Regulatory Capital Planning and Deferred Tax Assets in a Post-Financial Crisis Environment

Evan M. Eastman[a]
Florida State University

Anne C. Ehinger[b]
Florida State University

Cathryn M. Meegan[c]
Florida State University

January 2020

Abstract

We examine the role of accounting discretion in calculating regulatory capital in financial institutions. We use the insurance industry as our setting as regulators substantially relaxed rules relating to deferred tax asset (DTA) inclusion in regulatory capital calculations during and following the financial crisis. Many DTAs depend upon future taxable income for realization, making them less liquid relative to other assets. We find evidence that firms use the increased discretion in regulation to increase the proportion of their regulatory capital relating to DTAs. As DTAs are less liquid relative to other assets, our study raises the concern that insurance firms may appear more financially stable than the reality of their underlying economic condition. Consistent with this concern, we find firms with relatively low levels of regulatory capital include higher levels of DTAs in their regulatory capital calculations relative to their peers, higher levels of DTAs are associated with a higher likelihood of insolvency, and ratings agencies are not incorporating DTAs into their life insurer rating criteria. Our study has important implications for regulators considering changes to capital standards for other financial institutions.

Keywords: Deferred Tax Assets; Regulatory Capital; Insurance; Ratings; Regulation
JEL Codes: G18; G22; H25; M41; M48

The authors would like to thank Mike Barth, Jeff Paterson, Dan Schwarcz, the Texas A&M Tax Readings Group, and several individuals with the National Association of Insurance Commissioners for helpful comments and discussions.
[a] Dr. William T. Hold/The National Alliance Program in Risk Management/Insurance, College of Business, Florida State University, Tallahassee, FL, 32306, email: eeastman@business.fsu.edu.
[b] Department of Accounting, College of Business, Florida State University, Tallahassee, FL, 32306, email: aehinger@business.fsu.edu.
[c] Department of Accounting, College of Business, Florida State University, Tallahassee, FL, 32306, email: cmeegan@fsu.edu.

Regulatory Capital Planning and Deferred Tax Assets in a Post-Financial Crisis Environment

Abstract

We examine the role of accounting discretion in calculating regulatory capital in financial institutions. We use the insurance industry as our setting as regulators substantially relaxed rules relating to deferred tax asset (DTA) inclusion in regulatory capital calculations during and following the financial crisis. Many DTAs depend upon future taxable income for realization, making them less liquid relative to other assets. We find evidence that firms use the increased discretion in regulation to increase the proportion of their regulatory capital relating to DTAs. As DTAs are less liquid relative to other assets, our study raises the concern that insurance firms may appear more financially stable than the reality of their underlying economic condition. Consistent with this concern, we find firms with relatively low levels of regulatory capital include higher levels of DTAs in their regulatory capital calculations relative to their peers, higher levels of DTAs are associated with a higher likelihood of insolvency, and ratings agencies are not incorporating DTAs into their life insurer rating criteria. Our study has important implications for regulators considering changes to capital standards for other financial institutions.

Keywords: Deferred Tax Assets; Regulatory Capital; Insurance; Ratings; Regulation
JEL Codes: G18; G22; H25; M41; M48

I. INTRODUCTION

Financial institutions play a dominant role in the U.S. economy, representing 7.4 percent of gross domestic product in 2018 (U.S. Bureau of Economic Analysis).[1] The recent financial crisis of 2007-2009 illustrates the sensitivity of the U.S. market to financial institution liquidity concerns (e.g., Campello, Giambona, Graham, and Harvey 2011; Cornett, McNutt, Strahan, and Tehranian 2011). As a means of preventing financial institution liquidity shortfalls, regulators require these firms to maintain a minimum amount of regulatory capital. The purpose of the regulatory capital calculation is to determine if financial institutions have sufficiently liquid assets to fulfill obligations.[2] The calculation generally allows for inclusion of a portion of deferred tax assets (DTAs) as regulatory capital, leading to debates on how much of a firm's DTAs meet this requirement.[3] Following the financial crisis, financial institutions, including banks and insurers, pushed for new regulation increasing the amount of DTAs includable in their respective regulatory capital calculations. Recently, insurance regulators in the U.S. passed legislation allowing for increased inclusion of DTAs in regulatory capital calculations. We use the recent changes in regulation in the U.S. insurance industry to examine potential consequences and provide evidence on how changes in regulation affect regulatory capital.

In this paper, we examine the implications of regulatory changes that allow insurance companies more discretion to use DTAs as a component of their regulatory capital. Specifically, we examine four broad research questions. First, we test whether insurers increase the amount of admitted DTAs in regulatory capital following the adoption of SSAP 10R and SSAP 101—

[1] Banks represent 3.1 percent while insurance companies represent 2.8 percent of gross domestic product.
[2] In general, financial institutions report two categories of assets. The first category represents assets that are generally more liquid and, therefore, can be counted for regulatory capital purposes. The insurance industry refers to these assets as "admissible" or "admitted" assets. The second category represents non-liquid assets, which are not counted for regulatory capital purposes. The insurance industry refers to these assets as "non-admissible" or "non-admitted" assets.
[3] Unless otherwise indicated, DTAs refer to *net* deferred tax assets, which are adjusted gross deferred tax assets (deferred tax assets less the valuation allowance) less deferred tax liabilities.

regulatory changes to statutory accounting standards that allow for greater inclusion of DTAs in regulatory capital. Second, we examine whether firms with greater incentives to manipulate the amount of DTAs included in regulatory capital do so. Third, we examine whether firms with higher levels of admitted DTAs in their regulatory capital are more likely to become insolvent. Finally, we test whether ratings agencies consider DTAs included in regulatory capital when determining an insurance firm's financial strength rating.

This topic is of interest not only to researchers, but also to regulators and consumers. Researchers have called for additional evidence on firm behavior in response to regulation, specifically with respect to manipulation of DTAs for regulatory capital purposes (Hanlon and Heitzman 2010; Acharya and Ryan 2016). To our knowledge, our paper is the first to examine consequences of a change in regulatory capital regulation with respect to DTAs in isolation. Skinner (2008) finds that Japan's concurrent adoption of deferred tax accounting for financial reporting and allowance of DTAs in regulatory capital afforded banks discretion in their regulatory capital calculations and contributed to the Japanese financial crisis. Gallemore (2012) examines consequences of including DTAs in regulatory capital during the financial crisis and finds empirical evidence that banks with a higher proportion of capital composed of DTAs prior to the financial crisis were more likely to fail during the recession. Our setting differs from these papers for the following reasons. First, unlike Gallemore (2012), we examine a change in regulatory capital regulation. Second, unlike Skinner (2008), the change in regulatory capital regulation does not coincide with a change in financial reporting regulation. These two differences afford us sharper identification of the consequences of including DTAs in regulatory capital.

From a regulatory perspective, our findings have clear implications for developing capital requirements for financial institutions. The primary goal of regulators is to ensure the stability and solvency of financial institutions. Therefore, regulators are interested in ensuring that firms have sufficiently liquid assets to fulfill obligations. In the insurance industry, regulators have designed accounting standards and risk-based regulatory capital requirements with this goal in mind—assets that are not sufficiently liquid are not included as regulatory capital. While some components of DTAs have a degree of liquidity in that they result in current reductions in tax payments or tax refunds (e.g., loss carrybacks), others depend on future taxable income in order to provide liquidity in the form of reduced future cash tax payments. As a result, sufficiently distressed firms will not fully realize the future benefits associated with many DTAs. Therefore, the role of DTAs in regulatory capital is relevant as bank and insurance regulators consider whether and to what extent DTAs should be includable, particularly given prior evidence of the dangers of doing so (Skinner 2008; Gallemore 2012).

Our findings are also of interest to consumers. Due to the inherent information asymmetry between consumers and financial institutions, regulators are tasked with ensuring that financial institutions maintain a minimum level of financial strength so that they can fulfill future obligations to consumers (Munch and Smallwood 1981; Bhattacharya, Boot, and Thakor 1998; Klein 2012). Financial institutions exercising discretion over DTAs may appear to have greater liquidity to meet their obligations than actually supported by the underlying tax positions creating the DTAs, thereby providing an inaccurate depiction of their financial strength to regulators and consumers. Additionally, even if financial institutions do not actually become insolvent, increased risk can affect prices. Specifically, prior research finds evidence that consumers of financial products are risk-sensitive in that they demand lower prices when insolvency risk is higher (Flannery and Sorescu 1996; Sommer 1996; Park and Peristiani 1998; Epermanis and Harrington 2006). However, if consumers cannot untangle the increased risk associated with less liquid assets included in regulatory capital, firms may appear to be financially stronger than their actual economic condition, translating into higher prices for consumers. Therefore, any finding that relates DTAs to firm probability of insolvency (or perceived changes through financial strength ratings) has potential implications for consumers through prices.

Using ordinary least squares, we first regress the level of admitted DTAs on indicators for the various statutory accounting rules determining how insurers must account for DTAs, as well as other hypothesized determinants of DTAs.[4] By doing so, we discern whether and to what extent the use of DTAs has increased over time. We also test whether firms with relatively low regulatory capital are using discretion over DTAs to boost their capital in an effort to avoid regulatory scrutiny by state insurance regulators. We next use logit models to predict the probability of insolvency for the firms in our sample, with a particular focus on whether relatively higher DTAs as a percentage of regulatory capital are suggestive of solvency issues. Our final analysis tests whether ratings agencies use DTAs to inform their rating decisions.

We offer four main results. First, we find evidence that the *percentage* of DTAs included in regulatory capital has been increasing over time in the life insurance industry. We find that the *level* of admitted DTAs has increased over time for life insurers, but we do not find a corresponding increase in *total* (admitted plus non-admitted) DTAs. This result suggests that life insurers are using the discretion afforded in new regulation to increase the level of admitted DTAs. The increase has been particularly stark and began during the financial crisis leading up to the adoption of SSAP 10R, rising from $12 billion in admitted DTAs in 2007 to over $37 billion in 2016. In the property-casualty (P/C) industry, however, we find the increase in admitted DTAs was

[4] Consistent with insurer regulatory capital calculations, we use net DTAs in our analyses. The calculation consists of reducing any DTAs admitted into regulatory capital by any DTLs that could offset these DTAs in the applicable time period. See Section II for additional details.

concentrated in the years immediately following the financial crisis.[5] Second, we find evidence that firms with relatively low regulatory capital tend to have a greater proportion of their regulatory capital composed of DTAs, suggesting that firms manipulate DTAs to appear financially healthier, despite there being limited liquidation value to these assets. Third, we find evidence that the level of admitted DTAs is predictive of insurers becoming insolvent. Finally, despite our documented association between DTAs and insolvency, we find mixed evidence that ratings agencies use DTAs as a component of their rating criteria—notably, they do not appear to apply a rating penalty to life insurers following the implementation of SSAP 10R.

We make several contributions to the literature. First, we contribute to the literature on regulation, managerial incentives, and accounting discretion. In general, Petroni (1992) finds that insurers exercise discretion over loss reserves to appear financially stronger. Gaver and Paterson (1999) find that this discretion weakens following a change in regulation introducing risk-based capital requirements. Hanley, Jagolinzer, and Nikolova (2018) find that financially weaker insurance companies inflate their fair value estimates to a greater extent to produce regulatory capital ratios that appear financially healthier. Beatty, Chamberlain, and Magliolo (1995) find that banks exercise discretion over loan charge-offs, loan loss provisions, and the decision to issue securities as a means of managing their regulatory capital ratios. We identify a new area of discretion available to a sub-sample of financial institutions in the U.S.—inclusion of DTAs in the risk-based regulatory capital ratio for insurers—and examine managerial discretion over inclusion in response to evolving regulation.

