France are economically meaningful. As a comparison, Szczesny and Valentincic (2013) as well as Riedl (2004) document average write-offs of 2.8% of total assets for samples of German private and the United States listed firms, respectively.

[6] Between 2002 and 2005, around 10% of Germany's total exports are being exported to France and around 15% of France's total exports go to Germany (Organization for Economic Co-operation and Development [OECD], 2019).

[7] Exceptions from mandatory adoption of IFRS are explained in Section 7.2.

We contribute to the literature by shedding light on the under-researched question of how changes in tax-loss offsetting affect financial reporting of *loss firms*. We show a specific mechanism of how financial reporting is adjusted to tax accounting and do not rely on broad accrual-based earnings management estimations. Our findings are of particular interest to countries that plan to change or already changed tax-loss offsetting rules.[8] Our paper informs policymakers and financial statement users about the financial reporting consequences of changes in tax-loss offsetting.

Furthermore, we contribute to the financial reporting literature that investigates firms' write-off and impairment behavior. While prior literature is concerned with firm characteristics that influence write-offs and impairments (e.g., DeAngelo et al., 1994; Francis et al., 1996; Gietzmann & Wang 2019; Hazarika et al., 2012; Moore, 1973; Pourciau, 1993), we provide evidence that the institutional environment is an important determinant of firms' write-off behavior.

The rest of the paper is organized as follows. Section 2 summarizes the institutional setting. Section 3 introduces related literature and develops the hypotheses. Section 4 presents the data and research design. Section 5 provides the results, Section 6 contains cross-sectional tests, and Section 7 presents robustness tests and further results. The conclusion follows in Section 8.

2 | INSTITUTIONAL SETTING

2.1 | Tax-loss offsetting

Germany and France are continental European countries that can be classified as code law systems (Szczesny & Valentincic, 2013). Neither Germany nor France grants tax refunds in case of tax losses but tax losses are offset with profits from either previous or future periods. Between 2002 and 2005, German firms with negative taxable income could choose to carry tax losses backwards to offset it against profits from the previous year to a maximum of €511,500.[9] In the same period, French firms that incurred a negative taxable income could carry back the loss to the preceding three years. If firms did not have sufficient profits in the previous year(s) to offset the tax loss fully, a tax-loss carryforward is realized by the end of the fiscal year.[10]

In 2004, the rules to carry forward tax losses changed in Germany and France. Prior to the 2004 rule change, German firms could carry forward tax-losses indefinitely without a limit. From 2004 onwards, German firms can offset only 60% of the positive taxable income that exceeds €1 million against tax-loss carryforwards.[11] The reason for the change was that German firms had high amounts of tax-loss carryforwards (German Federal Government, 2003). In line with the intention of the regulator, the average tax-loss offsetting decreased from €103,532 in 2001 to €79,956 in 2004, suggesting that limiting the tax-loss offset had tax consequences for German corporations (Statistisches Bundesamt 2005, 2009).

Until 2003, French firms could offset their tax-losses against positive taxable income for five years following a tax loss. Beginning with 2004, tax losses can be offset against positive taxable income indefinitely (EY, 2005).

[8] For example, the United States Tax Cuts and Jobs Act of 2017 (TCJA) introduced stricter tax-loss offsetting. The TCJA was signed into law by President Trump on December 22, 2017 and has entered into force for taxable years beginning after December 31, 2017. Next to lowering the corporate income tax to 21%, the TCJA has disallowed loss carrybacks, reduced loss carryforwards offsetting to 80% of the taxable income and extended the carryforward period from 20 years to infinity.

[9] Germany has extended the tax-loss carryback from €511,500 to €1 million from 2015.

[10] France has reduced the period to carryback tax losses from three years to one year from 2012.

[11] Assume a firm has a tax loss of €10 million in year zero and a profit of €10 million in the following year. Prior to the rule change, the tax loss of €10 million in year zero would be carried forward and fully offset against the profit in year one. Thus, the taxable income is zero in year one and no taxes are paid in either year. After the rule change, only €6.4 million could be offset in year one (€1 million + 0.6* €9 million) and the remaining €3.6 million (taxable income after the tax rule change) would be subject to taxation.

2.2 | Individual financial statements

In Germany and France, taxable income is tied to book income in *individual* financial statements. In Germany, legal consequences, such as dividend distribution, tax payments, and payout restrictions, are linked to individual (unconsolidated) financial statements of each legal entity (Fülbier et al., 2017). For individual financial statements, firms are not allowed to adopt IFRS voluntarily. In France, the use of single financial statements is similar. Firms are not allowed to apply IFRS for their individual financial statements. Furthermore, individual accounts have a close link to tax considerations, whereas group accounts have no such link (Le Manh, 2017). Tax authorities in both countries use the individual financial statements as the basis for determining the taxable income, plus or minus tax adjustments. The most common adjustments are adding nondeductible business expenses, deducting tax-exempt income, and applying different amortization and depreciation schedules for book income and taxable income.

2.3 | Consolidation for tax purposes

Germany and France allow groups to opt to sum up profits and losses among *domestic* group members for tax purposes. Germany requires a shareholding of more than 50% in a German subsidiary and a contractual profit transfer agreement to sum up losses at the level of a parent company (§ 14 German Corporate Income Tax Act; *Körperschaftsteuergesetz*). The parent company files a tax return for the net taxable income of all companies included in the profit and loss transfer regime. France requires a shareholding of at least 95% in a French subsidiary to sum up losses at the level of a parent company. Similarly, a French parent company files a consolidated tax return for all consolidated subsidiaries (EY, 2005).

2.4 | Consolidated financial statements

Consolidated *financial statements* provide information for various stakeholders and are not formally aligned with tax accounts in either country. The so-called International Accounting Standards (IAS) regulation (EU Regulation 1606/2002, European Parliament, 2002) requires publicly listed firms in EU regulated markets to prepare their consolidated financial statements in accordance with IFRS since 2005. For firms that are not listed in a regulated market (e.g., private firms), both countries allow firms to choose between local GAAP and IFRS for consolidated accounts (André, 2017).[12]

3 | RELATED LITERATURE AND HYPOTHESIS DEVELOPMENT

Some studies find that the impact of tax rules on financial reporting behavior is predominantly prevalent in private firms (e.g., Ball & Shivakumar, 2005; Beatty & Harris, 1999; Burgstahler et al., 2006; Cloyd et al., 1996; Coppens & Peek, 2005). For example, Kosi and Valentincic (2013) study a panel of Slovenian *private firms*, where, as of 2005, asset write-offs are no longer tax-deductible expenses. The authors find write-offs to be positively associated with firm profitability when write-offs are tax-deductible, and less associated when write-offs are not tax-deductible. A similar result is provided by Garrod et al. (2008), who find that larger and more profitable *private firms* are more likely to write off. However, the magnitude of write-offs decreases with size. Similarly, German private firms write-off more if they are more profitable, have more financial debt, and payout dividends (Szczesny & Valentincic, 2013).

[12] André (2017) provides an overview of which EU country permits or prohibits private firms to use IFRS in consolidated and unconsolidated financial statements.

If tax rules provide incentives to alter tax accounting, as in the case of changed offsetting rules, firms have a choice to adjust their financial reporting accordingly or to not react in their financial reporting. Differences between tax accounting and financial reporting may be perceived as a red-flag for low-quality earnings by investors (Erickson et al., 2004; Hanlon, 2005). Thus, it is not obvious that firms adjust their consolidated financial statements in response to changes in tax-loss offsetting. While aligning financial reporting with tax accounting avoids the costs associated with high book-tax differences, it alters the information provided by financial reporting. This is documented by Guenther et al. (1997), who find that the incentive to defer income for tax purposes causes firms to also defer income for financial reporting purposes due to the higher book-tax conformity introduced by the 1986 Tax Reform Act. The higher book-tax conformity, however, has a negative impact on firms' earnings informativeness (Hanlon et al., 2008).

