The Effect of SSAP 101 on Loss Provisioning by Property-Casualty Insurers

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Abstract

This paper examines whether the adoption of the Statement of Statutory Accounting Principles (SSAP) 101, a new accounting standard that significantly limits management's discretion in both the recognition and measurement of tax contingencies, affects the loss provisions of property-casualty (PC) insurers. We find that PC insurers significantly reduce their loss provisions after SSAP 101 adoption, particularly those with greater ex ante exposure to SSAP 101, consistent with reduced incentives to establish loss reserves for tax purposes. Additionally, PC insurers with greater exposure to SSAP 101 show increased earnings persistence and decreased returns on asset volatility, suggesting improved insurer transparency and an improved overall risk profile via tax avoidance mitigation. Overall, our study offers important insight into the economic effects of accounting standards in the insurance industry.

Keywords: loss provisions, corporate taxation, insurance companies, SSAP 101

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1. Introduction

This paper examines the impact of the increased accounting guidance and reporting requirements of the Statement of Statutory Accounting Principles No. 101, *Income Taxes* (hereafter SSAP 101) on the quality of loss reserve estimates for property-casualty (PC) insurers. For a typical PC insurer, the reserves for unpaid losses have significant implications for both its financial statements and its tax returns. Loss reserves, which accounted for approximately 57% of PC insurers' total liabilities in 2012, are the largest liability in a typical PC insurer's book (Petroni, Ryan, and Wahlen 2000; A.M. Best Company 2013; Cheng, Weiss, and Lin 2015). Unlike other types of loss reserves for non-insurance companies, insurers' loss reserves are tax deductible. This unique feature makes loss reserves the largest deduction item on a typical PC insurer's tax returns (Riley 2011). Given the considerable judgment and uncertainty involved in estimating loss reserves, prior research suggests that PC insurance companies overstate them to reduce tax liability (Gaver and Paterson 1999; Penalva 1998). Because of the economic significance of tax deductions related to loss reserves, in recent years the IRS has increased scrutiny of the deductions PC insurance companies claim in computing taxable income (Riley 2011).

All U.S. insurance companies must prepare financial statements in accordance with the Statutory Accounting Principles (SAP) issued by the National Association of Insurance Commissioners (NAIC).[5] SSAP 101, which became effective in January 2012, requires PC insurers to record tax contingency reserves based on the "more-likely-than-not" merit threshold for each tax position, assuming that the tax authority possesses full information. The new requirement significantly limits judgment and discretion in both the recognition and measurement processes, for two reasons. First, the focus of the recognition of tax contingencies is on the tax positions' technical merits, rather than the probability of audit

[5] Public U.S. financial companies reporting to the Securities and Exchange Commission (SEC) are required to prepare another set of financial statements using Generally Accepted Accounting Principles (GAAP).

assessment or disallowance by the tax authority. Second, if the more-likely-than-not criterion is not met, the amount of tax contingency is measured without referring to the probability of possible assessment outcomes. Under SSAP 101, the increased uniformity and documentation for tax contingencies provides auditors and the IRS with more information about insurers' tax positions. Since it is unlikely that the tax deductions related to overprovision satisfy the technical merit threshold of SSAP 101, this new guidance likely increases the costs associated with claiming tax deductions by overprovisioning. This outcome leads to our main prediction that SSAP 101 will improve the quality of loss reserve estimates by reducing insurance companies' tax incentives in loss provisions.

Our empirical analyses are conducted using a sample of both private and public U.S. incorporated PC insurance firms. Our final sample includes 6,610 firm-year observations between 2009 and 2014. In terms of the research design, after controlling for the known determinants of the level of loss provisions that prior research documents, we compare PC insurance companies' loss provisions for the years before and after SSAP 101 adoption. Since economic conditions can induce time-series trends in insurers' loss provisions unrelated to the implementation of SSAP 101, we identify insurers that are ex ante more exposed to the new standard as well as those that have weaker incentives to over-reserve for tax purposes. We employ a difference-in-differences research design to identify the effects of SSAP 101 adoption on loss provisions.

Consistent with our main prediction, our results suggest that PC insurers significantly reduce their annual loss provision by an economically significant level of approximately 5% of total admitted assets after SSAP 101 adoption and the effects are significantly stronger among PC insurers subject to greater IRS monitoring, i.e., insurers that have greater exposure

to SSAP 101.[6] Additional cross-sectional tests provide triangulating evidence consistent with tax incentives being the main channel of the observed effect. In particular, we show that the reduction in loss provisions due to SSAP 101 adoption is weaker for PC insurers that were less tax aggressive prior to the new standard: public insurers, family firms, and loss firms. Taken together, our findings provide strong evidence that SSAP 101 adoption significantly reduces PC insurers' incentives to establish loss reserves for tax purposes.

To explore the broader implications of the improved loss provision estimates of PC insurers, we examine the effects of SSAP 101 on earnings quality and firm risk. As suggested by our main results showing that the tax incentives in the loss reserve estimation are mitigated under SSAP 101, we argue that PC insurers' loss reserve estimates will become more accurately reflective of the underlying economics. Consistent with our expectation, we document a significant increase in earnings persistence and a significant reduction in firm risk after SSAP 101 adoption for insurers that are more exposed to the new standard ex ante.

Our study makes several contributions to the literature. First, it adds to the literature on the effects of accounting standards on financial institutions' loss provisions. Prior research examining the relation between financial accounting and loss provisions mainly focuses on a setting involving banks (Scholes, Wilson, and Wolfson 1990; Warfield and Linsmeier 1992; Beatty, Chamberlain, and Magliolo 1995; Collins, Shackelford, and Wahlen 1995; Chen and Daley 1996; Beatty and Harris 1999; Hodder, McAnnally, and Weaver 2003; Andries, Gallemore, and Jacob 2017), with few studies examining the insurance company setting (Petroni 1992; Petroni and Shackelford 1995; Penalva 1998; Gaver and Paterson 1999). The insurance industry constitutes an economically significant part of the U.S. financial industry

[6] Admitted assets are assets recognized and accepted by state insurance laws in determining the solvency of insurers and reinsurers. State insurance laws require a conservative valuation of assets, prohibiting insurance companies from listing assets on their balance sheets with values that are uncertain, such as furniture, fixtures, debit balances, and accounts receivable that are more than 90 days past due. Only assets that can be easily sold in the event of liquidation or borrowed against and receivables for which payment can be reasonably anticipated are included in admitted assets.

and economy through its connection with other market participants, with net premiums written totaling $1.2 trillion in 2017.[7]

Second, this study contributes to the broader literature on the interactions and tradeoffs between financial and tax reporting incentives (Shackelford and Shevlin 2001; Hanlon and Heitzman 2010) and more specifically to the under-explored vein of research into the effect of financial reporting changes on financial firms' corporate tax behaviors. Prior literature employs settings involving corporate tax rate changes (Guenther 1994) and tax reporting changes (Guenther, Maydew, and Nutter 1997) or focusing on specific corporate decisions, such as executive compensation, fraud, and changes in corporate control (e.g., Klassen and Mawani 2000; Erickson, Hanlon, and Maydew 2004; Lynch, Romney, Stomberg, and Wangerin 2017). In contrast to these studies, we rely on the interesting setting of a financial reporting change (SSAP 101 adoption) and examine our research question using a large sample of public and private insurers. Our study responds to the call for more research on the taxation of financial institutions (Hanlon and Heitzman 2010) and contributes to a more complete understanding of the tax and financial reporting behaviors of non-industrial firms.

Third, we examine loss provisions – a specific account through which PC insurance firms engage in tax planning. As pointed out by Dyreng and Maydew (2018), while the past decade's tax research makes significant progress in documenting various factors that affect tax avoidance (Hanlon and Heitzman 2010; Wilde and Wilson 2017), few studies focus on the specific mechanisms through which firms lower their tax burdens. Our paper advances our understanding of how insurance companies relying on loss reserves engage in tax avoidance, thus contributing to the growing literature that examines the specific mechanisms of tax avoidance (e.g., Randolgh, Salamon, and Seida 2005; Brown 2011; Lisowsky 2010;

[7] PC insurers account for approximately 48%, with approximately $558 billion in net premiums written in 2017 (S&P Global Market Intelligence).

Chen, Cheng, Chow, and Liu 2018; Gallemore, Gipper, Maydew 2018). Focusing on SSAP 101 also helps to improve our understanding of how accounting standards could shape insurers' tax reporting behaviors, corporate transparency, and firm risk (e.g., Frank, Lynch, and Rego 2009; Gallemore and Labro 2015; Balakrishnan, Blouin, and Guay 2017; Guenther, Matsunaga, and Williams 2017). The results of our paper should also be of interest to accounting standard setters, tax authorities, and regulatory bodies.

The remainder of this paper is organized as follows. Section 2 discusses SSAP 101, reviews the related literature, and develops our hypotheses. Section 3 describes the research design and sample selection. Section 4 presents the main results as well as the results of robustness checks and additional analyses and Section 5 concludes.

2. Background, Prior Literature, and Hypotheses

In this section, we provide a brief description of the accounting and tax treatment of loss reserves by insurance companies and delve into prior research in this area. We then describe the background and some key elements of SSAP 101 before developing our predictions about the effects of SSAP 101 adoption on loss provisions in the PC insurance industry.

2.1 Background and Prior Research on Accounting and the Tax Treatment of Loss Reserves

When insurance companies underwrite policies, they expect some future claims to be paid. Based on the estimate of the value of future claims made against the policies, insurance companies establish loss reserves equal to the expected value of unpaid losses. On the balance sheet, loss reserves are a liability item that the insurance company uses to absorb claim payments. On the income statement, loss provision is an expense.

Although higher loss reserves allow the insurer to be better able to absorb future losses, they reduce its net income, retained earnings, and regulatory capital. The negative effect of higher loss reserves on earnings can have unfavorable implications for insurers' stock price, executive compensation, and external financing activities. Lower regulatory capital could also draw greater scrutiny from insurance regulators (Gaver and Paterson 1999). Consistent with PC insurers viewing financial reporting as an important factor in their loss provisions, prior research finds that managers of financially weak insurers bias their estimates of loss reserves downward (Petroni 1992; Petroni and Beasley 1996; Penalva 1998; Gaver and Paterson 1999, 2000, 2001).

In addition to regulatory and financial reporting incentives, insurers' loss provisions are further complicated by their implications for insurers' tax liability. The tax treatment of loss reserves for insurance companies follows the reserve method, under which insurance companies can deduct the loss reserves from taxable income immediately during the current period. This tax deductibility feature makes loss reserves the largest deduction item on a typical PC insurer's tax returns (Riley 2011). Therefore, under the reserve method, the tax treatment of loss reserves mimics the financial accounting treatment of loss reserves, resulting in a decrease in both book income and taxable income. Prior research documents evidence suggesting that tax incentives are an important factor in insurers' loss provisions. For example, Penalva (1998) finds that financially healthy insurers tend to overstate reserves to reduce their tax bills. Gaver and Paterson (1999) also find that insurers' loss reserve estimates are associated with tax incentives. Using aggregate industry data, Bradford and Logue (1999) find that firms overstate reserves in response to the tax rate reduction in the Tax Reform Act of 1986, consistent with the tax-motivated reserving hypothesis.

2.2 Hypothesis Development

2.2.1 SSAP 101 and PC Insurers' Loss Provisions

Insurance companies in the U.S. are required to prepare statutory financial statements in accordance with SAP.[8] In September 2011, the NAIC issued SSAP 101 to replace the former standards, effective January 1, 2012.[9] The standard's goal is to provide insurance companies with more consistent criteria for recording tax reserves and to require increased documentation of uncertain tax positions.

