

Bigus, Jochen; Georgiou, Nadine

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Relevance of debt- and tax-related motives for conditional conservatism of limited-liability and full-liability firms: evidence from Europe

Jochen Bigus¹ · Nadine Georgiou²

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Abstract

In contrast to shareholders of limited-liability firms, the owners of sole proprietorships and partnerships are fully liable for their firm's liabilities. We expect owners' full liability to mitigate agency problems of debt and to lower creditors' demand for financial debt covenants and accounting conservatism. Using a European sample of private firms, we find robust evidence that full-liability firms exhibit about 20–25% less timely loss recognition than limited-liability firms, confirming previous findings for German firms. In addition, we find that full-liability firms exhibit significantly more timely loss recognition in countries with high book-tax conformity, while limited-liability firms do not. Furthermore, we find some, but not robust, evidence that the strictness of the bankruptcy code and timely loss recognition are partial substitutes. Our analyses contribute to prior literature by analyzing how owner liability is related to conditional conservatism and how the characteristics of the institutional framework are related to this association.

Keywords Owner liability · Private firms · Cross-country study · Conditional conservatism · Book-tax conformity · Bankruptcy law

JEL Classification M41 · G32 · G35 · K34

✉ Jochen Bigus
jochen.bigus@fu-berlin.de

Nadine Georgiou
nadine.georgiou@uibk.ac.at

¹ Department of Finance and Accounting, Freie Universität Berlin, Thielallee 73, Berlin, Germany

² Department of Accounting, Auditing and Taxation, Universität Innsbruck, Innsbruck, Austria

1 Introduction

Corporate finance theory predicts that firms with owners' full liability, such as sole proprietorships and partnerships, will exhibit reduced agency problems related to debt, as owners are more likely to bear the downside risk of poor decisions (Tirole 2006). Consistently, Harhoff et al. (1998) and Bhimani et al. (2014) found evidence that full-liability firms were considerably less likely to default than limited-liability firms.

Hence, we may expect less demand for financial covenants in debt contracting with full-liability firms and less demand for conditional conservatism¹ (Watts 2003). When economic losses are recognized in a timelier manner than economic gains, creditors receive early warning signals of the borrowing firm's financial distress and can react quickly to limit default risk. Bigus et al. (2016) provided evidence that limited-liability firms recognize losses significantly earlier than full-liability firms, but only for German firms over the period 1996–2004.

This paper revisits the question of whether timely loss recognition differs across legal forms. The results in Bigus et al. (2016) may be driven by the German institutional framework, especially the creditor orientation of its corporate and bankruptcy law, and the fact that financial accounts are the basis for measuring taxable income, while there is no book-tax conformity in other countries. Peek et al. (2010) found that in countries with strong creditor orientation, creditors demand more conditional conservatism. Book-tax conformity may also increase incentives to recognize losses early. Hence, the results found for Germany may not be transferable to other countries with different institutional frameworks; however, the institutional framework does matter for private firms' financial reporting choices (Burgstahler et al. 2006; Gassen et al. 2006; Peek et al. 2010). In addition, Bigus et al. (2016) report results for the 1996–2004 period which may not hold more recently, as the cost of collecting financial information and the cost of assessing default risk have declined, in part because many financial reports have become available online (Kaya and Seebeck 2019). Easier access to information may decrease creditors' monitoring costs and agency problems of debt, which in turn may reduce the demand for financial covenants and accounting conservatism.

Hence, a replication analysis is useful to test the external validity of the results found in Bigus et al. (2016). We have a sample that includes *privately* held firms from ten European countries over the period 2004–2015. Note that there are virtually no full-liability firms that are publicly listed.² We indeed find strong evidence that full-liability firms exhibit significantly less timely loss recognition than limited-liability firms, by about 20–25%. Significant differences between the legal forms persist when we account for the endogenous choice of legal form. Since full-liability firms imply less severe agency problems of debt, we also expect and find lower levels of earnings smoothing (Trueman and Titman 1988; Bigus et al. 2016).

¹ We use the terms conditional conservatism and timely loss recognition synonymously.

² In Germany, a few public firms have the legal form of *Kommanditgesellschaft auf Aktien* (KGaA), where the full liability owner is a limited-liability firm. In effect, the liability setting is similar to that of an ordinary corporation.

In a second step, we exploit cross-country variation in the institutional framework. Since agency problems of equity are generally of minor importance for private firms, their financial accounting choices are mainly driven by debt contracting and tax-saving motives (Cascino et al. 2014). We therefore investigate how book-tax conformity moderates the association between legal form and conditional conservatism. Bigus et al. (2016) were unable to address this issue in a single-country setting. In the presence of book-tax conformity, firms may generally have an incentive to increase timely loss recognition simply to reduce the actual tax burden. We find that full-liability firms increase timely loss recognition significantly in the presence of high book-tax conformity. However, limited-liability firms' level of timely loss recognition generally remains unaffected, possibly because there is no discretion to further increase timely loss recognition. We also show that full-liability firms' conditional conservatism responds to increases in the corporate income tax rate. In summary, our results suggest that full-liability firms employ conditional conservatism mainly for tax reasons, while limited-liability firms use it for debt contracting and do not increase it further for tax reasons.

In addition, we investigate whether the strictness of the bankruptcy code marginally affects the association between full-liability status and timely loss recognition, as the bankruptcy code and full-liability status may be partial substitutes. We find some, albeit not robust, evidence in support of this conjecture.

We were able to identify ten European countries where financial disclosure is mandatory for sufficiently large full-liability firms (for an overview, see the online appendix). Full-liability and limited-liability firms may exhibit different characteristics that actually cause differences in default risk and differences in the demand for timely loss recognition. We therefore use a propensity score matched sample of full-liability and limited-liability firms, where the two groups have similar characteristics concerning important default risk factors, such as size, leverage, volatility of sales, reported losses, industry, and country affiliation.

Our study contributes to two strands of the literature. First, we contribute to the scarce literature on full-liability firms' reporting choices (Bigus et al. 2016) by providing *cross-country* evidence for the conjecture that owners' full liability serves as a substitute for conditional conservatism in debt contracting. Prior literature on conditional conservatism has mainly focused on limited-liability firms and publicly listed firms (Ball and Shivakumar 2005; Wittenberg-Moerman 2008; Garcia Lara et al. 2016).

Second, we show that the relationship between full-liability status and timely loss recognition is stronger under high book-tax conformity. Prior studies focused mainly on publicly listed firms which are limited-liability firms. For instance, Ball et al. (2000), Bushman and Piotroski (2006), and Hong et al. (2016) have documented that conditional conservatism of public firms varies with legal institutions. There is less evidence on private firms. Peek et al. (2010) discussed the role that creditor and investor protection plays regarding differences in conditional conservatism between public and privately held firms. We contribute to this literature by showing that the legal framework affects differences in accounting conservatism *within* the group of private firms, that is, between full-liability and limited-liability firms. Previous literature suggests that private firms' financial statements are substantially influenced

by tax motives; however, research has not yet addressed the tax motives of full-liability firms (Burgstahler et al. 2006; Garrod et al. 2008; Chen et al. 2011; Hope et al. 2011; Kosi and Valentincic 2013; Minnis and Shroff 2017; Ojala et al. 2020). Moreover, the literature has claimed that tax avoidance incentives imply unconditional conservatism (Basu 2005), which is supported by empirical evidence on publicly listed U.S. firms (Qiang 2007; more critically: Garcia et al. 2009b). We add to this line of research by showing that private firms' conditional conservatism is likely to be associated with tax motives, especially in the case of full-liability firms.

This paper is organized as follows. Section 2 provides information on the institutional background, develops the hypotheses, and describes the data. Sections 3 and 4 present the methodology and results on the association between owner liability status and timely loss recognition and the marginal impact of institutional characteristics on this association. Section 5 provides several robustness tests. Section 6 concludes.

2 Institutional background, hypotheses, and data

2.1 Institutional background

In Europe, each country implements and enforces its own rules on the financial accounting and disclosure requirements of privately held firms (Bernard et al. 2018). While regulations differ considerably across countries, disclosure and auditing requirements are generally stricter for limited-liability than for full-liability firms (see online appendix).

European private limited-liability firms are generally required to disclose and audit financial statements when they exceed certain size thresholds (Burgstahler et al. 2006; Bernard et al. 2018). In some countries (e.g., Estonia, Finland, Latvia, and Norway), even full-liability firms, especially partnerships, are subject to mandatory disclosure as well (European Union 2011).

Similarly, in some countries, partnerships' financial statements must be audited if these firms meet certain size thresholds (European Union 2011). Typically, the size thresholds are defined in the same way as for limited-liability firms (e.g., in Estonia, France, Norway, and Spain). Furthermore, accrual-basis accounting is generally required for partnerships. Consequently, it is important to address potential issues of self-selection bias, as some European countries do not have mandatory disclosure, accrual-basis accounting, or auditing for full-liability firms.

2.2 Hypotheses

In contrast to public firms, agency problems related to equity are negligible in private firms because there are typically few owners, and often an owner runs the firm (Cascino et al. 2014; Minnis and Shroff 2017). Even when management and ownership are separated, most private firms have few shareholders with the bargaining power to demand individual information from executives (Fülbiér and

Gassen 2010). Consistently, in our propensity score matched sample, the median number of owners is two for both private full-liability firms and private limited-liability firms. In publicly listed firms, individual owners typically do not have this bargaining power and must rely instead on financial accounting information. This information also influences the stock price. Shareholders of public firms have an exit option by selling their shares if they believe the stock is underperforming. Consequently, the *valuation* role of financial reporting is much more important for publicly listed firms than for private firms.

For private firms, the *contracting* role of financial accounting is more important, especially concerning debt financing and taxation (Fülbier and Gassen 2010). European private firms are primarily financed through loans from banks and other creditors (Cascino et al. 2014). Therefore, agency problems related to debt are of utmost importance (Beuselinck et al. 2023).

According to corporate finance theory, owners' full liability can mitigate agency problems related to debt in two significant ways (Tirole 2006). First, full liability improves incentives during financial distress because owners are more likely to bear the downside risk of poor decisions (Bhimani et al. 2014). Second, full liability can also serve as a costly signal: Only high-quality borrowers will find it advantageous to establish full-liability firms, as their expected savings on interest expenses will outweigh the expected loss from the seizure of private assets. In fact, full-liability firms are considerably less likely to default than private corporations (Bhimani et al. 2014; Harhoff et al. 1998).

To mitigate agency problems related to debt, borrowing firms are often willing to agree on debt covenants that constrain the dividend, financing, and investment policy; they may also require the borrowing firm to maintain certain financial ratios (Christensen and Nikolaev 2012; Smith and Warner 1979). Financial covenants are included in debt contracts because financial accounting information is standardized, verifiable, and recurring (Cascino et al. 2014).

We anticipate that limited-liability firms will have more severe agency problems of debt than full-liability firms, and thus a greater demand for financial covenants and conditional conservatism. From an ex-ante information perspective, this demand exists since creditors are more sensitive to the firm's economic losses than to its economic profits (Watts 2003). Moreover, conditional conservatism triggers an early ex-post violation of financial covenants, allowing lenders to more quickly exercise decision rights to limit their economic losses—such as by accelerating debt maturity and requiring more collateral (Wittenberg-Moerman 2008). We acknowledge that the debt contracting role of financial accounting is also relevant for publicly listed firms (Wittenberg-Moerman 2008; Christensen and Nikolaev 2012), but it may be relatively more important for private firms (Cascino et al. 2014). We posit Hypothesis 1 similarly to Bigus et al. (2016):

Hypothesis 1: Full-liability firms exhibit less conditional conservatism than limited-liability firms.