In Germany, the 2004 tax rule change made tax-loss offsetting stricter by delaying tax-loss deductions. This is costly for firms, as it increases taxable income and postpones tax savings to future periods. Thus, the 2004 tax rule change reduces the present value of tax savings resulting from tax-loss deductions. It, therefore, incentivizes firms to reduce large discretionary expenses (e.g., write-offs) in their *tax* accounting in loss years and postpone those expenses to profitable years. As the 2004 reform limited tax-loss deductions for German firms, we expect German loss firms to write-off less after 2004 in their financial reporting to reduce costly book-tax differences. We state our first hypothesis in alternative form as follows.

Hypothesis 1. After the 2004 restriction in tax-loss offsetting, German loss firms report write-offs to a lesser extent in their consolidated financial reporting.

In France, the 2004 tax rule change made tax-loss offsetting less strict. Extending the period to offset tax-losses from five years to infinity makes losses cheaper for French firms, as tax-losses do not forfeit any longer after five years. In the period with time constraints on tax-loss offsetting, firms had the incentive to avoid large losses by recognizing lower charges for write-offs if firms exhibited already losses. This suggests that the incentives of French firms to report losses are not influenced by the rules to offset tax-losses anymore as of 2004. Hence, we formulate our second hypothesis in alternative form as follows.

Hypothesis 2. After the 2004 extension in tax-loss offsetting, French loss firms report larger write-offs in their consolidated financial reporting.

4 | DATA AND RESEARCH DESIGN

4.1 | Data

We use consolidated financial statement data of publicly listed German and French firms from Worldscope by Thomson Reuters for the period 2002 to 2005, which includes two years before and after the offsetting rule change in Germany and France. Starting our sample period before 2002 is less suitable, as there was a tax system change in Germany in 2001. Thus, we define the pre-period from 2002 to 2003 and the post-period from 2004 to 2005.[13] Our main sample consists exclusively of firm-years with losses of German and French publicly listed firms. We observe 784 firm-years with losses from Germany and 650 firm-years with losses from France. Given our analysis of write-off behavior, we classify a firm-year as a loss firm-year if a firm realizes negative earnings before interest and taxes before write-offs in a given year. Observations with profitable years, that is, positive earnings before interest and taxes before write-offs, are used as a control group in Equation 3.

[13] We also test other time periods in the robustness section.

4.2 | Research design

Our main identification strategy is based on comparing two simultaneous changes in tax-loss offsetting with opposite expectations for Germany and France. We test German and French firms' financial reporting behavior separately pre and post the changes in tax-loss offsetting. Furthermore, we employ a difference-in-differences design where we compare the financial reporting behavior of German firms against French firms pre and post the changes in tax-loss offsetting. Both countries are neighbors, politically as well as economically highly connected, and face the same financial reporting environment. By explicitly comparing changes in both countries, we can rule out that macroeconomic factors or specific accounting regulations influence the results of our analyses.[14]

We argue in Section 3 that the 2004 changes in offsetting rules will induce German loss firms to write off to a lesser extent and French loss firms to write-off to a larger extent. The dependent variable in our research design is *WRITEOFF*, which is the sum of all impairments reported in Worldscope deflated by lagged total assets. *POST* is coded one for years after the tax rule changes and zero otherwise. We define a firm as a loss firm if it has negative earnings before interest, tax, *and* write-offs. The regressions use robust standard errors clustered at the firm level and include industry and year fixed effects when indicated.

In the first part of our analysis, we run regressions separately for Germany and France and are especially interested in the parameter estimate for *POST* (β_1). We expect β_1 to have a negative coefficient for Germany, which indicates that German loss firms impair assets to a lesser extent after the tax rule change. For France, we expect the opposite, that is, a positive coefficient.

$$\begin{aligned} WRITEOFF_{i,t} = {} & \beta_0 + \beta_1 * POST + \beta_2 * SIZE_{i,t} + \beta_3 * ROA_{i,t} + \beta_4 * SD(ROA)_{i,t} + \beta_5 * R\&D_{i,t} \\ & + \beta_6 * LEV_{i,t} + \beta_7 * BIG4_{i,t} + \beta_8 * IFRS_{i,t} + \beta_9 * WRITEOFF_{i,t-1} + \sum_{i=10}^{n} \beta_i * FE + \varepsilon_{i,t}. \end{aligned} \tag{1}$$

We include *SIZE* as a control variable because bigger firms might engage in larger write-offs and the write-off behavior of bigger firms may be more visible. *SIZE* is defined as the natural logarithm of total assets. We control for leverage induced incentives by including *LEV*, which is defined as financial long- and short-term debt over lagged total assets because firms that are close to violating debt covenants today or in the future might be more likely to shift profits in time to reduce volatility (e.g., DeFond & Jiambalvo, 1994; Sweeney, 1994). Poor performance might be linked to impairments and write-offs. Thus, profitability (*ROA*), defined as EBIT *corrected for write-offs* and deflated by lagged total assets, might influence write-off behavior of firms, as prior literature shows that managers shift earnings from the future to the current period if firm performance is weak (e.g., DeFond & Park, 1997). Because offsetting rules affect firms' risk-taking behavior (Langenmayr & Lester, 2018; Ljungqvist et al., 2017), we control for the country-industry-year standard deviation of return on assets before write-offs to control for changes in firms' risk-taking behavior at the country-industry level. Loss firms show more write-offs and have higher research and development costs than profitable firms (Bartov et al., 1998; Darrough & Ye, 2007; Joos & Plesko, 2005). Thus, we include *R&D*, defined as R&D expenses deflated by lagged total assets. Write-off behavior might be correlated with the quality of the auditor. Therefore, we include *BIG4* as an indicator variable that takes the value of one, if a firm is audited by a Big4 company and zero otherwise (DeAngelo, 1981). Furthermore, we control for the introduction of IFRS as a contemporaneous event during our sample period.[15] Lastly, we also control for the level of write-offs in the pre period ($WRITEOFF_{t-1}$).[16]

[14] For instance, Germany's GDP per capita grew from € 28.8k to € 35.2k between 2002 and 2006 while France's GDP per capita grew slightly less from € 28.2k to € 32.2k (OECD). We do not include GDP growth as a control variable in all our specifications, as GDP growth is highly correlated with the country indicator variables and the indicator variable for the post period. Nevertheless, in untabulated results we find that our results remain qualitatively the same if we include GDP growth as a control variable.

[15] For coding the dummy variable IFRS we apply the classification by Daske et al. (2013, p. 538). Hence, *IFRS* is coded one if the firm is using the IAS, any kind of IASC guidelines, or IFRS.

[16] In unreported results, we additionally control for the market-to-book ratio and find qualitatively similar results.

Prior literature shows that firms engage more in write-offs in the year of a CEO turnover (Hazarika et al., 2012; Moore, 1973; Pourciau, 1993). In our research design, we do not explicitly control for CEO turnovers as the required data is not available. Please note, however, that our research design consists of simultaneous difference-in-differences analyses with opposite predictions. If, for instance, we observed more forced CEO turnovers in the post period due to a macro-economic downturn, we would expect to find a higher frequency of write-offs and earnings baths. This could confound the finding in France, where we expect write-offs to a larger extent, but as we expect fewer write-offs in Germany, this would contradict the findings in Germany. Hence, if we find the expected effects in Germany and France that go in opposite directions, we can be confident that neither CEO characteristics nor CEO turnovers are omitted variables that drive our results.