Compared to prior standards, SSAP 101 significantly reduces the threshold at which recording a tax contingency reserve might be required. Specifically, it addresses the recognition and measurement of the benefits of uncertain tax positions by setting forth a process for evaluating the positions:

1) In determining the amount of federal and foreign income tax loss contingencies, SSAP 101 replaces the term "probable" in SSAP 5R with the term "more likely than not (a likelihood of more than 50 percent)."
2) In determining the amount of federal and foreign income tax loss contingencies, it shall be assumed that the reporting entity will be examined by the tax authority that has full knowledge of all relevant information.
3) If the estimated tax loss contingency is greater than 50% of the tax benefit originally recognized, the tax loss contingency recorded shall be equal to 100% of the original tax benefit recognized.

[8] As explained by the National Association of Insurance Commissioners (NAIC), SAP does not preempt state legislative and regulatory authority. State variations in insurers' accounting practices can occur in accordance with (1) Prescribed Accounting Practices, which are accounting practices that are incorporated directly into or exist in reference to state laws, regulations, and general administrative rules applicable to all insurance enterprises domiciled in a particular state; or (2) Permitted Accounting Practices, which are practices specifically requested by an insurer that depart from NAIC SAP and state-prescribed accounting practices and that have received approval from the insurer's domiciliary state regulatory authority.

[9] Prior to SSAP 101, SSAP 10 (and 10R), *Income Taxes*, and SSAP 5 (and 5R), *Liabilities, Contingencies and Impairments of Assets*, provided standards of accounting for income taxes and a framework for measuring tax contingencies for insurance companies. However, these prior standards provided limited guidance on the recognition and measurement of uncertain tax positions.

SSAP 101's guidance in determining tax reserves is similar to the guidance provided by FASB Interpretation No. 48 (FIN 48/ASC 740-10, hereafter FIN 48), *Accounting for Uncertainty in Income Taxes*, under Generally Accepted Accounting Principles (GAAP). However, FIN 48 is explicitly rejected for statutory accounting pursuant to paragraph 31 of SSAP 101. Although SSAP 101 does not adopt the requirement of FIN 48, the more-likely-than-not criterion and the assumption that the tax authority possesses full knowledge of the uncertain tax position (ignoring audit probabilities) are similar in spirit to the provisions in FIN 48. Specifically, the new standard significantly limits judgment and discretion in both the recognition and measurement processes: (i) the recognition of tax contingencies focuses on the technical merits of tax positions rather than the probabilities of audit assessment or disallowance by the tax authority, and (ii) if the more-likely-than-not criterion is not met, the amount of tax contingency is measured without referring to the probabilities of possible assessment outcomes.

In the absence of market frictions, such as financial reporting and tax incentives, PC insurers' loss reserve estimates should equal the expected value of the unpaid losses. However, as discussed above, given the considerable judgment and discretion over loss reserve estimation, both financial reporting and tax incentives are important factors affecting managers' loss provision decisions (Petroni 1992; Petroni and Beasley 1996; Penalva 1998; Gaver and Paterson 1999, 2000, 2001). Based on the assumption that the current period loss provision represents the outcome of the manager's cost-benefit analysis exercises, we expect SSAP 101 adoption to significantly alter the calculus underlying PC insurers' loss provisions. The increased uniformity of and documentation for tax contingencies provide more information about insurers' tax positions to auditors and the IRS. Moreover, under SSAP 101's guidance that firms should evaluate their tax positions with the assumption that the tax authority will audit the positions with full information, PC insurers' tax positions related to

the overstatement of loss reserves for tax purposes likely fail the more-likely-than-not technical merit threshold.

The existing research generally suggests that tightened guidance and disclosure requirements for income tax accounting can mitigate corporate tax avoidance. Analytical work by Mills, Robinson, and Sansing (2010) examines the strategic interactions between the taxpayer and the tax authority in the context of FIN 48. Mills et al. (2010) predict that under FIN 48, when information about the strength of tax positions becomes observable to the tax authority, tax compliance improves because taxpayers claim fewer weak tax positions. Survey evidence from the field suggests that the willingness of a majority of tax executives to engage in aggressive tax planning decreases due to FIN 48 (Graham, Hanlon, Shevlin, and Shroff 2014). Examining the effect of FIN 48 on tax avoidance using a state tax setting, Gupta, Mills, and Towery (2014) find that both firm-level state effective tax rates and aggregate state-level income tax collections increase after FIN 48, consistent with the standard being effective in curbing corporate tax avoidance. Henry, Massel, and Towery (2016) examine various tax disclosure regimes and find that FIN 48 is associated with decreased levels of tax avoidance.

In light of the above discussion, we expect that SSAP 101 adoption will decrease PC insurers' incentives to establish loss provisions for tax-avoiding purposes, leading to a decrease in loss provisions following the new standard. This leads to our first hypothesis:

H1: *PC insurers' loss provisions decrease following SSAP 101 adoption.*

Hypothesis H1 seeks to provide direct evidence that addresses our research question of whether SSAP 101 enhances the quality of PC insurers' loss estimates by reducing their incentives to over-reserve for tax purposes. Since SSAP 101 applies to all insurance companies in the U.S., one empirical challenge in identifying the effect of SSAP 101 on insurers' loss provisions is the existence of a control group. To better achieve identification,

we identify PC insurers that have smaller or larger ex ante exposure. We are interested in determining whether SSAP 101 adoption constrains tax-motivated loss provisioning behaviors, particularly for PC insurers that have stronger exposure to the new standard.

2.2.2 PC Insurer Exposure to SSAP 101: Ex ante IRS Monitoring

In recent years, tax positions pertaining to PC insurers' loss reserves have been on the radar of the IRS, which has ramped up audit efforts challenging the tax deductions claimed in relation to their loss provisions (Internal Revenue Service 2009; Riley 2011). In November 2009, the Large & Mid-Size Business (LMSB) Division of the IRS issued a Coordinated Issue Paper titled "Margins and Other Unsubstantiated Additions to Insurance Company Reserves for Unpaid Losses and Claims." The paper explains the IRS's position on PC insurers' loss reserves, stating the general rule that a PC insurer's loss reserves must represent the company's "actual unpaid losses as nearly as it is possible to ascertain them." As the title of the paper suggests, the IRS is concerned about insurers adding unsubstantiated "margins" to their loss reserves, exceeding the "fair and reasonable estimate" the regulation allows.

Hoopes, Mescall, and Pittman (2012) find that IRS monitoring is effective in curbing firms' tax avoidance behaviors. In our setting, the increased uniformity and documentation for tax contingencies under SSAP 101 will likely provide the IRS with more information about insurers' tax positions. This gives the IRS an enhanced information advantage in evaluating the strength of PC insurers' tax positions in general and in monitoring PC insurers' tax-motivated loss provision behaviors in particular (Mills et al. 2010; Hoopes et al. 2012). Therefore, we expect insurers that underwent greater IRS monitoring before SSAP 101 to be more exposed to the new standard than are insurers that received less IRS monitoring. Empirically, we predict that PC insurers that faced higher regulatory oversight by the IRS before 2011 will reduce loss provisions to a greater extent after SSAP 101. Our second hypothesis is stated as follows:

H2: *The decrease in loss provisions following SSAP 101 adoption is larger for insurers subject to greater IRS monitoring.*

The above prediction is not without tension. Under SSAP 101, insurers should evaluate their tax positions with two assumptions in mind: the certainty of an audit and the idea that the IRS has full information. If firms ignore audit probability when evaluating their tax positions and determining their loss reserves, the effect of SSAP 101 should not vary with insurers' ex ante IRS audit probability.

2.2.3 PC Insurer Exposure to SSAP 101: Ex ante Tax Aggressiveness

We argue that PC insurers that are ex ante less tax aggressive will be less exposed to SSAP 101 adoption because these firms were less likely to over-reserve for tax purposes prior to SSAP 101. Empirically, we expect the effect of SSAP 101 on PC insurers' loss provisions to be significantly weaker for less tax aggressive insurers, which were less likely to over-reserve for tax purposes prior to the new standard.

We identify three firm-level characteristics associated with corporate tax aggressiveness, as prior research suggests: (1) private ownership, (2) family ownership, and (3) the insurer's loss status. First, relative to private insurers, public insurers face greater public scrutiny and capital market pressure to report a better performance. Therefore, public insurers would find it costlier to implement this tax-saving strategy because establishing more loss provisions means reductions in both earnings and regulatory capital (Mills and Newberry 2001). Hence, we expect that the passage of SSAP 101 will have a greater impact on private PC insurers than on public ones.[10] Second, prior research suggests that family firms are less tax aggressive than non-family firms because the former are more sensitive to the potential reputational costs of being tax aggressive (Chen, Chen, Cheng, and Shevlin 2010). It follows

[10] As SEC registrants, public insurers are required to prepare their financial statements using GAAP, as the SEC requires. Therefore, public insurers need to prepare two sets of financial statements under both SAP and GAAP. For this reason, it is also likely that public insurers will be less affected by the introduction of SSAP 101 because of their prior exposure to FIN 48, which became effective in 2007 and has technical thresholds and documentation requirements similar to SSAP 101.

that family insurers will be less likely to engage in tax-motivated loss provisioning than are non-family insurers. Therefore, we expect that family-owned insurers will be less affected by the adoption of SSAP 101. Third, relative to profitable insurers, loss insurers are less likely to pursue tax deductions because they have less taxable income to shield. Therefore, we also expect loss insurers to be less exposed to the new standard for income tax accounting. We formally summarize our predictions in the following hypotheses:

H3: *The decrease in loss provisions following SSAP 101 adoption is larger for private insurers than it is for public insurers.*

H4: *The decrease in loss provisions following SSAP 101 adoption is smaller for family-owned insurers.*

H5: *The decrease in loss provisions following SSAP 101 adoption is smaller for insurers suffering from losses.*

2.2.4 SSAP 101 and the Loss Provisions of PC Insurers: In-house Actuaries

Our next cross-sectional analysis examines whether the use of independent versus in-house actuaries moderates, in a predictable manner, the effect of SSAP 101 on loss provisions for insurers. Since 1980, PC insurers have been required by state regulators to have an "Appointed Actuary" certify the accuracy of an insurer's loss reserves according to the "Property and Casualty Actuarial Opinion Model Law."[11] However, in-house actuaries can certify loss reserves as long as they meet specific requirements.[12] The estimation of loss reserves relies substantially on actuaries' expertise. Insurers can use actuarial services

[11] This model law does not contain any provision for the requirements to become an Appointed Actuary. Rather, the NAIC left this consideration to be addressed by the main professional association of actuaries in the U.S., the American Academy of Actuaries (AAA). More information about the AAA can be found at www.actuary.org.

[12] According to the AAA, the Appointed Actuary "is a qualified actuary who is appointed or retained to prepare the Statement of Actuarial Opinion … either directly by or by the authority of the board of directors through an executive officer of the company." See "Statements of Actuarial Opinion on Property and Casualty Loss Reserves, 2013", developed by the Committee on Property and Liability Financial Reporting of the American Academy of Actuaries. A "qualified actuary" must meet specific, strict qualification requirements (see "Qualification Standards (including Continuing Education Requirements) for Actuaries Issuing Statements of Actuarial Opinion in the United States", approved by the Board of Directors, American Academy of Actuaries, effective as of January 1, 2008).

provided by external consultant firms or employ in-house actuaries to determine the potential losses related to insurance policies (both new and existing) and hence the estimates of loss reserves (Cheng et al. 2015).