We additionally investigate how the institutional framework is related to the association between liability status and conditional conservatism. There is literature suggesting that a stricter bankruptcy code requires sufficient timely loss recognition (Bushman and Piotroski 2006: 112–114; Peek et al. 2010: 56). In contrast, Gassen and Fülbier (2015) and Dou et al. (2013) argued that the debt contracting function of financial reporting should become more important with institutional weakness, especially concerning *bankruptcy law*. In line with this reasoning, we argue that a lenient bankruptcy code reduces creditors' net benefit from renegotiation in financial distress and makes it more difficult to recover payouts to owners on the eve of bankruptcy. For instance, creditor rights may be impaired if the bankruptcy code allows a firm to reorganize and operate as a going concern during the insolvency process, leaving creditors with limited ability to recover their claims in full (Djankov et al. 2007). Hence, where creditor rights are limited by the bankruptcy code, creditors are more interested in early warning signals to allow them sufficient time to preserve the value of their claims. Thus, in countries with more lenient bankruptcy codes, we expect to see greater demand for financial debt covenants and for timely loss recognition. Indeed, for limited-liability firms, there is evidence that debt covenants substitute for creditors' rights (Hong et al. 2016). For full-liability firms, owner liability effectively reduces default risk and mitigates agency problems of debt, regardless of the bankruptcy code. Consequently, we expect that in the presence of a lenient bankruptcy code, limited-liability firms will exhibit even higher levels of conditional conservatism than full-liability firms. We posit:

Hypothesis 2a: The association between owner liability status and conditional conservatism is attenuated with a stricter bankruptcy code.

Another question is whether and how the level of legal contract enforcement in a country is associated with the level of accounting conservatism. We may expect that better legal enforcement reduces the cost of contract enforcement such that financial covenants are more likely to be agreed upon. Thus, we may expect higher levels of conditional conservatism for limited-liability firms and more pronounced differences to full-liability firms. We posit:

Hypothesis 2b: The association between owner liability status and conditional conservatism is more pronounced with higher levels of contract enforcement.

In addition, the tax framework is assumed to be important for private firms' financial accounting (Fülbier and Gassen 2010). Note that we focus only on non-consolidated financial statements, so taxation concerns matter because pre-tax earnings are linked to taxable income (book-tax conformity). Accounting conservatism shifts net earnings into the future and reduces the net present value of tax payments, given that there is book-tax conformity and a positive discount rate (Watts 2003).

Both conditional and unconditional conservatism reduce the net present value of tax payments. Unconditional conservatism is not event-driven and can be increased, for example, by accelerating depreciation or expensing R&D costs, or valuing

inventory at LIFO. There are limits to both forms of conservatism. If conditional conservatism implies excessive impairment losses or provision expenses, this may induce increased scrutiny by tax authorities (Garrod et al. 2008), especially if net earnings become negative and/or if reported impairment losses or provision expenses are at least partially based on subjective assessments (Qiang 2007; Kim and Jung 2007). There are limits to unconditional conservatism as well. Tax authorities provide guidelines, e.g., on depreciation methods and allowable useful lives. If the tax authorities consider the useful life of a vehicle to be three years, the firm cannot depreciate it over two years. Thus, firms can reduce taxable income via unconditional conservatism to a considerable *but limited* extent. If a firm wants to reduce taxable earnings further, it can only do so by using event-driven conservatism. In particular, the recognition and measurement of provision expenses allow for some discretion that can be used to manage taxable earnings. Consistent with this, Bornemann (2018) reports evidence that publicly listed firms increase their conditional conservatism when a future tax cut is announced. This also implies that unconditional and conditional conservatism do not completely preempt each other; it is possible to depreciate fixed assets as quickly as possible and still recognize provision expenses.

Previous studies on the link between tax-related incentives and accounting conservatism have mainly focused on *public* firms. For instance, Ball et al. (2000), Bushman and Piotroski (2006), and Hong et al. (2016) documented that the conditional conservatism of public firms varies with legal institutions. André and Filip (2016) found that after the adoption of IFRS, European public firms reduced their level of accounting conservatism, especially in countries with high book-tax conformity. Heltzer (2009) reported that financial income and taxable income of U.S. public firms are mainly related to accounting conservatism in the tax accounts, but not to conservatism in the financial accounts. Kim and Jung (2007) found that Korean public firms' level of conditional conservatism is not related to the firm's marginal tax rate.

There is only limited research on the association between book-tax conformity and conditional conservatism for *private* firms (Fülbier and Gassen 2010; Chen et al. 2011; Garrod et al. 2008; Kosi and Valentincic 2013). Generally speaking, timely loss recognition serves both the demand by creditors to inform early about deteriorating performance and the incentives to shift taxable income into the future. However, if the level of timely loss recognition is too high, borrowing firms may violate financial covenants.

In particular, book-tax conformity may induce full-liability firms to engage in more conditional conservatism, since the earlier recognition of losses and the later recognition of gains reduce actual taxable income. Without book-tax conformity, full-liability firms have no real motive for (discretionary) conditional conservatism, while limited-liability firms still have agency-related incentives. However, one might also argue that tax considerations provide similar marginal incentives to both legal forms such that the difference in conditional conservatism remains unchanged in the presence of book-tax conformity. We posit:

Hypothesis 2c: The association between owner liability status and conditional conservatism is attenuated in the presence of high book-tax conformity.

3 Research design and data

3.1 Research design

Following Ball and Shivakumar (2005), we measure private firms' conditional conservatism by the asymmetric persistence of net income:

$$\begin{aligned}\Delta NI_{i,t} = & \partial_0 + \partial_1 D\Delta NI_{i,t-1} + \partial_2 \Delta NI_{i,t-1} + \partial_3 D\Delta NI_{i,t-1} \times \Delta NI_{i,t-1} \\ & + FULL_i \times (\partial_4 + \partial_5 D\Delta NI_{i,t-1} + \partial_6 \Delta NI_{i,t-1} + \partial_7 D\Delta NI_{i,t-1} \times \Delta NI_{i,t-1}) \\ & + \partial_8 D\Delta S_{i,t} + \partial_9 \Delta S_{i,t} + \partial_{10} D\Delta S_{i,t} \times \Delta S_{i,t} \\ & + \text{interacted industry, year, and country fixed effects} + \varepsilon_{i,t}.\end{aligned}\quad (1)$$

ΔNI represents the change in net income of firm i from fiscal year $t-1$ to t , scaled by the beginning book value of total assets. $D\Delta NI$ is an indicator variable that takes the value of 1 if the change in net income is negative, and zero otherwise. $FULL$ is a binary variable with the value of 0 if there is a limited-liability firm and 1 if at least one individual owner can be held liable with their private assets, e.g., sole proprietorships and partnerships. Following Banker et al. (2016), we account for cost stickiness, that is, for a change in sales ΔS and whether that change in sales is negative or not $D\Delta S$. We also consider the industry, year, and country affiliations, and interact each of them with the variables ΔNI , $D\Delta NI$, and $D\Delta NI \times \Delta NI$.

Timely gain recognition implies a “transitory” increase in net income that tends to reverse, implying $\partial_2 < 0$ (Ball and Shivakumar 2005). Conditional conservatism implies that expected economic losses are recognized in a timelier manner than economic gains, such that a transitory decrease in net income is more likely to be reversed: $\partial_2 + \partial_3 < 0$. The coefficient ∂_3 reflects timely loss recognition with limited-liability firms; we expect $\partial_3 < 0$. ∂_7 represents the incremental effect of full-liability firms on the association with timely loss recognition. If conditional conservatism is less important to full-liability firms, ∂_7 will be positive.

Regarding Hypotheses 2a, 2b, and 2c, we include interactions for the institutional framework (INST) as follows:

$$\begin{aligned}\Delta NI_{i,t} = & \partial_0 + \partial_1 D\Delta NI_{i,t-1} + \partial_2 \Delta NI_{i,t-1} + \partial_3 D\Delta NI_{i,t-1} \times \Delta NI_{i,t-1} \\ & + FULL_i \times (\partial_4 + \partial_5 D\Delta NI_{i,t-1} + \partial_6 \Delta NI_{i,t-1} + \partial_7 D\Delta NI_{i,t-1} \times \Delta NI_{i,t-1}) \\ & + INST \times (\partial_8 + \partial_9 D\Delta NI_{i,t-1} + \partial_{10} \Delta NI_{i,t-1} + \partial_{11} D\Delta NI_{i,t-1} \times \Delta NI_{i,t-1}) \\ & + INST \times FULL_i \times (\partial_{12} + \partial_{13} D\Delta NI_{i,t-1} + \partial_{14} \Delta NI_{i,t-1} + \partial_{15} D\Delta NI_{i,t-1} \times \Delta NI_{i,t-1}) \\ & + \partial_{16} D\Delta S_{i,t} + \partial_{17} \Delta S_{i,t} + \partial_{18} D\Delta S_{i,t} \times \Delta S_{i,t} \\ & + \text{interacted industry, year, and country fixed effects} + \varepsilon_{i,t}.\end{aligned}\quad (2)$$

with $INST = \{STRENGTH_INSOLV; GOING_CON; ENFORCE; BK_TAX; BK_TAX2\}$.

We measure the strictness of the bankruptcy code using two measures. $STRENGTH_INSOLV$ is a dummy variable that takes the value of 1 if a country exhibits a value greater than or equal to the median value of the strength of the

insolvency framework index, and 0 otherwise. We retrieved the index values from the *Doing Business* database of the World Bank (2017, www.doingbusiness.org). The second measure is the dummy variable GOING_CON, which takes the values of 1 and 0 when the bankruptcy code allows the firm to continue operating as a going concern during and after the insolvency proceeding or not, respectively (Djankov et al. 2008). ENFORCE takes the value of 1 if a country exhibits a value greater than or equal to the median value of the “Score-enforcing contracts” index, which we also retrieved from the *Doing Business* database of the World Bank (2017), and 0 otherwise (Gassen and Fülbier 2015).

Following prior literature (Burgstahler et al. 2006), we employ two binary measures to capture book-tax conformity. The binary specification allows us to easily integrate tax concerns into the conditional conservatism model via an interaction term. BK_TAX conceptually measures whether or not financial accounts are the basis for measuring taxable income. BK_TAX is an indicator variable with a value of 1 if there is high book-tax conformity in the country, and 0 otherwise, as assessed by PriceWaterhouse Coopers (PwC 2016). We rely on PwC (2016) for several reasons. First, this publication is authored by a reputable, internationally operating auditing firm. Second, it covers more than 100 countries worldwide, including the smaller countries in our sample, such as Estonia and Latvia. Third, the publication’s timing aligns well with our investigation period. In some regressions, we also utilize data on corporate income tax rates and top statutory personal income tax rates from the OECD.³ In robustness tests, we classify countries with high and low book-tax conformity based on the mean of the book-tax conformity measure developed by Tang (2015, p. 455). Tang (2015) does not include Estonia and Latvia in her analysis, which leaves us with eight countries. We transform Tang’s (2015) continuous measure into a binary variable (BK_TAX2).⁴ We categorize the four countries with higher (lower) mean values as having high (low) book-tax conformity.

3.2 Data selection

European Union countries require private firms to disclose their financial reports when they reach a certain size (European Union 2015). We classify partnerships and sole proprietorships in each country’s respective legal form as full-liability firms (see the online appendix).⁵ We focus on closely held corporations with negligible agency problems of

³ See OECD, https://stats.oecd.org/index.aspx?DataSetCode=Table_III and https://stats.oecd.org/index.aspx?DataSetCode=TABLE_I7.

