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# PROPERTY-CASUALTY RESERVE ERRORS AND SURPLUS NOTE ISSUANCE


## ABSTRACT

Prior research contends that firm management may manipulate earnings in order to issue equity at a higher price or to issue debt with a lower yield. However, evidence surrounding this phenomenon and the potential effectiveness of earnings manipulation is mixed. Given the strict regulatory reporting requirements of property-casualty insurance companies and the increased use of surplus notes by insurers, the insurance industry represents an ideal setting to test for earnings management efforts around the issuance of securities. We provide the first evidence that insurers manage earnings via loss reserves around the issuance of surplus notes. However, while our evidence suggests that management manipulates reserves around surplus note issuance, the yields are unaffected by this activity. These results imply that although management may attempt to influence the price of issued securities though the management of earnings, investors are not influenced by this manipulation.


## INTRODUCTION

Investors in equity and debt instruments rely on accounting information released by issuing firms to set accurate prices for newly issued securities. While the incentives of equity and debtholders may differ regarding firm cash flows and risk-taking (Jensen, 1986), investors should reward an issuing firm with better price conditions (i.e., higher equity issue price or lower required interest rate on debt) when the firm is a better-performing, more financially stable organization. To the extent that firm earnings can be manipulated by managers, investors may be misled about the financial status of an issuing firm when managers take steps to obscure the true financial standing of the firm. If firm earnings send a signal to external parties regarding the firm's financial condition or serve as a trigger for other economic events

(e.g., incentive based compensation, determination of tax liability, etc.), firm management may attempt to manage earnings for the purpose of achieving these objectives.

In this study, we examine earnings management in the insurance industry surrounding surplus note issuances. Surplus notes are hybrid debt instruments with elements of both debt and equity securities. Previous studies have examined the topic of earnings management surrounding equity and debt issuances outside of the insurance industry with mixed results. While many of these studies agree that earnings management increases surrounding new security issuances, whether or not managers can effectively alter the price of those issues remains unsettled.[1] The mixed evidence presented in prior research may be attributable to factors related to the samples used in previous studies and the methods employed to estimate earnings management. Given that features of the insurance industry allow for more accurate estimation of earnings management (Petroni, 1992; Gaver and Paterson, 2004; Eckles and Halek, 2010) and a relatively homogeneous market to examine these issues, we contend that it is an ideal setting to examine earnings management around the issuance of financial securities.

The primary objective of this study is to examine the role of surplus notes in the property-casualty insurance industry and to investigate potential earnings management activity around the issuance of these securities. If management in the insurance industry is similar to that found in other industries, it is likely that insurer management will attempt to manipulate insurance reserves for the purpose of managing earnings prior to the issuance of surplus notes. Prior literature contends that the likely reason for this manipulation is that management intends to influence the terms associated with the security issuance, such that the price of equity is greater or the yield associated with debt issuance is lower. If evidence is consistent with this belief, it would indicate that investors who rely on firm-provided financial statements can potentially be misled by management. Prior studies present mixed results on the effectiveness of earnings manipulation so we attempt to shed new light on this topic by testing to determine if reserving errors are related to the interest rates linked to newly issued surplus notes.

[1] For example, Teoh et al., (1998a), Teoh et al., (1998b), Rangan (1998), Kim and Park (2005), and Liu et al., (2010) find evidence to support the notion that earnings management influences investor decisions. Shivakumar (2000) and Caton et al., (2011) find no evidence to support this theory.

As a preview of our results, we first find that surplus note issuers tend to under-reserve (overstate earnings), are less capitalized, and are more likely to be organized as mutual insurers than non-issuers. These findings are consistent with similar research that has examined the life insurance industry. We also find that firms issuing larger surplus notes tend to be smaller, safer (i.e., more capitalized) firms and are more likely to be organized as stock insurers. In examining earnings management, we find evidence that firms that issue surplus notes tend to under-reserve (overstate earnings) in the period prior to and concurrent with a surplus note issuance, but that this significant relationship no longer holds the year after an issuance. This activity is consistent with firms creating the appearance of higher policyholders' surplus or smoother earnings, both of which improve the appearance of financial stability and could result in lower yields for issued notes.[2] Finally, we find no evidence that under-reserving prior to a surplus note issuance influences investors or underwriters, as the relation between interest rates and reserve errors is insignificant. This finding is consistent with the findings of Shivakumar (2000) and Caton et al., (2011) and suggests that even if managers do attempt to influence investor or underwriter perception of the firm, they are not misled by earnings management.

By examining the relation between earnings management and surplus note issuances we make a number of important contributions to the literature. First, prior literature has yet to reach a consensus as to the effect that earnings management may have on the terms of security issuances. We are able to more directly capture earnings management by focusing on the insurance industry, which allows for a refined test of whether earnings management has the ability to influence the terms of security issuances. Second, there has been very little emphasis on the ability of earnings management to influence equity or debt issuances in the insurance industry, likely due to the fact that debt and equity issuances tend to be infrequent relative to other industries.[3] We are able to avoid some of the problems caused by the lack of equity and debt issuances by focusing on surplus notes, which are more commonly used and available for

[2] Policyholders' surplus is similar to owners' equity and is equal to the residual that remains once liabilities have been subtracted from assets.

[3] To our knowledge, the only study that examines this issue is a working paper by Beaver et al., (2000) which does not find that firms manage earnings around IPOs or SEOs in the insurance industry.

use by insurers of all organizational forms. Third, while some research has examined the role of surplus notes in the life insurance industry, the use of surplus notes in the property-casualty insurance market has largely been overlooked. Over the past decade, these hybrid securities have increased in use by property-casualty insurers, with an over 200 percent increase in the total value of surplus notes outstanding over the past eighteen years.[4] Given the growing role of these securities in the capitalization of insurers, it is important to understand why firms choose to issue surplus notes. Finally, our study is the first to explicitly test the factors related to the size of the surplus note issuance. While prior literature has emphasized the general decision to issue surplus notes, to this point little is known about the factors related to the dollar amount of the note issuance. Overall, the results of this study provide greater insight into the effect of managerial discretion in earnings manipulation on the terms of security issuances and into the general use of surplus notes in the property-casualty insurance industry.

The remainder of this study is organized as follows. In the next section, we provide an overview of the literature as it relates to the use of surplus notes the insurance industry, followed by a discussion of earnings management and the use of earnings management around securities issuance. Next, we formally develop and present each of our testable hypotheses. We then discuss the data, variables, and methods employed to test our hypotheses. Finally, we present and discuss the results of our empirical analyses and then conclude.

## LITERATURE REVIEW

### *Surplus Notes and Surplus Note Use*

Surplus notes are hybrid debt instruments issued by insurance companies which are used to increase the value of the firm's policyholders' surplus (Dumm and Hoyt, 1999; Berry-Stölzle, Nini, and Wende, 2014). They are commonly referred to as *hybrid* debt instrument because, unlike traditional bonds and other debt financing arrangements, the notes are not secured and are subordinated to other liabilities (most importantly, policyholder claims) in the event of insurer insolvency. In addition, surplus note

[4] Authors' calculations based on data obtained from the NAIC InfoPro database.

repayment is contingent upon approval of the state regulator and typically requires that the insurer meets a pre-determined surplus position before repayment is permitted. It is also noteworthy that these hybrid instruments are classified as non-admitted liabilities on insurer financial statements, which results in two unique advantages for the insurer. First, the fact that the surplus notes are a non-admitted liability means the notes will only appear on an insurer's balance sheet as a liability if the insurer's surplus exceeds a pre-specified level. Second, due to this treatment of surplus notes, only the principal and interest payments coming due are reported on the balance sheet as a liability (Dumm and Hoyt, 1999). Finally, like other forms of debt, surplus notes typically include stated maturities and interest rates.[5] Presumably, insurers that exhibit a greater degree of financial stability should pay a lower interest rate to reflect the lower probability of defaulting on the surplus note or being disqualified by the regulator to repay the note.

Capital structure within the insurance industry differs from many other industries due to the presence of stringent regulation, the low proportion of publicly traded insurers, and other external factors such as the need to financially prepare for catastrophes (Carson, Forster, and McNamara, 1998; Cheng and Weiss, 2012). Statutory accounting, the guiding framework of insurer accounting practices, requires that insurers recognize an immediate liability for future losses when insurance policies are sold. However, the premium associated with the policy is not recognized immediately; rather, it is recognized over time as it is earned. Furthermore, while the revenue cannot be recognized until it is earned, expenses associated with the issuance of the policy must be recognized immediately. Therefore, insurance companies innately carry high values of leverage which constrain them from issuing debt through bonds or other forms of borrowing. In addition, only roughly 12 percent of property and casualty insurance companies in the U.S. are publicly traded which means that most insurers cannot issue stock to increase their capital (Grace and Leverty, 2012). It has been shown that insurers that are constrained in raising capital hold more cash relative to their peers to compensate for these constraints (Harrington and Niehaus, 2002).

As a result of the limitations discussed above as well as greater access to capital via global financial markets, surplus note usage in the U.S. insurance industry has grown considerably over the past

[5] Maturities for surplus notes commonly vary from as little as one year to as much as thirty or more years.

two decades. Surplus note trends in the property-casualty insurance industry from 1996 through 2013 are presented in Figures 1 and 2. Figure 1 illustrates the total value of surplus notes in the property-casualty insurance industry while Figure 2 presents the total number of insurers with outstanding surplus notes during the eighteen year period.[6] Figure 1 illustrates the dramatic increase in the dollar value of surplus notes outstanding during the eighteen year period, with a total of roughly $4.89 billion in surplus notes outstanding in 1996 and approximately $16.6 billion outstanding in 2013. The difference between the 1996 values and the 2013 values represent a total change of nearly 250 percent, suggesting a greater reliance on funding through surplus notes during this time period.