[5] In general, we find that admitted DTAs and total DTAs decrease over time for P/C insurers. This result suggests that P/C insurers on average did not have DTA positions that allowed them to benefit from the increased discretion in the regulations in the same manner as life insurers.

Second, we contribute to the literature examining manager discretion over tax accounts. Prior literature finds evidence consistent with managers using tax accounts to engage in earnings management. Dhaliwal, Gleason, and Mills (2004) find evidence suggesting that managers manipulate their fourth quarter effective tax rate downward to meet earnings benchmarks. Other research finds that managers use discretion in the designation of permanently reinvested earnings (Krull 2004) and the tax cushion (e.g., Gupta, Laux, and Lynch 2016) to meet earnings targets. With respect to DTAs, there is mixed evidence on whether managers use deferred taxes to meet earnings targets (Miller and Skinner 1998; Bauman, Bauman, and Halsey 2001; Schrand and Wong 2003; Frank and Rego 2006). However, to the best of our knowledge, little research exists examining manager discretion over tax accounts to meet regulatory capital requirements. With respect to DTAs, Skinner (2008) finds that managerial incentives during the Japanese financial crisis led firms to use discretion over the inclusion of DTAs in regulatory capital following adoption of deferred tax accounting for financial reporting purposes, and this discretion allowed them to achieve their regulatory capital goals. In our setting, the insurance industry, we are able to examine responses to changes in regulation separately from responses to changes in accounting standards. Our research answers Hanlon and Heitzman's (2010, 133-134) call for additional research on financial institutions' responses to regulation allowing for greater inclusion of tax accounts in regulatory capital. More specifically, we find that firms include a greater amount of DTAs in their regulatory capital as discretion in the regulations increases and when they have greater incentives to do so to meet minimum capital requirements.

Finally, our research contributes to the literature examining the role of financial institutions in the recent financial crisis (Billio, Getmansky, Lo, and Pelizzon 2012; Koijen and Yogo 2015; Acharya and Ryan 2016). The goal of financial regulation is to maintain stability and liquidity in the financial industry (Acharya and Ryan 2016). Financial regulation generally uses regulatory capital ratios as a means of determining the stability and liquidity of these firms, thus incentivizing management to use all means available to maintain and improve these ratios. We find that managers use discretion in the regulations with respect to including DTAs in regulatory capital, and as discretion in the regulation increases, so does the level of admitted DTAs. We also find that firms with greater incentives to manipulate their regulatory capital ratios appear to use the increased discretion in DTA regulation to do so. These admitted DTAs increase the risk of insolvency and this increased risk of insolvency for life insurers appears to go unnoticed by ratings agencies, raising similar concerns as those thought to have precipitated the financial crisis.

The rest of this paper proceeds as follows. In section II we provide background on deferred tax assets as well as the insurance industry. In section III we provide our testable hypotheses. Section IV describes our research design and section V presents our results. We briefly conclude in section VI.

II. BACKGROUND

Deferred Tax Asset Accounting

SFAS 109, effective for fiscal years beginning after December 15, 1992, requires firms to use an asset and liability approach for reporting income taxes. Firms report estimated future tax effects related to temporary differences and carryforwards as deferred tax assets (DTAs) or liabilities (DTLs) on the balance sheet (SFAS 109, ASC 740). A gross DTA represents a future tax benefit, either a reduction in income taxes payable or a refund of previous income taxes paid. In order to utilize the gross DTA, a firm must have sufficient future income of the appropriate type and in the appropriate jurisdiction. If an evaluation of all evidence, positive and negative, suggests it is more likely than not that the future income will not be realized and the gross DTA will not be utilized, firms must accrue a valuation allowance against the gross DTA. Therefore, adjusted gross DTAs (deferred tax assets less valuation allowance) should represent the future tax benefits that management believes it more likely than not they will utilize. As managers also consider DTLs when assessing the valuation allowance, we use net deferred tax assets, (adjusted gross DTAs less DTLs), referred to as DTAs, in our analysis.

The accrual of DTAs and the valuation allowance requires managers to exercise discretion (Miller and Skinner 1998; Visvanathan 1998). There is some concern with regulators and the public that management may use this discretion opportunistically to meet particular targets. Research conducted soon after passage of SFAS 109 found mixed results with respect to the use of the valuation allowance for earnings management. Several studies find little evidence of earnings management to meet prior earnings or to take a big bath (Frank and Rego 2006). Others suggest that the valuation allowance is based on expectations of future performance, consistent with the requirements of SFAS 109, and is predictive of future income and cash flows (Jung and Pulliam 2006; Christensen, Paik, and Stice 2008; Miller and Skinner 2008; Dhaliwal, Kaplan, Laux, and Weisbrod 2013). In contrast, some studies find possible opportunistic use of the valuation allowance to smooth earnings (e.g., Schrand and Wong 2003) or meet analysts' forecasts (Bauman et al. 2001; Frank and Rego 2006).

The U.S. insurance industry provides a powerful setting in which to examine the issue of manager discretion over deferred taxes and regulatory capital. First, we have detailed adjusted gross DTA and DTL data from statutory annual reports required for U.S. insurers, allowing us to observe the amount of DTAs that insurance firms classify as admitted assets for regulatory purposes. In addition, Schipper (1989) suggests focusing studies of opportunistic management of accounting figures on situations with clear incentives. One such incentive occurs for financial institutions that are sufficiently financially distressed and at risk of violating their regulatory capital requirements. Visvanathan (1998) finds evidence suggesting firms in financial distress may be more likely to engage in earnings management using the valuation allowance. Managers also have incentives to engage in opportunistic activities when new regulation allows them to do so. With respect to the banking industry, Schrand and Wong (2003) find, in general, that management does not use the valuation allowance to manage earnings, but firms with sufficient regulatory capital reserve greater valuation allowances at adoption and use these valuation allowances to smooth future earnings. To our knowledge, no study has focused on the use of DTAs to manage regulatory capital in the U.S. insurance industry. For insurance companies, there are two separate situations where managers may exercise discretion over DTAs: in calculating the original accrual of DTAs and valuation allowance and in calculating the amounts that can be included for regulatory purposes using tax planning. Following the financial crisis, the insurance industry has experienced two regulatory changes over time that have increased insurer discretion over DTA reporting, thus allowing us to examine the effect of increased discretion over DTA reporting on financial institution regulatory capital ratios.

Institutional Background—The Insurance Industry

Insurance Regulation and Statutory Accounting

The insurance industry in the U.S. is largely regulated by individual states. The McCarran-Ferguson Act, passed in 1945, establishes that individual states can each govern and regulate their own insurance market. In an effort to harmonize regulation across states, the insurance commissioners from every state are part of a non-profit corporation known as the National

Association of Insurance Commissioners (NAIC). While the NAIC is not a government body—and, therefore, has no official legislative authority—the organization is "the most important and powerful entity in insurance regulation" (Schwarcz 2018, 193).

While certain regulations vary substantially from state to state, such as rate regulation (i.e., the regulation of insurance pricing), the NAIC has achieved substantial homogeneity for solvency regulation. Following a wave of serious insolvencies in the late 1980s and early 1990s, federal regulators threatened to overtake insurance regulation. The NAIC responded, in part, by creating the Financial Standards and Accreditation Program. In order to be a part of this program, a state insurance department must comply with the NAIC's solvency-associated model laws.[6] Failing to comply with the program would result in insurance regulators being unable to defer insurance regulation to an insurer's state of domicile, which would result in insurers shifting operations out of the non-complying state (Schwarcz 2018). Every state is, therefore, enrolled in the Financial Standards and Accreditation Program.

Insurance regulators have several methods for monitoring solvency.[7] While insurers historically relied on an "early warning system" which consists of a set of ratios (e.g., Petroni 1992; Gaver and Paterson 1999), following the aforementioned series of insolvencies in the late 1980s and early 1990s, the NAIC developed and adopted a system of risk-based capital (RBC) requirements that went into effect for life insurers in 1992 and P/C insurers in 1994.[8] The goal of the RBC system is to identify potentially distressed insurers prior to becoming insolvent. Regulators achieve this by constructing an RBC ratio, which is calculated as follows:

[6] Model laws are pieces of legislation that are written by the NAIC and are intended to be passed individually by states in an effort to improve the consistency of insurance regulation across states.
[7] Klein (2012) argues that insurance solvency regulation is necessary due to information asymmetry between insurance sellers and buyers—it is relatively difficult for consumers to assess the financial condition of insurers. It is also difficult for policyholders to monitor insurance sellers after the sale of the policy, to ensure that they do not take excess risk.
[8] The insurance industry uses the term "risk-based capital" to refer to insurance-specific regulatory capital requirements. In this paper, we use "regulatory capital" and "risk-based capital" interchangeably.

$$RBC\ Ratio = \frac{Total\ Adjusted\ Capital}{Total\ Risk - Based\ Capital} \qquad (1)$$

where *Total Adjusted Capital* is an insurer's adjusted capital and surplus.[9] A firm's level of admitted DTAs represent the amount of a firm's total DTAs that are included in *Total Adjusted Capital*. Holding all else equal, as the amount of admitted DTAs increases, the RBC Ratio also increases. *Total Risk-Based Capital* is intended to measure the amount of capital an insurer *should* hold based on how much risk they are taking. Insurer risks are broken into four categories. Property-casualty insurer risks are categorized as asset risk, credit risk, underwriting risk, and miscellaneous "off-balance sheet" risk. Life insurer risks are categorized as asset risk, insurance risk, interest rate risk, and miscellaneous business risk. Within each of these risk categories, the NAIC assigns RBC factors to activities according to how risky each activity is. For example, investing in highly rated corporate bonds carries a relatively low risk factor, while investing in common stocks carries a higher risk factor. Taking the weighted sums of the risks in each category (and then performing a covariance adjustment) results in a firm's total RBC (i.e., the denominator of the RBC ratio in equation (1)).

Based on this ratio, firms are subject to varying levels of regulatory action once their RBC ratio falls below a certain threshold (i.e., they are not holding sufficient capital to offset the risks they are taking). Specifically, once ratios fall below 200 percent (the Company Action Level or CAL), regulators have the right to seize a company and can force the company to take action to ensure solvency in a process known as receivership (Grace, Klein, and Phillips 2002). At this point, regulators can decide whether to attempt to rehabilitate the firm, with the ultimate goal of returning

[9] The starting point for an insurance firm's total adjusted capital is equal to the firm's total assets minus total liabilities. There are several adjustments required to balance sheet capital and surplus for the purposes of calculating the RBC ratio. One example is that life insurers must include the asset valuation reserve (AVR), which is a liability, into adjusted capital, thus increasing the numerator of the RBC ratio.

it to private ownership, or, if the financial situation is too severe, liquidating the firm to reduce the impact on those firm's policyholders.

Every state has set up a guaranty association to deal with insolvent insurers. When insurance regulators declare an insurer to be insolvent, they will collect assessments from other insurers operating in the state, proportional to their premium volume. These funds, as well as the proceeds from the liquidated assets from the troubled insurer, will be used to pay the claims of policyholders of the insolvent firm. Corporate policyholders are typically excluded from collecting from a guaranty fund and individuals are limited depending on the state and line of business. Leverty and Grace (2018) report that the average guaranty fund assessment is nearly two dollars for every one dollar in pre-insolvency assets, suggesting that insurer insolvencies are relatively expensive. The costs of these insolvencies are potentially passed on, at least in part, to policyholders of surviving insurers—Barrese and Nelson (1994, 13) estimate that around 21 percent of insolvency costs are passed onto consumers.