In the second part of our analysis, we include all loss firm-years for Germany and France and test the difference between French and German loss firms. Therefore, we include the variable *FRANCE*, which indicates if a firm is French. We interact *FRANCE* with *POST* and expect to find a positive coefficient (β_3), which would indicate that French loss firms recognize write-offs to a larger extent in the post period compared to German firms.

$$WRITEOFF_{i,t} = \beta_0 + \beta_1 * POST + \beta_2 * FRANCE_{i,t} + \beta_3 * POST * FRANCE_{i,t} + Controls + \varepsilon_{i,t}. \quad (2)$$

To rule out that limiting our sample to loss firms affects our results, we apply another difference-in-differences design where profitable firms are used as control groups in each country, respectively. We include *LOSS*, which is an indicator variable that takes on the value of one if a firm incurs a loss. We interact *LOSS* with *POST* and expect to find a negative coefficient (β_3) in the German sample and a positive coefficient in the French sample.

$$WRITEOFF_{i,t} = \beta_0 + \beta_1 * POST + \beta_2 * LOSS_{i,t} + \beta_3 * POST * LOSS_{i,t} + Controls + \varepsilon_{i,t}. \quad (3)$$

5 | RESULTS

Table 1 displays descriptive statistics for loss and profitable firms, separately for Germany and France. All nondichotomous variables are winsorized at 1% and 99% levels. The write-off variable is multiplied by 100 to increase the readability of our results. On average, German (French) loss firms write-off 1.71% (0.15%) of their total assets, whereas German (French) profitable firms write-off 0.61% (0.09%) of their total assets. This indicates that, on average, write-offs are larger in Germany than in France. The distribution of *WRITEOFF* is skewed and shows that most firms do not have write-offs in a given year. Furthermore, the median value of *WRITEOFF* is zero across all Panels, which shows that many firms do not have write-offs in a given year. We, therefore, repeat our analyses with, for example, a probit regression in Section 7 (Robustness tests and further results). Among German loss (profitable) firms 64% (73%) of the financial statements are in accordance with IFRS, whereas among French loss (profitable) firms 28% (41%) of the financial statements are in accordance with IFRS.[17]

Panel E of Table 1 shows mean comparisons for loss firms before and after the tax rule changes. In line with our expectations, German loss firms decrease write-offs by 0.86% and French loss firms increase write-offs by 0.19% in the post period. Both differences are statistically significant. One noticeable difference between the pre and post-period is that firms more often use IFRS, both in Germany and in France. This is explained by the fact that the IFRS was introduced in the post period. We discuss the impact of IFRS on our results in detail in Section 7.2. While most of the

[17] The difference in the fraction of financial reporting in accordance with IFRS between Germany and France may result from the fact that German firms were allowed to adopt IFRS early. Starting in 2005, most firms in the sample are required by the European Commission to use IFRS for firm-years starting in 2005. Exemptions from this rule are explained in Subsection 7.2.

TABLE 1 Summary statistics

Panel A: German firm-years with losses								
	N	Mean	Sd	Min	P25	P50	P75	Max
WRITEOFF	784	1.71	3.65	0.00	0.00	0.00	1.25	13.86
POST	784	0.39	0.49	0.00	0.00	0.00	1.00	1.00
SIZE	784	10.43	1.70	6.96	9.39	10.32	11.46	17.04
ROA	784	−0.16	0.16	−0.62	−0.22	−0.10	−0.04	0.00
sd(ROA)	784	0.18	0.03	0.07	0.17	0.18	0.19	0.26
R&D	784	0.03	0.07	0.00	0.00	0.00	0.02	0.28
LEV	784	0.20	0.26	0.00	0.00	0.12	0.29	1.35
BIG4	784	0.38	0.49	0.00	0.00	0.00	1.00	1.00
IFRS	784	0.64	0.48	0.00	0.00	1.00	1.00	1.00
Panel B: German firm-years with profits								
	N	Mean	Sd	Min	P25	P50	P75	Max
WRITEOFF	1,933	0.61	1.85	0.00	0.00	0.00	0.34	13.86
POST	1,933	0.55	0.50	0.00	0.00	1.00	1.00	1.00
SIZE	1,933	12.00	2.29	6.96	10.43	11.74	13.49	17.87
ROA	1,933	0.12	0.13	0.00	0.05	0.08	0.14	0.70
sd(ROA)	1,933	0.18	0.03	0.06	0.16	0.18	0.19	0.26
R&D	1,933	0.02	0.04	0.00	0.00	0.00	0.01	0.28
LEV	1,933	0.23	0.24	0.00	0.03	0.18	0.35	1.35
BIG4	1,933	0.56	0.50	0.00	0.00	1.00	1.00	1.00
IFRS	1,933	0.73	0.44	0.00	0.00	1.00	1.00	1.00

(Continued)

TABLE 1 (Continued)

Panel C: French firm-years with losses								
	N	Mean	Sd	Min	P25	P50	P75	Max
WRITEOFF	650	0.15	0.98	0.00	0.00	0.00	0.00	13.86
POST	650	0.43	0.50	0.00	0.00	0.00	1.00	1.00
SIZE	650	10.50	1.91	6.96	9.21	10.30	11.37	17.87
ROA	650	−0.15	0.16	−0.62	−0.20	−0.10	−0.04	0.00
sd(ROA)	650	0.17	0.03	0.12	0.16	0.17	0.18	0.21
R&D	650	0.02	0.06	0.00	0.00	0.00	0.00	0.28
LEV	650	0.25	0.25	0.00	0.06	0.21	0.35	1.35
BIG4	650	0.49	0.50	0.00	0.00	0.00	1.00	1.00
IFRS	650	0.28	0.45	0.00	0.00	0.00	1.00	1.00
Panel D: French firm-years with profits								
	N	Mean	Sd	Min	P25	P50	P75	Max
WRITEOFF	2,112	0.09	0.61	0.00	0.00	0.00	0.00	13.86
POST	2,112	0.52	0.50	0.00	0.00	1.00	1.00	1.00
SIZE	2,112	11.85	2.42	6.96	10.11	11.58	13.26	17.87
ROA	2,112	0.12	0.12	0.00	0.05	0.08	0.14	0.70
sd(ROA)	2,112	0.16	0.02	0.12	0.16	0.16	0.18	0.21
R&D	2,112	0.01	0.04	0.00	0.00	0.00	0.00	0.28
LEV	2,112	0.25	0.21	0.00	0.08	0.21	0.35	1.35
BIG4	2,112	0.53	0.50	0.00	0.00	1.00	1.00	1.00
IFRS	2,112	0.41	0.49	0.00	0.00	0.00	1.00	1.00

(Continued)

TABLE 1 (Continued)

Panel E: Mean comparison of firm-years with losses: pre and post							
	Germany				France		
	PRE	POST	Delta		PRE	POST	DELTA
WRITEOFF	2.05	1.19	−0.86**	*WRITEOFF*	0.07	0.26	0.19*
SIZE	10.58	10.18	−0.40**	*SIZE*	10.61	10.36	−0.25
ROA	−0.15	−0.17	−0.02	*ROA*	−0.15	−0.15	0.00
sd(ROA)	0.17	0.20	0.03**	*sd(ROA)*	0.17	0.17	0.00
R&D	0.03	0.04	0.01	*R&D*	0.02	0.03	0.01
LEV	0.19	0.21	0.02	*LEV*	0.23	0.28	0.05*
BIG4	0.38	0.39	0.01	*BIG4*	0.48	0.50	0.02
IFRS	0.57	0.73	0.15**	*IFRS*	0.24	0.33	0.09*

Notes: This table reports descriptive statistics for German loss and profitable firms in Panels A and B, and for French loss and profitable firms in Panels C and D. Panel E shows mean comparisons before and after the tax-loss offsetting changes in 2004 for Germany and France. *WRITEOFF* is write-offs as percentage of lagged total assets. *SIZE* is the natural logarithm of total assets. *ROA* is earnings before interest, tax, and write-offs deflated by lagged total assets. *sd(ROA)* is the standard deviation of *ROA* per industry (first digit of SIC code), country, year combination. *R&D* is research and development expenses deflated by lagged total assets. *LEV* is debt deflated by lagged total assets. *BIG4* is an indicator variable that takes the value of one if a firm is audited by a Big4 company. *IFRS* is and indicator variable that takes the value of one if a firm applies IAS. All nondichotomous variables are winsorized at the 1% and 99% levels. Refer to the Appendix for variable definitions.