**[Insert Figure 1 here]**

**]Insert Figure 2 here]**

Figure 2 presents the total number of insurers with surplus notes outstanding from 1996 through 2013. Firms were determined to have surplus notes outstanding if they reported any positive surplus notes values in a given year. The values reported in Figure 2 are consistent with those presented in Figure 1 and imply that a greater number of insurers are relying on surplus notes over time. Specifically, we find that roughly 183 firms had surplus notes outstanding in 1996, while approximate 265 insurers had surplus notes outstanding in 2013.[7] Not surprisingly, there is a significant increase in the total number of property-casualty insurers reporting positive surplus note values following the recession in the early 2000s. However, it is interesting to note that there is actually a slight decline in the number of firms with surplus notes outstanding following the financial crisis that occurred during 2008 and 2009, which contrasts findings from Berry-Stölzle el al. (2014), who show that capital issuances increased during the same period (in the life insurance industry).

[6] Values for both figures were calculated by the authors using the NAIC InfoPro database. The values are obtained from the "Liabilities, Surplus and Other Funds" page in the NAIC Annual Statements.

[7] Note that these values represent surplus notes outstanding and not surplus notes issued. Since many surplus notes are issued with terms that can range anywhere from one year to thirty years or more, there will naturally be an increase in this value over time. However, we believe that taken together with Figure 1, Figure 2 further illustrates the importance of surplus notes on the property-casualty insurance industry.

While research on surplus note usage in the insurance industry has been fairly limited, several studies have provided evidence on the subject. Dumm and Hoyt (1999) show that surplus note issuance may be related to capital constraints or financial distress – specifically, larger mutual insurers, insurers with low regulatory capital, and insurers with lower financial strength ratings are more likely to issue surplus notes. In addition, Berry-Stölzle et al., (2014) show that surplus notes are a tool that debt- and equity-constrained insurers might use to raise capital. Companies are more likely to issue surplus notes relative to other types of external financing when they are of the mutual organizational form and when their capitalization is low. [8]

*Earnings Management Surrounding Securities Issuance*

Firms which issue financing instruments may have an incentive to manage their pre-issue earnings in order to mislead potential investors and lenders regarding the firm's financial position (Teoh, Welch, and Wong, 1998a; Teoh, Welch, and Wong, 1998b; Shivakumar, 2000; DuCharme, Malatesta, and Sefcik, 2004). Firms which issue securities can overstate earnings in order to improve the appearance of financial strength and create the appearance of smoother earnings, thus leading to more favorable prices or repayment conditions (i.e., higher stock price or lower bond interest rate).

Prior research has examined earnings management before the issuance of equity and debt. Many studies show that there is abnormally high earnings management before securities issuance. However, the evidence regarding the effectiveness of earnings management surrounding issuances is inconsistent. Teoh et al. (1998a) and Teoh et al. (1998b) find that firms engage in upward earnings management before and leading up to initial public offerings (IPO) and seasoned equity offering (SEO), respectively. Both studies present evidence that these actions have the effect of causing investors to overpay for the issued stock and that the stocks ultimately underperform in subsequent years. Similar findings were reported by Rangan (1998) in a separate investigation of earnings management surrounding seasoned equity offerings. Kim and Park (2005) again find that earnings management is high prior to seasoned equity offerings and also

[8] In addition to Dumm and Hoyt (1999) and Berry-Stölzle et al., (2014), Cummins, Phillips, and Smith (2001) and Beasley and Petroni (2001) both use surplus note issuance or use as a control variable in their studies.

report that earnings management can mislead investors. However, rather than focusing on post-issue returns, the authors show that firms which aggressively manage earnings obtain higher offer prices on their SEO issues. Liu, Ning, and Davidson (2010) show that bond issuers also engage in earnings management and that issuers with higher degrees of earnings management are rewarded with lower interest rates on their bond issues.

Despite some evidence to support the effectiveness of overstating earnings before an equity or debt issuance, other studies suggest that earnings management does not influence prices or repayment conditions. As with the above studies, Shivakumar (2000) examines earnings management surrounding seasoned equity offerings and finds that firms are more likely to manage earnings before an issue. However, Shivakumar argues that the findings of Teoh et al. (1998b) and Rangan (1998) are biased and that using an unbiased measure of abnormal return shows that investors are not fooled by pre-issue earnings management. Caton et al. (2011) study earnings management surrounding bond offerings. In direct contrast to the findings of Liu et al. (2010), they find evidence that bond issuers overstate earnings before an issuance but also find that firms which manage earnings to a higher degree have lower initial financial strength ratings and pay a higher price for the debt. Caton et al. further find that these high earnings management bond issuers are downgraded less frequently than other issuers which indicates that investors were not deceived by initial earnings management.

*Loss Reserve Errors: Earnings Management in the Insurance Industry*

A potential shortcoming in much of the earnings management literature for publicly-traded firms is that the variable used to capture earnings management represents an incomplete view of firm earnings and is subject to an errors-in-variables problem.[9] The errors-in variables-problem stems from the use of predicted change in accruals which is then used to estimate additional regression analyses. One advantage

[9] The variable most commonly used in earnings management literature is equal to the change in current accruals minus the expected change in current accruals, the latter of which is estimated using multivariate regression analysis. The change in accruals is equal to the change in accounts receivable plus inventory plus other current assets minus the change in accounts payable plus taxes payable plus other current liabilities. This value is most commonly scaled by total firm assets.

of studying earnings management in the insurance industry is that annual regulatory reporting requirements are uniquely suited to capture changes in reported earnings and therefore the exact magnitude of earnings management.[10] As noted in Eckles et al., (2013), "Reserves are insurer-specific accruals and unlike the accruals discussed above used in many accounting and finance studies, reserve errors measure the *actual* error in accruals".

Reserve errors have been linked to numerous economic phenomena in the U.S. insurance industry. It is generally accepted that reserve error manipulation can be used by insurers to avoid or postpone the payment of taxes (Gaver and Paterson, 1999; Grace and Leverty, 2012), to smooth income (Weiss, 1985; Grace, 1990), and to avoid regulatory scrutiny (Petroni, 1992; Gaver and Paterson, 2004). Similarly, it has been shown that weaker firms under-reserve (over-state earnings) in order to appear stronger or to push earnings into the positive domain (Beaver, McNichols, and Nelson, 2003; Grace and Leverty, 2012). Additionally, Browne, Ma, and Wang (2009), Eckles and Halek (2010), and Eckles et al., (2011), find that publicly traded insurance firms under-reserve to a greater extent when managers receive a higher portion of incentive-based compensation, which suggests that insurers may manipulate reserves to mislead investors in order to reach some target price/performance level for a given security.

Two studies have explicitly approached the topic of reserve manipulation and financing decisions in the insurance industry. The first, a working paper by Beaver, McNichols, and Nelson (2000), examines IPOs and SEOs in insurance markets during the 1980's and early 1990's. They find no significant *increase* in under-reserving by issuers but do find a consistent under-reserving trend among these firms. Still, the authors conclude that insurers are not attempting to mislead investors through reserve manipulation. Additionally, Eckles, Halek, and Zhang (2014) study the topic of reserve errors and financing by examining the effect of accounting data quality on insurer pricing. The authors show that a higher standard deviation of accounting accrual data (including reserve errors) is negatively associated

[10] Whether or not this earnings management is intentional or the result of changes in expected losses is not always immediately identifiable.

with the price an insurer can charge for its product. In other words, greater dispersion in the manipulation or mis-estimation of insurer loss reserves leads to lower yields on insurance premiums.

## HYPOTHESES

The goal of our paper is to investigate the relation between earnings management and securities issuance in the insurance industry. We first examine the factors related to the decision to issue surplus notes and the firm-specific determinants related to the size of the issuance. This is of particular importance because while prior studies have documented the role of surplus notes in the life insurance industry, prior literature has yet to investigate the role of surplus notes in the property-casualty insurance industry. Additionally, no prior study has examined the *size* of surplus note issuance. We then test for the relationship between loss reserve errors and surplus notes in an effort to identify potential earnings management around the issuance of surplus notes. Finally, we empirically test for the potential effect that reserve errors have on the interest rates associated with the issued notes.

To our knowledge, only Dumm and Hoyt (1999) and Berry-Stölzle et al., (2014) directly study surplus note issuance and both studies focus on the life insurance industry. Our sample consists of property-casualty insurance companies because reserve errors can be calculated from the reported financial statements of property-casualty insurers. We expect that some motivations to issue surplus notes may hold across the two industries, but there are key differences that exist between industries that might affect these relations.[11] In both prior studies of surplus note issuance, insurers which are capital-constrained are more likely to issue surplus notes. Specifically, insurers of the mutual organizational form and financially weaker insurers are more likely to issue surplus notes.[12] While prior literature has examined the decision to issue surplus notes in the life insurance market, the decision to issue surplus

[11] For example, life insurers tend to sell long-term products for which less loss reserve variation should exist. Eckles and Halek (2010) explain that life insurers set reserves based on published mortality tables and therefore managers are afforded less discretion in setting loss reserves.