Both practitioner and academic studies have discussed the effect of having in-house versus outside consultant actuaries on the level of reserve errors (e.g., NAIC 1992; Kelly, Kleffner, and Li 2012; Gaver and Paterson 2014). Equipped with both professional expertise in the subject matter and a better understanding of the insurer's day-to-day operations, in-house actuaries should be able to devise loss reserve estimates that accurately reflect the insurer's expected value of unpaid losses. However, existing research suggests that in-house actuaries might lack independence because of their employment relationship with the insurer (Cheng et al. 2015), especially because actuaries often face high pressure from insurers' top management vis-à-vis loss reserve estimation (Philbrick 2004):

> For the property/casualty industry, a major goal is accurate loss reserves. … However, we must recognize that there are considerable pressures working to prevent us from achieving the goal of accurate reserves. Meeting earnings projections often entails its own set of powerful incentives, which may be weighted toward short-term results. This often exerts a powerful downward pressure on reserves, but the direction is not always the same. … The IRS also exerts pressure, usually downward. …In short, the selection of a reserve number involves considerable pressure that may not be counter-balanced by sufficient incentives to book the best possible number.

Outside of the PC insurance industry, the accounting literature has suggested that firms with a more prominent general counsel or a better in-house tax department are more aggressive in pursuing tax avoidance strategies (Abernathy, Kubick, and Masli 2016; Chen et al. 2018). Comparing the tax aggressiveness of firms that employ different tax preparers, Klassen, Lisowsky, and Mescall (2016) find that firms that rely on internal tax departments

are the most tax aggressive. Klassen et al. (2016) explain that the results are consistent with the greater reputation concerns of external tax preparers that sign off on the tax returns of firms with aggressive tax positions.

Judging from the above arguments, we expect that in-house actuaries will be more likely to suffer from impaired independence; hence, the estimates of loss provisions are subject to more biases when the insurer uses an in-house actuary. To the extent that tax considerations are important in insurers' loss provision decisions (Gaver and Paterson 1999; Penalva 1998), we expect that firms with in-house actuaries will tend to overprovision for loss ex ante. However, in the alternative case that financial reporting incentives are stronger for our sample firms, insurers with in-house actuaries may under-provision for loss ex ante. This suggests that further identification could be achieved if we could separate firms that have stronger tax or financial reporting incentives in exploring the role of in-house actuaries in the effect of SSAP 101 on loss provisions. Following our earlier discussion, we consider private (public) insurers to have relatively stronger tax (financial reporting) incentives for this analysis. Hence, our sixth hypothesis is conditioned on private insurers:

H6: *The decrease in loss provisions following SSAP 101 adoption is larger for private insurers with in-house actuaries.*

3. Data and Methodology

3.1 Sample Selection

The main data sources for this research are *Best's Insurance Reports, Property/Casualty Editions*, *Best's Key Rating Guide*,[13] the NAIC annual statement database, and the proxy statements of public insurers. The loss reserves are determined from Schedule P, Part 2 of insurers' annual statements. We define company ownership structures using the

[13] *Best's Insurance Reports, Property/Casualty*, and *Best's Key Rating Guide* are all published annually by the A. M. Best Company in Oldwick, New Jersey.

above database and cross-check the companies' websites and news sources on the internet. We categorize mutuals and closely held stocks as private insurers. Following Cheng, Cummins, and Lin (2017, 2018), a mutual firm is defined as a family-controlled firm if the information from the "Management" section of *Best's Insurance Reports* explicitly indicates it or if more than one member of the same family is present on the board. A private firm is defined as a family firm if the information from the "Management" section of *Best's Insurance Reports* gives explicit, detailed information about family ownership. A publicly traded insurance company is classified as a family firm if more than 5% of the firm's shares are owned by the family, following Anderson and Reeb (2003). Actuary information is hand collected from *Best's Insurance Reports*, and this information is cross-checked with information in the insurer's annual statement. Data indicating whether a state has stringent regulations are obtained from the NAIC's *Compendium of State Laws and Regulations on Insurance Topics.* All other remaining variables are obtained from the NAIC annual statement database.

The sample period is between 2009 and 2014, the years surrounding the adoption of SSAP 101 in 2011. We require firms to be incorporated in the U.S. and to be headquartered in one of the 50 states or the District of Columbia. Firms incorporated or headquartered outside the U.S. are subject to less IRS scrutiny since a greater proportion of their operations is located abroad; we hence exclude them from our analysis. We also limit our sample to C-corporations because the IRS enforcement data apply only to these firms. In other words, we include only stocks and mutuals (and reciprocals) in our sample.[14] Finally, data requirements for our control variables and loss reserve measures further limit the sample. Our full sample consists of 6,610 firm-year observations.

3.2 Research Design

[14] Cheng et al. (2017, 2018) suggest that modern reciprocals are virtually indistinguishable from mutuals.

To examine our predictions regarding the relation between SSAP 101 and loss reserves, we construct a firm-year panel and employ a difference-in-differences specification of Equation (1) as follows:

$$LOSS\_RES\_CY_{it} = \alpha_0 + \alpha_1 POST\_SSAP101_t + \alpha_2 EXPOSURE_{it-1} + \alpha_3 POST\_SSAP101_t \times EXPOSURE_{it-1} + \Sigma\alpha_i CONTROLS_{it} + \mu_t + \varepsilon_{it}, \quad (1)$$

where $LOSS\_RES\_CY_{it}$ is the current accident year loss reserves for insurer i in year t. $POST\_SSAP101_t$ is an indicator variable that equals one for observations in the post-SSAP 101 period (i.e., in or after 2012) and zero otherwise. $EXPOSURE_{it-1}$ represents an insurer's ex ante exposure to SSAP 101, which constitutes the treatment in our specification. Note that this variable is measured in year t–1. Our main variable of interest is the coefficient (α_3) on the interaction term $POST\_SSAP101_t \times EXPOSURE_{it-1}$, which captures the differential change in our outcome variable ($LOSS\_RES\_CY_{it}$) following the adoption of SSAP 101 between PC insurers with predictably smaller or larger exposure to this new standard of accounting for income taxes. For example, a negative value of the coefficient (α_3) would indicate that compared to PC insurers with smaller ex ante exposure, PC insurers with larger ex ante exposure to SSAP 101 subsequently decrease their loss provisions to a larger extent after the regulation's adoption.

We also include year fixed effects (μ_t) to capture any common trends in loss provisions during our sample period. Effectively, $POST\_SSAP101_t$ will be absorbed by the year fixed effects; hence, our estimating equation is:

$$LOSS\_RES\_CY_{it} = \alpha_0 + \alpha_1 EXPOSURE_{it-1} + \alpha_2 POST\_SSAP101_t \times EXPOSURE_{it-1} + \Sigma\alpha_i CONTROLS_{it} + \mu_t + \varepsilon_{it}. \quad (2)$$

Our identification assumption is that PC insurers did not determine *EXPOSURE* prior to adoption of SSAP 101 based on the expectation of this new standard. This assumption is reasonable in our setting because our exposure proxies are either exogenous to insurers'

decisions (IRS monitoring) or firm characteristics that are fairly time invariant or unlikely to change due to of SSAP 101 (i.e., private ownership, family ownership, and loss firm-years). As for the use of in-house actuaries, we do not have a strong reason to believe that firms changed their choice between in-house and external actuaries in anticipation of SSAP 101 adoption.

We omit the variable *EXPOSURE* to test H1, which examines whether PC insurers' loss reserves decrease in the years after SSAP 101 without regard to insurers' level of ex ante exposure to SSAP 101. We discuss the variable *EXPOSURE* in relation to H2-H6 below when we describe the results of the tests of these hypotheses.

The dependent variable, *LOSS_RES_CY*, is the current accident year loss reserves. We use current accident year loss reserves because our primary interest lies in the effects of SSAP 101 on insurance companies' tradeoffs between tax savings and earnings reported on the income statement for the current year. While insurers can apply discretion in revising prior years' loss reserves, the possibility of the exercise of discretion is greatest for the current year loss provisions. In other words, the potential for manipulation of the loss reserves becomes considerably lower over time for a prior accident year(s) than it is for the initial estimate of the current accident year loss reserves. Insurers cannot manage paid claims, and more claims are paid each year for a prior accident year(s). We scale *LOSS_RES_CY* by total assets to control for variation in insurer size (Petroni 1992; Beaver, McNichols, and Nelson 2003; Grace and Leverty 2012).

In Equation (1), we implement a difference-in-differences methodology. In particular, we rely on several identification assumptions that the effect of SSAP 101 is higher (or lower) for certain firms, as discussed above in our hypotheses.

In Appendix 2, we illustrate the construction of the variable *LOSS_RES_CY* using Nationwide Mutual as an example. In calendar year 2011, the estimated losses during

accident year 2011 is $8,539.439 million (Panel A, Row 11, Column 11). In calendar year 2011, Nationwide paid $5,293.916 million in losses associated with accidents that occurred in 2011 (Panel B, Row 11, Column 11). Thus, of the estimated $8,539.439 million in losses that occurred during accident year 2011, 61.99% were paid in this year. The 2011 accident year loss reserves are $3,299.523 million (= $8,539.439 million – $5,293.916 million), which is the value of *LOSS_RES_CY* in 2011 for Nationwide.

In terms of the empirical estimation of Equation (1), we follow Grace and Leverty (2012) and employ feasible generalized least squares (FGLS) with a panel-specific AR(1) autocorrelation structure.[15] Beaver and McNichols (1998) report positive serial correlations in reserve errors, indicating multi-period reserve management. This estimation is appropriate for the empirical modeling of insurers' loss provisions, which exhibit strong autocorrelation (Wooldridge 2002). In addition, we include year fixed effects to control for exogenous economic factors related to loss provisions that change over time and are not otherwise controlled for in the model.[16]

We include a number of control variables that prior research finds are related to changes in loss reserves. Following Grace and Leverty (2010, 2012) and Beaver et al. (2003), three indicator variables (*LOSS*, *SMALL PROFIT*, and *SMALL LOSS*) are created to identify firms' reported earnings. The *LOSS* indicator variable equals one for insurers with earnings in the top 90% of the negative earnings distribution and zero otherwise. The *SMALL PROFIT* (*SMALL LOSS*) indicator variable is set to one for insurers with reported earnings in the first 5% of the distribution to the right (left) of zero and zero otherwise.

[15] The Breusch-Pagan Lagrange multiplier test suggests that fixed/random effects models are preferred to a pooled cross-sectional model. The Hausman test indicates that fixed effects are preferred to random effects models. The modified Wald test rejects the null hypothesis that there is no groupwise heteroscedasticity (p<0.0001).

[16] Exogenous economic factors include unexpected inflation, regulatory changes, changes in court attitudes, and jury verdicts that are outside of management control (Petroni 1992). Gaver, Paterson, and Pacini (2012) document that the PC industry as a whole over-reserved from 1993 to 1997, under-reserved from 1998 to 2002, and returned to over-reserving from 2003 to 2004.

Long-tail business (*TAIL*) indicates that large loss reserves are needed to cover future loss payments. Thus, we expect a positive coefficient on the variable *TAIL*, which is defined as one minus the ratio of cash already paid this year for the current year's business to the estimation of loss incurred in the current year's business (Petroni et al. 2000; Petroni and Beasley 1996; Gaver and Paterson 2001).