**,*indicate significance at the 1% and 5% levels (two-tailed), respectively.

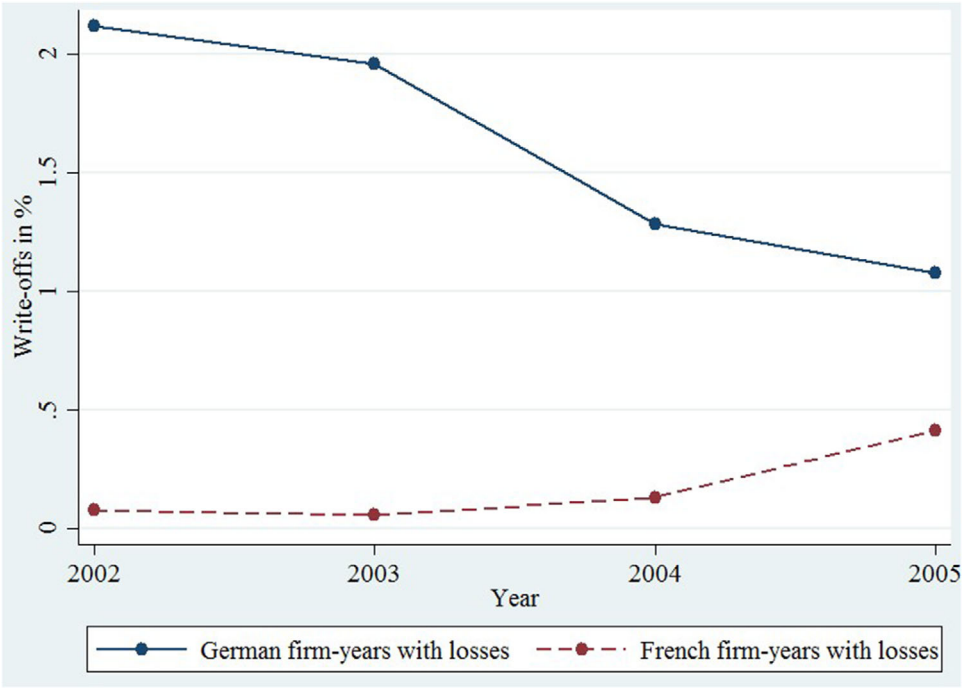

FIGURE 1 Write-offs of firm-years with losses
Notes: This graph depicts the average write-offs of German and French firm-years with losses for the pre-period (2002 and 2003) and the post-period (2004 and 2005)
[Colour figure can be viewed at wileyonlinelibrary.com]

control variables are not statistically different between the pre and post period, Panel E shows that German loss firms are smaller and French loss firms have more leverage in the post period.[18]

Table 2 shows the correlation matrix with Spearman correlations above and Pearson correlations below the main diagonal for German and French loss firms. Correlation coefficients that are significant at the 1% level are marked with a star. In line with our hypotheses, *WRITEOFF* is negatively associated with *POST* for German loss firms (Panel A) and positively for French loss firms (Panel B). Both correlations are statistically significant. Both panels furthermore show that last year's write-offs are positively correlated with current write-offs.

We run several difference-in-differences analyses, with Germany versus France being our main test. We validate the parallel trend assumption in Figures 1 and 2. Figure 1 compares German loss firms with French loss firms and Figure 2 compares loss firms with profitable firms. German and French loss firms show the same time trend in the pre-period before 2004, whereas German loss firms reduce the write-offs and French loss firms increase the write-offs of as from 2004. Similarly, German (French) profitable and loss firms show the same trends in the pre-period before 2004, while their write-offs develop differently in the period as from 2004 (Figure 2). We formally test the parallel trends assumption by regressing write-offs on indicator variables for each year and the interaction of these indicators with *LOSS*. In line with the graphical evidence, unreported results show no statistical significance in the pre-period (2003–2004), supporting the parallel trend assumption.

Table 3 reports regression results for German loss firms in Model 1, for French loss firms in Model 2, and German as well as French loss firms in Model 3. In line with Hypothesis 1 and Hypothesis 2, the results indicate that German

[18] To alleviate the concern that our results are driven by these differences, we entropy balance our sample to adjust for differences in the covariates' distributions of first and second moments and confirm our results (unreported).

TABLE 2 Correlation table

Panel A: German firm-years with losses										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1) WRITEOFF		−0.1117*	0.1922*	0.0254	−0.0807	−0.0621	0.0609	0.0745	0.1111*	0.3084*
(2) POST	−0.1145*		−0.1144*	−0.0103	0.4797*	0.0419	−0.0134	0.0123	0.1606*	0.0746
(3) SIZE	0.0477	−0.1148*		0.3437*	−0.1344*	0.1819*	0.2928*	0.3516*	0.0749	0.1240
(4) ROA	−0.0207	−0.0636	0.3616*		−0.1473*	−0.0935*	0.1025*	0.0598	−0.0234	0.1174*
(5) sd(ROA)	−0.0154	0.4807*	−0.1473*	−0.1688*		0.0778	−0.0813	0.022	0.0752	−0.0545
(6) R&D	−0.0418	0.0663	0.0171	−0.2732*	0.1792*		−0.0601	0.2849*	−0.1133*	−0.0522
(7) LEV	−0.0226	0.0276	0.1499*	−0.0975*	−0.0193	0.0491		0.0531	0.1201*	0.0173
(8) BIG4	0.0493	0.0123	0.3572*	0.0654	0.0326	0.2262*	0.067		−0.0032	0.0541
(9) IFRS	0.0531	0.1606*	0.0857	−0.0503	0.0704	−0.0784	0.1048*	−0.0032		0.1455*
(10) WRITEOFF$_{t-1}$	0.1458*	−0.0237	−0.0315	0.0374	−0.0040	−0.0005	−0.0317	0.0123	0.0215	
Panel B: French firm-years with losses										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) WRITEOFF		0.1217*	0.1906*	0.0734	0.0264	0.1191*	0.0508	0.0983	0.2213*	0.3584*
(2) POST	0.0965		−0.0906	0.0241	0.072	0.0626	0.0689	0.02	0.0986	−0.0644
(3) SIZE	0.1705*	−0.0652		0.3303*	−0.1582*	0.1808*	0.2097*	0.2977*	0.2755*	0.1205*
(4) ROA	−0.0088	0.0041	0.3311*		−0.084	−0.0748	0.0217	0.0365	0.1114*	0.0572
(5) sd(ROA)	−0.0152	0.0537	−0.1547*	−0.0906		−0.0749	−0.1590*	0.0258	−0.0523	0.0108
(6) R&D	0.0009	0.0566	0.0394	−0.1356*	−0.065		−0.0745	0.1870*	0.0839	0.0613
(7) LEV	0.0201	0.0959	0.1035*	−0.1765*	−0.1183*	−0.0041		−0.0433	0.0046	0.0066
(8) BIG4	0.0825	0.02	0.3228*	0.0442	0.0342	0.1306*	−0.0539		−0.0441	0.0778
(9) IFRS	0.081	0.0986	0.2533*	0.1520*	−0.0572	0.0178	−0.0424	−0.0441		0.0313
(10) WRITEOFF$_{t-1}$	0.2345*	0.0283	0.1699*	0.0344	−0.0235	0.0074	0.0193	0.0669	0.0332	

Notes: Spearman rank sum correlations above; Pearson correlations below the main diagonal. *WRITEOFF* is write-offs as percentage of lagged total assets. *SIZE* is the natural logarithm of total assets. *ROA* is earnings before interest, tax, and write-offs deflated by lagged total assets. *sd(ROA)* is the standard deviation of *ROA* per industry (first digit of SIC code), country, year combination. *R&D* is research and development expenses deflated by lagged total assets. *LEV* is debt deflated by lagged total assets. *BIG4* is an indicator variable that takes the value of one if a firm is audited by a Big4 company. *IFRS* is and indicator variable that takes the value of one if a firm applies International Accounting Standards. All nondichotomous variables are winsorized at the 1% and 99% levels.

*indicates significance at the 1% levels.