DTAs in the Insurance Industry—SSAP 10, SSAP 10R, and SSAP 101

In general, solvency regulation focuses on measuring how much of an insurance company's assets could readily be converted to cash if the company faced insolvency concerns. Admitted DTAs make up a significant portion of these assets considered in determining a company's total adjusted capital. Since the financial crisis, admitted DTAs as a percentage of total DTAs have consistently increased for life insurers (Figure 1). Admitted DTAs as a percentage of total DTAs initially increased for P/C insurers from 2007 through 2012. However, this percentage has begun to decline in more recent years (Figure 2).[10] For life insurers, the total dollar amount of admitted

[10] Life insurers heavily lobbied for changes in the inclusion of DTAs as regulatory capital. Under IRC §846, life insurers are required to discount their unpaid losses (loss reserves) for tax purposes, resulting in a lower deduction for

DTAs has increased from $12 billion in 2007 to $36 billion in 2016 (Figure 3), while total DTAs have remained relatively steady or slightly decreased since the financial crisis (Figure 5). P/C insurers have experienced a decline in both admitted and total DTAs following the financial crisis (Figures 4 and 6). Since DTAs rely on future taxable income to be realized, regulation generally limits the admissibility of DTAs in regulatory capital. Historically, insurance regulators have either not allowed DTAs to be used for regulatory purposes (prior to 2001) or have allowed relatively little discretion over their admittance (beginning in 2001). However, recently the NAIC has revised the regulations guiding the amount of DTAs includable in insurance companies' total adjusted capital calculation, or insurance companies' admitted DTAs. In general, the regulations have allowed for increased inclusion over time.

[Insert Figures 1 through 6 here]

From January 1, 2001 through December 31, 2009 insurance companies were required to follow the Statement of Statutory Accounting Principles No. 10 (SSAP 10) when determining the level of admitted DTAs for regulatory capital purposes. SSAP 10 provides the strictest criteria for calculating a firm's level of admitted DTAs. First, firms may admit any portion of adjusted gross DTAs (gross deferred tax assets less the valuation allowance) that resulted from net operating losses (NOLs) to the extent that the NOLs may immediately be carried back to prior tax returns to offset previously reported taxable income and result in an additional tax refund to the company. Second, with respect to remaining DTAs, firms may admit the lesser of adjusted gross DTAs that they expected to realize within one year or adjusted gross DTAs equal to 10 percent of statutory capital and surplus. Finally, a firm may admit any remaining adjusted gross DTAs if they can be used to offset existing deferred tax liabilities (DTLs). Thus, the final DTA amount admitted into

tax purposes than for financial reporting purposes, thus creating a deferred tax asset. Aggregate life insurance reserves were $3.182 trillion in 2016 representing approximately 50 percent of total life insurance liabilities.

regulatory capital takes into account admissible adjusted gross DTAs offset by any applicable DTLs.

During the financial crisis, insurance companies pushed regulators for revisions to the admissibility of DTAs in the regulatory capital calculation. Regulators in several states began allowing insurance firms to admit more DTAs to improve their capital positions as a means of regulatory forbearance (GAO 2013). Life insurance companies hit hardest during the financial crisis led the push for revision to SSAP 10 in the insurance industry.[11] In response, the NAIC issued SSAP 10R, a temporary replacement of SSAP 10 effective for interim and annual periods of 2010 and 2011. SSAP 10R provided more immediate DTA admission relief to insurance companies following the financial crisis while the NAIC continued to work on new, permanent regulation.

Similar to SSAP 10, the temporary SSAP 10R has three primary categories of admissible DTAs. Insurance companies still admit any adjusted gross DTAs relating to NOLs that can immediately be realized in the form of tax refunds. However, now firms may admit any remaining adjusted gross DTAs to a greater extent. If the firm's RBC ratio is greater than 250 percent (300 percent) for life (P/C) insurance companies, admissible adjusted gross DTAs now include the lesser of any adjusted gross DTAs expected to be realized within *three years* or *15 percent* of statutory capital and surplus. As noted in guidance issued by PwC, if adjusted gross DTAs are not expected to naturally reverse over this time period, the firm may be able to engage in tax planning strategies that would support increased reversals and admissibility (PwC 2012). As a result, the

[11] In 2009, the Clearing House Association L.L.C. and the American Bankers Association pushed for similar revisions in the banking industry and failed. In October 2013, the Federal Reserve published final Basel III regulations effective January 1, 2015. These regulations limit the amount of DTAs includable in parts of the regulatory capital calculation and increase the complexity associated with DTA inclusions in other parts of the regulatory capital calculation. It is initially unclear whether these regulations will allow for increased or decreased inclusion of DTAs in regulatory capital for banks.

expanded horizon for estimating adjusted gross DTA realization allows management additional opportunities to exercise discretion over identifying potential future tax planning strategies allowing for current admission in regulatory capital. With respect to any remaining adjusted gross DTAs that may be used to offset DTLs, companies now also have to consider the character of remaining adjusted gross DTAs and DTLs. More specifically, firms may only use ordinary adjusted gross DTAs to offset ordinary DTLs and capital adjusted gross DTAs to offset capital DTLs.

Effective January 1, 2012, SSAP 101 replaced SSAP 10 and SSAP 10R as guidance for the admission of DTAs into regulatory capital. SSAP 101 largely follows SSAP 10R, with one notable exception. Firms still start by considering adjusted gross DTAs relating to NOLs that can be realized as tax refunds, and they still end by considering remaining adjusted gross DTAs that can be used to offset DTLs of similar character. However, SSAP 101 modifies the second step by providing additional guidance on admission based on RBC ratios. If the company's RBC ratio is greater than *300 percent*, the company may admit the lesser of adjusted gross DTAs expected to be realized over three years or 15 percent of statutory capital and surplus. If the company's RBC ratio is *between 200 and 300 percent*, the company may admit the lesser of adjusted gross DTAs expected to be realized over *one year* or *10 percent* of statutory capital and surplus. Finally, if the company's RBC ratio is *below 200 percent*, the company admits zero additional adjusted gross DTAs in regulatory capital.[12] As the new regulations enhance the ability to use tax planning to increase assets included in regulatory capital and increase distance from risk-based capital limits

[12] Financial institutions go to great lengths to avoid regulatory attention (e.g., Hanley et al. 2018). In general, insurance companies avoid falling below the 200 percent CAL. As a result, almost no companies in our sample approach the 300 percent risk-based capital limitation under the new regulation.

that would trigger regulatory action, the insurance industry provides an ideal setting to examine the opportunistic use of this tax account where incentives are clear.

III. HYPOTHESIS DEVELOPMENT

In this study we test four hypotheses. First, we examine the association between the passage of SSAP 10R and SSAP 101 and changes in insurance companies' inclusion of DTAs in their regulatory capital calculation. Given the increase in the amount of discretion firms have over the level of admitted DTAs, we predict that insurance companies will increase the level of admitted DTAs included in total adjusted capital. We formally propose the following hypotheses in alternative form:

> **H1a**: *The level of admitted deferred tax assets will increase following implementation of SSAP 10R.*

> **H1b**: *The level of admitted deferred tax assets will increase following implementation of SSAP 101.*

As described above, both SSAP 10R and SSAP 101 substantially increase the amount of discretion firms have over the level of admitted DTAs, primarily by extending the time period of realization. Prior studies find evidence that when facing potential regulatory scrutiny, financial institutions use their discretion over non-DTA accounts to circumvent solvency regulation (Petroni 1992; Beatty et al. 1995; Collins, Shackelford, and Wahlen 1995; Gaver and Paterson 1999; Hanley et al. 2018). Consistent with prior literature, we predict that firms with greater incentives to use discretion to manipulate RBC ratios and, therefore, avoid regulatory scrutiny will do so. We formally propose the following hypotheses in the alternative form:

> **H2**: *The level of admitted deferred tax assets will be greater for firms with lower RBC ratios than for other firms.*

Financial institutions make up a significant portion of the U.S. economy. Therefore, their ongoing solvency can have a substantial impact on not only the financial sector, but the U.S. economy as a whole (Billio et al. 2012). As noted by Gallemore (2012, 12), unlike other components of regulatory capital, DTAs are dependent upon future taxable income and cannot be used to fulfill financial obligations in periods where a firm reports a loss. Given both the importance of a stable financial sector as well as the potential for DTAs to go unrealized, we therefore, propose the following hypothesis in null form:

> **H3**: *The level of admitted deferred tax assets is not associated with the probability of insurance firm insolvency.*

The primary goal of ratings agencies is to reduce information asymmetry between institutions and external parties. While studies suggest that ratings convey useful information to capital markets (e.g., Hand, Holthausen, and Leftwich 1992; Dichev and Piotroski 2001), another stream of literature questions the degree to which ratings agencies incorporate new information in a timely manner (e.g., Alissa, Bonsall, Koharki, and Penn 2013; Behr, Kisgen, and Taillard 2016; Flynn and Ghent 2017). Since SSAP 10R and SSAP 101 expand the period of time for includable DTAs, there is increased uncertainty as to whether a firm will be able to fully realize the DTAs included in regulatory capital. If rating agencies discount the additional DTAs due to the increased uncertainty of being realized, we may find a negative relation between DTAs and ratings. However, if ratings agencies do not adjust their ratings criteria for additional DTAs admitted under SSAP 10R and SSAP 101, there is the potential that issued ratings are overstated. The overstatement results from the issued rating treating DTAs equally with other sources of regulatory capital, many of which are more liquid and, therefore, more likely to be used to meet obligations.

A final possibility is that ratings agencies either do not consider or view the level of included DTAs as worthy of consideration for their rating criteria. In a 2013 GAO report, an anonymous ratings agency states that "the effects of the expanded limits were insignificant and did not affect the agency's ratings" (GAO 2013, 45). Ex ante, since the relation between DTAs and ratings is unclear, we propose the following null hypothesis:

> **H4**: *Ratings agencies do not incorporate the level of admitted deferred tax assets into their financial strength ratings.*

IV. RESEARCH DESIGN

Data

We use data from insurers' annual statutory filings provided by the NAIC. These filings include, but are not limited to, balance sheet, income statement, regulatory capital, and tax footnote data. P/C insurers and life insurers file separate statements. Our original sample includes all P/C and life insurers with financial statements from 2002 to 2016. We use data from 2002 to construct lagged variables, and we use data from 2003 to 2016 for our analysis. We then supplement these data with two additional sources. First, we use data from the NAIC's Global Receiver Information Database (GRID), which contains information on formal regulatory interventions for insurers between 1984 and 2018. We also obtain data on financial strength ratings from A.M. Best.

[Insert Table 1 here]

Table 1 provides information on our sample selection process for both our life and P/C samples. We begin our sample in 2003. We exclude 2001 to allow firms one year to implement SSAP 10. We use data from 2002 to create lagged variables used in our regression analyses. We end our sample period in 2016 to avoid contamination from the 2017 passage of the Tax Cuts and Jobs Act. We then clean our sample by excluding observations with non-positive or missing values of surplus, assets, or premiums. Additionally, we exclude firms that are domiciled outside of the 50 U.S. states or Washington D. C. Finally, we exclude firms with missing or insufficient data to calculate our control variables. Our life sample consists of 10,061 firm-year observations and 1,082 unique firms. Our P/C sample consists of 28,530 firm-year observations and 2,799 unique firms.[13,14]

Determinants of DTAs

Firms do not disclose the details behind their calculation of the RBC ratio (including the weighting assigned to each account based on its individual risk). However, they do disclose the unweighted amounts of admitted DTAs for purposes of calculating the RBC ratio. Therefore, we follow prior literature (e.g., Koijen and Yogo 2016; Hanley et al. 2018) and scale our account of interest (i.e., the level of admitted DTAs disclosed by the firm) by total surplus to proxy for the amount of DTAs included in the RBC ratio calculation.