⁴ Unlike Watrin et al. (2014) and Atwood et al. (2010), Tang (2015) filters out book-tax differences driven by country-level earnings management.

⁵ We consider the following legal forms to reflect full-liability firms: Belgium: Société en nom collectif/Vennootschap onder firma (SNC/VOF), Société en commandite simple/gewone commanditaire vennootschap (SCS/Comm. V). Denmark: Interessentskaber (I/S), Kommanditselskaber (K/S). Estonia: Täisühing (Tü), Usaldusühing (Üü). Finland: Avoin yhtiö (AY), Kommandiittiyhtiö (KY), Toiminimi (TMI). France: Société en nom collectif (SNC), Société en commandite simple (SCS). Germany: Offene Handelsgesellschaft (OHG),

equity. For instance, concerning Germany, we considered the *Gesellschaft mit beschränkter Haftung* (*GmbH*), but not the *Aktiengesellschaft*, since the latter legal form is usually chosen for firms with many shareholders. For this reason, a supervisory board is mandatory for the *Aktiengesellschaft* (section 95 *Aktiengesetz*), but not for the *GmbH* (or full-liability firms). To make a clean separation between limited and full-liability status, we also ignored legal forms that share characteristics of both liability forms, such as the *GmbH & Co KG* in Germany.

Various databases from Bureau van Dijk provide information on the legal form in the following items: Legal form (AIDA), national legal form (AMADEUS), current legal form (DAFNE), national legal form (ODIN), and detailed legal form (SABI). AMADEUS provides only limited financial accounting information on full-liability firms, except for Belgium and France. Therefore, we also accessed the following national databases: FAME (United Kingdom and Ireland); AIDA (Italy); DAFNE (Germany); ODIN (Denmark, Estonia, Finland, Iceland, Latvia, Lithuania, Norway); and SABI (Portugal, Spain).

We had to exclude private firms from Ireland and the United Kingdom since accrual accounting is not generally mandatory for them. We also excluded observations from Iceland, Lithuania, and Portugal, as we only found two (zero, zero, respectively) full-liability firms that met our financial data requirements. With each database, we selected the longest available time series of data at the time of investigation, ensuring that all necessary information on variables was fully provided. We considered only non-financial firms.

The extent to which the above financial databases include the population of limited and full-liability firms in their respective countries varies considerably (Eurostat 2017), see the first row of Table 1. For instance, the ODIN database includes about 40–50% of all limited-liability firms in Denmark,⁶ Estonia, Finland, and Norway; AMADEUS has data on about 5% (10%) of all French (Belgian) limited-liability firms; DAFNE, AIDA, and SABI have coverage rates of about 4% for limited-liability firms in Germany and about 5% for Italy and Spain, respectively. In the case of full-liability firms, financial reporting requirements are more lenient and coverage rates are much lower, ranging from 0.005% (Germany, Spain) to 2.4% (Denmark, Norway). We are not aware of publicly available financial accounting databases that include a higher proportion of full-liability firms.

Footnote 5 (continued)

Kommanditgesellschaft (KG), Eingetragener Kaufmann. Italy: Società in Nome Collettivo (SNC), Società in Accomandita Semplice (SAS). Latvia: Pilna sabiedrība (PS), Komandītsabiedrība (KS), Individuālais Komersants (IK). Norway: Ansvarlige selskaper (ANS)/Deltakerlignet selskap (DA), Kommandittselskap (KS), Enkeltpersonforetak (EPF). Spain: Sociedad colectiva, Sociedad comanditaria simple. The legal forms of limited-liability firms include: Belgium: Société privée à responsabilité limitée/besloten vennootschap met beperkte aansprakelijkheid (SPRL/BVBA), Denmark: Anpartsselskab (ApS), Estonia: Osatühing (Oü), Finland: Osakeyhtiö (OY), France: Société à responsabilité limitée (SARL), Germany: Gesellschaft mit beschränkter Haftung (GmbH), Italy: Società a responsabilità limitata (SRL), Latvia: Sabiedrība ar ierobežotu atbildību (SIA), Norway: Aksjeselskap (AS), Spain: Sociedad de Responsabilidad Limitada (SL). For more detailed information, please refer to the online appendix.

⁶ E.g., the coverage rate of Danish limited-liability firms in the ODIN database is estimated as follows: $436,158 / (109,795 \times 9) = 44.1\%$. We multiply by 9 because the number of firm-year observations refers to the period 2007–15. With respect to full-liability firms, the coverage rate is estimated as $22,890 / (108,165 \times 9) = 2.35\%$.

Table 1 Sample selection

Source	Legal form	Belgium	Denmark	Estonia	Finland	France	Germany	Italy	Latvia	Norway	Spain	Total
Time frame		AMADEUS 2004–13	ODIN 2007–15	ODIN 2007–15	ODIN 2007–15	AMADEUS 2004–13	DAFNE 2007–15	AIDA 2005–14	ODIN 2007–15	ODIN 2007–15	SABI 2004–15	
Total population of firms	FULL = 0	386,488	109,795	70,712	152,489	1,923,702	601,645	811,477	81,128	175,253	1,202,576	
in 2015 according to Eurostat (2017)	FULL = 1	255,642	108,165	12,057	139,233	1,568,350	2,194,254	3,008,479	29,182	119,951	1,768,371	
Firm-years in databases, including total assets, current assets, current liabilities, depreciation, net income, deletion of consolidated statements	FULL = 0	385,800	436,158	245,322	660,775	996,530	191,565	431,619	11,130	843,868	736,856	4,939,623
	FULL = 1	710	22,890	2392	1214	4847	907	14,001	3859	22,073	908	73,801
	Total	386,510	459,048	247,714	661,989	1,001,377	192,472	445,620	14,989	865,941	737,764	5,013,424
Firm-years after the dele- tion of implausible values	FULL = 0	280,713	307,277	217,023	556,340	954,694	181,397	332,776	9870	584,861	609,209	4,025,277
and missing values for operating risk, size, and debt	FULL = 1	402	5277	2064	794	4535	744	11,047	3523	12,555	731	41,672
	Total	281,115	312,554	219,087	557,134	959,229	182,141	343,823	13,393	597,416	609,940	4,066,949
Firm-years meeting the 3-year series of data requirement according to Eq. (1), before PSM	FULL = 0	149,734	50,662	88,788	211,115	491,642	37,882	191,629	1916	276,058	394,709	1,894,135
	FULL = 1	187	553	296	126	1,668	150	5,484	171	2,480	304	11,459
	Total	149,921	51,215	89,084	211,241	493,310	38,032	197,113	2087	278,538	395,013	1,905,594
Firm-years, after PSM	FULL = 0	449	357	2446	1080	12,706	1058	37,582	790	15,950	2641	75,059
	FULL = 1	51	189	285	120	1616	138	5282	125	2055	297	10,158
	Total	500	546	2731	1200	14,322	1196	42,864	915	18,005	2938	85,217

Table displays the total number of limited-liability and full-liability firms in the single countries under investigation, as of 2015 (Eurostat 2017; <https://ec.europa.eu/eurostat/web/business-demography/database>). It also shows the sample selection for each country. We excluded observations from certain industries: bank services, insurance, real estate, public administration, household activities, and extraterritorial organizations. In Italy, with 4.5 million limited-liability firm-years, we randomly selected 10% of the firms to simplify matching. PSM stands for propensity score matching, with a 9:1 match ratio for limited-liability firms to full-liability firms. Matching criteria include SIZE, DEBT, RISKSALLES, LOSS, industry, year, and country affiliation. FULL is a binary variable, with 1 for full-liability firms (partnership or sole proprietorship), and 0 for limited-liability firms. When applying entropy balancing as an alternative matching method with the same criteria, the sample includes 10,181 firm-years for full-liability firms and 1,660,978 firm-years for limited-liability firms

Given that limited-liability firms are usually larger than full-liability firms, and the national databases contained significantly more data points on limited-liability firms (an average ratio higher than 99:1, as seen in Table 1), we opted to use propensity score matching.

Therefore, we created a sample of firms with different legal forms, but with similar default risk properties. The matching criteria included the debt ratio, sales volatility, size measured by total assets, the incidence of reported losses, industry, year, and country affiliation. We employed nearest neighbor matching within a caliper and with replacement, following the methods outlined by Heckman et al. (1997, 1998). To keep sufficient statistical power and to ensure that at least 10% of the observations relate to full-liability firms, we matched one full-liability firm to nine limited-liability firms.⁷ We set a caliper size of $\varepsilon < 0.1$ (Rosenbaum and Rubin 1985); the matching results are very similar with $\varepsilon < 0.01$. After matching, the mean values of variables for full-liability and limited-liability firms did not differ significantly. The standardized mean bias was approximately 5% or less (Rosenbaum and Rubin 1985) in most countries, except for Denmark (not tabulated). All results remained the same when we excluded Danish firms. Further, we also used an entropy balancing approach (Hainmueller 2012). We reweighted the dataset such that the mean, variance, and skewness of the variables we used for propensity score matching were the same for full-liability and limited-liability firms.

4 Main results

4.1 Summary statistics

Table 2 illustrates that full-liability and limited-liability firms exhibit similar characteristics after propensity score matching. Following matching, approximately 12% of all observations pertain to full-liability firms, while 88% correspond to limited-liability firms. The sample firms are relatively small and heavily reliant on debt financing. The median firm has two owners, making agency problems related to equity negligible. The median full (limited) liability firm exhibits total assets of €535,000 (€520,000) and an average debt ratio of 57.4%. About 28% of the sample firms reported a loss in the current or two preceding years. The characteristics of full-liability and limited-liability firms hardly differ after propensity score matching.

The mean (median) value of 12.8 (13.5) for the strength of the insolvency framework index (STRENGTH_INSOLV) is relatively high, given that the scale ranges from 0 to 16. The bankruptcy code allows 27% of the sample firms to continue operating as a going concern (GOING_CON) during and after insolvency proceedings. Financial accounts are the basis for taxable income in 74% (BK_TAX) of our observations. The mean corporate income tax rate stands at 30.8%, while the mean top statutory personal income tax rate is 44.8%.

⁷ We also ran one-to-one nearest neighbor matching, and obtained statistically consistent results for financially sound firms (not tabulated).