[12] Financial strength/weakness is measured via the RBC ratio and AM Best ratings by Dumm and Hoyt (1999) and by the capital-asset ratio by Berry-Stölzle et al. (2014).

notes has not been comprehensively examined in the property-casualty industry, and prior literature has not yet examined the factors associated with the *size* of the issuance.

*Capital Constraints and Surplus Note Issuance*

Based on the findings of Dumm and Hoyt (1999) and Berry-Stölzle et al., (2014), we anticipate that firms which are "capital constrained" – i.e., those firms with limited access to financial markets and firms with low levels of capitalization – will be more likely to issue surplus notes. Specifically, we anticipate that mutual insurance companies and insurers with low levels of regulatory capital (proxied by RBC ratios) will be more likely to issue surplus notes.[13] However, while we anticipate that these "capital constrained" firms will be more likely to issue surplus notes, the relationship between organizational form, financial strength, and the *size* of surplus note issuance is ambiguous. It is natural to expect that mutual insurers are more likely to issue surplus notes since they have no other external financing options. However, there is no clear expectation as to whether the size of the issuance for mutual insurers will be greater than or less than the issuance amount for other organizational forms. If mutual insurers rely solely on surplus notes for the purpose of capitalization, it is possible that the size of the issued notes (relative to total assets) will be greater than that of stock insurers. However, given that mutual insurers tend to be more capitalized than stock insurers (Harrington and Niehaus, 2002), it is possible that the dollar amount of capital required by mutuals through the issuance of surplus notes will be less than that required by stock insurers.[14] In addition, we expect that firms with lower levels of capitalization will issue greater amounts of surplus note relative to total assets. Since surplus notes improve an insurer's policyholders' surplus without creating a balance sheet liability, surplus notes may be a valuable tool for an

[13] The risk based capital, or RBC, ratio is a measure of a firm's total adjusted capital divided by its required risk based capital. Higher values of the RBC ratio indicate a more financially secure firm. Typically, values below 200 percent are considered troublesome and these insurers will encounter greater regulatory scrutiny (Cummins, Harrington, and Klein, 1995; Grace, Harrington and Klein, 1998).

[14] Harrington and Niehaus (2002) note that the average ratio of capital to total liabilities from 1970 to 1999 was 53.7 percent for mutual insurers while it was only 43.1 percent for stock insurers. Additionally, the median RBC ratio for mutual insurers in our sample is 8.64 while the median RBC ratio for stock insurers in our sample is 7.22 Using a non-parametric equality-of-means test, we find that the median RBC values for mutual and stock insurers are statistically different.

undercapitalized insurer to improve its financial standing. We formalize our first set of hypotheses as follows:

*H1: Mutual insurers are more likely to issue surplus notes than stock insurers.*

*H2: Less capitalized insurers are more likely to issue surplus notes.*

*H3: There is no difference in the size of surplus notes issued by mutual insurers and stock insurers.*

*H4: Less capitalized insurers will issue surplus notes with a greater face amount.*

*Earnings Management and Surplus Note Issuance*

We next examine the relationship between earnings management and surplus note issuance in the insurance industry. While various factors have been tied to the manipulation of loss reserves, the insurance literature has offered limited evidence on how the issuance of securities impacts reserve management. By utilizing data on surplus note issuances, we are able to directly test whether insurers manipulate reserves around the issuance of securities and whether the manipulation influences the terms of the issuance. Following Caton et al., (2011) and Shivakumar (2000), we first investigate whether insurers manage reserves prior to the issuance of surplus notes. If insurers attempt to manage reserves for the purpose of appearing financially stronger and ultimately issuing the notes with lower interest rates, then we would expect issuing insurers to under-reserve in the year prior to the issuance and/or during the year of issuance. By under-reserving, the insurer increases surplus and appears financially stronger than it otherwise would. We formally state this hypothesis as:

*H5: Property-casualty insurers under-reserve in the year prior to and the year of surplus note issuance.*

While we hypothesize that the reason issuing insurers manipulate reserves is to secure better financing terms (specifically through a lower interest rate), the question remains as to whether investors are misled by reserve manipulation. Prior literature offers mixed results with regards to whether or not such manipulation actually has the ability to mislead investors of equity and debt. While Rangan (1998) and Teoh et al. (1998) find that earnings management has the ability to deceive investors, Shivakumar (2000) and Canton et al. (2011) find that investors recognize the existence of earnings management prior

to the issuance of seasoned equity and debt offerings and that they account for the manipulation. Given the mixed evidence offered by prior empirical research, we offer our sixth hypothesis in the null form as:

*H6: Surplus note yields are unaffected by the degree of the reserve error that exists prior to note issuance.*

Below we discuss the data and methods used to test each of our hypotheses.

## DATA, VARIABLES AND METHODOLOGY

### *Data*

The primary source of firm-specific financial and operational data is the National Association of Insurance Commissioner (NAIC) InfoPro database. The sample consists of property-casualty insurers for the period from 1996 through 2013. Since five years of data are required for the estimation of the reserve errors variables and one lagged year is required for the calculation of the growth variable, the final sample spans the period from 1998 through 2009. We supplement the NAIC data using hand-collected information regarding surplus notes issues, which are obtained directly from the NAIC Annual Statements in the General Interrogatories section (discussed below). We also apply a number of screens to the data. First, we remove firms that are missing data or that report illogical values. Second, we remove firms that report negative total assets, risk based capital, policyholders' surplus, and premiums written. We also follow Petroni (1992) and Leverty and Grace (2012) and remove observations with extreme reserve errors (i.e., those that are greater |50%|), insurers that write more than 25 percent of total premiums in accident/health, credit insurance, surety, and workers' compensation, and those firms that cede all of their premiums via reinsurance.[15] Finally, we remove professional reinsurers, as it is likely that

[15] Petroni (1992) removes firms writing more than 25 percent of premiums in these lines because managers of these firms will have less discretion in managing reserves.

the operations of these firms differ substantially from the operations of primary insurers.[16] We winsorize all continuous variables at the 1st and 99th percentiles to reduce bias caused by potential outliers.

*Variables*

Reserve Errors

The nature of the U.S. insurance industry allows us to directly observe revisions to insurer loss reserves, which are ultimately used to calculate reserve errors. Specifically, insurers are required to disclose estimated losses for each year, and then must report revisions to those estimates on an annual basis in regulatory statements. By examining the revisions over time, we can directly capture the difference between the initial estimation of incurred losses and the developed value for incurred losses, which becomes more accurate as the insurer pays claims associated with a given year over time. We calculate reserve errors as follows:

$$Reserve\ Error_{i,t} = Incurred\ Losses_{i,t} - Incurred\ Losses_{i,t+5} \quad (1)$$

for firm *i* in year *t*.[17] Using this approach, reserve errors that are greater than zero suggest that the firm has over-reserved (i.e., over-estimated incurred losses in year *t*), while reserve values that are less than zero indicate under-reserving. Data necessary for the calculation of reserve errors are obtained from Schedule P – Part 2 of the NAIC Annual Statements.

An illustration of the reserve error calculation is presented in Table 1, which shows the typical Schedule P – Part 2 for Allstate (NAIC company code 19232) in 2013. In order to calculate reserve errors for 2008, we examine the difference between the original estimate of incurred losses as set in 2008 and compare that value to developed incurred losses that are reported five years later in 2013. In this example, the reserve error for 2008 equals to the sum of the shaded values in Column (5) minus the sum of the

[16] We follow Cole and McCullough (2006) and define a professional reinsurer as any firm with a ratio of reinsurance assumed from non-affiliates to the sum of direct premiums written plus reinsurance assumed from affiliates that exceeds 75 percent.

[17] This approach to reserve error calculation is similar to the method proposed by Kazenski, Feldhaus, and Schneider (1992) and is consistent with prior literature (e.g., Eckles and Halek, 2010; Eckles et al., 2011; Grace and Leverty, 2012)

shaded values in Column (10), or $79,662 - $79,999, which equals a reserve error of -337. The -337 value corresponds with Allstate under-reserving in 2008 by approximately $337 million, which would ultimately have the effect of increasing the firm's surplus in year *t*. We follow prior literature and scale the reserve errors both by total firm assets and by developed reserves, resulting in two different reserve error measures, and we report empirical results for both.

**[Insert Table 1 here]**

Surplus Notes

Because we are interested in the potential manipulation of reserve errors around the issuance of surplus notes, the identification of newly issued surplus notes is required; however, there is limited available data that tracks the issuance of surplus notes. Given the lack of available surplus notes data, we identify new issuances by taking the following steps:

1. First, we identify all firms that report a positive surplus note value in year *t* that also reported a value of zero in year *t-1*. This information is included on the "Liabilities, Surplus and Other Funds" page of the NAIC annual statement. Firms that did not report a value in the prior year and report a positive surplus notes value in the current year are classified as having issued a new surplus note.
2. Second, we calculate the change in the dollar amount of surplus notes from year *t-1* to year *t*. Firms with an increase in the surplus note value reported from year *t-1* to year *t* are then flagged as *potentially* having issued a surplus note. An increase in this value would likely be due to either (1) the issuance of a new note or (2) an increase associated the increase interest payment obligations.
3. For firms initially classified as surplus notes issuers either in step (1) or (2), we then confirmed that an issuance took place by reviewing disclosures available in the General Interrogatories section of the statutory annual statements. For those cases where we could confirm that an

issuance took place, we then collected additional information regarding note characteristics, including interest rates, size of issuance, and AM Best rating.[18]

Once we verified that each identified firm issued a surplus note, we created a binary variable, *New Note*, equal to one for firms that issued a surplus note in a given year, and zero for firms that did not issue a new surplus note.