In order to examine if the level of admitted DTAs increases under SSAP 10R and SSAP 101 (H1a and H1b), we estimate the following model using OLS:

$$DTA_{it} = \beta SSAP10R_t + \gamma SSAP101_t + \phi \boldsymbol{X}_{it} + \boldsymbol{I}_s + \epsilon_{it} \quad (2)$$

where DTA_{it} is firm i's admitted net deferred tax assets in year t scaled by surplus. A firm's admitted net deferred tax assets include a reduction for existing deferred tax liabilities that would be realized during the period under consideration. $SSAP10R_t$ and $SSAP101_t$ are binary variables

[13] Due to the state-based regulatory structure of the U.S. insurance industry, insurers are commonly organized into groups with numerous affiliates operating in different states (Petroni and Shackelford 1995). For example, the Metropolitan Group consists of separate entities, including Metropolitan Life Insurance Co, New England Life Insurance Co, American Life Insurance Co, and Omega Reinsurance Corp, all acting under a common ownership structure. For example, our sample of 2,799 property-casualty firms represents unique underlying affiliates of insurance groups.

[14] State insurance regulators enforce regulatory capital requirements at the affiliate level. Likewise, the affiliate is responsible for reporting DTAs.

equal to one during years when SSAP 10R and SSAP 101 were enforced, respectively, and zero otherwise. If firms increase their level of admitted DTAs following SSAP 10R and SSAP 101, we expect positive estimated coefficients on $SSAP10R_t$ and $SSAP101_t$ ($\beta > 0$, $\gamma > 0$). $\boldsymbol{X}_{it}$ is a vector of firm-level control variables. $\boldsymbol{I}_s$ represents state fixed effects. ϵ_{it} is a random error term. We estimate equation (2) separately for life and P/C insurers to reflect differences in their operations and regulatory capital calculations.

In addition to our variables of interest, we also control for other factors that could potentially affect an insurer's level of admitted DTAs. Specifically, we include leverage ($Liabilities/Surplus_{it}$), profitability (ROA_{it}), size ($ln(Assets)_{it}$), and the insurer's ownership structure ($Mutual_{it}$).

In order to examine if firms with incentives to manipulate their level of admitted DTAs do so (H2), we estimate the following model using OLS:

$$DTA_{it} = \beta SSAP10R_t + \gamma SSAP101_t + \psi Low\ RBC_{it} + \omega SSAP10R_t * Low\ RBC_{it} + \zeta SSAP101_t * Low\ RBC_{it} + \phi \boldsymbol{X}_{it} + \boldsymbol{I}_s + \epsilon_{it} \quad (3)$$

$Low\ RBC_{it}$ is a binary variable equal to one if firm i's risk-based capital ratio was in the lowest 25 percent of firms in year t and zero otherwise. If firms with low RBC ratios use the discretion in regulation to increase their level of admitted DTAs more than other firms, suggesting manipulation, we expect positive estimated coefficients on $Low\ RBC_{it}$ ($\psi>0$). If new regulation allows these firms even greater opportunity for manipulation as compared to SSAP 10, we expect positive estimated coefficients on $SSAP10R_t*Low\ RBC_{it}$ and $SSAP101_t*Low\ RBC_{it}$ ($\omega > 0$, $\zeta > 0$). All other variables are as previously defined. We estimate equation (3) separately for life and P/C insurers to reflect differences in their operations and regulatory capital calculations.

Insolvency Prediction

Our third hypothesis examines the association between a firm's level of admitted DTAs and the probability of insolvency. To test this hypothesis, we estimate the following model using logit (Shumway 2001; Grace and Leverty 2010):

$$Insolvent_{it} = \beta DTA_{it} + \phi \boldsymbol{X}_{it} + \boldsymbol{I}_t + \epsilon_{it} \quad (4)$$

where $Insolvent_{it}$ is equal to one if insurer *i* becomes insolvent in either year *t+1* or year *t+2* (Grace and Leverty 2010).[15] DTA_{it} is firm *i*'s admitted net deferred tax assets in year *t* scaled by surplus. If the probability of insolvency increases with increases in a firm's level of admitted DTAs, we expect a positive estimated coefficient on DTA_{it} ($\beta > 0$). $\boldsymbol{X}_{it}$ is a vector of firm-level control variables. $\boldsymbol{I}_t$ represents year fixed effects. ϵ_{it} is a random error term. We estimate equation (4) separately for life and P/C firms.

We include several control variables to account for the potential risk of insolvency. Similar to equation (2), we include leverage ($Liabilities/Surplus_{it}$), profitability (ROA_{it}), size ($ln(Assets)_{it}$), and the insurer's ownership structure ($Mutual_{it}$). We also include controls for rapid expansion ($ln(Premium\ Growth)_{it}$), risk-shifting via reinsurance usage ($Reinsurance_{it}$), proxies for diversification ($Geo\ Herf_{it}$ and $Product\ Herf_{it}$), and whether a firm is affiliated with other insurers ($Group_{it}$).

Determinants of Financial Strength Ratings

Our fourth hypothesis examines whether any insolvency risk inherent in DTAs is considered by external ratings agencies. To test this hypothesis, we estimate the following model using ordered probit:

[15] We define an insurer as insolvent if they enter conservation, rehabilitation, receivership, or liquidation based on the NAIC's GRID.

$$Rating_{it} = \beta DTA_{it} + \phi \boldsymbol{X}_{it} + \boldsymbol{I}_t + \epsilon_{it} \tag{5}$$

where $Rating_{it}$ is a categorical variable translated from a firm's A.M. Best financial strength rating.[16] DTA_{it} is firm i's admitted net deferred tax assets in year t scaled by surplus. If a firm's rating decreases as its level of admitted DTAs increases, we expect a negative estimated coefficient on DTA_{it} ($\beta < 0$). $\boldsymbol{X}_{it}$ is a vector of firm-level determinants of financial strength ratings (Doherty and Phillips 2002; Koijen and Yogo 2016; Carson, Eastman, and Eckles 2018; Hepfer, Wilde, and Wilson 2019) and follows the list of control variables included in equation (4). $\boldsymbol{I}_t$ represents year fixed effects. ϵ_{it} is a random error term.

V. RESULTS

Descriptive Statistics

We present descriptive statistics for our sample in Table 2. Panel A provides sample statistics for life insurers in our sample while Panel B provides sample statistics for the P/C insurers in our sample. The average life insurer reports 4.46 percent of surplus as admitted deferred tax assets, while the average property-casualty insurer reports 3.39 percent of surplus. The mean for life insurers is slightly skewed, however, as the median life insurer (2.31 percent) reports lower DTAs relative to the median P/C insurer (3.03 percent). In both samples, the 10th percentile is zero (untabulated), indicating that at least 10 percent of insurer-years in our sample report no admitted DTAs as part of their regulatory capital ratio.

Panel C provides sample statistics for ratings upgrades and downgrades in our sample broken out by insurer type and regulation. The frequency of ratings upgrades remains relatively

[16] Following Doherty and Phillips (2002) and Carson et al. (2018), we define $Rating_{it}$ to be equal to 4 for ratings "A++" and "A+," 3 for rating "A," 2 for rating "A-," 1 for ratings "B++" and "B+," and 0 for all lower ratings. Following Epermanis and Harrington (2006), we treat the last reported rating in the range of August of year *t-1* to July of year *t* as the rating in year *t*.

constant across insurer type and regulation, ranging from 3.15 percent of P/C insurers receiving upgrades under SSAP 101 to 4.44 percent of P/C insurers receiving upgrades under SSAP 10. Life insurers appear to experience an increase in the frequency of ratings downgrades moving from SSAP 10 to SSAP 10R (4.17 percent to 7.21 percent), reinforcing that the life insurance industry struggled following the financial crisis. However, life insurers experienced a steep decline in the frequency of ratings downgrades moving from SSAP 10R to SSAP 101 (7.21 percent to 1.69 percent). P/C insurers appear to experience a steady decline in the frequency of ratings downgrades across regulations.

[Insert Tables 2 and 3 here]

In Table 3 we provide correlations for the variables used in our study. Panel A provides correlations for life insurers while panel B provides correlations for P/C insurers. We report Pearson correlations in the bottom triangles and Spearman correlations in the upper triangles. Bolded figures are significant at the 0.10 percent level. Notably, for both life and P/C insurers, DTA_{it} is negatively and statistically significantly correlated with $RBC\ Ratio_{it}$. These correlations suggest that firms with lower levels of regulatory capital tend to report a higher level of admitted deferred tax assets, consistent with firms manipulating their RBC ratios by including higher levels of admitted DTAs in total adjusted capital when nearing financial distress. Since correlations do not account for other potentially confounding factors that could determine a firm's reported DTAs, we next provide a multivariate examination of the determinants and consequences of DTAs.

Determinants of DTAs Across Accounting Standards

We present empirical estimation of equations (2) and (3) in Table 4. The dependent variable, DTA_{it}, is an insurer's admitted deferred tax assets as a percentage of surplus. Columns

(1) and (2) present results on our sample of life insurers, while columns (3) and (4) present results for our sample of P/C insurers. We report standard errors in parentheses beneath estimated coefficients. We cluster standard errors at the firm level and include state fixed effects to control for any differences in general insurance regulation across states (e.g., differences in rate regulation). Positive coefficients indicate an increase in the proportion of admitted DTAs to surplus following a change in regulation while negative coefficients indicate a decrease in the proportion of admitted DTAs to surplus following a change in regulation.

[Insert Table 4 here]

The first notable result in Table 4 is that coefficient estimates on the $SSAP101_t$ indicator variable are positive and statistically significant for life insurers (columns (1) and (2)), but not for P/C insurers (columns (3) and (4)). However, the coefficient estimates on the $SSAP10R_t$ indicator variables are positive and significant in all four specifications, regardless of the industry segment. Since positive coefficient estimates are indicative of higher levels of admitted deferred tax assets following a change in regulation, these results suggest that insurers took advantage of the increased discretion afforded by regulators during the SSAP 10R regime when they had sufficient total DTAs to do so (Figures 5 and 6). While life insurers continued to report relatively high DTAs under SSAP 101, P/C firms did not report DTAs any differently under SSAP 101 relative to SSAP 10. Given that life insurers were the segment of the insurance industry that heavily lobbied for the passage of SSAP 10R, it is not surprising that our results indicate they took advantage of the new regulation to report relatively higher DTAs. In addition, life insurers were more severely affected by the financial crisis than the P/C industry. As the P/C industry was able to recover more quickly, they most likely had less incentive to continue to exercise discretion with respect to their regulatory capital.

The specifications in columns (2) and (4) of Table 4 include an indicator variable, *Low* RBC_{it}, that is equal to one if a firm's risk-based capital ratio is in the lowest 25 percent of the industry each year, and zero otherwise. This indicator variable is meant to capture a firm's incentives to report relatively higher admitted DTAs when it is potentially financially distressed to improve its apparent financial condition. We also interact *Low* RBC_{it} with the indicator variables for the changing regulatory regimes ($SSAP10R_t$ and $SSAP101_t$) in order to see whether firms were more able to inflate admitted DTAs following the passage of new regulation that appeared to make it relatively easier to use discretion over DTAs.