TABLE 3 Regression results – Firm-years with losses

Dep. Var.	Germany		France		Germany and France	
WRITEOFF	**Pr.**	**Model 1**	**Pr.**	**Model 2**	**Pr.**	**Model 3**
Constant		0.537		−1.882**		0.771
		(1.761)		(0.624)		(1.117)
POST	(−)	**−0.607***	**(+)**	**0.150***		
		(0.268)		**(0.072)**		
FRANCE						−1.798**
						(0.204)
POST*FRANCE					(+)	**1.030****
						(0.262)
SIZE		0.157		0.071*		0.114*
		(0.087)		(0.031)		(0.047)
ROA		−1.566		−0.433		−1.022*
		(0.981)		(0.438)		(0.571)
sd(ROA)		−9.453		5.294*		−4.528
		(6.790)		(2.500)		(4.129)
RD		−3.018*		−0.627		−1.656
		(1.598)		(0.526)		(0.923)
LEV		−0.295		−0.089		−0.173
		(0.490)		(0.110)		(0.277)
BIG4		0.390		0.056		0.183
		(0.300)		(0.069)		(0.162)
IFRS		0.358		0.087		0.301
		(0.261)		(0.090)		(0.163)
$WRITEOFF_{t-1}$		0.139**		0.304**		0.158**
		(0.044)		(0.056)		(0.043)
Year-FE		No		No		Yes
Industry-FE		Yes		Yes		Yes
N		784		650		1,434
R-squared		0.080		0.104		0.130

Notes: This table provides OLS regression results for firm-years with losses only. The plus or minus sign in brackets before the coefficient indicates the prediction of our hypothesis. The dependent variable *WRITEOFF* is total write-offs as percentage of lagged total assets. Refer to the Appendix for further variable definitions. Thus, we omit the indicator variable *POST* from Model 3 to avoid perfect collinearity of the year fixed-effects with *POST*. *POST* is an indicator variable that takes on the value of one if a firm-year is from the post period, that is, 2004 and 2005. *FRANCE* is an indicator variable that takes the value of one if a firm is located in France, and zero otherwise. *WRITEOFF* is write-offs as percentage of lagged total assets. *SIZE* is the natural logarithm of total assets. *ROA* is earnings before interest, tax, and write-offs deflated by lagged total assets. *sd(ROA)* is the standard deviation of *ROA* per industry (first digit of SIC code), country, year combination. *R&D* is research and development expenses deflated by lagged total assets. *LEV* is debt deflated by lagged total assets. *BIG4* is an indicator variable that takes the value of one if a firm is audited by a Big4 company. *IFRS* is and indicator variable that takes the value of one if a firm applies IAS. All nondichotomous variables are winsorized at the 1% and 99% levels. The regressions include industry and year fixed effects when indicated. Standard errors are clustered at the firm level and presented in parentheses.

**,*indicate significance at the 1% and 5% levels (two-tailed), respectively.

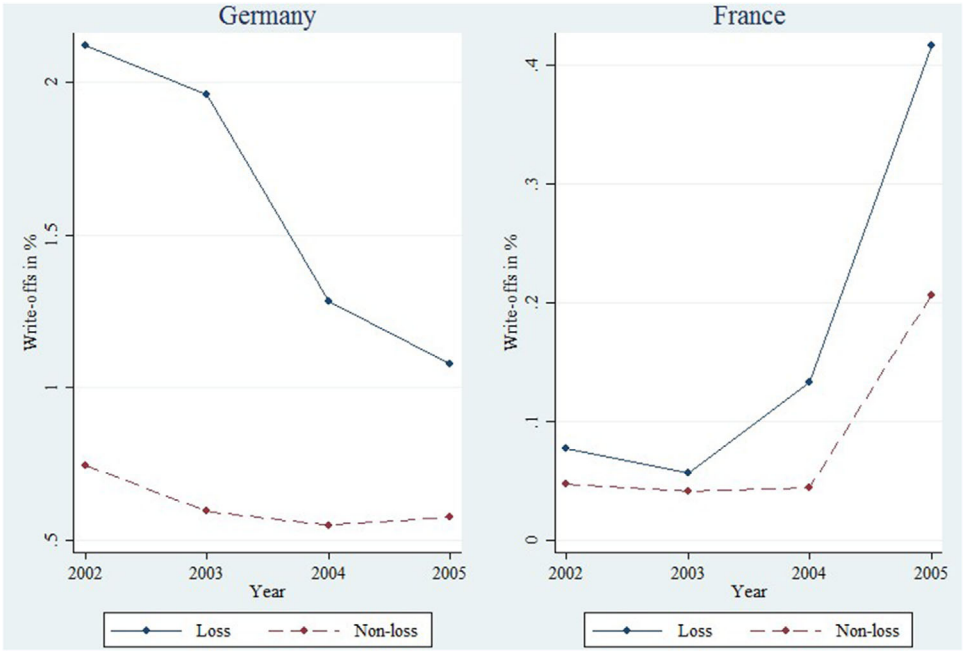

FIGURE 2 Write-offs of firm-years with losses versus firm-years with profits
Notes: This graph depicts the average write-offs of (i) firm-years with losses and profits in Germany and (ii) firm-years with losses and profits in France for the pre-period (2002 and 2003) and the post-period (2004 and 2005), respectively
[Colour figure can be viewed at wileyonlinelibrary.com]

loss firms conduct write-offs to a lesser extent after 2004 and French loss firms to a larger extent. On average, German loss firms write off 0.61% of total assets less in the post period (Model 1), whereas French loss firms write off 0.15% of total assets more in the post period (Model 2). When testing France against Germany (Model 3), French loss firms write-off 1.03% of total assets more in the post period.[19] In addition, the coefficient of -1.798 for *FRANCE* suggests that French loss firms generally write-off around 1.8% of total assets less than German loss firms. All results are statistically significant.[20]

Our results are economically meaningful. The decrease in write-offs by 0.61% implies that German loss firms reduce write-offs by 29.6% relative to the period while French firms more than triple their write-offs compared to the pre-period. Szczesny and Valentincic (2013) report average write-offs of fixed and current assets of 2.8% for German small and medium-sized enterprises that engage in write-offs of current and fixed assets. Similarly, Riedl (2004) finds that in the period from 1992 till 1998, 16.5% of US firms have write-offs. Among the firms that write off, the average write-offs amount to 2.8% of total assets. In terms of control variables, *SIZE* and previous write-offs ($WRITEOFF_{t-1}$) render positive in all models, suggesting that larger loss-firms write off more, on average, and that previous write-offs are correlated with current years' write-off. The coefficients of *ROA*, that is, the pre-write-offs return on assets, are negative

[19] In the third model, we use year fixed effects together with *POST* as an indicator variable for the post-period. Due to its perfect collinearity with the year fixed effects, we do not report the variable *POST*.

[20] In untabulated tests, we match each French loss firm to one German loss firm based on all observable characteristics to test whether differences in fundamental operations between German and French loss firms influence our results. For each variable, we use a caliper width that corresponds to half a standard deviation of the respective variable. For dichotomous variables, we require an exact match. t-tests confirm that French loss firms and German loss firms are not statistically different after the matching algorithm. The results using the matched sample are statistically significant and the economic magnitude is slightly greater.

across all models and statistically significant in Model 3, indicating that higher profitability is negatively associated with write-offs.

The previous results compare German loss firms with French loss firms. As all cross-country studies, our study could potentially suffer from omitted correlated variables. Therefore, the next tests investigate whether our results hold when we use profitable firms within Germany and within France as control groups (Table 4). Model 1 shows the results for *POST*LOSS* without any control variables or fixed effects. The results suggest that German loss firms statistically significantly write off 0.75% of total assets less in the post-period than German profitable firms. Models 2 and 3 show that the results are robust to including control variables and fixed-effects. The economic significance of the results of Table 4 are in line with the results of Table 3: In the most stringent Model 3, we find that German loss firms write off 0.63% of total assets less in the post-period (Table 3: 0.61%). French loss firms write off 0.11% more in the post-period, but the results are statistically insignificant across all models (Table 3: 0.15%, statistically significant at the 5% level). Furthermore, the coefficients on *LOSS* in Model 1 to Model 3 suggest that in Germany loss-firms write off statistically significantly more than profitable firms in our sample period.