Income Smoothing and Tax Incentives

In addition to the primary variables of interest, it is also argued that management may attempt to manage earnings for the purpose of smoothing income or taking advantage of tax incentives. If a firm generates income that is higher (lower) than average income in a given year, management may choose over-reserve (under-reserve) for the purpose of stabilizing income over time. By choosing to under or over-reserve, the firm is able to manage the volatility of earnings as well as the expectations of owners and other stakeholders. We control for income smoothing by including a series of indicator variables based on where the firm's level of profitability lies on the distribution of profitability (Beaver, McNichols, and Nelson, 2003).[19] We create a *SmallProfit* binary variable equal to 1 for firms that lie within the first five percent of the distribution to the right of zero. Those firms that manage earnings are more likely to do so to ensure positive earnings in a year in which they would otherwise report a loss, so if firms do manage earnings, they are more likely to be concentrated in this part of the distribution. We also create a *SmallLoss* binary variable and a *Profit* variable. The *SmallLoss* variable is equal to 1 for firms whose profitability is within the first five percent of the distribution to the left of zero, and the *Profit* variable is equal to 1 for firms in the top 95 percent of the distribution to the right of zero. Finally, we omit the *Loss* variable from our models, which is equal to 1 for firms in the top 95 percent of the distribution to the left of zero.[20]

[18] Information on note characteristics were obtained from the general interrogatories section of the annual statements, state regulatory reviews, insurer financial reports, and other sources located through internet searches.
[19] We proxy for profitability using return on assets (ROA), calculated as the ratio of net income to total assets.
[20] Another proxy for earnings management used in prior literature is the three year average of ROA (Grace, 1990). However, given the limited number of surplus note issuances in the data set, we choose to employ the binary

Management may also choose to manipulate reserves for the purpose of delaying tax payments. As noted by Grace (1990), over-reserving has the effect of reducing an insurer's tax lability for a given year. While it only delays the payment of taxes and does not eliminate the tax liability in the future, over-reserving can be used by firms to manipulate current year tax payments. The firms that are most likely to manipulate reserves for the purpose of delaying taxes are those firms with a high tax rate; as such, we account for these firms using a binary variable, *HighTax*, equal to 1 for firms that paid taxes in a given year and did not receive a tax refund (Petroni, Ryan and Wahlen, 2000).

Control Variables

Prior literature offers a number of other firm-specific factors that might influence the degree of reserve error that is exhibited. We include additional variables that are intended to capture unique firm characteristics that might be involved in setting reserves. Given that diversification creates a more complex organization, diversified firms may be more susceptible to errors when setting reserves. We control for geographic and product diversification by creating separate product and geographic diversification measures equal to the complement of the Herfindahl-Hirschman Index (HHI),

$$Diversification_{i,t} = 1 - \sum_{j=1}^{n} \left( \frac{DPW_{i,j,t}}{DPW_{i,t}} \right)^2 \quad (2)$$

for insurer *i* writing business in state (line) *j* in year *t*. The geographic diversification measure is calculated using direct premiums written in the 50 U.S. states and the District of Columbia, while the product diversification measure is calculated using direct premiums written in 23 unique lines of business.[21] We also control for the proportion of premiums written in long-tail lines of business (Aiuppa

variables which do not have the effect of reducing the sample period by an additional two years. We re-estimated all models discussed below using the three year average ROA value and the results on the primary variable of interest (*New Note*) are qualitatively and quantitatively similar to those presented in this study.

[21] We follow Liebenberg and Sommer (2008) and combine similar lines to create the following 23 lines of business: (1) Accident and Health, (2) Aircraft, (3) Boiler and Machinery, (4) Commercial Auto, (5) Commercial Multi-Peril, (6) Credit, (7) Earthquake, (8) Farmowners', (9) Fidelity, (10) Financial Guaranty, (11) Fire and Allied Lines, (12) Homeowners', (13) Inland Marine, (14) Medical Malpractice, (15) Mortgage Guaranty, (16) Ocean Marine, (17) Other, (18) Other Liability, (19) Personal Auto, (20) Products Liability, (21) Theft, (22) Surety, and (23) Workers' Compensation.

and Trieschmann, 1987; Petroni, 1992). Since it can take many years for an insurer to determine the actual losses associated with policies issued for long-tailed risks, it is likely more difficult to accurately set reserves for these policies. We account for long-tail business by including a variable equal to the proportion of premiums attributed to long-tail lines of business relative to total premiums written.[22] Prior research has commonly controlled for the potential influence that firm size can have on reserve errors, arguing that large firms have the resources to more accurately determine appropriate reserves when initially setting them (e.g., Aiuppa and Trieschmann, 1987; Browne et al., 2009). We control for firm size by including the natural logarithm of total firm assets.

Harrington and Danzon (1994) argue that firms with weak solvency incentives are more likely to charge low prices and grow quickly relative to firms that have greater solvency incentives, which will ultimately be linked to under-reserving activity. Firms that grow quickly may also be able to do so because of lax underwriting, which could have the effect of introducing greater-than-expected losses, which would also result in under-reserving for high growth firms.[23] We account for growth by including by percentage change in premiums written from year *t-1* to year *t*. In addition to the influence that growth could have on reserve activity, Harrington and Danzon (1994) note that insurers may use reinsurance as a method to camouflage underpricing and under-reserving that might take place during periods of high growth. Given this possibility, we control for reinsurance utilization by including the ratio of reinsurance ceded to non-affiliated insurers to the sum to total direct premiums written and reinsurance assumed from unaffiliated insurers. Research has also provided evidence that firms may manipulate earnings in order to mask potential solvency issues. By under-reserving, a firm can increase its surplus and create the illusion that it is more financially solvent than is true. This technique may be used by insurers to avoid additional regulatory scrutiny that might be caused by inappropriate levels of capitalization (e.g., Gaver and

[22] We follow Eckles et al. (2011) and consider the following lines to be "long-tail" lines: Automobile Liability, Commercial Multi-Peril, Farmowners', Homeowners', Medical Malpractice, "Other" Liability, Products Liability, and Workers' Compensation.

[23] Barth and Eckles (2015) find a significantly positive relationship between growth (measured by growth in claims) and reserve error growth.

Paterson, 2004). We control for insurer solvency in our models by including the risk based capital (RBC) ratio, which is calculated as:

$$RBC_{i,t} = \frac{Total\ Adjusted\ Capital_{i,t}}{Authorized\ Control\ Level\ RBC_{i,t}} \quad (3)$$

State regulators require that insurers maintain total adjusted capital that exceeds 200 percent of authorized control level RBC, and failure to maintain an RBC ratio that exceeds 2:1 can result in additional regulatory scrutiny (Cummins, Harrington, and Klein, 1995; Grace, Harrington and Klein, 1998).

The final control variables we include in the models are indicator variables for organizational form and group membership. The U.S. property-casualty insurance industry is largely composed of stock and mutual insurance companies, where stock insurers are owned by outside investors while mutual insurance companies are owned by policyholders. It is generally argued that the stock organizational form better controls owner-manager conflicts, which results in stock insurer management having a greater degree of managerial discretion than mutual insurer management. Significant empirical evidence suggests that organizational form (and the corresponding degree of managerial discretion attributed to the organizational form) influences various operational and financial characteristics including capitalization levels (Harrington and Niehaus, 2002), the lines of business the firm writes in (Mayers and Smith, 1988), distribution systems used (Kim, Mayers and Smith, 1996), executive compensation (Mayers and Smith, 1992), and the riskiness of the firm (Lamm-Tennant and Starks, 1993). Given that it is argued that mutual insurers have less managerial discretion, mutuals should be more likely to use more conservative reserving, which would suggests a positive relation between the mutual organizational form and reserve errors (e.g., Leverty and Grace, 2012). We include a binary variable equal to 1 for mutual insurers and for "other" insurers.[24] Finally, we include a binary variable equal to 1 for firms that are members of an insurance group. Affiliated firms have access to active internal capital markets (Powell and Sommer, 2007; Powell, Sommer, and Eckles, 2008; Fier, McCullough and Carson, 2013), are more capitalized than

[24] "Other" organizational forms include Lloyd's, risk retention groups, reciprocals, US branches of alien insurers, and health, medical, dental and indemnity (HMDI) companies. While it is not uncommon for studies to omit "other" insurers (e.g., Berry-Stölzle et al., 2012), we include them in order to maximize the number of surplus note issuances in the sample.

unaffiliated firms (Cummins and Sommer, 1996), and they have been shown to offer insurance at a lower price than that which is offered by their unaffiliated counterparts (Sommer, 1996).

Summary statistics for the dependent and independent variables are presented in Table 2 and correlations between all variables are presented in Table 3. Consistent with prior literature, the summary statistics indicate that the average insurer over-reserves during the sample period (e.g., Eckles and Halek, 2010; Grace and Leverty, 2010; Grace and Leverty, 2012). Table 2 also indicates that the issuance of surplus notes is relatively limited, with roughly 1.6 percent of the sample issuing a surplus note from 1997 to 2009. The average insurer in the sample has total assets of approximately $695 million, an average growth rate of 12 percent, and is relatively concentrated both across products and geographic location. Firms in the sample have an average RBC that greatly exceeds the 2:1 regulatory threshold, they cede nearly 18 percent of premiums to unaffiliated insurers, and less than half are characterized by a high tax rate. Finally, nearly 70 percent of our sample is composed of affiliated insurers, while 23 percent of the firms in the sample are of the mutual organizational form and 8.7 percent are not of the stock or mutual organizational forms.