Notably, we find in columns (2) and (4) that the estimated coefficients on *Low* RBC_{it} are positive and statistically significant for both life and P/C firms. This finding suggests that firms with relatively low levels of risk-based capital are more likely to report higher admitted DTAs after controlling for other factors, which is consistent with firms reporting higher admitted DTAs to avoid potential regulatory scrutiny. We find no evidence that this behavior strengthened with the passage of either SSAP 10R or SSAP 101—the coefficients on the interaction terms ($SSAP101_t$**Low* RBC_{it} and $SSAP10R_t$**Low* RBC_{it}) are not statistically significantly different from zero. However, taken together, these results suggest that relatively financially weak firms tend to include a greater proportion of DTAs in total adjusted capital across regulatory regimes, which is consistent with our second hypothesis.

Determinants of Insolvency—Impact of DTAs

We present results from our logistic estimation of equation (4) in Table 5. The dependent variable, $Insolvent_{it}$, is a binary variable equal to one if a firm entered insolvency in either year $t+1$ or year $t+2$. Column (1) presents results for life insurers while column (2) presents results for P/C insurers. Both columns include year fixed effects. We report standard errors in parentheses beneath each coefficient estimate. Positive coefficients indicate a higher probability of insolvency while negative coefficients indicate a lower probability of insolvency with respect to an increase in the level of admitted DTAs.

[Insert Table 5 here]

Our main result in Table 5 is that the coefficient estimates on DTA_{it} are positive and significant—strongly positively significant in the case of life insurers. These results suggest that both life and P/C insurers are more likely to enter insolvency when they report relatively higher levels of admitted DTAs. This empirical result is consistent with both our hypothesis and Gallemore's (2012) result when estimating bankruptcy risk for banks. Our interpretation of this finding is that since DTAs are a relatively illiquid asset, their presence on the balance sheet is not helpful when firms have need of cash to, for example, pay claims. Therefore, while higher levels of admitted DTAs may *appear* to make a firm look financially healthy to regulators and other stakeholders, a balance sheet with relatively more admitted DTAs is not able to provide liquidity needed when an insurer must pay claims. Consistent with prior literature, larger firms, more profitable firms, and group members are less likely to become insolvent, while firms with relatively more liabilities compared to surplus are more likely to become insolvent.

Determinants of Ratings—Impact of DTAs

We present empirical estimation from our ordered probit estimation of equation (4) in Table 6. The dependent variable, $Rating_{it}$, is a numerical categorization of a firm's financial strength rating in year t. Panel A presents results for our sample of life insurers while panel B presents results for our sample of P/C insurers. We estimate separate models for each of the three regulatory regimes with different rules for calculating admitted DTAs (i.e., SSAP 10, SSAP 10R, and SSAP 101). Column (1) reports results for SSAP 10, column (2) reports results for SSAP 10R, and column (3) reports results for SSAP 101. All models include year fixed effects. We report standard errors in parentheses beneath each coefficient estimate. Positive coefficients indicate a higher rating while negative coefficients indicate a lower rating.

[Insert Table 6 here]

First, examining the results in panel A for life insurers, we note that the coefficient estimates for DTA_{it} differ across regulation regimes. While the coefficient estimate on DTA_{it} is negative and statistically significant in column (1) for the SSAP 10 period, the coefficient estimates in columns (2) and (3) for the SSAP 10R and SSAP 101 periods, respectively, are not statistically significantly different from zero. This result suggests that while the ratings agency initially issued a ratings penalty to firms reporting relatively higher levels of admitted DTAs on their balance sheets, they began to ignore admitted DTAs once SSAP 10R passed. Taken together with our previous findings that life insurers experienced a steep decline in the frequency of ratings downgrades following SSAP101 (Table 2, Panel C) and tended to report significantly higher levels of admitted DTAs following the passage of SSAP 10R (Table 4, Figures 1 and 3), this finding is potentially concerning given that admitted DTAs are associated with a higher level of insolvency as reported in Table 5. This finding suggests that external ratings agencies are not adequately incorporating the risk of admitted DTAs into their ratings criteria for life insurers.

On the other hand, the results in panel B of Table 6 suggest that ratings agencies are appropriately considering admitted DTAs when assigning ratings to P/C insurers. The coefficient estimates on DTA_{it} in all three columns are negative and significant, suggesting that ratings agencies assign a ratings penalty for holding relatively higher levels of admitted DTAs. Contrary to life insurers, there also appears to be an increasing influence over time, as the magnitude of the coefficient estimates increase when going from SSAP 10, to SSAP 10R, to SSAP 101. Overall, these results suggest that while ratings agencies do interpret higher levels of admitted DTAs as being riskier during their initial introduction to statutory accounting with SSAP 10, they only appear to continue treating admitted DTAs as risky during SSAP 10R and SSAP 101 for P/C insurers, and not for life insurers, which is a substantial finding given that life insurers experienced a significantly larger increase in admitted DTAs with the implementation of SSAP 10R.

VI. CONCLUSION

Using a setting in which regulatory changes allow managers' more discretion, we find evidence that insurance companies increase the inclusion of DTAs in regulatory capital used to determine whether financial institutions are sufficiently liquid to meet their obligations. Importantly, companies with relatively low levels of regulatory capital included higher levels of DTAs in regulatory capital, potentially as a means of avoiding regulatory scrutiny. We also find that firms with higher levels of DTAs included in regulatory capital are more likely to go insolvent. This result supports concerns that the inclusion of less liquid assets such as DTAs may cause financial institutions to appear financially healthier than their true underlying positions. Despite the increased risk and uncertainty inherent in the insurance company's regulatory capital, rating agencies do not appear to consider the level of admitted DTAs when determining financial strength ratings, at least for life insurers.

Our findings have important implications for regulators. Consistent with Skinner (2008) and Gallemore (2012), our results suggest that, when permitted, financial institutions will use greater discretion over DTA reporting to improve their perceived capital position. In addition to ratings agencies, other financial statement users may also be unable accurately assess the liquidity of DTAs included in regulatory capital. If this is the case, new regulation increasing the inclusion of DTAs for regulatory capital purposes may increase the risk associated with these financial firms. Our results may potentially be concerning given the overall importance of financial institutions in the economy.

REFERENCES

Acharya, V. V., and S. G. Ryan. 2016. Banks' Financial Reporting and Financial System Stability. *Journal of Accounting Research* 54(2): 277-340.

Alissa, W., S. B. Bonsall IV, K. Koharki, and M. W. Penn Jr. 2013. Firms' Use of Accounting Discretion to Influence their Credit Ratings. *Journal of Accounting and Economics* 55: 129-147.

American Bankers Association. Comment letter on regulatory capital limits on deferred tax assets. September 25, 2009.

Barrese, J., and J. M. Nelson. 1994. Some Consequences of Insurer Insolvencies. *Journal of Insurance Regulation* 13(1): 3-18.

Bauman, C. C., M. P. Bauman, and R. F. Halsey. 2001. Do Firms Use the Deferred Tax Asset Valuation Allowance to Manage Earnings?. *Journal of the American Taxation Association* 23(Supplement): 27-48.

Beatty, A., S. L. Chamberlain, and J. Magliolo. 1995. Managing Financial Reports of Commercial Banks: The Influence of Taxes, Regulatory Capital, and Earnings. *Journal of Accounting Research* 33(2): 231-261.

Behr, P., D. J. Kisgen, and J. P. Taillard. 2016. Did Government Regulations Lead to Inflated Credit Ratings?. *Management Science* 64(3): 1034-1054.

Bhattacharya, S., A. W. A. Boot, and A. V. Thakor. 1998. The Economics of Bank Regulation. *Journal of Money, Credit and Banking* 30(4): 745-770.

Billio, M., M. Getmansky, A. W. Lo, and L. Pelizzon. 2012. Econometric Measures of Connectedness and Systemic Risk in the Finance and Insurance Sectors. *Journal of Financial Economics* 104: 535-559.

Campello, M., E. Giambona, J. R. Graham, and C. R. Harvey. 2011. Liquidity Management and Corporate Investment During a Financial Crisis. *Review of Financial Studies* 24(6): 1944-1979.

Cornett, M. M., J. J. McNutt, P. E. Strahan, and H. Tehranian. 2011. Liquidity Risk Management and Credit Supply in the Financial Crisis. *Journal of Financial Economics* 101: 297-312.

Carson, J. M., E. M. Eastman, and D. L. Eckles. 2018. Ratings: It's Accrual World. *Journal of Risk and Insurance* 85(3): 787-809.

Christensen, T. E., G. H. Paik, and E. K. Stice. 2008. Creating a Bigger Bath Using the Deferred Tax Valuation Allowance. *Journal of Business Finance & Accounting* 35(5): 601–25.

Collins, J. H., D. A. Shackelford, and J. M. Wahlen. 1995. Bank Differences in the Coordination of Regulatory Capital, Earnings, and Taxes. *Journal of Accounting Research* 33(2): 263-291.

Dhaliwal, D. S., C. A. Gleason, and L. F. Mills. 2004. Last-Chance Earnings Management: Using the Tax Expense to Meet Analysts' Forecasts. *Contemporary Accounting Research* 21(2): 431-459.

Dhaliwal, D. S., S. E. Kaplan, R. C. Laux, and E. Weisbrod. 2013. The Information Content of Tax Expense for Firms Reporting Losses. *Journal of Accounting Research* 51(1): 135–64.

Dichev, I. D., J. D. Piotroski. 2001. The Log-Run Stock Returns Following Bond Ratings Changes. *Journal of Finance* 56(1): 173-203.

Doherty, N. A., and R. D. Phillips. 2002. Keeping Up with the Joneses: Changing Rating Standards and the Buildup of Capital by U.S. Property-Liability Insurers. *Journal of Financial Services Research* 21(1/2): 55-78.

Epermanis, K., and S. E. Harrington. 2006. Market Discipline in Property/Casualty Insurance: Evidence from Premium Growth Surrounding Changes in Financial Strength Ratings. *Journal of Money, Credit and Banking* 38(6): 1515-1544.

Financial Accounting Standards Board (FASB). 1992. *Accounting for Income Taxes*. Statement of Financial Accounting Standards No. 109 (FAS 109). (February). Norwalk, CT: FASB.

Financial Accounting Standards Board (FASB). 2009. *Income Taxes (Topic 740)*. Accounting Standards Update No.2009-06. (September). Norwalk, CT: FASB.

Flannery, M. J., and S. M. Sorescu. 1996. Evidence of Bank Market Discipline in Subordinated Debenture Yields: 1983-1991. *Journal of Finance* 51(4): 1347-1377.

Flynn, S., and A. Ghent. 2017. Competition and Credit Ratings After the Fall. *Management Science* 64(4): 1672-1692.

Frank, M. M., and S. O. Rego. 2006. Do Managers Use the Valuation Allowance Account to Manage Earnings around Certain Earnings Targets?. *Journal of the American Taxation Association* 28(1): 43-65.

Gallemore, J. 2012. Deferred Tax Assets and Bank Regulatory Capital. Working Paper, University of North Carolina at Chapel Hill.

Gaver, J. J., and J. S. Paterson. 1999. Managing Insurance Company Financial Statements to Meet Regulatory and Tax Reporting Goals. *Contemporary Accounting Research* 16(2): 207-241.