We control for the impact of state rate regulation on insurers' loss provisions (*RATE_REGULATION*). Nelson (2000) hypothesizes that insurers are interested in convincing regulators that they can charge low rates, so insurers have an incentive to understate reserves. Grace and Leverty (2010) instead suggest that insurers have an incentive to overestimate loss reserves in an attempt to convince regulators that the regulated price is too low. Thus, we have no priors for the coefficient on *RATE_REGULATION*.

To measure the exposure to rate regulation for each insurer, we adopt the rate regulation variable used in Grace and Leverty (2010):

$$RATE\_REGULATION_{i,t} = \frac{\sum \text{Premiums Written}_{i,s,t,l} \times \text{Stringent Regulation Law}_{s,t,l}}{\sum \text{Premiums Written}_{i,s,t,l}}, \quad (3)$$

where i indicates firm i, s indicates state s, l indicates line l, and t indicates year t. This variable calculates the percentage of total premiums written subject to stringent state regulations for each firm. A state is considered to have a stringent rate regulatory law if it has state-made rates, a prior approval law, or a file and use law that requires the insurer file for prior approval if it wants to charge a rate that deviates from that filed by a rate advisory organization (Harrington 2002; Grace and Leverty 2010). States with file and use, use or file, filing only, or flex rating (with a large rating band) are considered not stringently regulated.

Furthermore, the different lines of business operated by the insurers have significant impacts on their loss provisions. We classify all lines of business into personal lines (*NPW_PERSONAL*), commercial long-tail business lines (*NPW_COMMERCIAL*) and

commercial short-tail business lines (Cheng et al. 2017). Commercial long-tail business lines are considered the most complex type of PC insurance and personal lines the least (Regan 1997). We have no priors for the signs of these variables in the regressions.

Other control variables include insurer size (*SIZE*), reinsurance usage (*REINSURANCE*), net premium written growth (*NPW_GROWTH*), product line and geographic Herfindahl indices (*HERFINDAHL_LINE*; *HERFINDAHL_STATE*), and group ownership (*GROUP_AFFILIATION*) (Grace and Leverty 2010, 2012). *SIZE* is estimated as the logarithm of net premiums written. Harrington and Danzon (1994) indicate that reinsurance usage and growth are related to under-reserving. *REINSURANCE* is measured as the percentage of gross premiums written ceded to reinsurers. *NPW_GROWTH* is measured as the percentage increase in net premiums written from the previous to the current year. Insurers ceding more business should have smaller loss reserves if reinsurers are expected to cover a significant part of the losses. Additionally, financially weak firms tend to hide their financial condition through reinsurance (Harrington and Danzon 1994). They are also expected to under-report loss reserves to increase firm growth, suggesting that the coefficient on growth is negative. Therefore, reinsurance usage and firm growth should be negatively related to loss reserves.

HERFINDAHL_LINE is measured as the sum of the squared percentage of premiums earned in each of the lines written by the PC insurer, while *HERFINDAHL_STATE* is measured using the sum of the squared percentage of business written in each of the 50 states and the District of Columbia by the insurer (Cheng et al. 2017). We control for the product line and geographic Herfindahl indices because the nature of the insurer's business structure might affect its loss provisions, though we do not have any ex ante predictions regarding whether the effect is positive or negative. *GROUP_AFFILIATION* is an indicator variable equal to one for insurers associated with a group and zero otherwise. We control for group

affiliation because it is associated with intragroup reinsurance, which could decrease the need for a significant amount of loss reserves.

4. Empirical Results

4.1 Descriptive Statistics

Table 1 presents the summary statistics. Panel A shows the mean and related statistics for the full sample of insurers. The table indicates that the mean current accident year loss reserves are approximately 10% of total assets. Approximately 68% of the sample consists of mutual or closely held stock insurers, and the remaining 32% are public insurers. Family control exists in approximately 36% of insurers, consistent with Cheng et al. (2017, 2018). Approximately 31% of insurers use internal actuaries to certify their loss reserve estimations.

Panel B of Table 1 reports the means and medians for the samples of insurers before and after SSAP 1101. Both the mean and median current accident year loss reserves (*LOSS_RES_CY*) are significantly higher before SSAP 101. This univariate result provides preliminary support for our prediction in H1. The mean proportions of loss firms (*LOSS*) and firms reporting small profits (*SMALL_PROFITS*) are both higher in the pre-SSAP 101 years, whereas both net premium written growth (*NPW_GROWTH*) and the product line Herfindahl index (*HERFINDAHL_LINE*) are higher in the post-SSAP 101 period.

[Please insert Table 1 about here]

Table 2 reports the pairwise correlations among the major variables. In particular, the negative and significant correlation between current accident year loss reserves (*LOSS_RES_CY*) and the post-event indicator (*POST_SSAP101*) mirrors the univariate results discussed above, providing preliminary support for H1.

[Please insert Table 2 about here]

We now move on to regression tests of our various hypotheses. As a quick recap, the first six hypotheses relate to the relation between SSAP 101 adoption and insurers' loss provisions, as well as the cross-sectional variations in this relation. To conduct the regression tests, we rely on the regression specification indicated in Equation (2).

4.2 Test of H1

H1 predicts that PC insurers' loss provisions will decrease after the adoption of SSAP 101 because of the tightened guidance and disclosure requirements for insurance companies' income tax accounting. Column (1) of Table 3 presents the results of the test of H1. The coefficient on *POST_SSAP101* is significantly negative (-0.005; $p<0.01$) after we control for year fixed effects and other factors affecting PC insurers' loss reserves. This result is consistent with the univariate results above and our prediction that PC insurers' loss reserves will decrease following SSAP 101 adoption. The coefficient estimate indicates that PC insurers on average reduce loss provisions by an economically significant amount of approximately 0.5% of their total admitted assets, or a tax saving of approximately $1.5 million for the average PC insurer at a statutory tax rate of 35%.

In terms of control variables, our results show that many of them are significantly related to current year loss reserves in a way that is consistent with prior studies (e.g., Nelson 2000; Harrington 2002; Grace and Leverty 2010, 2012; Cheng et al. 2017, 2018). For example, we find that private insurers (*PRIVATE*) have larger loss provisions than public insurers do, consistent with prior research suggesting that private insurers have less immediate resources for capital and have to rely on loss provisions to cover potential surprises in future claims (Cheng et al. 2015). *LOSS*, *SMALL_LOSS*, and *SMALL_PROFITS* are all positively associated with loss provisions, consistent with loss firms or firms with small losses or small profits tending to have larger loss provisions than profit firms (Grace and Leverty 2010, 2012). *TAIL* carries a positive and significant coefficient, consistent with

our expectation that insurers with long-tail lines tend to have larger loss provisions to cover future claim payments (Petroni et al. 2000; Petroni and Beasley 1996; Beaver et al. 2003; Gaver and Paterson 2001). The coefficient on *RATE_REGULATION* is positively and significantly related to *LOSS_RES_CY*, suggesting that insurers have an incentive to increase loss provisions to convince regulators that the regulated price is too low, a result consistent with those in Grace and Leverty (2010, 2012). Firm size is positively related to *LOSS_RES_CY*. Larger firms have higher loss provisions (Grace and Leverty 2010, 2012; Cheng et al. 2015). The coefficients on *HERFINDAHL_LINE*, *NPW_PERSONAL*, and *NPW_COMMERCIAL* are all positively significant, consistent with firms with more business in personal lines (such as personal auto liability and homeowner liability) and commercial long-tail businesses having larger loss provisions. These findings also support the fact that insurers with more complex businesses increase their loss provisions for conservative reasons. Consistent with Grace and Leverty (2010), we find that *REINSURANCE* is negatively related to loss provisions, suggesting that insurers purchase reinsurance as a substitute for loss provisions. Also consistent with Grace and Leverty (2010, 2012), higher premium growth (*NPW_GROWTH*) is associated with lower loss provisions. The coefficient on *GROUP_AFFILIATION* is negative, consistent with the potentially lower need for large loss provisions for group-affiliated insurers, which are associated with intragroup reinsurance (Grace and Leverty 2010). Finally, family ownership is associated with higher loss provisions, consistent with the argument that family firms are more reputation sensitive and more conservative in financial reporting (Chen, Chen, and Cheng 2014).

In sum, our results indicate that PC insurers significantly decrease loss provisions after the adoption of SSAP 101, consistent with our prediction in hypothesis H1 that the new accounting standard for income taxes will constrain PC insurers' incentives to establish loss provisions for tax avoidance purposes.

4.3 Test of H2

We are interested in determining whether SSAP 101 adoption-constrained tax-motivated loss provisioning behaviors are more pronounced for PC insurers that have stronger exposure to the new standard. In particular, our hypothesis H2 predicts that the decrease in loss provisions following SSAP 101 adoption is larger for insurers subject to greater IRS monitoring. SSAP 101 is expected to give the tax authority a better information advantage over PC insurers' tax positions, so insurers that ex ante face greater IRS monitoring are likely to be affected by the new standard to a greater extent.

Our empirical proxy for IRS monitoring is the probability that the insurer is subject to an IRS audit in the year prior to SSAP 101 adoption (*IRS_AUDIT*). *IRS_AUDIT* is calculated as the number of corporate tax return audits completed in the IRS's current fiscal year for an IRS asset size group, divided by the number of corporate tax returns received in the previous calendar year for the same IRS asset size group (Hoopes et al. 2012).[17] These data are obtained from the Transactional Records Access Clearinghouse (TRAC), a non-profit entity that uses Freedom of Information Act requests and lawsuits to access information directly from the IRS. The IRS maintains records of audits completed and returns received for every IRS district by firm size (based on total assets) each year. Therefore, the variation in audit probability is induced by firm size, location, and fiscal year. In the regression, *IRS AUDIT* is measured using data from 2011, the year prior to SSAP 101 adoption, to address potential endogeneity.

Before we discuss the regression results, we check whether this assumption is satisfied by visualizing the dynamics of our dependent variable *LOSS_RES_CY* over our sample period from 2009 to 2014. This is important because our research design builds on the assumption that the treatment and control groups do not show a clear trend in *LOSS_RES_CY*

[17] We thank Jeff Hoopes for kindly sharing with us the data for IRS audit probability.

before SSAP 101 adoption. Figure 1 plots the annual mean values of PC insurers' loss reserves for the current year, for firms with above- and below-median IRS audit probability, surrounding SSAP 101 adoption between 2009 and 2014. As shown in Figure 1, there is no clear trend between the two groups until 2012, the year when SSAP 101 became effective, after which the loss provisions of both groups start to decrease, providing evidence that the parallel trend assumption is not violated for our difference-in-differences research design. It is also observed from the plot that the decreases in loss reserves from 2011 to subsequent years are more significant for insurers with a higher IRS audit probability, providing preliminary support for hypothesis H2.

The results of the test of H2 are presented in Column (2) of Table 3. The results show that the coefficient on the interaction term *POST_SSAP101×IRS_AUDIT* is significantly negative (-0.013; $p<0.01$), consistent with our prediction that the decrease in loss provisions following SSAP 101 adoption will be larger for insurers subject to greater IRS monitoring. This incremental effect of IRS monitoring is of economic significance. For an average insurer, moving from the 25th to the 75th percentile of *IRS_AUDIT* is associated with an incremental reduction in loss provisions of 0.92% of total admitted assets.[18] The overall effect of SSAP 101 on loss provisions remains significant (-0.003; $p<0.01$), accounting for an approximately 3% reduction in loss provisions post-SSAP 101. The results on the control variables are similar to those reported earlier. These findings provide support for hypothesis H2, that PC insurers that face higher IRS monitoring have greater decreases in loss reserves after SSAP 101 adoption.