**[Insert Table 2 here]**

**[Insert Table 3 here]**

*Methodology*

In order to test hypotheses 1 and 2, we first examine the determinants associated with the decision to issue surplus notes. The observable decision to issue a surplus note ($y_{i,t}$) is assumed to be the outcome of unobservable variable $y_{i,t}^{*}$ (Baum, 2006). The relation is given as:

$$y_{i,t}^{*} = \alpha + \beta_1 ReserveError_{i,t-1} + \beta\delta_{i,t-1} + \eta_t + \varepsilon_{i,t} \quad (4)$$

where

$$y_{i,t} = \begin{cases} 1 \text{ if } y_{i,t}^{*} > 0 \\ 0 \text{ otherwise} \end{cases} \quad (5)$$

for firm $i$ in year $t$, $ReserveError$ is equal to the reserve error variable for year *t-1* in Equation (1), scaled either by total assets or developed reserves, $\delta_{i,t-1}$ denotes a vector of control variables that prior literature suggests are related to the issuance decision, and $\eta_t$ is a series of year control variables. In order to test for the determinants of surplus note issuance, we employ a probit model and cluster standard errors at the firm-level (Petersen, 2009).

We estimate two variations of the probit model. First, we estimate the model using the control variables that were previously discussed above. Next, we re-estimate the model after replacing some of the continuous control variables with binary variables in order to estimate conditional probabilities associated with the decision to issue surplus notes. Specifically, we replace the size, diversification, RBC, and long-tail continuous variables with binary variables. The *Size* variable is replaced with a binary variable equal to 1 for the top 10 percent of firms in terms of size. The diversification variables are replaced with binary variables equal to 1 for firms that only operate in one line of business (*One Line*) or in one state (*One State*). The *RBC* variable is replaced with a binary variable (*Low RBC*) that is equal to 1 for firms that lie within the first 10 percent of the distribution of RBC for the sample. Finally, we replace the proportion of premiums in long-tail lines of business with a binary variable equal to 1 for firms that write at least 75 percent of long-tail lines of business.

Following our examination of the decision to issue surplus notes, we then investigate the factors associated with the dollar value of the notes issued in order to test hypotheses 3 and 4. Given that the firm must make the initial decision to issue a surplus note, we account for selection bias by estimating both a two-stage Heckman model and an ordinary least squares (OLS) model. The first stage of the Heckman is a probit model that estimates the decision to issue a surplus note, while the second stage accounts for the selection decision by including the inverse Mill's ratio obtained from the first stage[25], calculated as:

$$\lambda(\alpha_i) = \frac{\phi(\alpha_i)}{1 - \Phi(\alpha_i)} \tag{6}$$

[25] The first stage of the Heckman selection model requires the inclusion of variables that are excluded in the second stage. We include the *High Tax*, *Small Profit*, *Profit*, and *Small Loss* variables in the first stage of the Heckman model.

where $\phi(\cdot)$ is the normal density function and $\Phi(\cdot)$ denotes the normal cumulative density function (Baum, 2006). The primary dependent variable of interest is the ratio of the face value of the surplus note(s) issued scaled by prior year total assets (*Amt Issued*).[26] The estimated model is given as:

$$\frac{Surplus\ Note\ Amount_{i,t}}{Total\ Assets_{i,t-1}} = \alpha + \beta_1 RBC_{i,t-1} + \beta_2 Mutual_{i,t-1} + \beta\delta_{i,t-1} + \beta\lambda + \eta_t + \varepsilon_{i,t} \qquad (7)$$

where $\lambda$ is the inverse Mill's ratio that is calculated from the first stage and is only included in the Heckman models. The primary independent variables of interest are $RBC_{i,t-1}$ and $Mutual_{i,t-1}$, which are used to test hypotheses 3 and 4. Both the Heckman and OLS models are estimated with the inclusion of (unreported) year control variables.

We next test for the relation between reserving activity and the issuance of surplus notes. The Wooldridge (2002) test suggests the existence of first order autocorrelation, while the modified Wald test indicates that there is group-wise heteroscedasticity. We follow the work of Grace and Leverty (2012) and account for these joint concerns by estimating a feasible generalized least squares (FGLS) model with a panel-specific AR(1) structure. Given the use of this approach, we must drop a total of 174 firms because the observations only have a single year of data in the sample. Because we are interested in examining reserve activity around the issuance of surplus notes, our dependent variable is the reserve error for year *t*, while the independent variable of interest is a binary variable equal to 1 for firms that issue surplus notes (*New Note*). We estimate three separate models to examine reserving at different points in time with three different independent variables of interest, such that the independent variables are equal to 1 for (1) firms that issue in the current year, (2) firms that will issue a note in the following year, and (3) firms that issued a policy in the prior year. Formally, we estimate the following model:

$$Reserve\ Error_{i,t} = \alpha + \beta_1 New\ Note_{i,t\ (t-1,t+1)} + \beta\delta_{i,t} + \eta_t + \varepsilon_{i,t} \qquad (8)$$

[26] Information regarding the face value of the notes issued is obtained through hand collection of information found in the NAIC annual statements. Since some firms do not report the value of the note(s) issued, we only consider those that report that information in their annual statements.

where $Reserve\ Error_{i,t}$ is calculated using Equation (1), $New\ Note_{i,t\ (t+1,t-1)}$ is a binary variable equal to 1 for firms that issue a surplus note in year *t* (or, in separate models, in years *t+1* or *t-1*), $\delta_{i,t}$ is a vector of control variables, and $\eta_t$ is a series of binary year controls variables. If firms are under-reserving for the purpose of (potentially) gaining better terms for the notes being issued, we expect a negative relation between reserve errors and surplus note issuance for firms issuing in the current year or following year, and no significant relation between reserve errors and prior year surplus not issuance.

If results are consistent with Hypothesis 5 and there is evidence that firms manipulate reserves around the issuance of surplus notes, the question that remains is why firms may choose to do so. Some prior research provides evidence that suggests non-insurance firms will manage earnings in an effort to obtain better price conditions for the equity or debt that is issued (Shivakumar, 2000). The argument is that firm management will attempt to appear financially stronger in order to issue stock at a higher price or debt at a lower yield. We test this hypothesis by estimating the following model:

$$\begin{aligned} Interest\ Rate_{i,t} \\ &= \alpha + \beta Reserve\ Error_{i,t-1} + \beta Best_{i,t} + \beta Amt\ Issued_{i,t} \\ &+ \beta Fixed\ Interest_{i,t} + \beta\delta_{i,t-1} + \eta_t + \varepsilon_{i,t} \end{aligned} \quad (9)$$

where $Interest\ Rate_{i,t}$ is equal to the interest rate in the year of surplus note issuance for insurer *i* in year *t*, $Reserve\ Error_{i,t-1}$ represents the reserve error variable as presented in in Equation (1), $Best_{i,t}$ denotes a series of binary variables that captures the firm's A.M. Best financial strength rating in year *t*,[27] $Amt\ Issued_{i,t}$ is the ratio of the dollar amount of the surplus note issuance relative to prior year total assets, $Fixed\ Interest_{i,t}$ is a binary variable equal to 1 for issuances that use a fixed interest rate rather than a variable interest rate, $\delta_{i,t-1}$ represents a vector of control variables that have been discussed previously, and $\eta_t$represents a series of binary variables to control for the year that the notes were issued. For firms that issue surplus notes with a fixed interest rate, we use the fixed rate value as our dependent

[27] We use a total of four binary variables to capture A.M. Best financial strength ratings, where *Best1* = A++ or A+, *Best2* A or A-, *Best3* = B++ or B+, *Best4*= B or lower. We omit the *Best1* binary variable from our models to avoid multicollinearity.

variable. For firms that issue notes with a variable rate, we calculate the rate for the year of issuance. It should be noted that affiliated insurers have the ability to issue surplus notes to other group members. When these transactions take place, it is likely that less information asymmetry exists between group members and the terms of the issuance may be based on other factors than those related to firm or issuance characteristics. Given these potential differences, we estimate our models for the pooled sample as well as for affiliated and unaffiliated subsamples.

## RESULTS

### *Surplus Note Issuance*

We test our first set of hypotheses by examining the decision to issue surplus notes in the property-casualty insurance industry using Equation (4), and the results are presented in Table 4. The results presented in Model 1 include the reserve error variable scaled by total assets, while the results presented in Model 2 include the reserve error variable scaled by developed reserves. The results in both models provide support for both Hypothesis 1 and Hypothesis 2. With regards to Hypothesis 1, we find that mutual insurers are more likely to issue surplus notes than the other organizational forms. This finding is consistent with the results that have been presented in the life insurance industry which indicate that firms with a limited ability to raise capital are more likely to rely on surplus notes than are firms that have greater access to external capital markets. The negative and significant coefficient on the *RBC* variable lends support for Hypothesis 2 and suggests that firms with a greater degree of capitalization are less likely to issue surplus notes. An argument could be made that more capitalized firms are more likely to issue surplus notes if the funds will be used to take advantage of various market conditions (such as acquisitions or expansion), but the results presented in Table 4 indicate that it is the less capitalized firms that are more likely to issue surplus notes potentially for the purpose of improving their capital position.[28]

[28] The positive and significant coefficient on the *Growth* variable in Model 1 does provide some initial evidence that firms with greater growth opportunities are more likely to issue surplus notes. However, given the lack of statistical significance for the *Growth* variable in Model 2, it is difficult to make any clear statements regarding this relationship.