Table 2 Summary statistics after propensity score matching

Variables and characteristics	Mean	Std. dev.	Q1	Median	Q3
Private full-liability firms, N = 10,158					
SIZE: ln(total assets in €1000)	6.2823	1.8853	5.0370	5.9661	7.1839
SIZE: total assets in €1000	535.02		154.01	389.98	1,318
DEBT	0.5762	0.2841	0.3556	0.6318	0.8194
RISKSALLES	0.2323	0.2210	0.0739	0.1663	0.3159
LOSS	0.2950		0	0	1
# OWNERS (N = 8807)	2.2839	1.5018	2	2	2
AUDIT	0.2533	0.4349	0	0	1
BK_TAX	0.7396		0	1	1
BK_TAX2 (N = 9748)	0.7504		1	1	1
PERS_TAXRATE	44.7621	6.0870	43.0000	45.8000	47.3000
RATIO_FULL (N = 10,147)	0.0258	0.0396	0.0082	0.0161	0.0411
Private limited-liability firms, N = 75,059					
SIZE: ln(total assets in €1000)	6.2544	1.6374	5.2040	6.1463	7.2167
SIZE: total assets in €1000	520.30		182.00	466.99	1,361
DEBT	0.5742	0.2621	0.3709	0.6145	0.7965
RISKSALLES	0.2306	0.2171	0.0745	0.1667	0.3147
LOSS	0.2733		0	0	1
# OWNERS (N = 67,673)	2.4341	1.5472	2	2	3
AUDIT	0.2409	0.4276	0	0	0
STRENGTH_INSOLV	12.83	1.01	12.50	13.50	13.50
GOING_CON	0.27		0	0	1
ENFORCE, original data	57.69	16.71	42.20	45.40	75.10
BK_TAX	0.7384		0	1	1
BK_TAX2 (N = 71,823)	0.7520		1	1	1
CORP_TAXRATE	30.8506	3.8126	28.0000	31.2900	31.4000
RATIO_FULL (N = 75,005)	0.0205	0.0389	0.0044	0.0105	0.0260

For definitions of the variables, please refer to Table 10 in the Appendix. Table presents information on the full-liability and limited-liability firms in our PSM-matched sample, including some variables that are not used in the regression analyses, such as the matching variables SIZE, DEBT, RISKSALLES, LOSS and the variable #OWNERS. Note that the instrumental variable RATIO_FULL (refer to Table 9) has fewer observations due to our inability to assign postal codes to specific regions for certain firms in Norway and France

4.2 Full-liability status and conditional conservatism: cross-country analyses

As argued in Sect. 3.1, timely recognition of gains implies $\partial_2 < 0$ and timely loss recognition implies $\partial_2 + \partial_3 < 0$ with $\partial_3 < 0$ (Ball and Shivakumar 2005). The coefficients ∂_2 and ∂_3 relate to limited-liability firms. The coefficient ∂_7 represents the incremental effect of full-liability firms on the association with timely loss recognition. We expected timely loss recognition to be less important to full-liability firms; thus $\partial_7 > 0$.

Table 3 shows the results concerning Hypothesis 1. We find that 22.6% (∂_2) of limited-liability firms' net income increases and 48.3% ($\partial_2 + \partial_3$) of their net income decreases are transitory (Column 1). This implies that limited-liability firms recognize economic losses in a timelier manner than they recognize economic gains. With full-liability firms, 23.7% ($\partial_2 + \partial_6$) of net income increases and 39.0% ($\partial_2 + \partial_3 + \partial_6 + \partial_7$) of net income decreases are transitory. Thus, full-liability firms are approximately 20% less likely to recognize losses in a timely manner; in Bigus et al. (2016, Table 11), this figure is approximately 30%. These results remain robust when we exclude firms from Italy, the country with the most observations (see Column 2) and if we use net income before taxes instead of net income (Column 3). When we exclude observations from France, the results remain the same (not tabulated). Excluding observations from Norway, full-liability firms still exhibit lower levels of timely loss recognition, but the difference is no longer statistically significant (not tabulated).

Column 5 shows that the results are more pronounced for the subsample of financially sound firms. We define those firms as financially sound whose return on assets exceeds the median (2.2%) and whose leverage is lower than the third quartile (80%). This finding aligns with previous research indicating that financially distressed private firms adjust their conditional conservatism substantially (Garcia Lara et al. 2009a; Bigus et al. 2016). Consistently, the coefficient ∂_7 , indicating the difference in timely loss recognition between these legal forms, amounts to 0.104 with the full sample but increases to 0.215 in the subsample of financially sound firms, with the p value decreasing from 2.0 to 0.04%.

Column 7 demonstrates that we obtain similar results when restricting our sample to firms subject to mandatory disclosure according to information from the European Union (2011); for more detailed information, see the online appendix. We conducted this subsample test because there may be a self-selection effect among firms that voluntarily report. We also conducted a regression for firms subject to mandatory accrual accounting, and the results remain unchanged (not tabulated). The results are also robust when we measure net income before taxes (Column 8). In contrast to the full sample, the difference in timely loss recognition between the legal forms remains significant when we use entropy balancing (Column 9).

When we look at the subsample of highly leveraged firms (debt ratio \geq third quartile, i.e., 80%), we still observe significant timely loss recognition for limited-liability firms, albeit at lower levels than for less leveraged firms (see coefficients ∂_3 in Columns 10 and 11 of Table 3). We also observe more timely gain recognition for highly leveraged firms (see coefficients ∂_2). Overall, these findings are consistent with the conjecture that financial distress may induce firms to recognize gains earlier and losses later, particularly among limited-liability firms, implying lower levels of conditional conservatism (Garcia Lara et al. 2009a; Bigus et al. 2016). Full-liability firms still exhibit lower levels of timely loss recognition, but they barely miss statistical significance at conventional levels (see coefficients ∂_7 in Column 10).

In sum, we find evidence in support of Hypothesis 1. Limited-liability firms exhibit significantly higher levels of conditional conservatism than full-liability firms. Hence, the findings of Bigus et al. (2016) for German firms seem to hold in a European setting as well. Similar to Bigus et al. (2016), we do not observe significant differences

Table 3 (continued)

This table shows how private full-liability firms' conditional conservatism differs from that of private limited-liability firms for the full sample (Columns 1–3), for a subsample of financially sound firms (Columns 5–8), and for subsamples of firms with high and low leverage (Columns 10–11) after propensity score matching is performed for each. Columns 4 and 9 include the results of an entropy balanced sample. Financially sound firms have a return on assets exceeding the median (2.2%) and leverage lower than the third quartile (0.80). *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively, using a two-tailed test. Robust standard errors have been adjusted for heteroscedasticity and clustering at the firm level. *FULL* is a dummy with a value of 1 if the firm is a full-liability firm (partnership, sole proprietorship), and a value of 0 if it is a limited-liability firm. $\Delta NI_{i,t}$ is the change in net income of firm i from fiscal year $t-1$ to t , scaled by the beginning book value of total assets. $D\Delta NI$ is an indicator variable taking a value of 1 if the change in net income was negative, and a value of 0 otherwise. Cost stickiness includes the variables $\Delta S_{i,t}$ (change in sales of firm i from fiscal year $t-1$ to t , scaled by the beginning book value of total assets) and $D\Delta S_{i,t}$ (indicator variable taking a value of 1 if the change in sales was negative, and a value of 0 otherwise). FE stands for interacted fixed effects. For information on the mandatory disclosure regulations, see the online appendix.

in conditional conservatism between limited and full-liability firms when firms are in financial distress.

4.3 Full-liability status and conditional conservatism: The impact of the institutional framework

Table 4 depicts the results for the marginal effects of the institutional framework. The strength of the insolvency code (STENGTH_INSOLV) and the ability to operate as a going concern (GOING_CON) do not materially affect the association between owner liability status and timely loss recognition (see ∂_{15}). Nevertheless, we generally observe more timely loss recognition with a stricter bankruptcy code (see ∂_{11} in Column 1 and ∂_3 in Column 2). Surprisingly, we find lower levels of timely loss recognition in countries with higher legal enforcement (ENFORCE = 1), but the coefficients are mostly insignificant (Columns 3 and 9).

In contrast to the bankruptcy regime, book-tax conformity seems to affect full-liability firms differently than limited-liability firms, for the full sample (Columns 4–6) as well as for the subsample of financially sound firms (Columns 10–12). In the absence of high book-tax conformity, full-liability firms exhibit significantly lower levels of conditional conservatism than limited-liability firms (see ∂_7). With high book-tax conformity, the differences in conditional conservatism between the legal forms tend to disappear, mainly because full-liability firms increase their conservatism significantly (see ∂_{15}). The results are robust when we consider the corporate and top statutory personal income tax rates for limited-liability and full-liability firms, respectively (Columns 6 and 12). When we utilize the book-tax conformity measure derived from Tang (2015), the results are only significant for financially sound firms (Column 11).

Table 5 shows that the results regarding book-tax conformity are generally unchanged when we exclude firm observations from the countries from which we have the most observations, i.e., Italy, Norway and France, see Columns 2–4 and 7–9. The results are generally more pronounced, both economically and statistically, for financially sound firms (see Columns 6–12); the test for differences in the coefficients of ∂_{15} in Columns 1 and 6 is significant ($p = 0.014$). Columns 10 and 11 show that full-liability firms increase timely loss recognition when they otherwise exhibit relatively low levels of unconditional conservatism. We measure unconditional conservatism by the 3-year average of country-industry-year-adjusted depreciation expenses over lagged fixed assets. This finding implies a substitutive relationship between conditional and unconditional conservatism.

Taken together, this evidence supports Hypothesis 2c. In countries with a high degree of alignment between financial and tax accounts, full-liability firms have strong incentives to reduce taxable income through timely loss recognition, while limited-liability firms may have limited opportunities to further increase conditional conservatism. However, we have to reject Hypotheses 2a and 2b because we find no supporting evidence of a marginal effect of the strictness of the bankruptcy code or the level of legal enforcement.

Table 4 Hypotheses 2a, 2b, and 2c: Full-liability status, institutional variables, and conditional conservatism

Sample	Financially sound firms												
	All firms												
Dep. variable	$\Delta NI_{i,t}$ Coeff. (t value)												
Matching method	PSM												
INST =	STRENGTH_	GOING_	ENFORCE	BK_TAX	BK_	TAX2	BK_	TAX	ENFORCE	GOING_	BK_	TAX2	
	INSOLV	CON	CON		TAX	PERS_	TAXRATE		CON	INSOLV	TAX	PERS_	
Cost stickiness (Banker et al. 2016)	Pred. sign	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$\Delta NI_{i-1} (\theta_2)$	-0.323*** (-2.67)	-0.226*** (-8.07)	-0.219*** (-7.77)	-0.110 (-0.60)	-0.312* (-2.93)	-0.0835 (-0.43)	0.161 (0.88)	-0.131*** (-3.61)	-0.121*** (-3.33)	-0.037 (-0.14)	-0.164* (-1.72)	0.191 (0.68)	
$D\Delta NI_{i-1} \times \Delta NI_{i-1} (\theta_3)$	0.061 (0.38)	-0.254*** (-5.30)	-0.262*** (-5.42)	-0.480 (-1.47)	-0.288*** (-2.43)	-0.595* (-1.91)	-0.250 (-1.48)	-0.461*** (-6.84)	-0.466*** (-6.91)	-0.413 (-1.11)	-0.345*** (-2.41)	-0.691* (-1.78)	
$FULL \times \Delta NI_{i-1} (\theta_6)$	0.038 (1.04)	-0.003 (-0.09)	-0.047 (-1.22)	-0.030 (-0.64)	-0.014 (-0.32)	-0.017 (-0.36)	0.035 (0.81)	0.025 (0.59)	-0.035 (-0.72)	-0.042 (-0.94)	-0.034 (-0.67)	-0.028 (-0.63)	
$FULL \times D\Delta NI_{i-1} \times \Delta NI_{i-1} + (\theta_7)$	0.083 (1.52)	0.075 (1.24)	0.097 (1.53)	0.176** (2.38)	0.143** (2.16)	0.164** (2.26)	0.249*** (3.52)	0.096 (1.02)	0.157* (1.70)	0.324*** (3.94)	0.340*** (4.21)	0.305*** (3.75)	
$INST \times \Delta NI_{i-1} (\theta_{10})$	0.102 (-0.55)	-0.090 (-0.76)	-0.098* (-1.93)	-0.1180 (-0.65)	0.069 (0.66)	-0.005 (-0.75)	-0.286 (-1.56)	0.297 (1.62)	-0.093* (-1.72)	-0.102 (-0.39)	0.0135 (0.15)	-0.0104 (-1.18)	
$INST \times D\Delta NI_{i-1} \times \Delta NI_{i-1} (\theta_{11})$	-0.319*** (-2.04)	0.235* (1.83)	0.237*** (2.62)	0.234 (0.72)	0.082 (0.72)	0.011 (1.14)	-0.215 (-1.33)	-0.262 (-1.26)	0.043 (0.41)	-0.026 (-0.07)	-0.062 (-0.46)	0.008 (0.65)	
$INST \times FULL \times \Delta NI_{i-1} (\theta_{14})$	-0.085 (-1.55)	-0.014 (-0.25)	0.096* (1.78)	0.0416 (0.73)	-0.001 (-0.01)	0.002 (0.81)	-0.081 (-1.22)	-0.050 (-0.74)	0.065 (-0.25)	0.126* (1.92)	0.078 (1.13)	0.006* (1.90)	
$INST \times FULL \times D\Delta NI_{i-1} \times \Delta NI_{i-1} (\theta_{15})$	0.026 (0.30)	0.056 (0.63)	0.005 (0.06)	-0.178** (-2.00)	-0.110 (-1.35)	-0.007** (-1.97)	-0.102 (-0.80)	0.195 (1.56)	0.137 (1.13)	-0.426*** (-3.63)	-0.350*** (-3.13)	-0.016*** (-2.40)	
Industry, year, and country FE	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	Included	

5 Robustness tests and additional analyses

5.1 Alternative measure of conditional conservatism

Ball and Shivakumar (2005) suggested a second measure of conditional conservatism based on the relationship between cash flow from operations and accruals (= net income – cash flow from operations). Thus, accruals and cash flow from operations are negatively correlated. In a sense, accruals tend to conceal operating performance.