[Please insert Table 3 about here]

[18] [(0.206 – 0.133)×(–0.013)]/0.103×100% = 0.92%.

4.4 Robustness Tests

For robustness, we examine whether our results are sensitive to alternative estimation methods, an alternative proxy for loss reserves, and alternative definitions of *EXPOSURE*.

In Panel A of Table 4, we document the robustness of our results to different estimations. Recall that our main estimation method uses the framework of feasible FGLS with a panel-specific AR(1) autocorrelation structure, following Grace and Leverty (2012). To ensure that our results are not sensitive to the choice of estimation method, we employ OLS as an alternative estimation method. As Columns (1) and (2) of Table 4, Panel A show, our results are robust to OLS estimation. As a further robustness test, we include firm fixed effects to control for time-invariant unobserved heterogeneity at the firm level. As shown in Columns (3) and (4) of Table 4, Panel A, our results are robust to the inclusion of firm fixed effects. These results reinforce our main finding that SSAP 101 adoption decreases PC insurers' loss provisions using the FGLS approach.

In Panel B of Table 4, we document the robustness of our results using an alternative dependent variable: total loss reserves (*LOSS_RES_TOTAL*). The primary difference between *LOSS_RES_TOTAL* and our main measure of current year loss reserves (*LOSS_RES_CY*) is that the former is a balance sheet item and the latter an income statement item. In addition to the annual loss provisions established for a given year, the total loss reserves in a given year for a PC insurer also provide a basis for the IRS to gauge and evaluate the appropriateness of the associated tax positions. Therefore, we expect that PC insurers will avoid IRS scrutiny by also lowering the amount of total loss reserves after SSAP 101, particularly for those that face greater IRS monitoring. As the results show, the effect of SSAP 101 adoption has a similar negative effect on insurers' total loss reserves, and the effect is more negative for insurers

with greater IRS monitoring. [19]

In Panel C of Table 4, we document the robustness of our results using two alternative measures of IRS monitoring. First, to address the potential concern that the variable *IRS_AUDIT*, our main measure of insurers' exposure to SSAP 101, could be driven by insurers' firm size (total assets), we create a new variable of size- and time-adjusted IRS audit probability. Specifically, using the audit probability data, we create *IRS_AUDIT_SIZE_ADJ*, which is the residuals from a regression of audit probability on asset size and year. We re-estimate Equation (2) using the residuals from the year 2011 to measure insurers' exposure to SSAP 101 due to IRS monitoring. The results using *IRS_AUDIT_SIZE_ADJ* as an alternative proxy for IRS monitoring are reported in Column (1) of Table 4's Panel C. In particular, the coefficient on the interaction term *POST_SSAP101×IRS_MONITORING* is significantly negative (-0.001; $p<0.05$), consistent with our earlier findings using the unadjusted *IRS_AUDIT* proxy. This finding also suggests that insurer size does not drive our results. To provide additional confirmation, we employ a second alternative proxy capturing IRS enforcement activities introduced by Bozanic, Hoopes, Thornock, and Williams (2016). Bozanic et al. (2016) construct a measure, labeled IRS attention, using the number of downloads the IRS makes of a firm's annual financial reports from EDGAR. In our regression, we define a new variable, *IRS_ATTENTION*, as PC insurers ranked in the top decile by the IRS's annual report downloads in 2011. Note that this variable is defined for public insurers only. We re-estimate Equation (2) using *IRS_ATTENTION* as a second alternative proxy for IRS monitoring and report the results in Column (2) of Table 4's Panel C. The coefficient on the interaction term *POST_SSAP101×IRS_MONITORING* is negative and significant (-0.004; $p<0.05$), providing further evidence in support of hypothesis H2 using an alternative measure of IRS monitoring.

[19] The sample size is larger in the test using the total loss reserve measure because there are fewer missing values for this measure in the database. The results are similar when we restrict the test to the same sample.

Taken together, the results from our series of robustness tests provide strong support for the robustness of our main finding that SSAP 101 adoption decreases PC insurers' loss provisions, particularly for those with stronger exposure to SSAP 101 (i.e., facing greater IRS scrutiny).

[Please insert Table 4 about here]

4.5 Tests of H3, H4, and H5

Our next cross-sectional test examines whether PC insurers that have weaker tax incentives ex ante experience decreased loss reserves after SSAP 101 adoption. As discussed above, we rely on three firm-level characteristics to capture insurers' ex ante tax incentives: private ownership, family ownership, and loss firms.

H3 predicts that SSAP 101 adoption has a milder effect on public firms because they are also less likely to overstate loss provisions for tax purposes if they are under greater public scrutiny and capital market pressure. Column (1) of Table 5 presents the results. Our variable of interest is the coefficient on the interaction term *POST_SSAP101×PRIVATE*, which is negative and significant at the 1% level (-0.002; $p<0.01$). These results are consistent with our prediction that the decrease in loss provisions following SSAP 101 will be incrementally larger for private insurers, rejecting the null of H3. The size of the difference is of economic significance: the magnitudes of the coefficients indicate that the economic effect of SSAP 101 on private insurers [-0.004 + (-0.002) = -0.006] is approximately 1.5-fold what it is on public insurers (-0.004). It is important to note that the effect of SSAP 101 on public insurers, despite being smaller, is also significant (-0.004; $p<0.01$). Overall, our findings suggest that SSAP 101 adoption has a significant impact on reducing the loss provisions of both private and public PC insurers, with private insurers experiencing a much stronger effect.

Column (2) of Table 5 tabulates the results of the cross-sectional test regarding family

insurers. The result on the interaction term *POST_SSAP101×FAMILY* is significantly positive (0.005; $p<0.01$), supporting our prediction that the loss reserve estimations of family-owned insurers will be less impacted by SSAP 101.

The results of the cross-sectional test regarding loss firms are presented in Column (3) of Table 5. The coefficient on the interaction term *POST_SSAP101×LOSS* is significantly positive, consistent with H4's prediction that the loss provisions of loss firms will be significantly less affected by SSAP 101 adoption.

Overall, the results are consistent with our expectation that the loss provisions of PC insurers are less affected by SSAP 101 adoption when they have a weak ex ante incentive to over-reserve for tax benefits. These results, together with those presented earlier for hypotheses H1 and H2, provide consistent and convincing support for our main prediction that SSAP 101 will decrease PC insurers' loss provisions by constraining their incentives to establish loss reserves for tax purposes.

[Please insert Table 5 about here]

4.6 Tests of H6

Hypothesis H6 examines on how in-house actuaries moderate the effect of SSAP 101 on loss provisions for insurers. To the extent that in-house actuaries are more likely to suffer from impaired independence, the estimates of loss provisions are subject to more biases when the insurer used an in-house actuary prior to SSAP 101. Hence, we expect the effect of SSAP 101 on reducing loan loss provisions to be even greater for firms using in-house actuaries before 2011.

Following Cheng et al. (2015), we create a variable, *INHOUSE_ACTUARY*, which is an indicator that equals one if the insurer uses an actuary who is an employee of the firm to certify the accuracy of the loss reserves in financial statements submitted to regulators; otherwise, the indicator equals zero. In some cases, insurers still use their in-house actuaries

to prepare financial statements but rely on external independent actuaries, e.g., actuaries at consulting firms or Big 4 auditors, to certify loss reserves in the annual financial reports submitted to regulators. In this case, we define these firms as using independent actuaries to certify loss reserves.

In Column (1) of Table 6, the results show that the main effect of *INHOUSE_ACTUARY* is negative and significant, suggesting that PC insurers with in-house actuaries have small loss reserves on average. The interaction effect (*POST_SSAP101×INHOUSE_ACTUARY*) is negative and significant (-0.001, $p<0.01$), suggesting that the decrease in loss provisions following SSAP 101 adoption is larger for insurers with in-house actuaries.

More interestingly, when we conduct the estimation separately using the private firm-only and public firm-only samples, we find that the main effect of *INHOUSE_ACTUARY* is not significant in the private insurer sample (Column (2)), but it is significantly negative in the public insurer sample (Column (3)). These results are consistent with our expectation that the bias of in-house actuaries will differ between private and public insurers such that those with public insurers tend to bias their loss reserve estimates downward for a higher net income number. In contrast, those in private firms are less likely to under-reserve because private insurers are under less capital market pressure. Finally, the results indicate that the interaction effect of *POST_SSAP101×INHOUSE_ACTUARY* is significantly negative among private insurers, but it is not significantly different from zero among public insurers. These results support our prediction that for private insurers, the negative effect of SSAP 101 adoption on loss provisions will be significantly stronger for firms with in-house actuaries to certify the accuracy of an insurer's loss reserves.

[Please insert Table 6 about here]

In addition, we expect that the direction of the bias differences will depend on whether the insurer is a public or private firm. Specifically, due to capital market pressure, managers of public insurers are more likely to have their in-house actuaries certify lower loss reserve estimates, leading to higher earnings. In contrast, subject to lower capital market pressure, managers of private insurers are more likely to pressure their in-house actuaries to provide higher loss reserves to increase tax shields. This leads to the following prediction of an interaction effect: for public insurers, having in-house actuaries does not significantly change the effect of SSAP 101 on loss provisions; however, for private insurers, the negative effect of SSAP 101 adoption on loss provisions is significantly stronger for firms with in-house actuaries.

5. Additional Tests

5.1 Consequences of Improved Loss Provision Estimates

Collectively, the results presented so far offer strong support for our prediction that SSAP 101 reduces PC insurers' incentives to establish reserves for tax purposes. To examine the broader implications of the effect of SSAP 101 on PC insurers, we conduct additional analyses to explore whether the enhanced quality of the loss reserve estimate improves the quality of earnings and overall risk of PC insurers.

Biases in loss reserve estimates can distort the true financial conditions of insurance firms, which play an important role in the financial sector and the overall health of the economy. To investigate the broader economic consequences of SSAP 101, we examine its effects on PC insurers' earnings quality and overall firm risk. A loss reserve estimate that better reflects the true underlying economics of the insurer implies higher-quality earnings and regulatory capital. As such, we predict that SSAP 101 adoption will enhance the quality of earnings and the overall risk for PC insurers. The results of these tests could improve our

understanding of how accounting standards shape insurers' tax reporting behaviors, corporate transparency, and firm risk and they should be of interest to accounting standard setters, tax authorities, and policy makers.

In testing the effect of SSAP 101 on earnings persistence, we estimate Equation (4) using OLS below:

$$\begin{aligned} NI_{it+1} = {} & \alpha_0 + \alpha_1 POST\_SSAP101_t \times EXPOSURE_{it-1} \times NI_{it} \\ & + \alpha_2\, POST\_SSAP101_t \times EXPOSURE_{it-1} + \alpha_3\, EXPOSURE_{it-1} \times NI_{it} \\ & + \alpha_4\, POST\_SSAP101_t \times NI_{it} + \alpha_5 POST\_SSAP101_t + \alpha_6 EXPOSURE_{it-1} + \alpha_7 NI_{it} \\ & + \Sigma\alpha_i CONTROLS_{it} + \mu_t + \varepsilon_{it}, \end{aligned} \quad (4)$$

where net income (*NI*) is our primary earnings measure. We also employ net income before taxes (*NIBT*) and net income before dividends and taxes (*NIBDT*) as alternative earnings proxies. Consistent with our earlier analysis, we employ IRS monitoring (*IRS_AUDIT*) as our primary exposure proxy and use insurers' private ownership (*PRIVATE*) as an alternative exposure proxy. Our variable of interest in Equation (4) is the three-way interaction term *POST_SSAP101*×*EXPOSURE*×*NI*, the coefficient on which captures the effect of SSAP 101 adoption on the association between current and next year's earnings for firms that have larger exposure to SSAP 101.