The results in Table 4 also provide some initial evidence that is consistent with Hypothesis 5. The negative and significant coefficients on the reserve error variables in both models indicate that under-reserving (or more negative reserve errors) is related to the decision to issue surplus notes. Finally, we find that some of the other control variables related to the issuance decision include the use of reinsurance, profitability, and insurer tax rates.

**[Insert Table 4 here]**

We next present the probabilities associated with some of the variables of interest that were previously discussed in Table 4.[29] We re-estimate Equation (4) after replacing many of the continuous variables with binary variables, which allows us to estimate the probability of issuing surplus notes based on either being assigned a value of one or zero for each binary variable. Table 5 reports the probabilities of surplus note issuance as well as marginal effects. First, holding all other independent variables at their means we find that mutual insurers have a 2.45 percent probability of issuing surplus notes, while non-mutual insurers only have a 0.74 percent likelihood of issuance. This difference indicates that mutual insurers are 3.3 times more likely to issue surplus notes than are firms that are of other organizational forms. The large difference in probabilities provides further support for Hypothesis 1 and also emphasizes the importance of surplus notes for firms with limited options to obtain capital.

**[Insert Table 5 here]**

In addition to the findings based on organizational form, we also confirm our initial findings for Hypothesis 2 and find that less capitalized firms are much more likely to issue surplus notes than are better capitalized firms. Specifically, firms with low RBC ratios are approximately 2.8 times more likely to issue surplus notes than are those firms that are not among the group of low RBC firms.[30] While the difference is not quite as dramatic as that seen when discussing the organizational form results, the

[29] We present the results for the model including the binary variable for firms that under-reserve based on the reserve error variable scaled by total assets to conserve space. However, the results are qualitatively and quantitatively similar when using the binary variable based on reserve errors scaled by developed reserves. Results are available from the authors upon request.

[30] The *Low RBC* variable is a binary variable equal to 1 for firms that fall within the first ten percent of the distribution of RBC in the sample.

contrast is stark and indicates that less capitalized firms rely on surplus note issuance to a much greater extent than do more well capitalized firms.

Finally, results in Table 5 also imply that insurers that under-reserve (*Under RE Asset*) are 1.89 times more likely to issue surplus notes than are firms that over-reserve. These findings are again consistent with those presented in Table 4 and also support Hypothesis 5 and provide some evidence that reserve activity is related to the surplus note issuance decision.

*Size of Surplus Note Issuance*

The results presented in the previous section provide support for Hypotheses 1 and 2 and also provide some initial evidence that reserving is related to the decision to issue surplus notes. Next, we test for the firm-specific factors related to the size of the issuance using Equation (7).[31] The results of these estimations are presented in Table 6. First, we reject Hypothesis 3 and find that there is a significant difference between mutual insurers and other organizational forms with respect to surplus note issuance size. Mutual insurers that issue surplus notes are more likely to issue surplus notes with lower face amounts (relative to prior year total assets) than are stock insurers. The coefficient on the *Mutual* variable indicates that classification as a mutual insurer is associated with surplus note issuances that are between 6 and 7 percent lower than notes issued by stock insurers. This result is consistent with Harrington and Niehaus (2002) who present evidence that mutual insurers tend to be more capitalized than stock insurers.

**[Insert Table 6 here]**

Our fourth hypothesis posits that less capitalized insurers will issue surplus notes with a larger face amount than firms that are better capitalized. The results presented in Table 6 indicate that firms with a greater RBC ratio are actually more likely to issue surplus notes with greater face amounts. One explanation for this result could be that external capital markets are more likely to issue greater amounts to firms that are more finically secure. Finally, we find that firm size is inversely related to the size of the issuance. Overall, the results presented in Tables 5 and 6 indicate that mutual insurers are more likely to

[31] While we present results obtained from both the Heckman models and the OLS models, the insignificant coefficient on the *Lambda* variable indicates that sample selection bias should not be of concern in our models.

issue surplus notes but for smaller amounts relative to prior year assets, while less capitalized firms are more likely to issue surplus notes (likely in order to recapitalize) but will issue notes for smaller amounts relative to more capitalized firms.

*Surplus Note Issuance and Reserve Errors*

The results presented above provide insight into the characteristics associated with firms that issue surplus notes and with the size of the notes that are ultimately issued. While the prior empirical analyses provide initial evidence regarding the relation between potential reserve manipulation and surplus note issuance, we more directly test the possible relationship in this section. Before examining the relation in the multivariate setting, we first employ a univariate analysis to examine reserving activity around the issuance of surplus notes. We anticipate that if firms manipulate reserves around the issuance of surplus notes, issuing firms should under-reserve to a greater extent than non-issuers prior to the issuance and in the year of the issuance, but there should be no difference between the two groups the year following the issuance. We present the univariate analysis in Table 7.

**[Insert Table 7 here]**

Table 7 presents the difference in reserve errors before the issuance of surplus notes, in the year of the surplus note issuance, and the year following surplus note issuance for firms that do and do not issue notes. The difference in means between issuers and non-issuers in the year prior to and the year of the surplus note issuance indicate that issuers under-reserve during these two years, while the remainder of the sample tends to over-reserve. We also find that the difference is statistically significant at the 1 percent level during these two years. However, in the year following the surplus note issuance, we find that the reserve error measures for the group of issuing firms are positive, indicating that these firms over-reserve rather than under-reserve. Additionally, for one of the two measures we find that there is not a statistically significant difference in means between the issuers and non-issuers in the year following the surplus note issuance. These results provide further evidence in support of Hypothesis 5.

While the comparison of means presented in Table 7 support Hypothesis 5, we further investigate the relation between potential reserve manipulation around the issuance of surplus notes in the multivariate setting. We estimate Equation (8) for both reserve error variables and present the results in Tables 8 and 9. The results in Table 8 (using the ratio of reserve errors relative to total assets as the dependent variable) indicate that there is an inverse relation between the issuance of surplus notes in the current year and in the following year (*t+1*). This finding suggests that firms that issue a surplus note in the current year or that will issue notes in the following year tend to have more negative reserve errors (or under-reserve), which is consistent both with the univariate results and with Hypothesis 5. However, when examining the relation between reserve errors and surplus notes for those firms that issued in the prior year (*t-1*), there is not a statistical relation between the two variables. This is what one would anticipate if firms were potentially manipulating reserves prior to the issuance of the surplus notes. If management manipulates reserves for the purpose of obtaining lower interest rates on the surplus notes issued, then there should be a significant relation between reserving in the year prior to and the year of the issuance. However, once the notes are issued, there is a reduced incentive to manipulate the reserves and the statistical relation between reserve errors and note issuance should diminish. These results are consistent when using either of the two reserve error measures.

In addition to the primary independent variables of interest, we find that a number of the other control variables are related to reserve errors. Many of the findings are consistent with the results presented in prior studies. Specifically, we find that diversification (both product and geographic) are inversely related to reserve errors, as is reinsurance utilization and growth, and the level of capitalization (RBC). We also find that the proportion of business written in long-tail lines of business and classification as a mutual insurer are associated with higher reserve errors. Finally, while there is some evidence in favor of the tax and smoothing motivations for reserving manipulation that has been presented in prior studies, we find mixed evidence of both depending on the dependent variable used. Overall, the results provide further support for our contention that management manipulates reserves around the issuance of

surplus notes. In the next section, we test whether the potential manipulation influences the yields/spreads on the issued notes.

*Surplus Note Yields and Reserve Errors*

The evidence above provides support for the notion that management manipulates earnings around the issuance of surplus notes; we find that surplus note issuers tend to under-reserve prior to issuance. Prior literature argues that one motivation for earnings management around the issuance of debt or equity is to manage the terms of issuance, such that the price of equity is maximized or the price of the debt issuance (i.e., the yield) is minimized. We test for this possibility by examining whether surplus note interest rates are related to reserve errors. As noted previously, we hand collect surplus note terms from NAIC Annual Statements when the information is provided, which results in a final sample of 182 surplus note issuers.[32,33] Summary statistics for this subsample are provided in Table 10.

**[Insert Table 10 here]**

The summary statistics in Table 10 provide insight into the characteristics of the surplus notes that are issued in our sample. First, we find that the average interest rate for the sample is 6.42 percent, with a minimum of zero and a maximum of 11 percent. The summary statistics also indicate that the majority of issuing firms have an AM Best financial strength rating of A or A- and that, on average, insurers issued notes equal to roughly 10.6 percent of prior year total assets. Beyond the surplus note characteristics, we find that the firms that issue surplus notes (for which detailed information on surplus notes is provided) tend to under-reserve, have lower levels of capitalization as captured by RBC, are more frequently mutual insurers, and have much higher growth rates than non-issuers.

We next estimate Equation (9) to examine the relation between reserve errors, firm characteristics, surplus note characteristics, and the interest rates associated with the issued notes. The

[32] Information pertaining to surplus notes are inconsistent in the NAIC annual statements, with some firms providing significant detail regarding the issuances, while other firms provide very little information regarding their surplus note issuances.