With conditional conservatism, this negative association is mitigated for unrealized economic losses. For instance, asset impairments and provision expenses anticipate cash outflow, suggesting a positive association that counteracts the basic negative correlation between accruals and cash flow from operations (Ball and Shivakumar 2005). There is a much milder mitigation effect for economic gains because their recognition is more often tied to the realization of gains in cash terms. Therefore, economic gains are more likely to be concealed by accruals than economic losses. Hence, Ball and Shivakumar (2005) expect a less negative correlation between accruals and *negative* cash flows from operations than between accruals and positive cash flows from operations. We employ the following model:

$$\begin{aligned} \text{ACC}_{i,t} = & \beta_0 + \beta_1 \text{DCFO}_{i,t} + \beta_2 \text{CFO}_{i,t} + \beta_3 \text{DCFO}_{i,t} \times \text{CFO}_{i,t} \\ & + \text{FULL}_i \times (\beta_4 + \beta_5 \text{DCFO}_{i,t} + \beta_6 \text{CFO}_{i,t} + \beta_7 \text{DCFO}_{i,t} \times \text{CFO}_{i,t}) \\ & + \text{INST} \times (\beta_8 + \beta_9 \text{DCFO}_{i,t} + \beta_{10} \text{CFO}_{i,t} + \beta_{11} \text{DCFO}_{i,t} \times \text{CFO}_{i,t}) \\ & + \text{INST} \times \text{FULL}_i \times (\beta_{12} + \beta_{13} \text{DCFO}_{i,t} + \beta_{14} \text{CFO}_{i,t} + \beta_{15} \text{DCFO}_{i,t} \times \text{CFO}_{i,t}) \\ & + \beta_{16} \Delta \text{S}_{i,t} + \beta_{17} \Delta \text{S}_{i,t} + \beta_{18} \Delta \text{S}_{i,t} \times \Delta \text{S}_{i,t} \\ & + \text{interacted industry, year, and country fixed effects} + \varepsilon_{i,t}. \end{aligned}$$

with $\text{ACC}_{i,t} = \Delta \text{Net working capital}_{i,t} - \text{Depreciation}_{i,t}$.
 with $\text{INST} = \{\text{STRENGTH_INSOLV}; \text{GOING_CON}; \text{ENFORCE}; \text{BK_TAX}; \text{BK_TAX2}\}.$

CFO represents cash flow from operations, measured as earnings before exceptional and extra-ordinary items, minus accruals. DCFO is a dummy variable taking the value of 1 if CFO is negative, and 0 otherwise. The negative association between positive cash flows and accruals suggests $\beta_2 < 0$. Conditional conservatism implies a less negative association with negative cash flows, thus $\beta_3 > 0$. Given that full-liability firms exhibit lower conditional conservatism, we expect $\beta_7 < 0$ in the absence of high book-tax conformity. With high book-tax conformity, limited-liability and full-liability firms may have an incentive to increase conditional conservatism, implying $\beta_{11} > 0$ and $\beta_{15} > 0$, respectively.

In contrast to Ball and Shivakumar (2005), we also control for increases or decreases in sales (ΔS and ΔS). Banker et al. (2016) do not link the cost stickiness argument to the accrual-based specification of conservatism. Nevertheless, we believe that changes in sales regularly affect net working capital and accruals because some sales are typically recognized as income before customers actually pay. In fact, the sales variables are statistically significant. Without the sales

variables, the results remain the same, but adjusted R^2 decreases by about 3–4 percentage points.

Table 6 presents the findings of the impact of the institutional framework on the association between legal form and conditional conservatism. Unlike the basic specification of conditional conservatism, the marginal impact of the insolvency code on the association between full-liability status and conditional conservatism is significant, as expected by Gassen and Fülbier (2015) and Hong et al. (2016) and consistent with Hypothesis 2a. The interaction term $\text{STRENGTH_INSOLV} \times \text{FULL} \times \text{DCFO} \times \text{CFO}$ is positive in Columns 1 and 7, suggesting that differences in accounting conservatism between limited and full-liability firms are smaller (larger) in countries with stricter (more lenient) bankruptcy codes. The negative sign of the term $\text{GOING_CON} \times \text{FULL} \times \text{DCFO} \times \text{CFO}$ is consistent with this conjecture (Columns 2 and 8).

Moreover, in countries with higher levels of legal contract enforcement (ENFORCE), we find that limited-liability firms exhibit significantly higher levels of conservatism and that the differences to full-liability firms' conservatism levels decrease (see β_{14} and β_{15} , respectively, in Columns 3 and 9). This finding supports the conjecture that better contract enforcement increases the marginal benefits of debt covenants and thus of conditional conservatism.

Regarding the book-tax conformity analyses in Columns 4–6 and 10–12, the coefficient β_7 is negative, indicating that full-liability firms exhibit less timely loss recognition than limited-liability firms in the presence of low book-tax conformity. However, the picture changes with high book-tax conformity. Full-liability firms exhibit significantly higher levels of timely loss recognition ($\beta_{15} > 0$). Note that $\beta_{15} > 0$ and $\beta_{14} < 0$, thus full-liability firms not only conceal economic losses to a lesser extent, *but also* conceal economic gains to a larger extent with high book-tax conformity than without. We obtain similar results when we employ the BK_TAX2 measure based on Tang (2015). In sum, concerning book-tax conformity, we obtain the same results as with the first specification of conditional conservatism.

5.2 Endogeneity analyses: Heckman procedure

We modeled the possibly endogenous choice of legal form by conducting a Heckman procedure (Lennox et al. 2012). The first regression estimates the probability of establishing a full-liability firm. By adding the inverse Mills ratio and its interactions to the second regression, it is possible to control for possible selection bias.

To obtain unbiased estimates for the selection effect, we need an exogenous variable that is associated with the choice of legal form but is unlikely to be related to the *firms'* financial reporting choices. Owners' risk attitudes and other individual data, e.g., tax-related data, may affect the choice of legal form, but we lack the relevant data. The New Institutionalism approach in organization theory suggests that firms' decisions are also driven by rational and effective peer firms that are considered to be, and therefore serve as, role models (Tempel and Walgenbach 2007). Czarniawska (2005) highlighted trends in organization which, similar to the New Institutionalism approach, resulted in the adaptation of peer firms' practices, and eventually in the convergence of organizational

Table 6 (continued)

Sample	Pred. All firms sign	Financially sound firms												
Dep. variable		ACC _{i,t} Coeff. (t value)	ACC _{i,t} Coeff. (t value)											
Matching method		PSM	Entropy balancing	PSM										
				Entropy balancing										
	INST =	STRENGTH_ INSOLV	GOING_ CON	ENFORCE	BK_TAX	BK_TAX2	BK_TAX	STRENGTH_ INSOLV	GOING_ CON	ENFORCE	BK_TAX	BK_TAX2	BK_TAX	
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	
Adj. R ² in % (R ² in %)		56.4	56.4	56.4	56.3	57.8	(49.8)	61.2	61.2	61.1	61.1	61.3	(53.7)	
F-Stat		431.8	428.4	420.0	415.2	454.5	1334	378.9	372.4	369.1	360.6	388.0	1456	

Table 6 presents regression results using the accrual-based measure of conditional conservatism (Ball and Shivakumar 2005). It illustrates the differences in conditional conservatism between full-liability and limited-liability firms in countries with stricter and more lenient bankruptcy codes (Columns 1–2 and 7–8), with high levels of legal enforcement (Columns 3 and 9), and in countries with high levels of book-tax conformity (Columns 4–6 and 10–12). Columns 1–6 refer to the full sample and Columns 7–12 to the sample of financially sound firms, as defined in Table 3. For Columns 1–5 and 7–11, we used a 1:9 propensity score matching approach, where one full-liability firm was matched to nine limited-liability firms. Columns 6 and 12 show the results with an entropy balanced sample. For a definition of variables, see Table 4. *, **, and *** denote significance at the 10%, 5%, and 1% levels, using a two-tailed test. Robust standard errors have been adjusted for heteroscedasticity and clustering at the firm level

practices. We may expect similar tendencies with private firms, especially when local lawyers provide similar advice to several firms. In light of organization theory, we infer that the *regional* propensity for certain legal forms may affect the owners' choice of legal form but is unlikely to be related to the *individual firms'* accounting choices. Therefore, we believe that the regional propensity for certain legal forms is likely to meet the exclusion restriction.

In the first stage, we model the choice of legal form and employ the variable $RATIO_FULL$, calculated as the ratio $\frac{\text{full-liability firms in region}}{\text{limited liability firms in region}}$ for each region of a country before propensity score matching. To identify these regions, we employed geographical data from Eurostat (known as the NUTS system).⁸ We defined 6 to 27 regions per country, and assigned firms to certain regions. The mean value of $RATIO_FULL$ is 0.0211.

In the first stage, $RATIO_FULL$ exhibits a positive sign ($p < 0.001\%$); see Columns 1 and 4 in Table 7. In the second stage, the coefficients for the inverse Mills ratio are not significant with financially sound firms, and slightly significant with the full sample; this indicates no or limited endogeneity of liability status (Columns 2–3 and 5–6). The coefficient ∂_7 is significant, confirming that full-liability firms exhibit lower levels of timely loss recognition than limited-liability firms in the presence of low book-tax conformity. The moderate variance inflation factors of the inverse Mills ratio and of the $FULL$ variable indicate low levels of multicollinearity, suggesting that the model is not specified incorrectly (Lennox et al. 2012).

With regard to Hypothesis 2c, the endogeneity-adjusted results confirm our main findings (Columns 2–3 and 5–6). We test only with regard to book-tax conformity because we found no robust results on the marginal effect of the insolvency framework or the level of legal enforcement. In the presence of high book-tax conformity, full-liability firms show more timely loss recognition (∂_{15}), while limited-liability firms do not (∂_{11}). The results are stronger with financially sound firms; full-liability firms even tend to delay gains for tax reasons (∂_{14}). When we exclude firms from France and Norway, the results remain the same; however, the statistical significance of the $TAX \times FULL \times \Delta NI \times \Delta NI$ interaction terms is lower without Norwegian firms ($p < 6\%$, untabulated).⁹ Overall, the evidence supports Hypothesis 2c.