To sum up, our results are in line with Hypotheses 1 and 2 that German (French) lossmaking firms write off less (more) in the period after a tax rule change that makes losses more (less) costly. Hence, we provide empirical evidence that firms respond in their financial reporting write-off behavior to changes in tax-loss offsetting rules.

6 | CROSS-SECTIONAL RESULTS

6.1 | Analyst following

A firm's choice to adjust financial reporting in response to changes in tax accounting depends on the importance of financial reporting. Firms that have (more) analysts following likely care more about the informativeness of their financial statements and are also more likely to receive more attention by investors. In our sample, around 43% of our observations have an analyst following. If we do not find any analyst following in the IBES database, we assume that the firm has no analyst following.[21] We expect that firms that care more about the informativeness of their financial statements are less likely to alter financial reporting in response to changes in tax accounting.

We use the number of analysts following as a proxy for the importance of firms' financial reporting. Thus, we include *#ANALYSTS*, which is the number of analysts following as reported in the I/B/E/S database. We expect that German and French loss firms with more analysts following adjust their write-offs less, as firms with a higher analyst following have a greater incentive to provide financial reports that are informative about economic performance. We expect and find a positive (negative) coefficient for the interaction of *POST*#ANALYSTS* in Germany (France) in Table 5, which indicates that those firms react less to the changes in offsetting rules. Both coefficients have the expected sign and are statistically significant at the 10% level.

6.2 | International business operations

Consolidated financial reporting is influenced by business operations of all subsidiaries belonging to the group. Some of these subsidiaries may not be in the home jurisdiction of the parent and therefore not affected by the tax-loss offsetting changes. If available, we use data from Bureau van Dijk's Orbis database on the percentage of assets of

[21] The average number of analysts following for firms with at least one analyst is 8.03. Including the number of analyst in our main analyses does not affect our results.

TABLE 4 Regression results: Profit versus loss firm-years

Dep. Var.		Germany				France		
WRITEOFF	Pr.	Model 1	Model 2	Model 3	Pr.	Model 4	Model 5	Model 6
Constant		0.668**	−0.224	1.027		0.044*	−0.318**	−0.724**
		(0.070)	(0.445)	(0.574)		(0.018)	(0.097)	(0.205)
POST		−0.105	−0.266**			0.084**	0.074**	
		(0.081)	(0.087)			(0.029)	(0.026)	
LOSS		1.378**	1.474**	1.425**		0.022	0.047	0.047
		(0.204)	(0.229)	(0.224)		(0.036)	(0.066)	(0.065)
***POST*LOSS**	**(−)**	**−0.752****	**−0.690****	**−0.626***	**(+)**	**0.107**	**0.093**	**0.105**
		(0.266)	**(0.261)**	**(0.250)**		**(0.092)**	**(0.088)**	**(0.087)**
SIZE			−0.010	0.002			0.021**	0.022**
			(0.024)	(0.026)			(0.007)	(0.007)
ROA			0.692	0.759			−0.027	−0.024
			(0.491)	(0.503)			(0.176)	(0.176)
sd(ROA)			3.970**	−6.541*			0.224	2.491*
			(1.696)	(2.694)			(0.543)	(1.032)
RD			−1.370	−1.021			−0.002	−0.051
			(0.871)	(0.881)			(0.189)	(0.194)
LEV			0.112	0.180			0.074	0.044
			(0.247)	(0.251)			(0.090)	(0.088)
BIG4			0.088	0.092			0.018	0.017
			(0.115)	(0.117)			(0.022)	(0.023)
IFRS			0.207	0.232**			0.089**	0.057*
			(0.106)	(0.108)			(0.024)	(0.025)
$WRITEOFF_{t-1}$			0.150**	0.138***			0.489**	0.486**
			(0.029)	(0.029)			(0.093)	(0.093)
Year-FE		No	No	Yes		No	No	Yes
Industry-FE		No	No	Yes		No	No	Yes
N		2,717	2,717	2,717		2,762	2,762	2,762
R-squared		0.046	0.073	0.089		0.008	0.145	0.155

Notes: This table provides OLS regression results for firm-years with profits and losses. The plus or minus sign in brackets before the coefficient indicates the prediction of our hypothesis. The dependent variable *WRITEOFF* is total write-offs as percentage of lagged total assets. We omit the indicator variable *POST* from Model 3 and Model 6 to avoid perfect collinearity of the year fixed-effects with *POST*. *POST* is an indicator variable that takes on the value of one if a firm-year is from the post period, that is, 2004 and 2005. *LOSS* is an indicator variable that takes the value of one if a firm has negative earnings before interest, tax, and write-offs, and zero otherwise. *WRITEOFF* is write-offs as percentage of lagged total assets. *SIZE* is the natural logarithm of total assets. *ROA* is earnings before interest, tax, and write-offs deflated by lagged total assets. *sd(ROA)* is the standard deviation of *ROA* per industry (first digit of SIC code), country, year combination. *R&D* is research and development expenses deflated by lagged total assets. *LEV* is debt deflated by lagged total assets. *BIG4* is an indicator variable that takes the value of one if a firm is audited by a Big4 company. *IFRS* is and indicator variable that takes the value of one if a firm applies International Accounting Standards. All nondichotomous variables are winsorized at the 1% and 99% levels. The regressions include industry and year fixed effects when indicated. Standard errors are clustered at the firm level and presented in parentheses.

**,* indicate significance at 1% and 5% levels (two-tailed), respectively.

TABLE 5 Regression results: Cross-sectional analyses

Dep. Var.		Germany			France	
WRITEOFF	Pr.	Model 1	Model 2	Pr.	Model 3	Model 4
Constant		1.614	−0.904		−1.933*	−1.746
		(1.824)	(1.993)		(0.858)	(0.896)
POST		−0.869**	−1.199*		0.222**	0.153
		(0.262)	(0.482)		(0.082)	(0.132)
#ANALYSTS		0.036			0.018	
		(0.034)			(0.025)	
***POST*ANALYSTS**	**(+)**	**0.126*** **		(−)	**−0.042*** **	
		(0.068)			**(0.025)**	
FOREIGN_ASSETS			−0.447			0.280
			(0.656)			(0.162)
***POST*FOREIGN_ASSETS**	**(+)**		**1.518*** **	(−)		**−0.122**
			(0.798)			**(0.484)**
Controls		Yes	Yes		Yes	Yes
Industry-FE		Yes	Yes		Yes	Yes
N		784	364		650	275
R-squared		0.090	0.129		0.113	0.129

Notes: This table provides OLS regression results for firm-years with losses. The plus or minus sign in brackets before the coefficient indicates the prediction of our hypothesis. The dependent variable *WRITEOFF* is total write-offs as percentage of lagged total assets. First, we interact *POST* with *#ANALYSTS*, which is the number of analysts following. Second, we interact *POST* with *FOREIGN_ASSETS*, an indicator variable for foreign business operations, to test whether the effect is less among firms with large operations in foreign countries. Refer to the Appendix for further variable definitions. *POST* is an indicator variable that takes on the value of one if a firm-year is from the post period, that is, 2004 and 2005. All nondichotomous variables are winsorized at the 1% and 99% levels. The regressions include industry and year fixed effects when indicated. Standard errors are presented in parentheses.

**,* indicate significance at 1% and 5% levels (two-tailed), respectively.

*** indicates significance at the 10% level (two-tailed).

subsidiaries located abroad.[22] We merge these measures for the degree of foreign business operations with the consolidated financial statements of our German and French sample firms.