[33] While we hand collected complete data for a total of 203 firms, we lose a total of 21 observations as a result of using lagged independent variables.

results from these estimations are presented in Tables 11 and 12. Focusing on the pooled sample, we find that very few firm and note characteristics are associated with the interest rate. First, we fail to reject Hypothesis 6 and find that there is an insignificant relation between reserve errors (*RE Asset*) and surplus note yield. This finding indicates that even if management does attempt to manipulate reserves for the purpose of reducing yields on surplus notes, investors are not misled and the yields are unaffected by these activities. The fact that bond yields are not affected by managers' attempts to manipulate reserves is consistent with the findings of Caton et al. (2011) who find that while firms may attempt to mislead investors and other financial rating agencies, they are unsuccessful in doing so. In addition to the reserve error results, we also find that diversified firms have a lower interest rate relative to more concentrated firms, while notes with a fixed interest rate (rather than a variable rate) tend to have a higher interest rate. The negative coefficient on the *Lob Div* variable in the pooled model is consistent with prior literature. Specifically, Deng, Elyasiani and Mao (2007) examine the relation between diversification and bond yields for publicly traded bank holding companies and report an inverse relation, such that diversification results in a reduction in bond yields.

**[Insert Table 11 here]**

**[Insert Table 12 here]**

The second column in Table 11 reports the results from the estimation of Equation (9) for only the sample of unaffiliated firms. As discussed previously, we re-estimate the models for affiliated and unaffiliated firms because affiliated firms have the ability to issue surplus notes directly to group members, which might influence the terms of the issued notes. For the sample of unaffiliated firms, we first find that there is again no significant relation between reserve errors and surplus note yield. Given that this sub-sample excludes the affiliated firms that could likely bias the results, these results provide stronger evidence that the reserve manipulation does not influence the terms of the notes that are issued. The results presented in Tables 11 and 12 also indicate that A.M. Best financial strength ratings are related to surplus note yield. We find that firms with a financial strength rating below A- tend to issue surplus notes with higher interest rates, which would be anticipated if the financial strength ratings

provide information to investors regarding the insurer's ability to meet future financial obligations. We also find that both the face amount of the surplus note scaled by prior year total assets and firm size are inversely related to interest rates. This finding is consistent with the results reported by Bhojraj and Sengupta (2003) who provide some limited evidence that the size of bond issuance is inversely related to the bond yield. The authors argue that this relationship is likely due to the fact that economies of scale in underwriting would have the effect of reducing the overall underwriting costs.

Finally, the results for the subsample of only affiliated insurers are provided in the third column, both for Tables 11 and 12. In general, very few of the independent variables are statistically related to surplus note interest rate. We find that fixed interest rates are associated with higher surplus note yields, while growth is negatively related to surplus note interest rates. Neither of these results is consistent with our expectations or prior literature, which might suggest that the traditional factors that have previously been shown to relate to bond yields might not influence surplus note yields when the ultimate purchasers of the notes are affiliated firms or parents. This conjecture is further supported by the fact that the financial strength ratings are unrelated to the surplus note yields for the subsample of affiliated firms while they do influence surplus note interest rates for the sample of unaffiliated firms. Overall, the results across the three samples suggests that while there are a number of factors related to surplus note yields, reserve errors do not influence the interest rates credited to investors on these investments.

## CONCLUSION

Investors commonly rely on the financial information provided by firm management for the purpose of assessing a firm. While some may presume that the information reported by management accurately reflect the firm's current financial status, management does have discretion when determining the ultimate values that are reported to external stakeholders. Within the context of security issuance, managers may use that discretion for the purpose of securing more favorable terms from investors (i.e., higher equity prices or lower bond yields). Prior finance and accounting literature has documented systematic earnings manipulation prior to securities issuances, with results suggesting that management

may intentionally manipulate accruals for the purpose of over-stating earnings. While the literature has shown that firm management may attempt to influence the price of the equity or the debt being issued, there are mixed results regarding the *effectiveness* of the manipulation. In other words, while managers may attempt to manipulate earnings around the issuance of equity or debt, there is mixed support for the notion that earnings manipulation has the ability to mislead investors or impact the price of equity or debt yields.

In this study, we investigate earnings management prior to securities issuances in the U.S. property-casualty insurance industry. By focusing on the property-casualty insurance industry we are able to employ a more accurate measure of earnings management than has been used in prior literature. We measure the error in insurers' loss reserve estimates and relate this information to the issuance of surplus notes, which are a hybrid bond instrument whose use has increased over the past two decades in the property-casualty industry. Our findings indicate that insurers that issue surplus notes under-reserve to a greater degree than non-issuers and that the likelihood of issuing surplus notes in the current or next year is negatively related to reserve errors in the current year. We believe our findings provide evidence that issuing firms tend to manage earnings prior to an issuance. By under-reserving, firm management is able to create the appearance of a financially stronger firm with smoother earnings which could influence the terms of the issued notes. Furthermore, while we find that firms under-reserve the year prior to issuance and the year of issuance, there is no significant relation between reserve errors and surplus note issuance in the year *following* an issuance. We also examine the effectiveness of earnings management for issuers by examining the relation between reserve errors and surplus note interest rates. We find that reserve errors are unrelated to interest rates for our entire sample of firms, a subsample of firms which issued surplus notes to non-affiliated organizations, and a subsample of firms which issued surplus notes to affiliates.

In addition to our primary findings, our study is the first to provide insight into the issuance of surplus notes in the property-casualty industry. We show that firms that issue surplus notes tend to be organized as non-stock insurers, have lower levels of capitalization, and tend to use more reinsurance than

firms that do not issue surplus notes. We report that mutual insurers are over three times more likely than stock insurers to issue surplus notes and that less capitalized firms are nearly three times more likely to issue surplus notes than firms with greater financial resources. The finding that non-stock insurers and insurers with lower levels of capitalization are more likely to issue surplus notes are consistent with the findings of Dumm and Hoyt (1999) and Berry-Stölzle et al. (2014) and support the notion that capital constrained insurers are more likely to issue surplus notes. Furthermore, our study is also the first to examine the size of surplus note issuances. Our findings indicate that, while capital constrained insurers are more likely to issue surplus notes, financially stronger firms with greater access to capital markets tend to engage in larger issuances. Overall, our results suggest that (1) management actively manages reserves around the issuance of surplus notes, (2) investors are not influenced by earnings manipulation and earnings management does not affect the terms of the issuance, and (3) the decision to issue surplus notes and the size of the issuance is highly dependent on access to other sources of capitalization as well as the firm's current capitalization.

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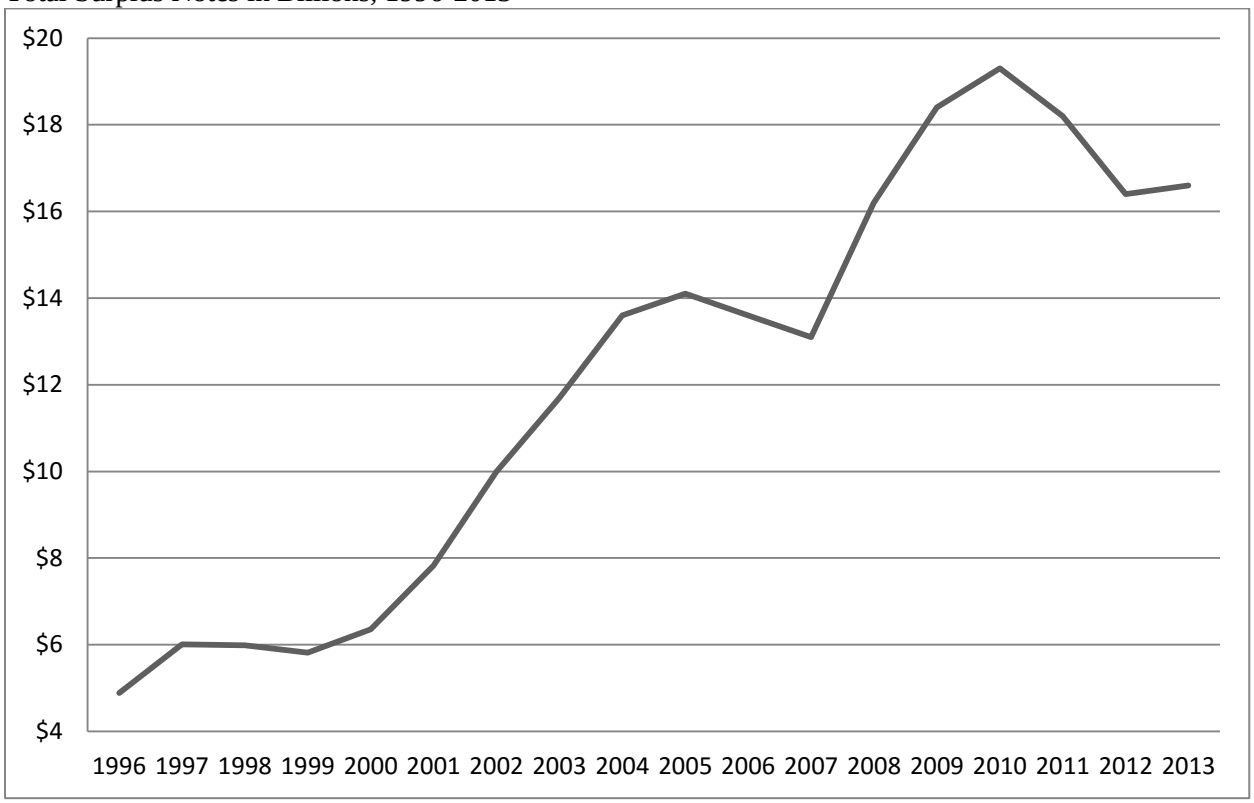
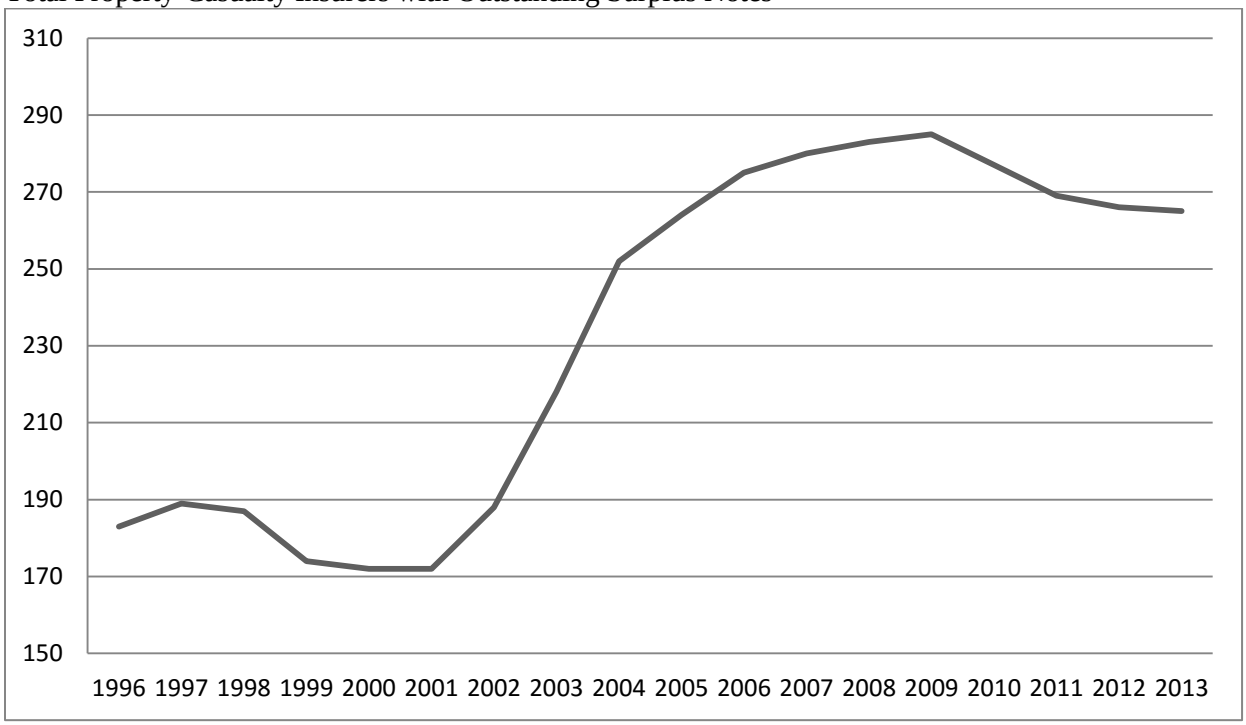
**FIGURE 1**
Total Surplus Notes in Billions, 1996-2013