Grace, M. F., R. W. Klein, and R. D. Phillips. 2002. Managing the Cost of Property-Casualty Insurer Insolvencies in the U.S. Center for Risk Management and Insurance Research, Georgia State University, Atlanta, Research Report 02-1.

Grace, M. F., and J. T. Leverty. 2010. Political Cost Incentives for Managing the Property-Liability Insurer Loss Reserve. *Journal of Accounting Research* 48(1): 21-49.

Government Accountability Office (GAO). 2013. Insurance Markets: Impacts of and Regulatory Response to the 2007-2009 Financial Crisis. GAO-13-583.

Gupta, S., R. C. Laux, and D. P. Lynch. 2016. Do Firms Use Tax Reserves to Meet Analysts' Forecasts? Evidence from the Pre- and Post-FIN 48 Periods. *Contemporary Accounting Research* 33(3): 1044-1074.

Hand, J. R. M., R. W. Holthausen, and R. W. Leftwich. 1992. The Effect of Bond Rating Agency Announcements on Bond and Stock Prices. *Journal of Finance* 47(2): 733-752.

Hanley, K. W., A. D. Jagolinzer, and S. Nikolova. 2018. Strategic Estimation of Asset Fair Values. *Journal of Accounting and Economics* 37: 1-24.

Hanlon, M. and S. Heitzman. 2010. A Review of Tax Research. *Journal of Accounting and Economics* 50(2-3): 127-178.

Hepfer, B. F., J. H. Wilde, and R. J. Wilson. 2019. Tax and Nontax Incentives in Income Shifting: Evidence from Shadow Insurers. *The Accounting Review* Forthcoming.

Jung, D.-J., and D. Pulliam. 2006. Predictive Ability of the Valuation Allowance for Deferred Tax Assets. *Academy of Accounting and Financial Studies Journal* 10(2): 49–70.

Klein, R. W. 2012. Principles for Insurance Regulation: An Evaluation of Current Practices and Potential Reforms. *Geneva Papers on Risk and Insurance—Issues and Practice* 37: 175-199.

Koijen, R. S. J., and M. Yogo. 2015. The Cost of Financial Frictions for Life Insurers. *American Economic Review* 105(1): 445-475.

Koijen, R. S. J., and M. Yogo. 2016. Shadow Insurance. *Econometrica* 84(3): 1265-1287.

Krull, L.K. 2004. Permanently Reinvested Foreign Earnings, Taxes, and Earnings Management. *The Accounting Review* 79(3): 745-767.

Leverty, J. T., and M. F. Grace. 2018. Do Elections Delay Regulatory Action?. *Journal of Financial Economics* 130(2): 409-427.

Miller, G. S., and D. J. Skinner. 1998. Determinants of the Valuation Allowance for Deferred Tax Assets under SFAS No. 109. *The Accounting Review* 73(2): 213–33.

Munch, P., and D. E. Smallwood. 1981. Theory of Solvency Regulation in the Property and Casualty Insurance Industry. *Studies in Public Regulation* G. Fromm (ed.), Cambridge, MA: MIT Press.

Park, S., and S. Peristiani. 1998. Market Discipline by Thrift Depositors. *Journal of Money, Credit, and Banking* 30(3): 347-364.

Petroni, K. R. 1992. Optimistic Reporting in the Property-Casualty Insurance Industry. *Journal of Accounting and Economics* 15(4): 485-508.

Petroni, K. R., and D. A. Shackelford. 1995. Taxation, Regulation, and the Organizational Structure of Property-Casualty Insurers. *Journal of Accounting and Economics* 20: 229-253.

PwC. 2012. Tax Accounting for Insurance Companies.

Schipper, K. 1989. Earnings Management. *Accounting Horizons* 3(4): 91–102.

Schrand, C. M., and M. H. F. Wong. 2003. Earnings Management Using the Valuation Allowance for Deferred Tax Assets under SFAS No. 109. *Contemporary Accounting Research* 20(3): 579-611.

Schwarcz D. 2018. Is U.S. Insurance Regulation Unconstitutional?. *Connecticut Insurance Law Journal* 25: 191-256.

Shumway, T. 2001. Forecasting Bankruptcy More Accurately: A Simple Hazard Model. *Journal of Business* 74(1): 101-124.

Skinner, D. J. 2008. The Rise of Deferred Tax Assets in Japan: The Role of Deferred Tax Accounting in the Japanese Banking Crisis. *Journal of Accounting and Economics* 46: 218-239.

Sommer, D. W. 1996. The Impact of Firm Risk on Property-Liability Insurance Prices. *Journal of Risk and Insurance* 63(3): 501-514.

U.S. Department of Commerce. The International Trade Administration. 2019. https://www.selectusa.gov/financial-services-industry-united-states.

Visvanathan, G. 1998. Deferred Tax Valuation Allowances and Earnings Management. *Journal of Financial Statement Analysis* 3(4): 6-10.

Appendix A

Variable definitions

Variables of Interest		
DTA	=	Firm *i*'s net admitted deferred tax assets in year *t* scaled by surplus. We calculate net admitted deferred tax assets as admitted gross deferred tax assets less valuation allowance less deferred tax liabilities.
Insolvent	=	A binary variable equal to one if insurer *i* becomes insolvent in either year *t+1* or year *t+2*. We define an insurer as insolvent if they enter conservation, rehabilitation, receivership, or liquidation based on the NAIC's GRID.
Low RBC	=	A binary variable equal to one if firm *i*'s risk-based capital ratio was in the lowest 25 percent of firms in year *t* and zero otherwise.
Rating	=	A categorical variable translated from a firm's A.M. Best financial strength rating. Following Doherty and Phillips (2002) and Carson et al. (2018), we define $Rating_{it}$ to be equal to 4 for ratings "A++" and "A+," 3 for rating "A," 2 for rating "A-," 1 for ratings "B++" and "B+," and 0 for all lower ratings. Following Epermanis and Harrington (2006), we treat the last reported rating in the range of August of year *t-1* to July of year *t* as the rating in year *t*.
SSAP10	=	A binary variable equal to one during years when SSAP10 was enforced and zero otherwise.
SSAP10R	=	A binary variable equal to one during years when SSAP10R was enforced and zero otherwise.
SSAP101	=	A binary variable equal to one during years when SSAP101 was enforced and zero otherwise.
General Control Variables		
Geo Herf	=	A Herfindahl index based on firm *i*'s direct premiums written in the 50 U.S. states and Washington D.C. in year *t*.
Group	=	A binary variable equal to one if a firm was organized as a member of a group in year *t* and zero otherwise.
Liabilities/Surplus	=	Firm *i*'s total liabilities divided by total surplus in year *t*.
ln(Assets)	=	The natural log of total assets in year *t*.
ln(Premium Growth)	=	The natural log of the ratio of premiums written in year *t* divided by premiums written in year *t-1*.
Mutual	=	A binary variable equal to one if firm *i* was organized as a mutual in year *t* and zero otherwise.
Product Herf	=	A Herfindahl index based on firm *i*'s premiums written across 24 lines of business for property-casualty firms and 11 lines of business for life firms in year *t*.
Reinsurance	=	Firm *i*'s reinsurance ceded divided by the sum of direct premiums written and reinsurance assumed in year *t*.
ROA	=	Firm *i*'s net income divided in year *t* divided by assets in year *t-1*.

Figure 1

Percentage of DTAs Admitted by Life Insurers

This figure presents admitted deferred tax assets as a percentage of total deferred tax assets for life insurers from 2003 to 2016.

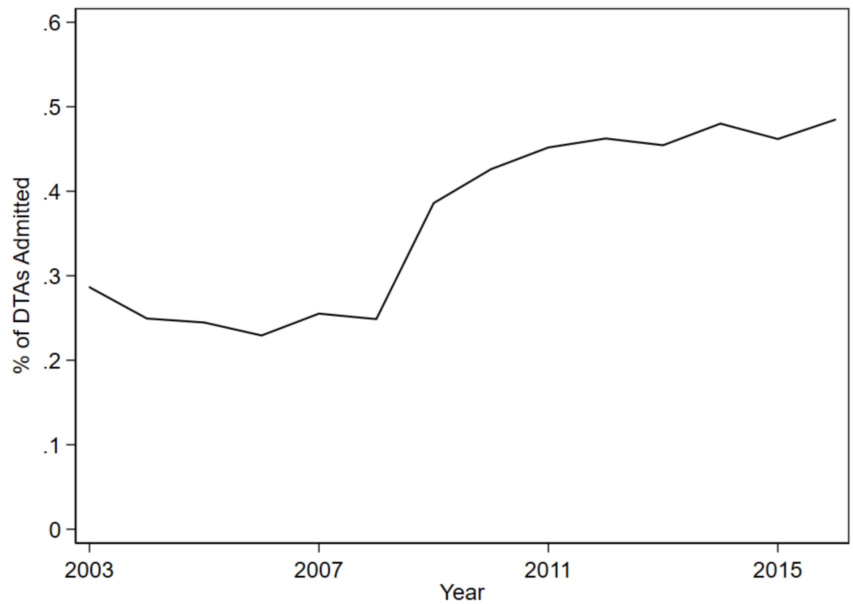

Figure 2

Percentage of DTAs Admitted by Property-Casualty Insurers

This figure presents admitted deferred tax assets as a percentage of total deferred tax assets for property-casualty insurers from 2003 to 2016.

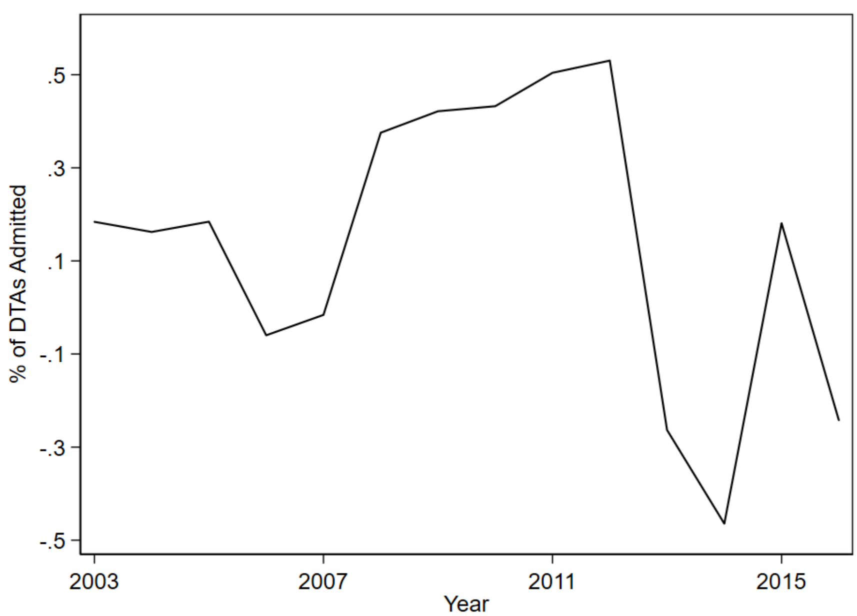

Figure 3
Admitted Deferred Tax Assets for Life Insurers

This figure presents admitted deferred tax assets reported on life insurer balance sheets from 2003 to 2016. We report DTAs in total dollars and as a share of surplus of the reporting firms. Surplus is the difference between admitted assets and liabilities and is roughly equivalent to equity under GAAP reporting.