We interact the measure for foreign business operations (*FOREIGN_ASSETS*) with *POST* to test whether German (French) firms that have larger foreign business operations adjust their write-offs after the change in tax-loss offsetting to a lesser extent. For Germany (France) we expect a positive (negative) coefficient on the interaction of *FOREIGN_ASSETS* and *POST*. The coefficients for German and French loss firms show the expected signs, but only the coefficient in the German sample is statistically significant. This corroborates our results as the effects of changes in tax-loss offsetting on write-offs of loss firms are less pronounced for firms with more foreign business operations. Table 5 reports the results.

[22] As the ownership information is static in Orbis, we can only identify the subsidiaries based on ownership information from 2016 and data on the subsidiaries themselves is only available as of 2006. The year 2006 is the last year of our sample period in robustness tests described in Section 7.3. For the year 2006, we aggregate the foreign total assets held by the subsidiaries of our German and French firms, respectively, and put this in relation to all total assets held by the subsidiaries. Similarly, we put the number of domestic subsidiaries in relation to all subsidiaries for each German (French) firm. The untabulated results are qualitatively the same.

7 | ROBUSTNESS TESTS AND FURTHER RESULTS

7.1 | Alternative estimations

In Table 6, we use alternative estimations to corroborate our findings. Generally, a firm can decide to engage in a write-off and then determine the size of the write-off. Given these economic decisions associated with write-offs, our dependent variable can be seen as censored with many observations that are exactly zero. In Panel A of Table 6, we show that our results also hold when using a Tobit regression. We still find that German loss-firms write-off less and French firms write-off more in the post period.

Additionally, we show the results of logit regressions (decision to engage in a write-off) and OLS regression for *WRITEOFF* > 0 in Panels B and C of Table 6, respectively. In Panel B, we find the expected signs of the *POST* coefficients, but only for France the coefficient is significant. Similarly, we find the expected signs in Panel C, but only the coefficient for Germany is significant. We interpret this finding as follows: German firms are as likely to report a write-off in the post-period as in the pre-period, but if they report a write-off, they report less. French firms are more likely to report a write off in the post-period, but if they report a write-off, they report as much as in the pre-period. Taken together, the results are in line with our hypotheses as, on average, German firms write-off less in the post period and French firms write-off more.

7.2 | International financial reporting standards

A potential concern of this study is that our results might be affected by the introduction of IFRS if German firms were allowed to adopt IFRS early, whereas French firms were not. However, our research design addresses this concern in several ways. First, our research design consists of simultaneous difference-in-differences analyses with opposite predictions. Thus, the introduction of IFRS is unlikely to affect the write-offs of loss firms in different directions. Second, we include an indicator variable for IFRS in all our write-offs regressions to control for the impact of the IFRS introduction. Third, we obtain confirming evidence also when holding the institutional environment constant in Table 4. While studies of early adoption find no correlation between profitability and early adoption (e.g., Dumontier & Raffournier, 1998; Wu & Zhang, 2009), we nevertheless conduct our analyses within a subset of firms that did not change their GAAP system during our investigation period. Hence, we avoid a potentially different impact of IFRS on German loss and profitable firms.

There are three main reasons why firms did not have a GAAP change between 2002 and 2006. First, since 1998 German firms could choose between local GAAP and IAS for their consolidated financial statements.[23] Thus, some early adopters of IFRS did not have a GAAP change during our sample period. Second, some firms were allowed to postpone the IFRS introduction for two years (e.g., firms that are cross-listed in the US and that prepared their consolidated financial statements in accordance with US-GAAP). And third, firms listed on exchange-regulated stock exchanges (e.g., the Entry Standard of the Frankfurt Stock Exchange and the Alternext market in Paris or the New York Stock Exchange) are not required to use IFRS and can still choose between local GAAP and IFRS (European Parliament, 2002, Article 4).[24]

In Table 6 Panel D, we repeat our analyses from Table 3 within the subsample of firms that did not have a GAAP change. Our sample reduces to 509 (363) firm-year observations for Germany (France). The decrease in write-offs in the post-period for German loss firms without a GAAP change amounts to 1.82% of total assets (Model 1), while French firms increase their write-offs by 0.15% in the post-period (Model 2). The results also hold when we

[23] This choice was introduced into section 292a of the German commercial code via the Facilitation of Capital Acquisition Act.

[24] Pierk (2018) shows that less than 20% of IPO firms voluntarily adopt IFRS upon listing on exchange-regulated markets.

TABLE 6 Estimations with different specifications

	Panel A: Tobit Regression						Panel B: Logit Regression					
	Germany		France		Germany and France		Germany		France		Germany and France	
WRITEOFF	Pr.	Model 1	Pr.	Model 2	Pr.	Model 3	Pr.	Model 1	Pr.	Model 2	Pr.	Model 3
POST	(-)	**-0.899*****	(+)	**2.371***		-1.264***	(–)	**–0.045**	(+)	**1.190***		–0.232
		(0.541)		**(1.060)**		(0.658)		**–0.202**		**–0.465**		(0.258)
FRANCE						–10.115**						–3.413**
						(1.018)						(0.354)
***POST*FRANCE**					(+)	**4.407****					(+)	**1.318****
						(1.083)						**(0.398)**
N		784		650		1,434		784		650		1,430
Pseudo-squared		0.032		0.156		0.130		0.111		0.288		0.300
	Panel C: OLS Regression for *WRITEOFF* > 0						**Panel D: Loss firms without GAAP Change**					
	Germany		France		Germany and France		Germany		France		Germany and France	
WRITEOFF	Pr.	Model 1	Pr.	Model 2	Pr.	Model 3	Pr.	Model 1	Pr.	Model 2	Pr.	Model 3
POST	(-)	**–1.032***	(+)	**1.272**		–1.195*	(–)	**–1.816***	(+)	**0.145**		–1.004**
		(0.488)		**(1.310)**		(0.593)		**(0.337)**		**(0.112)**		(0.298)
FRANCE						–2.614**						–1.940**
						(0.922)						(0.252)
***POST*FRANCE**					(+)	**2.401*****					(+)	**1.275****
						(1.304)						**(0.343)**
N		380		41		421		509		363		872
R-squared		0.107		0.517		0.107		0.105		0.091		0.152

Notes: This table provides Tobit regression results in Panel A, logit regression results in Panel B, OLS regression for positive write-offs in Panel C, and OLS regression for firm-years with losses but without a GAAP change in Panel D. The dependent variable in Panels A, C, and D is *WRITEOFF* and the probability to write-off in Panel B. *POST* is an indicator variable that takes on the value of one if a firm-year is from the post period, that is, 2004 and 2005. *FRANCE* is an indicator variable that takes the value of one if a firm is located in France, and zero otherwise. Refer to the Appendix for further variable definitions. The plus or minus sign in brackets before the coefficient indicates the prediction of our hypothesis. All tables include fixed effects and control variables in line with the previous analyses. All nondichotomous variables are winsorized at the 1% and 99% levels. The regressions include industry and year fixed effects when indicated. Standard errors are clustered at the firm level and presented in parentheses.

**,* indicate significance at 1% and 5% levels (two-tailed), respectively.

***indicates significance at the 10% level (two-tailed).

analyze differences in write-offs between France and Germany. In the sample without a GAAP change French loss firms write-off 1.28% of total assets more in the post-period than German loss firms (Model 3). Whereas the coefficients of interest in Model 1 and Model 3 are statistically significant, the coefficient of *POST* is only close to significant at conventional levels of statistical significance in Model 2 (*p*-value: 0.11), which can result from the lower statistical power due to the low number of observations. Overall, these results corroborate our findings and are in line with Hypotheses 1 and 2.

7.3 | Variation in the length of pre- and post-period and balanced panel

In untabulated results, we test whether our results are robust to changes in sample selection choice by repeating the analysis from Table 3 Model 3 with (i) a balanced panel of two years before and after the changes in tax-loss offsetting to rule out that the sample composition affects our results, (ii) an unbalanced panel with only one year before and after the changes, and (iii) an unbalanced panel of three years before and after the changes in tax-loss offsetting. The results remain qualitatively the same in all three alternative specifications. The coefficient on *POST*FRANCE* in the one-year unbalanced sample is smaller and shows less statistical significance than the coefficient in Table 3 Model 3, which can be attributed to the lower number of observations in this sample. The coefficient on *POST*FRANCE* in the three years unbalanced sample is statistically significant at the 1% level, but economically smaller than in Table 3 Model 3, which may be attributed to more contemporary events taking place during the longer sample period (e.g., the German tax system changed from an 'imputation system' to a 'classical corporate tax system' in 2001[25]).