In assessing the effect on insurers' overall risk, we estimate Equation (5) using OLS as follows:

$$\begin{aligned} ROA\_VOLATILITY_{it} = {} & \alpha_0 + \alpha_1 POST\_SSAP101_t \times EXPOSURE_{it-1} + \alpha_2 POST\_SSAP101_t \\ & + \alpha_3 EXPOSURE_{it-1} + \Sigma\alpha_i CONTROLS_{it} + \mu_t + \varepsilon_{it}, \end{aligned} \quad (5)$$

where *ROA_VOLATILITY* is the standard deviation of the insurer's ROA, our measure of their overall risk. Similarly, we use IRS monitoring (*IRS_AUDIT*) and insurers' private ownership (*PRIVATE*) as two proxies for insurers' ex ante exposure to SSAP 101. In Equation (5), we are interested in the coefficient on the interaction term *POST_SSAP101*×*EXPOSURE*, which captures the effect of SSAP 101 adoption on the overall risk of insurers with particularly strong exposure to SSAP 101.

Table 7 reports the results of the earnings persistence tests using Equation (4), with Panel A showing results using *IRS_AUDIT* as the exposure measure and Panel B showing results using *PRIVATE* as the exposure proxy. Across all specifications in Panel A, the coefficients on the three-way interaction term *POST_SSAP101×IRS_AUDIT×NI* are significantly positive, suggesting a significant increase in earnings persistence after SSAP 101 adoption among firms facing higher IRS monitoring. Using insurers' private ownership as an alternative exposure proxy, we again document similar results that are consistent across all three earnings measures. In sum, our results provide consistent evidence suggesting that SSAP 101 improves PC insurers' earnings persistence among insurers that have stronger exposure to the new standard.

[Please insert Table 7 about here]

Table 8 reports the results of ROA volatility tests using Equation (5). In Column (1), we report the results of Equation (5) omitting the interaction term. The coefficient on *POST_SSAP101* is significantly negative, suggesting a decrease in PC insurers' overall risk after SSAP 101 adoption (-0.004; $p<0.01$). The economic effect is significant, representing a decrease in ROA volatility of over 17%. In terms of the incremental effect due to insurers' heterogeneous exposure to SSAP 101, we find that insurers that are more exposed to the new standard experience a greater decrease in overall risk, as evidenced by the negative and significant coefficients on *POST_SSAP101×IRS_AUDIT* and *POST_SSAP101×PRIVATE* in Columns (2) and (3), respectively.

In sum, we document strong evidence suggesting that private PC insurers exhibit higher earnings persistence and lower ROA volatility after SSAP 101 adoption, particularly for those with greater ex ante exposure to SSAP 101. Our findings are consistent with our prediction that the improved quality of the loss reserve estimate will enhance the quality of earnings and reduce the overall risk of PC insurance firms.

[Please insert Table 8 about here]

6. Conclusion

This paper examines the effect of the adoption of a new accounting standard for the income taxes of PC insurance companies (SSAP 101) on the quality of their loss reserve estimates. Building on prior literature that suggests that insurers have incentives to establish loss reserves for tax purposes (Penalva 1998; Gaver and Paterson 1999), we predict and find that SSAP 101 adoption reduces insurance companies' loss reserve provisions, particularly for insurers that have greater ex ante exposure to SSAP 101. Consistent with tax incentives being the main channel of the observed effect, we find that the reduction in loss provisions is significantly weaker for insurers that are less likely to over-reserve for tax purposes ex ante. We also find that earnings persistence improves and overall risk declines after SSAP 101 adoption among insurers that are more affected by the new standard. Overall, our paper provides evidence of how accounting standards for income taxes can improve firms' transparency, earnings quality, and overall risk profile by curbing their tax avoidance behavior.

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Appendix 1 List of variables

Variable	Description/Construction Details
LOSS_RES_CY	Current accident year loss reserves, scaled by total admitted assets.
POST_SSAP101	An indicator for the post-implementation period of SSAP 101, equal to one for 2012 or after observations, and zero otherwise.
PRIVATE	An indicator equal to one if the insurer is private and zero otherwise.
IRS_AUDIT	IRS audit probability in 2011, a proxy for the IRS's effort to monitor the insurer, calculated as the number of corporate tax return audits completed in IRS fiscal year 2011 (October 1 to September 30) divided by the number of corporate tax returns received in calendar year 2010.
INHOUSE_ACTUARY	An indicator equal to one if the insurer employs in-house actuaries and zero otherwise.
LOSS	An indicator variable equal to one if the insurer's earnings are in the top 90% of the negative earnings distribution in year *t* and zero otherwise.
FAMILY	An indicator equal to one if the insurer is a family-owned insurer and zero otherwise.
NI	Net income.
NIBDT	Net income before dividends and taxes.
ROA_VOLATILITY	ROA volatility, measured by the standard deviation of the insurer's ROA.
SMALL_LOSS	An indicator variable equal to one if the insurer's earnings are in the top 5% of the negative earnings distribution in year *t* and zero otherwise.
SMALL_PROFITS	An indicator variable equal to one if the insurer's earnings are in the bottom 5% of the positive earnings distribution in year *t* and zero otherwise.
TAIL	One minus the ratio of cash already paid this year for the current year's business to the estimation of incurred loss in the current year's business.

RATE_REGULATION	Percentage of premiums written in a state with stringent rate regulation.
SIZE	Natural logarithm of net premiums written.
HERFINDAHL_LINE	Herfindahl indices of premiums written by product line.
HERFINDAHL_STATE	Herfindahl indices of premiums written by state.
NPW_PERSONAL	Proportion of net premiums written (NPW) from personal lines (i.e., Farmowners Multiple Peril, Homeowners Multiple Peril, Personal Automobile Physical Damage, and Personal Automobile Liability) to total NPW.
NPW_COMMERCIAL	Proportion of net premiums written (NPW) from commercial long-tail lines (i.e., Workers' Compensation, Other Liability, and Commercial Automobile Liability) to total NPW.
REINSURANCE	Percentage of gross premiums written that is ceded to reinsurers.
NPW_GROWTH	One-year percentage change in net premiums written.
GROUP_AFFILIATION	An indicator variable equal to one for insurers associated with a group and zero otherwise.

Appendix 2 Example of the calculation of current accident year loss reserves (*LOSS_RES_CY)*

Panel A: Loss estimates reported at year end ($000)

Calendar Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Accident Year										
Prior	3,285,875	3,410,600	3,524,213	3,637,263	3,587,121	3,623,562	3,685,809	3,714,597	3,739,139	3,746,374
2002	5,972,319	5,928,093	5,976,433	5,980,533	5,956,761	5,944,897	5,938,278	5,932,815	5,924,491	5,933,300
2003		6,341,971	6,172,137	6,162,098	6,115,388	6,101,180	6,097,493	6,090,287	6,090,476	6,085,835
2004			6,473,471	6,413,553	6,339,425	6,341,557	6,309,336	6,284,525	6,269,843	6,263,201
2005				6,943,086	6,791,488	6,794,457	6,798,872	6,770,778	6,758,415	6,745,659
2006					7,073,917	7,017,149	7,020,017	6,984,007	6,944,226	6,919,259
2007						7,465,502	7,507,457	7,404,207	7,339,228	7,297,571
2008							8,456,304	8,518,540	8,419,513	8,342,704
2009								8,005,030	7,766,655	7,682,848
2010									7,701,817	7,588,385
2011										8,539,439
Column Total	9,258,194	15,680,664	22,146,254	29,136,533	35,864,100	43,288,304	51,813,566	59,704,786	66,953,803	75,144,575

Appendix 2 (continued)

Panel B: Cumulative paid net losses reported at year end ($000)

Calendar Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Accident Year										
Prior	----	1,302,260	2,048,337	2,483,888	2,716,385	2,912,724	2,994,335	3,124,176	3,197,355	3,283,836
2002	3,485,702	4,651,574	5,185,129	5,501,019	5,686,662	5,782,591	5,833,137	5,866,513	5,882,927	5,895,712
2003		3,591,356	4,832,488	5,316,455	5,650,653	5,839,750	5,938,248	5,986,874	6,019,722	6,038,703
2004			3,611,387	4,942,134	5,466,912	5,819,707	6,005,531	6,110,435	6,164,597	6,192,091
2005				3,788,748	5,172,434	5,842,367	6,228,643	6,455,542	6,576,735	6,627,072
2006					3,880,331	5,398,637	6,016,739	6,396,915	6,621,094	6,736,893
2007						4,100,337	5,687,570	6,286,051	6,684,713	6,918,106
2008							4,925,220	6,692,479	7,331,730	7,764,890
2009								4,501,817	6,063,960	6,716,105
2010									4,475,772	6,021,151
2011										5,293,916
Column Total	3,485,702	9,545,190	15,677,341	22,032,244	28,573,377	35,696,113	43,629,423	51,420,802	59,018,605	67,488,475

This table is excerpted from the 2011 Annual Statement of Nationwide Mutual Insurance Company Schedule P: Part 2-Summary (Panel A) and Part 3-Summary (Panel B). Panel A reports the amount of estimated losses for an accident year by the calendar year of evaluation as well as subsequent adjustments in the estimate as claims are settled over time. Panel B reports the cumulative paid net losses for an accident year by the calendar year of evaluation.

Illustration of the calculations of the current accident year loss reserves:
In calendar year 2011, the current accident year loss reserves (*LOSS_RES_CY*) are calculated as the difference between the estimated loss for accident year 2011 in 2011 (Cell 2011×2011 in Panel A: $8,539.439 million) and the cumulative paid net loss for accident year 2011 as of 2011 (Cell 2011×2011 in Panel B: $5,293.916 million), or ($8,539.439 – 5,293.916) million = $3,299.523 million.