⁸ To identify and link regions with postal codes in the databases, we used the Eurostat NUTS (Nomenclature of territorial units for statistics) classification, which allows for cross-border statistical comparisons within the EU at different regional levels. For an overview of NUTS, refer to: https://ec.europa.eu/eurostat/databrowser/view/demo_r_d3area/default/table. Accessed 13 April 2022.

⁹ In general, our results become weaker, but still remain significant, when we exclude Norwegian firms. This suggests that the differences in conservatism across legal forms are relatively pronounced in Norway. Possibly, there are two reasons for this finding: First, in contrast to other countries in the sample, financial statements of Norwegian private limited-liability firms *must* be audited, regardless of size (Hope and Langli 2010: 579), and our results are stronger with audited financial statements. Second, Hope and Langli (2010) do not find evidence for impaired auditor independence in Norway even though auditors face hardly any litigation risk in Norway and reputations risks are negligible with private firms. They conclude that Norwegian audit firms seem to be motivated by high levels of professional ethics and integrity; this may also enhance timely loss recognition.

Table 7 Endogeneity analyses on Hypotheses 1 and 2c: Heckman correction

Sample	Pred. sign	All firms		Financially sound firms	
		First stage	Second stage	First stage	Second stage
		<i>FULL</i>	$\Delta NI_{i,t}$ Coeff. (t value)	<i>FULL</i>	$\Delta NI_{i,t}$ Coeff. (t value)
TAX =			BK_TAX	BK_TAX	BK_TAX \times CORP_ PERS_TAX RATE
		(1)	(2)	(3)	(4)
$\Delta \Delta NI_{i-1} \times \Delta NI_{i-1} (\partial_3)$	-		-0.870** (-2.17)	-1.005** (-2.58)	-0.671 (-1.35)
$FULL \times \Delta \Delta NI_{i-1} \times \Delta NI_{i-1} (\partial_7)$	+		0.202*** (2.75)	0.190*** (2.62)	0.342*** (4.16)
$TAX \times \Delta NI_{i-1} (\partial_{10})$			-0.103 (-0.57)	-0.047 (-0.79)	-0.012 (-1.34)
$TAX \times \Delta \Delta NI_{i-1} \times \Delta NI_{i-1} (\partial_{11})$			0.223 (0.69)	0.011 (1.15)	0.009 (0.74)
$TAX \times FULL \times \Delta NI_{i-1} (\partial_{14})$			0.034 (0.60)	0.002 (0.76)	0.059** (2.06)
$TAX \times FULL \times \Delta \Delta NI_{i-1} \times \Delta NI_{i-1} (\partial_{15})$			-0.195** (-2.20)	-0.007** (-2.08)	-0.430*** (-3.69)
RATIO_FULL		8.50*** (8.23)		6.59*** (5.04)	
$IMR \times \Delta NI_{i-1}$			-0.131* (-1.89)	-0.132* (-1.91)	0.004 (0.00)
$IMR \times \Delta \Delta NI_{i-1} \times \Delta NI_{i-1}$			0.242* (1.89)	0.248* (1.89)	0.149 (1.49)

Table 7 (continued)

Sample	Pred. sign	Financially sound firms			
		All firms		Financially sound firms	
		First stage	Second stage	First stage	Second stage
Dep. variable		<i>FULL</i>	$\Delta N I_{i,t}$ Coeff. (t value)	<i>FULL</i>	$\Delta N I_{i,t}$ Coeff. (t value)
TAX =			BK_TAX	BK_TAX \times CORP_ PERS_TAX RATE	BK_TAX PERS_TAX RATE
		(1)	(2)	(3)	(4)
Cost stickiness (Banker et al. 2016)		–	(1.70)	(1.73)	(0.77)
Industry and year FE		Included	Included	Included	Included
Country FE		Included	Included	Included	Included
N =		85,152	85,152	85,152	37,172
R ² (Pseudo-R ²) in %		1.42	21.7	21.7	31.0
F-Stat. (Wald Chi ² -Stat.)		194.37	83.2	83.2	59.2
VIF FULL			12.21	11.5	8.42
VIF Inverse Mills ratio			3.07	3.06	3.32

This table presents the results of endogeneity-adjusted regression analysis examining the relationship between full-liability status and conditional conservatism based on the propensity score matched sample (one full-liability firm was matched to nine limited-liability firms). We employ *RATIO_FULL* as an exogenous variable in the first-stage regression, which models the choice of legal form. *RATIO_FULL* is calculated as the ratio $\frac{\text{full-liability firms in region}}{\text{limited liability firms in region}}$ in each region of a country before propensity score matching is performed. Columns 1–3 pertain to the full sample, while Columns 4–6 pertain to the sample of financially sound firms as defined in Table 3. For definitions of $\Delta N I_{i,t}$, *FULL*, BK_TAX, CORP_TAXRATE, and PERS_TAXRATE, see Table 10 in the Appendix. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively, using a two-tailed test. Robust standard errors have been adjusted for heteroscedasticity and clustering at the firm level. FE stands for interacted fixed effects

5.3 Change in minimum capital requirements

With respect to Hypothesis 1, we addressed possible endogeneity concerns by considering changes in the minimum paid-in capital required by corporate law. Stricter minimum capital requirements are likely to reduce the perceived default risk of limited-liability firms, while leaving full-liability firms unaffected. Using the World Bank's "Doing Business" database and the findings of Armour (2016), we identified large decreases or increases in minimum paid-in capital requirements of 20% or more in Italy and in Norway (Armour 2016).¹⁰ In August 2012, the minimum paid-in capital for Italian limited-liability firms (s.r.l.) was reduced from €10,000 to €1. In Norway, the minimum capital requirement changed from 100,000 Norwegian kroner in 2012 (approx. €12,853) to 30,000 kroner in 2013 (approx. €3856).

We find that the timely loss recognition of limited-liability firms increased after minimum capital requirements became more lenient (not tabulated). In the subsample of financially sound firms, limited-liability firms also significantly reduced timely gain recognition. In line with our expectations, full-liability firms' conditional conservatism did not change materially after the amendment to corporate law.

5.4 Change in corporate income tax rates or top personal income tax rates

With respect to Hypothesis 2c, Table 8 shows the results of how firms' conditional conservatism changed after an increase in statutory corporate or top personal income tax rates in countries with book-tax conformity (see Table 12 in the Appendix for the corresponding time series information). After an increase in top personal income tax rates, full-liability firms engage in significantly more timely loss recognition, especially financially sound firms (∂_{15}). However, we observe *less* timely loss recognition of limited-liability firms after an increase in the corporate income tax rate, possibly to avoid increased scrutiny by tax authorities (Coppens and Peek 2005; Garrod et al. 2008).

Higher tax rates increase the marginal benefits and the likelihood of (more intensive) tax audits. Well-performing limited-liability firms appear to weigh the expected marginal costs of tax audits and negative reputational costs more heavily than the direct tax benefits of increasing timely loss recognition. In addition, the level of timely loss recognition may already have been high before the corporate tax rate increase, so that additional efforts to further increase timely loss recognition are limited and likely to be challenged by tax auditors. In contrast, for full-liability firms, direct tax savings from increased accounting conservatism seem to outweigh the expected marginal costs associated with tax audits. Note that prior to the tax increase, full-liability firms' level of conditional conservatism was relatively low, so that increasing it implies relatively low marginal costs and tax auditors are less likely to challenge them. Overall, these findings lend support to the conjecture that full-liability and limited-liability firms

¹⁰ There were also changes in capital requirements in Denmark (2011) and Latvia (2012), but no observations on full-liability firms before the change in capital requirements.

Table 8 Hypothesis 2c: Increase in the corporate income tax rate and conditional conservatism

Sample	Pred. sign	All firms	Financially sound firms
Dep. variable		$\Delta NI_{i,t}$ Coeff. (t-value)	$\Delta NI_{i,t}$ Coeff. (t-value)
		(1)	(2)
$D\Delta NI_{i,t-1} \times \Delta NI_{i,t-1} (\partial_3)$	–	–0.301*** (–4.45)	–0.486*** (–5.60)
$FULL \times D\Delta NI_{i,t-1} \times \Delta NI_{i,t-1} (\partial_7)$	+	0.141*** (2.58)	0.287*** (4.14)
$INCR_TAXR \times D\Delta NI_{i,t-1} \times \Delta NI_{i,t-1} (\partial_{11})$		0.099 (1.25)	0.232** (2.23)
$INCR_TAXR \times FULL \times D\Delta NI_{i,t-1} \times \Delta NI_{i,t-1} (\partial_{15})$	–	–0.241** (–2.14)	–0.601*** (–3.85)
Cost stickiness (Banker et al. 2016)		Included	Included
Industry, year, and country FE		Included	Included
N=		72,710	32,886
Adj. R ² in %		21.4	31.0
F-Stat		75.3	55.6

Table 8 presents the regression results of an analysis of how an increase in the corporate income tax rate or the top personal income tax rate is related to the conditional conservatism of limited-liability and full-liability firms, respectively. We conducted the analyses based on a propensity score matched sample (one full-liability firm was matched to nine limited-liability firms). The variable INCR_TAXR is a binary variable with a value of 1 for limited-liability firms (for full-liability firms) if there was an increase in the CORP_TAXRATE (an increase in the PERS_TAXRATE, respectively) in countries with high book-tax conformity. It has the value of 0 if there was no change for the respective legal form or if there was a change in a country with low book-tax conformity. Refer to https://stats.oecd.org/index.aspx?DataSetCode=Table_III and Table 11 in the Appendix for the development of corporate and top personal income tax rates over time. For definitions of $\Delta NI_{i,t}$, $D\Delta NI_{i,t}$ and FULL, see Table 10 in the Appendix. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively, using a two-tailed test. Robust standard errors have been adjusted for heteroscedasticity and clustering at the firm level. FE stands for interacted fixed effects

react differently to increases in tax rate in terms of their levels of conditional conservatism.

5.5 Alternative explanations

Survivorship bias: Our results may be driven by survivorship bias. Since the bankruptcy risk of full-liability firms is lower than that of limited-liability firms (Bhimani et al. 2014), the degree of survivorship bias is likely to be greater for limited-liability firms. Consequently, our results are rather conservative, and are likely to be even stronger in the absence of survivorship bias. For the subsample of financially sound firms, we expect survivorship bias to be less severe, and indeed the results are generally stronger.

With respect to omitted variables, we address the role of (1) audits and (2) collateral.¹¹ Regarding *audits*, it may be the case that limited-liability firms exhibit higher levels of timely loss recognition because their financial statements are more likely to be audited (Cano-Rodriguez 2011). Only in the subsample of audited firms, limited-liability firms exhibit a *significantly* higher level of timely loss recognition than full-liability firms. This is in line with Hypothesis 1. Since audits improve the information value of a covenant violation, the marginal benefits of debt covenants increase. Since there is more demand for debt covenants among limited-liability firms, the difference in timely loss recognition is higher in the presence of audits (with audit: $\partial_7 = 0.146$, $t\text{-value} = 2.01$; without audit: $\partial_7 = 0.087$, $t\text{-value} = 1.58$).