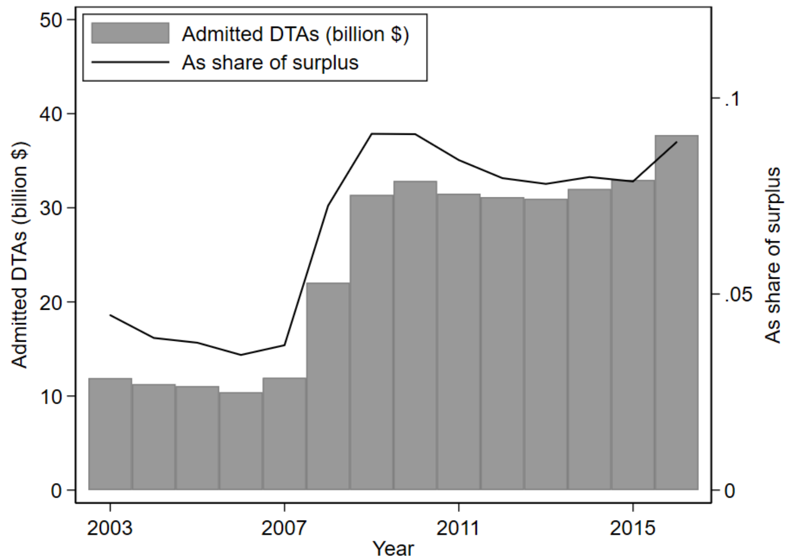

Figure 4
Admitted Deferred Tax Assets for Property-Casualty Insurers

This figure presents admitted deferred tax assets reported on property-casualty insurer balance sheets from 2003 to 2016. We report DTAs in total dollars and as a share of surplus of the reporting firms. Surplus is the difference between admitted assets and liabilities and is roughly equivalent to equity under GAAP reporting.

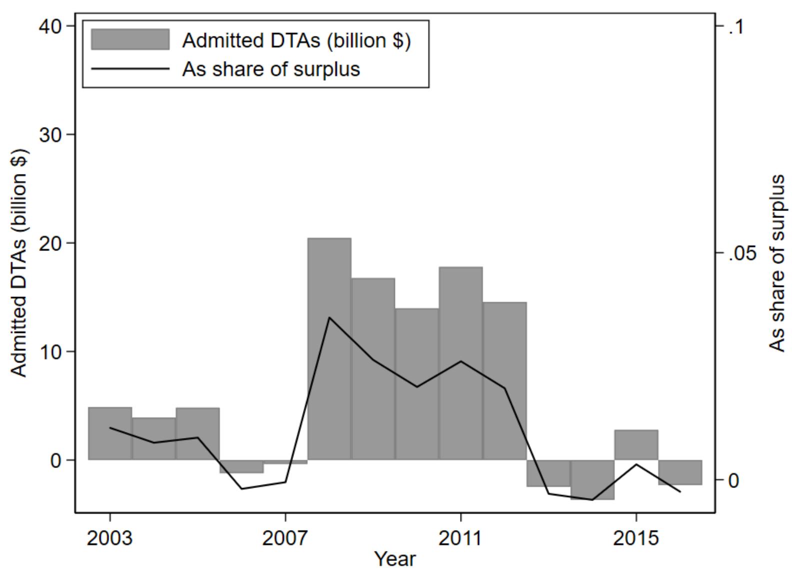

Figure 5

Total Deferred Tax Assets for Life Insurers

This figure presents total deferred tax assets reported on life insurer balance sheets from 2003 to 2016. We report DTAs in total dollars and as a share of total assets of the reporting firms.

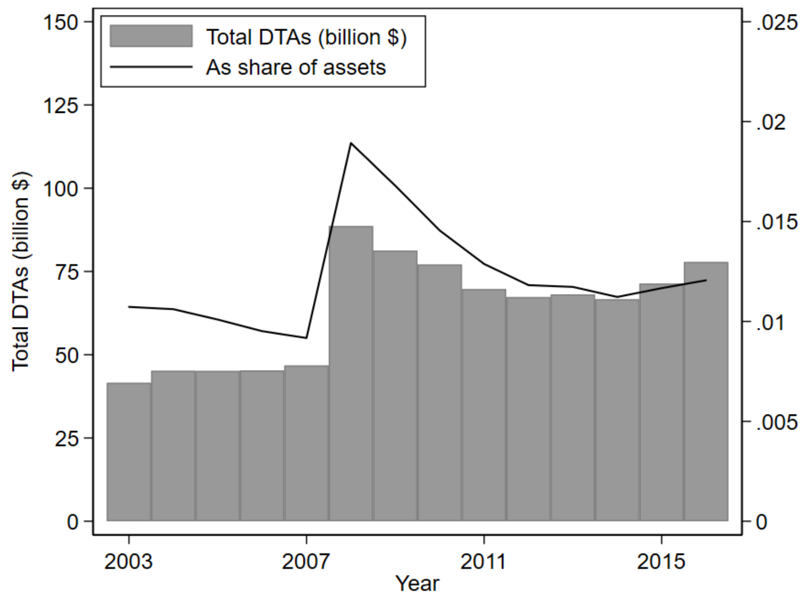

Figure 6

Total Deferred Tax Assets for Property-Casualty Insurers

This figure presents total deferred tax assets reported on property-casualty insurer balance sheets from 2003 to 2016. We report DTAs in total dollars and as a share of total assets of the reporting firms.

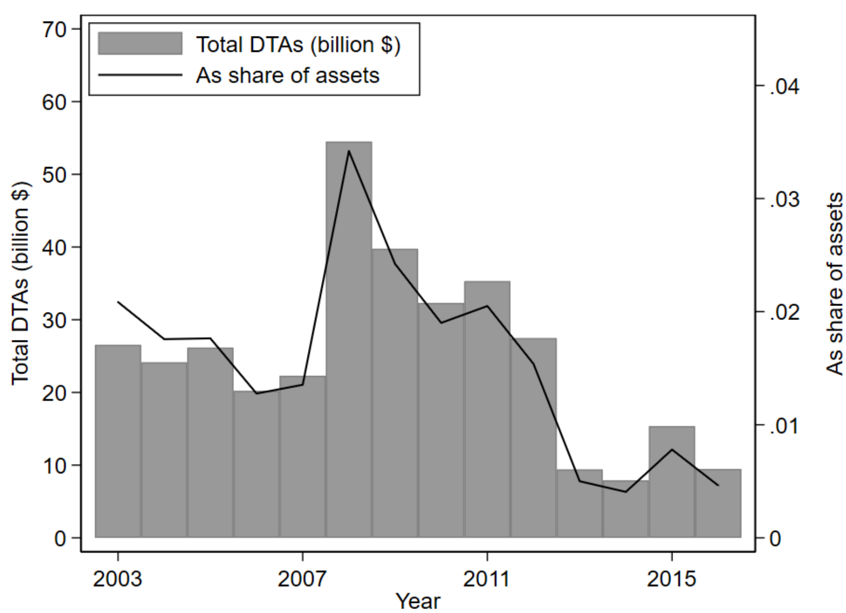

Table 1

Sample Selection Table

This table summarizes our sample selection process. Our final sample of 10,061 life insurer firm year observations and 28,530 P/C insurer firm year observations represents firms from 2003 to 2016.

Panel A: Life Insurers Sample	
Firm-years in life Annual Statements from 2003 to 2016	12,246
Less firm-years with missing or non-positive assets, surplus, or premiums	(1,344)
Less firm-years with firms domiciled outside of the 50 U.S. states and D.C.	(199)
Less firm-years with insufficient data to calculate variables	(642)
Final Life Insurer Sample (1,082 unique firms)	10,061

Panel B: Property-Casualty Insurers Sample	
Firm-years in P/C Annual Statements from 2003 to 2016	41,739
Less firm-years with missing or non-positive assets, surplus, or premiums	(9,498)
Less firm-years with firms domiciled outside of the 50 U.S. states and D.C.	(469)
Less firm-years with insufficient data to calculate variables	(3,242)
Final Property-Casualty Insurer Sample (2,799 unique firms)	28,530

Table 2
Summary Statistics

This table contains summary statistics for our sample of 10,061 observations for life insurers in Panel A and 28,530 observations for P/C insurers in Panel B. Panel C provides summary statistics on the number and frequency of ratings upgrades and downgrades partitioned by insurer type and regulation. See Appendix A for variable definitions.

Panel A: Life Insurers

Variable	Mean	Std.	25th Pctl	50th Pctl	75th Pctl
DTA	0.0446	0.0640	0.0005	0.0231	0.0736
Liabilities/Surplus	8.2892	9.9564	1.2164	4.8093	11.826
ROA	0.0175	0.0582	0.0001	0.0100	0.0300
ln(Assets)	19.221	2.8672	16.955	19.148	21.292
Mutual	0.0698	0.2549	0.0000	0.0000	0.0000
ln(Premium Growth)	0.0055	0.5323	-0.1188	0.0041	0.1227
Reinsurance	0.1941	0.2628	0.0046	0.0679	0.2855
Geo Herf	0.4394	0.4001	0.0664	0.2332	0.9639
Product Herf	0.8312	0.1431	0.7154	0.8394	0.9806
Group	0.7639	0.4247	1.0000	1.0000	1.0000
RBC Ratio	25.512	61.016	6.5369	9.5375	16.768

Panel B: Property-Casualty Insurers

Variable	Mean	Std.	25th Pctl	50th Pctl	75th Pctl
DTA	0.0339	0.0438	0.0004	0.0303	0.0594
Liabilities/Surplus	1.6956	1.5758	0.7333	1.3781	2.1667
ROA	0.0241	0.0574	0.0037	0.0261	0.0493
ln(Assets)	18.253	2.0126	16.809	18.174	19.586
Mutual	0.1900	0.3923	0.0000	0.0000	0.0000
ln(Premium Growth)	0.0132	0.6432	-0.0674	0.0308	0.1347
Reinsurance	0.3679	0.3102	0.0895	0.2985	0.6145
Geo Herf	0.5804	0.3872	0.1692	0.5784	1.0000
Product Herf	0.6694	0.3144	0.3550	0.7078	1.0000
Group	0.6343	0.4816	0.0000	1.0000	1.0000
RBC Ratio	14.779	25.921	5.0440	8.0594	13.403

Panel C: Frequency of Ratings Changes by Regulation

	Life			*Property-Casualty*		
	SSAP 10	SSAP 10R	SSAP 101	SSAP 10	SSAP 10R	SSAP 101
Number Upgrades	83	38	57	354	151	177
% of Observations	3.24%	3.43%	3.45%	4.44%	3.88%	3.15%
Number Downgrades	107	80	28	371	141	176
% of Observations	4.17%	7.21%	1.69%	4.65%	3.63%	3.13%