7.4 | Alternative classification: Big bath

The literature on financial accounting write-offs discusses the incidence of large write-offs, commonly referred to as a "big bath". Moore (1973) is one of the first who documents discretionary write-offs after management changes. The evidence following this study unveils that firms that engage in discretionary write-offs, are larger, more highly leveraged, and have more often nonroutine CEO changes or nonoverconfident CEOs (Elliott & Shaw, 1988; Hazarika et al., 2012; Pourciau, 1993). Similarly, Strong and Meyer (1987) provide evidence that the major determinant of write-offs is management turnover. Furthermore, discretionary write-offs occur more often if managers are at the upper bound of their bonus plans (Healy, 1985; Holthausen et al., 1995). Haggard et al. (2015) study whether the information environment improves or becomes more opaque after large write-offs (i.e., earnings big bath) and find an improved information environment following an earnings bath. In untabulated tests, we repeat all analyses with a logistic regression design with *BIGBATH* as the dependent variable.[26] In line with our predictions, German loss firms are 9.9% less likely and French firms are 2.0% more likely to engage in an earnings bath after the 2004 tax rule changes. Testing German loss firms versus French loss firms shows that French firms are 25.3% more likely to engage in an earnings bath after the tax rule change than German firms.

[25] A 'classical corporate tax system' is a system in which two different layers of taxes occur. First, corporate income taxes are levied at the level of the corporation. Second, shareholders need to pay taxes on received dividends. Under an imputation system, the corporation pays the full taxes (corporate income tax and a prepayment for shareholder level taxes) as long as the profits are not distributed. Upon profit distribution, the corporation receives a tax refund, the shareholder needs to pay taxes on the received dividend and part of the taxes paid by the corporation are imputed (i.e., a tax credit is granted) at the shareholder level.

[26] Following Elliott and Shaw (1988), *BIGBATH* is equal to one if the respective firm writes-off more than 1% of total assets.

7.5 | Alternative control group

To further rule out that neither institutional differences nor differences between loss and profitable firms drive our results, we apply a third difference-in-differences design in which we compare German (French) loss firms with Spanish loss firms. In untabulated results, we choose Spain as a control group, as Spain is the fifth-largest economy in Europe and had neither changes in the corporate income tax rate nor in the tax-loss offsetting during our observation period. Thus we include *GERMANY* and *FRANCE* as indicator variables that take on the value of one if a firm-year is from Germany or France, respectively. We interact *GERMANY* and *FRANCE* with *POST* and expect to find a negative coefficient for the interaction of Germany and Post and a positive coefficient for the interaction of France and Post.

In line with our expectations (no change in tax-loss carryforward rules), untabulated results show that Spanish firms have no significant change in write-offs in the post period. When including the mentioned interactions terms, the interaction of *GERMANY* POST* and *FRANCE* POST* show the expected coefficients, that is, negative for *GERMANY* POST* and positive for *FRANCE* POST*. The results are, however, only close to statistical significance.

8 | CONCLUSION

This paper examines the relation between tax-loss offsetting rules and financial reporting behavior of loss firms. In particular, we investigate a delay (i.e., restriction) in tax-loss offsetting in Germany and an extension in the period to offset tax-losses in France. For German loss firms, tax losses became costlier as they are not allowed to fully offset their tax-losses in the following profitable year. Conversely, the extension of tax-loss offsetting for French loss firms from five years to infinity made losses cheaper. In line with the idea that firms have an incentive to avoid large book-tax differences, we find that German (French) loss firms write off 0.61% of total assets less (0.15% of total assets more) in response to the 2004 tax rule changes. We contribute to the literature by providing evidence on the financial reporting behavior of the under-researched group of loss firms. Our results suggest that restrictions (extensions) in tax-loss offsetting incentivize managers to engage in fewer (more) financial reporting write-offs.

Knowing these interdependencies between tax accounting and financial reporting is important for investors in evaluating financial reporting signals about the underlying economics of the firm. Policymakers, tax legislators, and standard setters should be aware that tax-loss offsetting rules not only affect the tax payments of firms, but also consolidated financial reporting of loss firms. For example, changes in tax-loss offsetting in the United States introduced by the Tax Cuts and Jobs Act 2017 may be an area for future research to test whether our results for Germany and France also hold in other jurisdictions. In particular, the United States, disallowed loss carrybacks, reduced loss carryforwards offsetting to 80% of the taxable income, and extended the carryforward period from 20 years to infinity for taxable years beginning after December 31, 2017.

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DATA AVAILABILITY STATEMENT

Data used in this study are available from public sources identified in the paper.

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APPENDIX A

VARIABLE DEFINITIONS

Dependent variables	
WRITEOFF	Total write-offs as percentage of lagged total assets. (wc18225+wc18274+wc18275)/wc02999t-1*100
Independent variables in write-off and big-bath regressions	
#ANALYSTS	Number of analysts following as reported in the I/B/E/S database.
BIG4	Indicator variable that takes the value of one if a firm is audited by a Big4 company. Variable is based on wc07800.
FOREIGN_ASSETS	Assets held by foreign subsidiaries as percentage of assets held by all subsidiaries of a firm. Data is retrieved from the Orbis database.
FRANCE	Indicator variable that takes the value of one if a firm is located in France, and zero otherwise.
GERMANY	Indicator variable that takes the value of one if a firm-year from Germany is observed, and zero otherwise
IFRS	Indicator variable that takes the value of one if a firm applies IAS, any kind of IASC guidelines, or IFRS, and zero otherwise (Daske et al., 2013) Variable is based on wc07536.
LEV	Debt deflated by lagged total assets. wc03255/$wc02999_{t-1}$.
LOSS	Indicator variable that takes the value of one if a firm has negative earnings before interest, tax, and write-offs, and zero otherwise.
POST R&D	Indicator variable that takes on the value of one if a firm-year is from the post period, that is, 2004 and 2005. Research and development expenses deflated by lagged total assets. wc01201/$wc02999_{t-1}$.
ROA	Earnings before interest, tax, and write-offs deflated by lagged total assets. (wc18191 + wc18225 + wc18274 + wc18275)/$wc02999_{t-1}$
sd(ROA)	Standard deviation of *ROA* per industry (first digit of SIC code), country, year combination.
SIZE	Natural logarithm of total assets. ln(wc02999)
$WRITEOFF_{t-1}$	Lag of total write-offs as percentage of lagged total assets. ($wc18225_{t-1}$+$wc18274_{t-1}$+$wc18275_{t-1}$)/$wc02999_{t-2}$

APPENDIX B

Tax-loss carryforward and carrybackward rules 2018 (excluding minimum taxation of profits as, e.g.,, introduced in germany in 2004)

Country	Carryforward	Carrybackwards
Austria	∞	0
Belgium	∞	0
Bulgaria	5	0
Cyprus	5	0
Czech Rep.	5	0
Denmark	∞	0
Estonia[a]		
Finland	10	0
France	∞	1
Germany	∞	1
Greece	5	0
Hungary	5	0
Ireland	∞	1
Italy	∞	0
Latvia[b]		
Lithuania	∞	0
Luxembourg	17	0
Malta	∞	0
The Netherlands	9	1
Norway	∞	0
Poland	5	0
Portugal	5	0
Romania	7	0
Slovakia	4	0
Slovenia	∞	0
Spain	∞	0
Sweden	∞	0
Switzerland	7	0
The United Kingdom	∞	1

Note: The table provides an overview of the 2018 rules on tax-loss carryforward and carrybackward for European countries.

[a]Taxes are only levied upon profit distributions of resident corporations.

[b]Not available in the EY corporate tax guides.