Collateral tends to mitigate agency problems related to debt (Tirole 2006). The reader might contest that limited-liability firms exhibit higher levels of timely loss recognition because they provide less collateral than full-liability firms do. Except for Denmark, our databases do not provide data on collateralized loans. In addition, we do not have access to credit file data. Therefore, we defined a variable COLLATERAL, which equals the sum of tangible fixed assets and accounts receivable divided by lagged total assets, reflecting the potential collateral. We then ran regression analyses with a subsample of financially sound firms exceeding the median value of COLLATERAL and another subsample where this was not the case (not tabulated). Limited-liability firms continue to display significantly higher levels of conditional conservatism even when controlling for potential collateral. However, in the subsample of firms with above-median potential collateral, the disparities in timely loss recognition between legal forms diminish but remain statistically significant (COLLATERAL above median: $\partial_7 = 0.164$, $t\text{-value} = 1.95$; below median: $\partial_7 = 0.271$, $t\text{-value} = 3.47$). This is consistent with the conjecture that collateral and timely loss recognition are substitutes for each other in mitigating agency problems related to debt.

5.6 Full-liability status and earnings smoothing

Bigus et al. (2016) also reported evidence that full-liability firms smooth earnings less than limited-liability firms. Full-liability firms should have less need to smooth earnings to avoid violating debt covenants, such as violations concerning interest coverage (EBIT/interest expenses) and the ratio of debt to EBIT or to EBITDA,

¹¹ A third omitted variable could be relationship lending. We cannot exclude the possibility that full-liability firms are more likely to obtain loans from relationship lenders with access to private information, resulting in lower demand for financial reporting quality (Bigus and Hillebrand 2017; Breuer et al. 2018). Relationship intensity is often measured by the number of bank relationships (Elsas 2005; Ongena et al. 2012). If full-liability firms are more likely to have close bank relationships, they should have fewer bank relationships than limited-liability firms. For the countries where we have data on the number of bank relationships (Denmark, Estonia, Germany, Latvia, and Spain), we find a non-significant difference in the mean number of bank relationships (1.90/1.94 for full-liability/limited-liability firms, $p = 0.247$). However, even if there were a significant difference, the meta-analytic evidence from Kysucky and Norden (2016) does not suggest that relationship lenders reduce collateral and covenant requirements despite possessing private information. Regardless of the bank's private information, covenants must be based on verifiable information to be enforceable.

which are commonly used as accounting-based debt covenants (Nikolaev 2010: 146; Dichev and Skinner 2002: 1101). From an information perspective, creditors tend to perceive lower default risk with lower earnings volatility (Trueman and Titman 1988). Given that full-liability firms imply less severe agency problems of debt than limited-liability firms, we should expect the latter firms to have a greater need to signal creditworthiness through stable earnings.

We measure earnings smoothing by dividing the variability of earnings over time by the variability of performance in economic terms, that is, the variability of cash flow from operations (e.g., Burgstahler et al. 2006):

$$SMTH_{i,t} = - \frac{SD\left(\frac{\text{net income}_{i,t}}{\text{total assets}_{i,t-1}}\right)}{SD\left(\frac{\text{cash flow from operations}_{i,t}}{\text{total assets}_{i,t-1}}\right)}. \quad (4)$$

SD stands for standard deviation, which is computed based on financial data for three fiscal years to mitigate the effect of abnormally high or low values on earnings or cash flow from operations. We scale by lagged total assets. Cash flow from operations is defined as the difference between net earnings and total accruals (Daske et al. 2006). Total accruals are equal to the change in working capital minus depreciation (Gassen and Fülbier 2015). The date t defines a 3-year period. We multiply this figure by -1 so that higher values correspond to more earnings smoothing.

We repeated the propensity score matching for the earnings smoothing analysis because the smoothing measure requires four consecutive years of data. Accordingly, the sample size is smaller than for the timely loss recognition analysis. We adopt the following regression:

$$SMTH_{i,t} = \beta_0 + \beta_1 FULL_i + \sum_{j=2}^J \beta_j CONTROL_{i,t,j} + \alpha_k + \gamma_n + z_t + \varepsilon_{i,k,n,t}. \quad (5)$$

CONTROL captures firm-specific characteristics, α_k denotes the set of industry dummies, γ_n represents country dummies, z_t denotes the set of year dummies, and $\varepsilon_{i,k,n,t}$ is the error term. We control for other firm-specific variables that are likely to affect earnings smoothing (Dou et al. 2013; Gassen and Fülbier 2015), such as firm size (SIZE), operating risk (RISKSALLES), firm growth (GROWTH), leverage ratio (DEBT), the incidence of losses (LOSS), and the corporate/personal income tax rate (TAX_RATE). For robustness tests, we also control for audited financial statements (AUDIT).

The SMTH variable indicates that, on average, the standard deviation of scaled net income is 63.1% of the standard deviation of scaled operating cash flows, and the median value is 35.0% (untabulated). Table 9 shows the regression results for the earnings smoothing analyses. Controlling for other factors, earnings smoothing is 0.107 lower for full-liability firms than for private corporations (Column 1), which corresponds to approximately 17% of the mean level of earnings smoothing in this sample ($=0.631$) and approximately 30% of the median value ($=0.350$). The coefficient of the DEBT variable is highly statistically significant, and important in economic terms. An increase in the debt ratio by one standard deviation (24%) results

Table 9 Robustness test, pooled OLS regressions for European private firms: 2007–2015, dependent variable: earnings smoothing (SMTH)

	Pred. sign	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH			
		Coeff. (t-value)	Coeff. (t-value)	Coeff. (t-value)	Coeff. (t-value)	Coeff. (t-value)	Coeff. (t-value)	Coeff. (t-value)	Coeff. (t-value)	Coeff. (t-value)	Coeff. (t-value)	Coeff. (t-value)	Coeff. (t-value)	Coeff. (t-value)	Coeff. (t-value)	Coeff. (t-value)	Coeff. (t-value)	Coeff. (t-value)			
		Total sample before PSM				Total sample after PSM				Total sample after PSM				Total sample after PSM				Total sample after PSM			
		Without balancing		Entropy balancing		Only firms with manda- tory financial disclosure		Only firms with manda- tory accrual accounting		Without Italy		Without Norway		Without France		Including AUDIT		Including AUDIT			
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)											
FULL	-	- 0.107*** (- 6.92)	- 0.0779*** (- 5.03)	- 0.0657*** (- 5.83)	- 0.300*** (- 6.03)	- 0.107*** (- 6.94)	- 0.186*** (- 6.83)	- 0.0636*** (- 4.16)	- 0.103*** (- 5.97)	- 0.0656*** (- 3.96)											
	+/-	0.044*** (14.49)	0.0672*** (72.99)	0.0410*** (10.56)	0.0208*** (3.05)	0.0446*** (13.28)	0.0442*** (9.21)	0.0489*** (13.32)	0.0367*** (10.11)	0.0425*** (11.91)											
DEBT	+	0.582*** (29.04)	0.622*** (10.78)	0.637*** (24.77)	0.387*** (7.27)	0.581*** (28.98)	0.442*** (14.22)	0.670*** (13.32)	0.595*** (26.84)	0.581*** (29.01)											
RISKS	+	0.0178 (0.58)	- 0.0108 (- 1.11)	0.0569 (1.29)	- 0.111 (- 1.02)	0.0162 (0.53)	- 0.0810 (- 1.37)	0.0399 (1.21)	- 0.0106 (- 0.32)	0.0211 (0.69)											
GROWTH	+/-	- 0.0833*** (- 2.81)	- 0.148*** (- 18.53)	- 0.0369 (- 0.86)	- 0.139 (- 1.58)	- 0.0813*** (- 2.77)	- 0.247*** (- 4.71)	0.0338 (1.07)	- 0.0967*** (- 2.98)	- 0.0892*** (- 3.02)											
LOSS	+/-	- 0.317*** (- 37.81)	- 0.371*** (- 155.7)	- 0.307*** (- 27.20)	- 0.328*** (- 12.96)	- 0.316*** (- 37.77)	- 0.326*** (- 20.46)	- 0.319*** (- 37.65)	- 0.329*** (- 36.24)	- 0.316*** (- 37.72)											
COPR_(PERS_)	+/-	0.0064*** (5.49)	- 0.0022*** (- 8.73)	- 0.0059*** (- 3.76)	0.0129*** (6.15)	0.0087*** (3.18)	0.0013 (0.06)	0.0002 (0.008)	0.0008 (0.29)	- 0.0016 (- 1.63)											
TAX_RATE																					
AUDIT																					

Table 9 (continued)

	Pred. sign	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH	SMTH
		Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
		(t-value)	(t-value)	(t-value)	(t-value)	(t-value)	(t-value)	(t-value)	(t-value)	(t-value)	(t-value)	(t-value)	(t-value)	(t-value)	(t-value)	(t-value)	(t-value)	(t-value)	(t-value)	(t-value)	(t-value)	(t-value)
		Total sample after PSM	Total sample before PSM			Total sample after PSM			Only firms with mandatory financial disclosure		Only firms with mandatory accrual accounting		Without Italy		Without Norway		Without France		Including AUDIT			
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)												
FULL × AUDIT		-/+																				
Constant		-1.200***	-1.330***	-1.138***	-1.015***	-1.195***	-1.176***	-1.345***	-1.212***	-0.174***												
		(-26.77)	(-109.8)	(-17.92)	(-14.48)	(-14.94)	(-13.67)	(-16.62)	(-15.13)	(-4.34)												
		Included	Included	Included	Included	Included	Included	Included	Included	Included	Included											
Industry, year and country FE		57,037	1,215,616	1,215,665	7335	56,940	25,924	46,154	46,777	57,037												
		9.9	10.2	11.5	10.3	6.4	8.4	11.2	11.0	10.3												
		105.8	110.4	2,315	392.6	15.3	40.7	100.3	100.8	104.4												

This table shows how full-liability firms' earnings smoothing differs from that of private limited-liability firms. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively, using a two-tailed test. Robust standard errors are adjusted for heteroscedasticity and clustering at the firm level. Columns 2 and 3 show the results for the sample before propensity score matching, without and with entropy balancing, respectively. Entropy balancing is a multivariate reweighting method described in Hainmueller (2012) that allows users to reweight a dataset such that the covariate distributions in the reweighted data satisfy a set of specified moment conditions. We reweighted the dataset in such a way that the mean, variance, and skewness of the SIZE, DEBT, RISKSALLES, and LOSS variables – which we also used for propensity score matching—are the same for both full-liability and limited-liability firms. Columns 4 and 5 show the results for a subsample of firms with mandatory disclosure and mandatory requirements, respectively, see Table 11 in the Appendix. AUDIT is a dummy variable with a value of 1 if the financial statement is audited, and 0 otherwise. All variables are winsorized at the 1% and 99% percentiles. For a definition of the variables, see Table 10 in the Appendix. FE stands for fixed effects.

in an increase in earnings smoothing of approximately 0.139 ($24\% \times 0.58$), which is about 40% of the median value ($=0.350$). This evidence is consistent with the conjecture that financial ratios become more important in debt contracting as default risk increases.

Column 3 reports the results when we apply entropy balancing according to Hainmueller (2012). Columns 4 and 5 report the results with a subsample of firms subject to mandatory financial disclosure and mandatory accrual accounting, respectively. The FULL variable still shows the expected sign and remains highly significant. We also ran the regressions without observations from Italy, France, or Norway and obtained the same results (Columns 6–8). The results are also robust when we consider audited financial statements (Column 9) and when we account for endogeneity using a Heckman procedure (not tabulated).