Figure 1: Trends in *LOSS_RES_CY* Surrounding SSAP 101 Adoption: High versus Low IRS Audit Probability – Full Sample

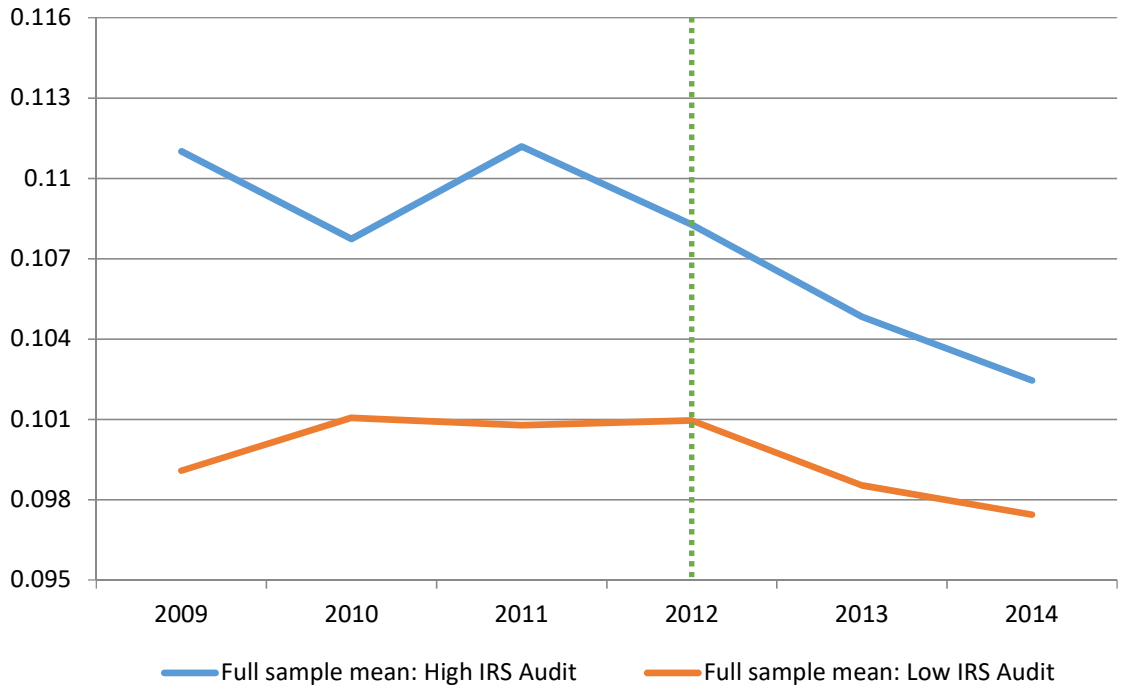

Table 1: Descriptive statistics

Panel A: Summary statistics

Panel A reports summary statistics for the variables used in the analysis for the full sample of 6,610 firm-year observations between 2009 and 2014.

Variable	Mean	Std. Dev.	25th	Median	75th
LOSS_RES_CY	0.103	0.053	0.066	0.100	0.133
POST_SSAP101	0.501	0.500	0.000	1.000	1.000
IRS AUDIT	0.188	0.089	0.133	0.174	0.206
PRIVATE	0.682	0.466	0.000	1.000	1.000
FAMILY	0.358	0.479	0.000	0.000	1.000
LOSS	0.183	0.387	0.000	0.000	0.000
INHOUSE_ACTUARY	0.306	0.461	0.000	0.000	1.000
NI (*millions*)	30.67	285.0	0.181	2.603	12.80
ROA_VOLATILITY	0.023	0.031	0.008	0.016	0.028
SMALL_LOSS	0.006	0.078	0.000	0.000	0.000
SMALL_PROFITS	0.026	0.161	0.000	0.000	0.000
TAIL	0.546	0.232	0.359	0.539	0.727
RATE_REGULATION	0.379	0.349	0.038	0.304	0.620
SIZE	17,640	1,969	16,416	17,669	18,896
HERFINDAHL_LINE	0.483	0.298	0.230	0.378	0.695
HERFINDAHL_STATE	0.533	0.385	0.143	0.469	1.000
NPW_PERSONAL	0.407	0.377	0.007	0.358	0.793
NPW_COMMERCIAL	0.282	0.331	0.008	0.112	0.468
REINSURANCE	0.373	0.285	0.125	0.313	0.591
NPW_GROWTH	0.066	0.420	-0.039	0.030	0.099
GROUP_AFFILIATION	0.733	0.442	0.000	1.000	1.000

Table 1: Descriptive statistics (continued)

Panel B: Variable means and medians, pre and post SSAP 101

Panel B reports the means and medians for the variables used in the pre- and post-SSAP 101 period analysis. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively, in the differences in the means (t-test) or medians (rank sum test).

	Pre-SSAP 101		Post-SSAP 101	
Variable	Mean N = 3,300	Median N = 3,300	Mean N = 3,310	Median N = 3,310
LOSS_RES_CY	0.104**	0.102***	0.101	0.098
IRS_AUDIT	0.187	0.174	0.189	0.174
PRIVATE	0.671*	1.000*	0.692	1.000
FAMILY	0.360	0.000	0.356	0.000
LOSS	0.220***	0.000***	0.147	0.000
INHOUSE_ACTUARY	0.315**	0.000	0.297	0.000
NI (*millions*)	24.70***	2.159***	32.80	3.104
ROA_VOLATILITY	0.025**	0.018**	0.022	0.013
SMALL_LOSS	0.006	0.000	0.006	0.000
SMALL_PROFITS	0.031**	0.000**	0.022	0.000
TAIL	0.548	0.541	0.545	0.526
RATE_REGULATION	0.378	0.306	0.380	0.302
SIZE	17.61	17.65	17.67	17.67
HERFINDAHL_LINE	0.476*	0.371**	0.489	0.389
HERFINDAHL_STATE	0.528	0.458	0.537	0.480
NPW_PERSONAL	0.406	0.367	0.409	0.358
NPW_COMMERCIAL	0.277	0.117	0.286	0.108
REINSURANCE	0.373	0.318	0.372	0.311
NPW_GROWTH	0.041***	0.009***	0.092	0.048
GROUP_AFFILIATION	0.732	1.000	0.734	1.000

Table 2: Correlations

This table reports the pairwise correlations for the major variables used in the analysis. The correlations in boldface are significant at the 0.10 level (based on two-tailed tests). See Appendix 1for variable definitions.

	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) *LOSS_RES_CY*	**-0.025**	**0.040**	**0.085**	**0.124**	**-0.031**	**0.193**	**0.202**	**0.090**	**0.328**
(2) *POST_SSAP101*		**0.023**	-0.003	0.014	-0.019	**-0.094**	-0.006	0.003	0.017
(3) *IRS_AUDIT*			**-0.165**	**-0.069**	**0.306**	**-0.135**	**0.212**	**0.049**	**0.793**
(4) *PRIVATE*				**-0.244**	**-0.338**	**0.134**	**-0.196**	**-0.106**	**0.233**
(5) *FAMILY*					**0.022**	**-0.067**	0.015	**0.092**	**-0.065**
(6) *LOSS*						**-0.114**	**-0.117**	-0.000	**-0.109**
(7) *INHOUSE_ACTUARY*							-0.013	**-0.028**	**0.325**
(8) *TAIL*								**0.050**	**0.046**
(9) *RATE_REGULATION*									**0.050**
(10) *SIZE*									

Table 3: The effect of SSAP 101 adoption on loss provisions

This table reports the test results for the effect of SSAP 101 adoption on insurers' loss provisions between 2009 and 2014. Following Grace and Leverty (2012), we use feasible generalized least squares with a panel-specific AR(1) autocorrelation structure model in the estimation. A constant term is included but not reported. Please refer to Appendix 1 for variable definitions. Robust standard errors are reported in parentheses below each coefficient. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable: LOSS_RES_CY	(1)	(2)
POST_SSAP101	-0.005***	-0.003***
	(0.000)	(0.001)
POST_SSAP101×IRS_AUDIT		-0.013***
		(0.003)
IRS_AUDIT		-0.226***
		(0.005)
PRIVATE	0.013***	0.015***
	(0.001)	(0.000)
LOSS	0.019***	0.019***
	(0.000)	(0.000)
SMALL_LOSS	0.006***	0.007***
	(0.001)	(0.001)
SMALL_PROFITS	0.008***	0.007***
	(0.001)	(0.001)
TAIL	0.091***	-0.000
	(0.001)	(0.001)
RATE_REGULATION	0.004***	0.108***
	(0.001)	(0.001)
SIZE	0.008***	0.005***
	(0.000)	(0.001)
HERFINDAHL_LINE	0.002***	0.017***
	(0.001)	(0.000)
HERFINDAHL_STATE	0.000	0.002***
	(0.001)	(0.001)
NPW_PERSONAL	0.052***	-0.007***
	(0.001)	(0.001)
NPW_COMMERCIAL	0.029***	0.053***
	(0.001)	(0.001)
REINSURANCE	-0.041***	0.028***
	(0.001)	(0.001)
NPW_GROWTH	-0.002***	-0.033***
	(0.000)	(0.001)
GROUP_AFFILIATION	-0.004***	-0.004***
	(0.001)	(0.000)
FAMILY	0.012***	0.011***
	(0.001)	(0.001)
Year Fixed Effects	Included	Included
N	6,610	6,610

Table 4: The effect of SSAP 101 adoption on loss provisions – Sensitivity analysis

Panel A reports the test results for the effect of SSAP 101 adoption on insurers' loss provisions between 2009 and 2014 using OLS (with/without firm fixed effects). A constant term is included but not reported. Please refer to Appendix 1 for variable definitions. Robust standard errors are reported in parentheses below each coefficient. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: OLS and the firm fixed effects model

Dependent variable: LOSS_RES_CY	(1)	(2)	(3)	(4)
POST_SSAP101	-0.003**	-0.003	-0.009***	-0.006***
	(0.001)	(0.002)	(0.001)	(0.001)
POST_SSAP101×IRS_AUDIT		-0.024**		-0.015***
		(0.010)		(0.005)
IRS_AUDIT		-0.241***		-0.005
		(0.022)		(0.020)
PRIVATE	0.010***	0.0090***	0.014**	0.014**
	(0.003)	(0.003)	(0.006)	(0.006)
LOSS	0.029***	0.030***	0.015***	0.015***
	(0.002)	(0.002)	(0.001)	(0.001)
SMALL_LOSS	0.006	0.0078	0.004	0.004
	(0.009)	(0.009)	(0.003)	(0.003)
SMALL_PROFITS	0.016***	0.016***	0.006***	0.006***
	(0.004)	(0.004)	(0.002)	(0.002)
TAIL	0.004	0.005	0.105***	0.105***
	(0.010)	(0.011)	(0.007)	(0.007)
RATE_REGULATION	0.081***	0.101***	0.011**	0.011**
	(0.007)	(0.007)	(0.005)	(0.005)
SIZE	0.003	0.003	0.024***	0.024***
	(0.003)	(0.003)	(0.003)	(0.003)
HERFINDAHL_LINE	0.009***	0.018***	-0.016**	-0.016**
	(0.001)	(0.001)	(0.008)	(0.008)
HERFINDAHL_STATE	0.004	0.005	-0.002	-0.002
	(0.004)	(0.004)	(0.007)	(0.007)
NPW_PERSONAL	-0.005	-0.004	0.016**	0.016**
	(0.004)	(0.004)	(0.008)	(0.008)
NPW_COMMERCIAL	0.054***	0.053***	0.028***	0.028***
	(0.005)	(0.005)	(0.008)	(0.008)
REINSURANCE	0.033***	0.028***	-0.029***	-0.029***
	(0.005)	(0.005)	(0.005)	(0.005)
NPW_GROWTH	-0.038***	-0.037***	-0.004***	-0.004***
	(0.004)	(0.004)	(0.001)	(0.001)
GROUP_AFFILIATION	-0.000	-0.004**	-0.001	-0.001
	(0.003)	(0.002)	(0.003)	(0.003)
FAMILY	0.001	0.001	0.001	0.001
	(0.005)	(0.005)	(0.005)	(0.005)
Firm Fixed Effects	-	-	Included	Included
Year Fixed Effects	Included	Included	Included	Included
R^2	0.36	0.41	0.91	0.91
N	6,610	6,610	6,610	6,610

Table 4: The effect of SSAP 101 adoption on loss provisions – Sensitivity analysis (continued)

Panel B reports the test results for the effect of SSAP 101 adoption on insurers' loss provisions between 2009 and 2014 using total loss reserves (*LOSS_RES_TOTAL*) as the dependent variable. Following Grace and Leverty (2012), we use feasible generalized least squares with a panel-specific AR(1) autocorrelation structure model in the estimation. A constant term is included but not reported. Please refer to Appendix 1 for variable definitions. Robust standard errors are reported in parentheses below each coefficient. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel B: Alternative proxy for loss reserves: Total loss reserves