Table 3
Correlation Matrix

This table reports correlations for our sample of firms. Pearson correlations are reported in the bottom triangles while Spearman correlations are reported in the upper triangles. See Appendix A for variable definitions. Bolded figures are significant at the 0.10 percent level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Panel A: Life Insurers											
(1) *DTA*		**0.4925**	**-0.0676**	**0.5014**	**0.0828**	**0.0323**	**0.1640**	**-0.4217**	**-0.1935**	**0.2301**	**-0.2377**
(2) *Liabilities/Surplus*	**0.3472**		**-0.3732**	**0.6351**	**0.0422**	0.0085	**0.0857**	**-0.3481**	**-0.2128**	**0.0831**	**-0.3789**
(3) *ROA*	**-0.0487**	**-0.1895**		**-0.1068**	**-0.0713**	**-0.0400**	**-0.0885**	**0.0494**	**0.0300**	**0.0220**	**0.1295**
(4) *ln(Assets)*	**0.3886**	**0.5282**	**-0.0342**		**0.0929**	**0.0252**	**0.1186**	**-0.6048**	**-0.2941**	**0.3519**	**-0.2481**
(5) *Mutual*	**0.0700**	-0.0018	**-0.0374**	**0.0885**		-0.0165	-0.0070	**-0.1158**	**-0.0686**	**-0.1345**	**-0.0428**
(6) *ln(Premium Growth)*	-0.0108	-0.0125	**-0.0476**	-0.0111	-0.0161		**-0.1241**	-0.0131	0.0007	0.0043	**-0.1045**
(7) *Reinsurance*	**0.0817**	**-0.0466**	**-0.0745**	**-0.0346**	**-0.0539**	**-0.1417**		**-0.2416**	**-0.1134**	**0.1300**	0.0077
(8) *Geo Herf*	**-0.3532**	**-0.2335**	**0.0289**	**-0.5392**	**-0.1085**	0.0093	**-0.1553**		**0.1555**	**-0.2328**	**0.1504**
(9) *Product Herf*	**-0.1364**	**-0.1166**	**0.0371**	**-0.2867**	**-0.0613**	**0.0339**	**0.0274**	**0.1477**		**-0.0655**	**0.0817**
(10) *Group*	**0.1684**	**0.0645**	**0.0357**	**0.3484**	**-0.1345**	0.0055	**0.0838**	**-0.2034**	**-0.0706**		0.0055
(11) *RBC Ratio*	**-0.1878**	**-0.1968**	-0.0235	**-0.2775**	**-0.0360**	**-0.0509**	**0.0714**	**0.1778**	**0.1208**	**-0.0360**	
Panel B:P/C Insurers											
(1) *DTA*		**0.5400**	**-0.0682**	**0.2338**	**-0.0581**	**0.0700**	**0.0652**	**-0.1052**	**-0.1886**	**0.1633**	**-0.3237**
(2) *Liabilities/Surplus*	**0.3854**		**-0.1845**	**0.3097**	**-0.1106**	**0.0550**	**0.0954**	**-0.1256**	**-0.1052**	**0.0941**	**-0.6668**
(3) *ROA*	**-0.1017**	**-0.2264**		**0.0812**	**-0.0258**	**-0.0239**	**-0.1129**	**-0.0503**	**-0.0218**	-0.0083	**0.2438**
(4) *ln(Assets)*	**0.2020**	**0.1799**	**0.0774**		0.0054	**-0.0236**	**0.0859**	**-0.4804**	**-0.4373**	**0.4908**	**-0.1047**
(5) *Mutual*	**-0.0543**	**-0.0672**	**-0.0236**	0.0018		**-0.0110**	**-0.1286**	**0.1945**	**-0.1105**	**-0.1627**	**0.0907**
(6) *ln(Premium Growth)*	**0.0666**	0.0024	**-0.0511**	**-0.0254**	-0.0003		**-0.0453**	0.0010	0.0064	**-0.0456**	**-0.0686**
(7) *Reinsurance*	0.0118	**0.0658**	**-0.0881**	**0.0439**	**-0.1552**	**-0.1130**		**-0.2076**	**-0.2296**	**0.2873**	-0.0018
(8) *Geo Herf*	**-0.0853**	**-0.0426**	**-0.0427**	**-0.4489**	**0.1821**	0.0088	**-0.2025**		**0.2999**	**-0.3118**	**0.0916**
(9) *Product Herf*	**-0.1413**	0.0131	-0.0036	**-0.4012**	**-0.1310**	-0.0100	**-0.1761**	**0.2803**		**-0.3535**	**0.0175**
(10) *Group*	**0.1260**	**0.0180**	-0.0001	**0.4784**	**-0.1627**	**-0.0615**	**0.2886**	**-0.3014**	**-0.3251**		**0.0804**
(11) *RBC Ratio*	**-0.2568**	**-0.3092**	**0.1152**	**-0.1664**	**-0.0339**	**-0.1114**	**0.1160**	**0.0770**	**0.1162**	**0.0511**	

Table 4

Determinants of DTAs across Accounting Standards

This table reports results from an OLS regression of *DTA* (a firm's admitted deferred tax assets divided by surplus) on *SSAP10R* and *SSAP101* (binary variables equal to one during years when SSAP 10R and SSAP 101 were enforced, respectively, and zero otherwise) and *Low RBC* (a binary variable equal to one if firm *i*'s risk-based capital ratio was in the lowest 25 percent of firms in year *t* and zero otherwise). Columns (1) and (2) present results for life insurance companies. Columns (3) and (4) present results for property-casualty insurance companies. See Appendix A for additional variable definitions. All specifications include state fixed effects. *, **, *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels, respectively (two-tailed tests). Standard errors are clustered by firm and are presented in parentheses under coefficient estimates. We winsorize all continuous explanatory variables at one and 99 percent.

	Life				Property-Casualty			
	(1)		(2)		(3)		(4)	
SSAP101	0.0201	***	0.0196	***	-0.0008		-0.0011	
	(0.002)		(0.002)		(0.001)		(0.001)	
SSAP10R	0.0241	***	0.0238	***	0.0043	***	0.0046	***
	(0.002)		(0.002)		(0.001)		(0.001)	
*SSAP101*Low RBC*			0.0029				0.0017	
			(0.005)				(0.002)	
*SSAP10R*Low RBC*			0.0028				0.0013	
			(0.005)				(0.002)	
Low RBC			0.0077	***			0.0051	***
			(0.003)				(0.002)	
Liabilities/Surplus	0.0014	***	0.0013	***	0.0083	***	0.0089	***
	(0.000)		(0.000)		(0.001)		(0.001)	
ROA	0.0031		0.0038		-0.0125	*	-0.0077	
	(0.016)		(0.017)		(0.007)		(0.008)	
ln(Assets)	0.0049	***	0.0050	***	0.0024	***	0.0021	***
	(0.001)		(0.001)		(0.000)		(0.000)	
Mutual	0.0138	**	0.0139	**	-0.0047	**	-0.0046	**
	(0.006)		(0.006)		(0.002)		(0.002)	
State FE	Yes		Yes		Yes		Yes	
R^2	24.47%		24.32%		17.49%		18.87%	
F-Stat	68.02		47.40		62.18		49.61	
Observations	10,398		10,061		28,530		26,883	

Table 5

Determinants of Insolvency – Impact of DTAs

This table reports results from a logistic regression of *Insolvent* (a binary variable equal to one if the firm entered insolvency in either year *t+1* or year *t+2*) on *DTA* (the firm's admitted deferred tax assets divided by surplus). Column (1) presents results for life insurance companies. Column (2) presents results for property-casualty insurance companies. See Appendix A for additional variable definitions. All specifications include year fixed effects. *, **, *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels, respectively (two-tailed tests). Standard errors are clustered by firm and are presented in parentheses under coefficient estimates. We winsorize all continuous explanatory variables at one and 99 percent.

	Life	Property-Casualty
	(1)	(2)
DTA	7.4556 ***	2.8122 *
	(2.342)	(1.440)
ln(Assets)	-0.2564 ***	-0.3536 ***
	(0.094)	(0.060)
ROA	-11.6730 ***	-10.4118 ***
	(2.005)	(0.962)
ln(Premium Growth)	-0.2334	-0.4180 ***
	(0.263)	(0.095)
Reinsurance	-0.0826	-0.0910
	(0.682)	(0.259)
Liabilities/Surplus	0.0360 ***	0.3145 ***
	(0.012)	(0.025)
Geo Herf	-0.6259	-0.5852 **
	(0.556)	(0.238)
Product Herf	3.0369 **	0.3292
	(1.435)	(0.347)
Group	-1.1470 ***	-0.5525 ***
	(0.379)	(0.202)
Mutual	0.5768	-0.8198 ***
	(0.488)	(0.265)
Year FE	Yes	Yes
ROC Curve	85.83%	90.60%
Pseudo-R^2	21.38%	25.30%
χ^2	110.43	554.51
Observations	7,251	26,930

Table 6

Determinants of Ratings – Impact of DTAs

This table reports results from an order probit regression of *Rating$_{it}$* (a numerical categorization of a firm's financial strength rating in year *t*) on *DTA* (the firm's admitted deferred tax assets divided by surplus). Panel A (Panel B) presents results for our sample of life insurers (property-casualty insurers). We estimate separate models for each of the three regulatory regimes with different rules for DTA reporting (i.e., SSAP 10, SSAP 10R, and SSAP 101). Column (1) reports results for SSAP 10, column (2) reports results for SSAP 10R, and column (3) reports results for SSAP 101. See Appendix A for variable definitions. All specifications include year fixed effects. *, **, *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels, respectively (two-tailed tests). Standard errors are clustered by firm and are presented in parentheses under coefficient estimates. We winsorize all continuous explanatory variables at one and 99 percent.

	Panel A: Life Insurers			*Panel B.: Property-Casualty Insurers*		
	SSAP 10	SSAP10 R	SSAP 101	SSAP 10	SSAP 10R	SSAP 101
	(1)	(2)	(3)	(1)	(2)	(3)
DTA	-0.9032 **	-0.0258	-0.0593	0.1764	-1.6305 ***	-2.7783 ***
	(0.433)	(0.502)	(0.425)	(0.384)	(0.545)	(0.407)
ln(Assets)	0.5696 ***	0.4708 ***	0.4059 ***	0.3258 ***	0.3052 ***	0.3556 ***
	(0.016)	(0.022)	(0.017)	(0.009)	(0.013)	(0.011)
ROA	0.6234	1.1752	0.3173	2.7475 ***	4.3867 ***	3.3542 ***
	(0.549)	(1.001)	(0.732)	(0.250)	(0.398)	(0.370)
ln(Premium Growth)	0.2009 ***	0.1794 ***	0.0853	0.1089 ***	0.1551 ***	0.1640 ***
	(0.045)	(0.066)	(0.056)	(0.021)	(0.033)	(0.029)
Reinsurance	0.5085 ***	0.3049 **	0.3355 ***	0.8030 ***	0.7796 ***	0.9345 ***
	(0.092)	(0.135)	(0.097)	(0.045)	(0.064)	(0.054)
Liabilities/Surplus	-0.0302 ***	-0.0305 ***	-0.0248 ***	-0.2602 ***	-0.1988 ***	-0.2152 ***
	(0.003)	(0.004)	(0.003)	(0.013)	(0.021)	(0.017)
Geo Herf	0.9144 ***	0.8787 ***	0.9841 ***	-0.1374 ***	-0.1066 **	-0.1661 ***
	(0.073)	(0.109)	(0.089)	(0.036)	(0.052)	(0.043)
Product Herf	0.4974 ***	0.8547 ***	0.7842 ***	-0.3684 ***	-0.4518 ***	-0.3426 ***
	(0.157)	(0.235)	(0.190)	(0.042)	(0.060)	(0.049)
Group	0.7015 ***	0.7340 ***	0.7771 ***	0.3620 ***	0.4390 ***	0.3881 ***
	(0.068)	(0.108)	(0.086)	(0.032)	(0.047)	(0.039)
Mutual	-0.3180 ***	-0.0997	-0.1553	0.0373	0.0600	-0.2382 ***
	(0.080)	(0.131)	(0.113)	(0.032)	(0.048)	(0.038)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo-R^2	24.47%	20.35%	17.51%	13.29%	14.07%	15.68%
χ^2	1956.32	700.21	897.99	3313.40	1639.31	2582.88
Observations	2,680	1,139	1,729	8,329	4,076	5,847