6 Summary

This paper finds robust cross-country evidence for the period 2004–15 that firms with full owner liability, such as partnerships, exhibit significantly less timely loss recognition than limited-liability firms. However, for financially distressed firms, the level of timely loss recognition differs less between legal forms. We confirm the results of Bigus et al. (2016) that were found for a set of German firms in the period 1996–2004. This evidence supports the conjecture that agency problems of debt are less severe for full-liability firms, implying a lower demand for debt covenants and for timely loss recognition.

Unlike Bigus et al. (2016), we also investigate the moderating effect of book-tax conformity. We find strong evidence that full-liability firms' conditional conservatism increases substantially when financial and tax accounts are highly aligned. In contrast, limited-liability firms exhibit a similar level of conditional conservatism regardless of whether book-tax conformity is high or low. We also find some, but not robust, evidence that a stricter, i.e., more creditor-friendly, bankruptcy regime moderates the association between liability status and conditional conservatism, suggesting that debt covenants and the bankruptcy code may partially substitute to mitigate agency problems of debt.

Our study has a number of limitations. We have focused primarily on the role of financial reporting in debt *contracting* and have not explored its information function for shareholders. However, the information function may play a minor role since ownership is usually concentrated in private firms. We were unable to obtain financial accounting data on full-liability firms from more countries due to generally lenient financial reporting regulations. For the same reason, the coverage rate of full-liability firms is much lower than that of limited-liability firms. Different coverage rates may introduce selection bias. We address this concern by using propensity score matching and a Heckman procedure. In addition, we do not possess data on owners' income taxes, limiting our ability to fully capture tax incentives. Finally, although agency problems of equity are likely to be negligible in our dataset, we cannot rule out the possibility that executives of limited-liability firms are more likely to receive performance-based compensation than executives of full-liability

firms. If so, the owners of limited-liability firms would demand greater accounting conservatism, as this would reduce expected bonus payments. We must leave these issues to future research.

In summary, our findings suggest that limited-liability firms utilize conditional conservatism primarily to mitigate agency problems of debt, and presumably also to reduce expected tax payments, while full-liability firms use it primarily for tax reasons. In particular, future research may investigate more thoroughly the complex interactions between tax-induced (conditional and unconditional) accounting conservatism, legal form, book-tax conformity, corporate income tax rates, tax-shifting opportunities, especially in multinational organizations, tax enforcement and leverage ratios.

Appendix

See Tables 10, 11 and 12.

Table 10 Definitions of variables

Variables (sources: AIDA, AMADEUS, DAFNE, ODIN, SABI, all Bureau van Dijk)	
ΔNI	$\Delta NI_{i,t}$ represents the change in firm i 's net income from fiscal year $t-1$ to t , scaled by the beginning book value of total assets
ΔNI	Binary variable: 1 for a negative change in net income, 0 otherwise
FULL	Binary variable: 1 for a partnership or sole proprietorship, 0 for a limited-liability firm
ACC	Represents accruals. $ACC = ((\Delta \text{current assets}) - (\Delta \text{total short payables}) - (\text{depreciation})) / \text{lagged total assets}$, refer to Ball and Shivakumar (2005)
CFO	Reflects cash flow from operations. $CFO = (\text{earnings before exceptional and extraordinary items} - ACC) / \text{lagged total assets}$
ΔS	$\Delta S_{i,t}$ represents the change in sales of firm i from fiscal year $t-1$ to t , scaled by the beginning book value of total assets
ΔS	Binary variable: 1 for negative change in sales, 0 otherwise
AUDIT	Binary variable: 1 for an audited financial statement, 0 otherwise. We consider the absence of an auditor name (AIDA, ODIN, AMADEUS, SABI, and DAFNE) as indicative of no audit
RATIO_FULL	The ratio of full-liability firms to limited-liability firms, $\frac{\text{full-liability firms in region}}{\text{limited liability firms in region}}$ for each region within a country before conducting propensity score matching. To identify these regions, we utilized geographical data from Eurostat, specifically the Nomenclature of Territorial Units for Statistics (NUTS), which associates provinces and regions with postal codes. We established 6 to 27 regions per country and assigned nearly all firms to specific regions
Matching variables and other variables used in earnings smoothing regressions (Table 9) (sources: AIDA, AMADEUS, DAFNE, ODIN, SABI, all Bureau van Dijk)	
SMTH	$SMTH_{i,t} = \frac{SD(\text{net income}_{i,t} / \text{total assets}_{i,t-1})}{SD(\text{cash flow from operations}_{i,t} / \text{total assets}_{i,t-1})} \cdot (-1)$ <p>Net income is before taxes. Standard deviations are computed for three fiscal years. We scale by lagged total assets. Cash flow from operations is defined as the difference between net earnings and total accruals (Daske et al. 2006). Total accruals are equal to the change in working capital minus depreciation (Gassen and Fülbier 2015)</p>

Table 10 (continued)

SIZE	Natural logarithm (Ln) of total assets in €1000, calculated as an average over 3 years
DEBT	The ratio of total liabilities to total assets, calculated as an average over 3 years
RISKSALLES	Absolute value of the ratio $\frac{sales_t - sales_{t-1}}{\max(sales_t, sales_{t-1})}$, averaged over a 3-year period
LOSS	Binary variable: 1 if there was a loss in year t or the two preceding years, 0 otherwise
GROWTH	Annual percentage change in total assets averaged over 3 years
Variables related to the institutional framework (sources: PwC 2016; Tang 2015; OECD Tax database, World Bank Doing Business database; Djankov et al. 2008)	
BK_TAX	Binary variable: 1 if financial statements are used to calculate taxable income in the country (book-tax conformity, BK_TAX), and 0 if not (PwC 2016)
BK_TAX2	Binary variable: 1 if the mean value of country-level book-tax conformity is high (based on a median split) according to Tang (2015), and 0 if not. See Table 11 for details
CORP_TAXRATE	The combined statutory corporate income tax rate applied to limited-liability firms, which reflects the basic combined central and subcentral corporate income tax rate. This rate is calculated by adding the central government rate (after deductions for subnational taxes) to the subcentral rate. Data source: https://stats.oecd.org/index.aspx?DataSetCode=Table_III
PERS_TAXRATE	Top statutory personal income tax rate, applicable to full-liability firms. Data source: https://stats.oecd.org/index.aspx?DataSetCode=TABLE_I7
INCR_TAXR	Binary variable: 1 indicates limited-liability firms (full-liability firms) that experienced an increase in CORP_TAXRATE (PERS_TAXRATE, respectively) in countries with high book-tax conformity. It takes the value 0 if there was no change for the respective legal form or if there was a change in a country with low book-tax conformity
STRENGTH_INSOLV	Dummy variable: 1 if a country exhibits a value greater than or equal to the median value of the strength of the insolvency framework index (values between 0 and 16), and 0 otherwise (see <i>Doing Business</i> database of the World Bank (2017) www.doingbusiness.org). (http://www.doingbusiness.org/data/exploretopics/resolving-insolvency)
GOING_CON	Dummy variable: 1 if a firm continues to operate as a going concern during and after the insolvency proceedings; 0 otherwise (Djankov et al. 2008)
ENFORCE	Dummy variable: 1 if the score for enforcing contracts according to the <i>Doing Business</i> database of the World Bank (2017) equals or exceeds the third quartile; 0 otherwise

All metric variables have been winsorized at the 1% and 99% percentiles

Table 11 Variables related to the institutional framework

Variable	Source	Belgium B	Denmark DK	Estonia ES	Finland FI	France F	Germany D	Italy I	Latvia LV	Norway N	Spain E
Panel A: Time-invariant variables											
Strength of insolvency framework index	World Bank	11.5	12	14	14.5	11	15	13.5	12	12.5	12
GOING_CON	Djankov et al. (2008)	1	1	0	1	0	0	0	0	1	1
ENFORCE	World Bank	77.1	67.9	68.9	73.9	76.2	76.7	41.3	76.5	75	62.4
BK_TAX	PwC (2016)	1	0	0	1	1	0 ^a	1	1	0	1
BK_TAX2	Mean value of book-tax conformity in Tang (2015)	0.43	0.45	–	0.75	0.84	0.39	0.87	–	0.15	0.83
2006	Classification	0	0	–	1	1	0	1	–	0	1
	OECD, Dataset: Tables II.1 and I.7	35.97/53.5				34.43/45.8					35/45
2007		33.99/53.7				34.43/45.8		37.25/44.9			32.5/43
2008		33.99/53.7				34.43/45.8		31.4/44.9			30/43
2009		33.99/53.7		21/21	26/49.1	34.43/45.8	29.37/47.5	31.4/44.9	15/23	28/40	30/43
2010		33.99/53.7		21/21	26/49	34.43/46.7	29.49/47.5	31.4/45.2	15/26	28/40	30/43
2011		33.99/53.7		21/21	26/49.2	36.1/50.5	29.55/47.5	31.4/47.3	15/25	28/40	30/45
2012		33.99/53.7	25/55.4	21/21	24.5/49	36.1/54.4	29.58/47.5	31.29/47.3	15/25	28/40	30/52
2013		33.99/53.7	25/55.6	21/21	24.5/51.1	38/54.5	29.64/47.5	31.29/47.3	15/24	28/40	30/52
2014			24.5/55.6	21/21	20/51.5		29.71/47.5		15/24	27/39	30/52
2015				20/20	20/51.6				15/23	27/39	28/45

^aBook-tax conformity in Germany equals 0 from 2010 onwards, and 1 otherwise. The time series of tax rate data starts with the third year for which we have observations because Eq. (1) requires net income from t and $t-1$, each standardized by lagged total assets. For variable definitions, refer to Table 10. Statutory corporate income tax rates and top statutory personal income tax rates can be found at https://stats.oecd.org/index.aspx?DataSetCode=Table_III and https://stats.oecd.org/index.aspx?DataSetCode=TABLE_I7, respectively

Table 12 Changes in statutory corporate income tax rates and in top statutory personal income tax rates, each in percentage points, in countries with high book-tax conformity

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Belgium										
Δ corporate tax rate	1.98	−1.98	0	0	0	0	0	0		
Δ personal tax rate	0	0.2	0	0	0	0	0	0		
Finland										
Δ corporate tax rate				0	0	0	−1.5	0	−4.5	0
Δ personal tax rate				−1	−0.1	0.2	−0.2	2.1	0.4	0.1
France										
Δ corporate tax rate	−0.52	0	0	0	0	1.67	0	1.9		
Δ personal tax rate	−7.7	0	0	0	1	3.8	3.9	1		
Germany										
Δ corporate tax rate	0	0	0	−0.04						
Δ personal tax rate	0	0	0	0						
Italy										
Δ corporate tax rate	0	−5.85	0	0	0	−0.11	0	0		
Δ personal tax rate	0.3	0	0	0.3	2.1	0	0	0.6		
Latvia										
Δ corporate tax rate				0	0	0	0	0	0	0
Δ personal tax rate				−2	3	−1	0	−1	0	−1
Spain										
Δ corporate tax rate	0	−2.5	−2.5	0	0	0	0	0	0	−2.0
Δ personal tax rate	0	−2.0	0	0	0	2.0	7.0	0	0	−7.0

This table provides information on the changes in statutory corporate income tax rates and in top statutory personal income tax rates, each in percentage points, in countries with high book-tax conformity, based on https://stats.oecd.org/index.aspx?DataSetCode=Table_III and https://stats.oecd.org/index.aspx?DataSetCode=TABLE_I7, respectively. Note that book-tax conformity in Germany equals 0 from 2010 onwards

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Declarations

Conflict of interest The authors have no relevant financial or nonfinancial interests to disclose.

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