Dependent variable: LOSS_RES_TOTAL	(1)	(2)
POST_SSAP101	-0.021***	-0.020***
	(0.001)	(0.001)
POST_SSAP101×IRS_AUDIT		-0.014***
		(0.005)
IRS_AUDIT		-0.275***
		(0.009)
PRIVATE	-0.006***	-0.008***
	(0.001)	(0.001)
LOSS	0.028***	0.033***
	(0.001)	(0.001)
SMALL_LOSS	0.012***	0.015***
	(0.003)	(0.003)
SMALL_PROFITS	0.010***	0.010***
	(0.001)	(0.001)
TAIL	0.241***	0.281***
	(0.003)	(0.003)
RATE_REGULATION	0.035***	0.021***
	(0.001)	(0.001)
SIZE	0.033***	0.042***
	(0.000)	(0.000)
HERFINDAHL_LINE	-0.041***	-0.032***
	(0.002)	(0.002)
HERFINDAHL_STATE	0.021***	0.037***
	(0.002)	(0.001)
NPW_PERSONAL	0.030***	0.018***
	(0.002)	(0.002)
NPW_COMMERCIAL	0.145***	0.118***
	(0.002)	(0.002)
REINSURANCE	-0.055***	-0.046***
	(0.002)	(0.002)
NPW_GROWTH	-0.023***	-0.028***
	(0.001)	(0.001)
GROUP_AFFILIATION	-0.012***	-0.010***
	(0.001)	(0.001)
FAMILY	0.006***	0.016***
	(0.001)	(0.001)
Year Fixed Effects	Included	Included
N	9,059	9,059

Table 4: The effect of SSAP 101 adoption on loss provisions – Sensitivity analysis (continued)

Panel C reports the test results for the effect of SSAP 101 adoption on insurers' loss provisions between 2009 and 2014 using two alternative proxies for IRS monitoring. Following Grace and Leverty (2012), we use feasible generalized least squares with a panel-specific AR(1) autocorrelation structure model in the estimation. A constant term is included but not reported. Please refer to Appendix 1 for variable definitions. Robust standard errors are reported in parentheses below each coefficient. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel C: Alternative proxies for IRS monitoring

Dependent variable: LOSS_RES_CY	(1)	(2)
	IRS_AUDIT_ADJ	*IRS_ATTENTION*
POST_SSAP101	-0.003**	-0.005***
	(0.001)	(0.001)
POST_SSAP101×IRS_MONITORING	-0.001**	-0.004**
	(0.000)	(0.002)
IRS_MONITORING	0.014	-0.015***
	(0.021)	(0.002)
PRIVATE	0.014*	-
	(0.007)	-
LOSS	0.016***	0.050***
	(0.001)	-0.002
SMALL_LOSS	0.004	(0.007)
	(0.003)	-0.011
SMALL_PROFITS	0.006***	0.001
	(0.002)	-0.002
TAIL	0.004	0.079***
	(0.003)	(0.004)
RATE_REGULATION	0.103***	-0.012***
	(0.008)	(0.002)
SIZE	0.011*	0.012***
	(0.006)	(0.000)
HERFINDAHL_LINE	0.024***	0.014***
	(0.003)	-0.003
HERFINDAHL_STATE	-0.016*	0.008***
	(0.009)	-0.002
NPW_PERSONAL	-0.002	0.060***
	(0.008)	-0.003
NPW_COMMERCIAL	0.017*	0.028***
	(0.009)	(0.004)
REINSURANCE	0.027***	-0.035***
	(0.010)	(0.002)
NPW_GROWTH	-0.030***	-0.001
	(0.006)	(0.001)
GROUP_AFFILIATION	-0.003***	0.023***
	(0.001)	-0.006
FAMILY	0.002	0.023***
	(0.006)	-0.002
Year Fixed Effects	Included	Included
N	6,610	1,048

Table 5: The effect of SSAP 101 adoption on loss provisions – The ex ante tax aggressiveness of PC insurers

This table reports the test results for the effect of SSAP 101 adoption on insurers' loss provisions between 2009 and 2014. Following Grace and Leverty (2012), we use feasible generalized least squares with a panel-specific AR(1) autocorrelation structure model in the estimation. Please refer to Appendix 1 for variable definitions. Robust standard errors are reported in parentheses below each coefficient. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable: LOSS_RES_CY	(1)	(2)	(3)
POST_SSAP101	-0.004***	-0.006***	-0.005***
	(0.000)	(0.000)	(0.000)
POST_SSAP101×PRIVATE	-0.002***		
	(0.000)		
POST_SSAP101×FAMILY		0.005***	
		(0.000)	
POST_SSAP101×LOSS			0.006***
			(0.001)
PRIVATE	0.014***		
	(0.001)		
FAMILY		0.012***	
		(0.001)	
LOSS			0.016***
			(0.000)
Control Variables	Included	Included	Included
Year Fixed Effects	Included	Included	Included
N	6,610	6,610	6,610

Table 6: The effect of SSAP 101 adoption on loss provisions – Potential in-house actuary bias

This table reports the test results for the effect of SSAP 101 adoption on insurers' loss provisions between 2009 and 2014. Following Grace and Leverty (2012), we use feasible generalized least squares with a panel-specific AR(1) autocorrelation structure model in the estimation. Please refer to Appendix 1 for variable definitions. Robust standard errors are reported in parentheses below each coefficient. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable: LOSS_RES_CY	(1) Full Sample	(2) Private Only	(3) Public Only
POST_SSAP101	-0.004***	-0.004***	-0.007***
	(0.000)	(0.000)	(0.001)
POST_SSAP101×INHOUSE_ACTUARY	-0.001***	-0.005***	0.001
	(0.000)	(0.001)	(0.001)
INHOUSE_ACTUARY	-0.005***	0.000	-0.008***
	(0.001)	(0.000)	(0.001)
Control Variables	Included	Included	Included
Year Fixed Effects	Included	Included	Included
N	6,552	4,448	2,104

Table 7: SSAP 101 adoption and the earnings persistence of insurance companies

Panel A reports the test results for the effect of SSAP 101 adoption on insurers' earnings persistence using IRS audit (*IRS AUDIT*) as the partitioning variable. Note that observations for the year of adoption of SSAP 101 (t = 2012) are dropped. For the period before SSAP 101 adoption, Earnings t+1 ends at the year 2012, with Earnings t as the year 2011. For the period after SSAP 101 adoption, Earnings t begins with 2013 and Earnings t+1 is 2014. A constant term is included but not reported. Please refer to Appendix 1 for variable definitions. Robust standard errors are reported in parentheses below each coefficient. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: IRS monitoring

Dependent variable: NI proxy	(1) *NI t*+1	(2) *NIBT t*+1	(3) *NIBDT t*+1
POST_SSAP101×IRS_AUDIT×NI proxy	0.390***	0.427***	0.278***
	(0.078)	(0.086)	(0.066)
POST_SSAP101×IRS_AUDIT	-31.438	-0.387	13.683
	(21.951)	(24.162)	(24.825)
IRS_AUDIT×NI proxy	-0.006	0.036**	0.012
	(0.018)	(0.017)	(0.017)
POST_SSAP101×NI proxy	0.018***	0.008	0.008
	(0.006)	(0.006)	(0.007)
POST_SSAP101	3.432	-0.833	-2.862
	(4.538)	(4.976)	(5.134)
IRS_AUDIT	165.249***	168.872***	158.964***
	(17.377)	(19.241)	(19.837)
NI proxy	0.713***	0.711***	0.747***
	(0.016)	(0.015)	(0.015)
Control Variables	Included	Included	Included
Year Fixed Effects	Included	Included	Included
Adjusted R^2	0.68	0.71	0.73
N	5,499	5,499	5,499

Table 7: SSAP 101 adoption and the earnings persistence of insurance companies (continued)

Panel B reports the test results for the effect of SSAP 101 adoption on insurers' earnings persistence using private firm status (*PRIVATE*) as the partitioning variable. Note that observations at the adoption of SSAP 101 (t = 2012) are dropped. For the period before SSAP 101 adoption, Earnings t+1 ends at the year 2012, with Earnings t as the year 2011. For the period after SSAP 101 adoption, Earnings t begins with 2013 and Earnings t+1 is 2014. A constant term is included but not reported. Please refer to Appendix 1 for variable definitions. Robust standard errors are reported in parentheses below each coefficient. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel B: Private insurers

Dependent variable: NI proxy	(1) *NI t*+1	(2) *NIBT t*+1	(3) *NIBDT t*+1
POST_SSAP101×PRIVATE×NI proxy	0.611**	0.681**	0.412**
	(0.248)	(0.266)	(0.181)
POST_SSAP101×IRS_AUDIT	-2.559	-6.173	-5.422
	(4.440)	(4.699)	(4.470)
PRIVATE×NI proxy	-0.444***	-0.483***	-0.309***
	(0.152)	(0.147)	(0.108)
POST_SSAP101×NI proxy	0.017**	0.016**	0.013
	(0.007)	(0.008)	(0.012)
POST_SSAP101	-0.132	3.627	3.811
	(4.695)	(5.020)	(4.948)
PRIVATE	-1.694	0.338	-0.578
	(2.301)	(2.487)	(2.619)
NI proxy	0.817***	0.836***	0.838***
	(0.042)	(0.038)	(0.033)
Control Variables	Included	Included	Included
Year Fixed Effects	Included	Included	Included
Adjusted R^2	0.67	0.71	0.72
N	5,499	5,499	5,499

Table 8: SSAP 101 adoption and firm risk

This table reports the test results for the effect of SSAP 101 adoption on insurers' overall risk between 2009 and 2014. A constant term is included but not reported. Please refer to Appendix 1 for variable definitions. Robust standard errors are reported in parentheses below each coefficient. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable: ROA_VOLATILITY	(1)	(2)	(3)
POST_SSAP101	-0.004***	0.001	-0.004***
	(0.001)	(0.002)	(0.001)
POST_SSAP101×IRS_AUDIT		-0.021**	
		(0.010)	
POST_SSAP101×PRIVATE			-0.073***
			(0.009)
IRS_AUDIT		-0.002	0.024***
		(0.009)	(0.008)
PRIVATE	-0.002***	-0.002***	0.013***
	(0.001)	(0.001)	(0.002)
TAIL	-0.017***	-0.017***	-0.016***
	(0.003)	(0.003)	(0.003)
RATE_REGULATION	-0.004***	-0.004***	-0.003***
	(0.001)	(0.001)	(0.001)
SIZE	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)
HERFINDAHL_LINE	0.010***	0.010***	0.011***
	(0.002)	(0.002)	(0.002)
HERFINDAHL_STATE	-0.000	-0.000	-0.000
	(0.002)	(0.002)	(0.002)
NPW_PERSONAL	-0.010***	-0.010***	-0.009***
	(0.002)	(0.002)	(0.002)
NPW_COMMERCIAL	-0.012***	-0.012***	-0.011***
	(0.002)	(0.002)	(0.002)
REINSURANCE	-0.007***	-0.007***	-0.006***
	(0.002)	(0.002)	(0.002)
NPW_GROWTH	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)
GROUP_AFFILIATION	-0.001	-0.002	-0.000
	(0.001)	(0.001)	(0.001)
FAMILY	0.002**	0.002**	0.002*
	(0.001)	(0.001)	(0.001)
Year Fixed Effects	Included	Included	Included
Adjusted R^2	0.06	0.06	0.07
N	6,562	6,562	6,562