Values represent the total value of outstanding surplus notes in the property-casualty insurance industry (in billions), as calculated by the authors using the NAIC InfoPro database.

**FIGURE 2**

Total Property-Casualty Insurers with Outstanding Surplus Notes




Values represent the total number of U.S. property-casualty insurers with outstanding surplus notes, as calculated by the authors using the NAIC InfoPro database.

**TABLE 1**
Loss Reserve Error Calculation

**ALLSTATE INSURANCE COMPANY (NAIC CODE 19232)**

**SCHEDULE P – PART 2 – SUMMARY**

| Years in Which Losses Were Incurred | INCURRED NET LOSSES AND DEFENSE AND COST CONTAINMENT EXPENSES REPORTED AT YEAR END ($000,000 OMITTED) | | | | | | | | | | DEVELOPMENT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 2004 | 2 2005 | 3 2006 | 4 2007 | 5 2008 | 6 2009 | 7 2010 | 8 2011 | 9 2012 | 10 2013 | 11 One Year | 12 Two Year |
| 1. Prior | 7,763 | 7,768 | 7,755 | 7,913 | 8,012 | 8,298 | 8,569 | 8,769 | 8,928 | 9,108 | 179,267 | 339,106 |
| 2. 2004 | 13,200 | 12,777 | 12,528 | 12,472 | 12,474 | 12,497 | 12,489 | 12,484 | 12,486 | 12,495 | 8,491 | 10,616 |
| 3. 2005 | XXX | 16,993 | 16,398 | 16,099 | 16,206 | 16,216 | 16,190 | 16,184 | 16,150 | 16,125 | (24,829) | (59,140) |
| 4. 2006 | XXX | XXX | 13,215 | 13,274 | 13,215 | 13,185 | 13,104 | 13,094 | 13,118 | 13,075 | (42,214) | (18,999) |
| 5. 2007 | XXX | XXX | XXX | 14,034 | 14,064 | 13,909 | 13,823 | 1,382 | 13,812 | 13,764 | (47,945) | (54,910) |
| 6. 2008 | XXX | XXX | XXX | XXX | 15,691 | 15,489 | 15,482 | 15,475 | 15,451 | 15,432 | (18,306) | (42,160) |
| 7. 2009 | XXX | XXX | XXX | XXX | XXX | 14,949 | 14,901 | 14,743 | 14,687 | 14,628 | (58,347) | (114,421) |
| 8. 2010 | XXX | XXX | XXX | XXX | XXX | XXX | 15,179 | 14,915 | 14,750 | 14,714 | (35,870) | (200,984) |
| 9. 2011 | XXX | XXX | XXX | XXX | XXX | XXX | XXX | 16,235 | 15,951 | 15,869 | (82,731) | (366,456) |
| 10. 2012 | XXX | XXX | XXX | XXX | XXX | XXX | XXX | XXX | 14,791 | 14,875 | 83,805 | XXX |
| 11. 2013 | XXX | XXX | XXX | XXX | XXX | XXX | XXX | XXX | XXX | 14,173,262 | XXX | XXX |
| | | | | | | | | | | 12. Totals | (38,679) | (507,348) |

**TABLE 2**
Summary Statistics (n = 15,503)

| Variable | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|
| RE Asset | 0.0094 | 0.0774 | -0.2867 | 0.2325 |
| RE DevRes | 0.0221 | 0.0958 | -0.2545 | 0.3897 |
| New Note | 0.0159 | 0.1250 | 0.0000 | 1.0000 |
| Size | 18.2911 | 1.8326 | 14.6283 | 23.1998 |
| Geo Div | 0.4234 | 0.3833 | 0.0000 | 0.9665 |
| Lob Div | 0.3808 | 0.2979 | 0.0000 | 0.8926 |
| Growth | 0.1202 | 0.5977 | -1.0000 | 4.0779 |
| RBC | 13.0811 | 21.0670 | 1.2213 | 158.9605 |
| Pct Longtail | 0.7006 | 0.2616 | 0.0000 | 1.0000 |
| ReinsUtil | 0.1799 | 0.2269 | -0.0058 | 0.9814 |
| Small Profit | 0.0320 | 0.1760 | 0.0000 | 1.0000 |
| Profit | 0.7221 | 0.4480 | 0.0000 | 1.0000 |
| Small Loss | 0.1870 | 0.3899 | 0.0000 | 1.0000 |
| High Tax | 0.4971 | 0.5000 | 0.0000 | 1.0000 |
| Mutual | 0.2272 | 0.4190 | 0.0000 | 1.0000 |
| Other | 0.0866 | 0.2812 | 0.0000 | 1.0000 |
| Group | 0.6946 | 0.4606 | 0.0000 | 1.0000 |

*RE Asset* = the KFS reserve error scaled by total assets; *RE DevRes* = the KFS reserve error scaled by five-year developed reserves; *New Note* = binary variable equal to 1 for firms that issued a surplus note in year t; *Size* = natural log of total assets; *Geo Div* = one minus the geographic HHI, based on premiums written in 50 U.S. states and the District of Columbia; *Lob Div* = one minus the line-of-business HHI, based on premiums written in 23 lines of business; *Growth* = the percentage change in net premiums written from the prior year to the current year; *RBC* = risk-based capital measure, equal to the ratio of total adjusted capital to authorized control level capital; *Pct Longtail* = the proportion of premiums written in long-tail lines of business; *ReinsUtil* = the ratio of reinsurance ceded to non-affiliates to total direct premiums written plus reinsurance assumed from non-affiliates; *Small Profit* = binary variable equal to 1 for firms whose return on assets lie within the first five percent of the distribution to the right of zero; *Profit* = binary variable equal to 1 for firms in the top 95 percent of the distribution to the right of zero; *Small Loss* = binary variable equal to 1 for firms in the first five percent of the distribution to the left of zero; *High Tax* = binary variable equal to 1 for firms which paid taxes in year *t*; *Mutual* = binary variable equal to 1 for insurers of the mutual organizational form; *Other* = binary variable equal to 1 for insurers that are not of the mutual or stock organizational forms; *Group* = binary variable equal to 1 for firms that are members of an insurance group.

**TABLE 3**
Correlation Matrix

| | Variable | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) | RE Asset | 1.00 | | | | | | | | | | | | | | | | |
| (2) | RE DvRs | **0.83** | 1.00 | | | | | | | | | | | | | | | |
| (3) | New Note | **-0.04** | **-0.03** | 1.00 | | | | | | | | | | | | | | |
| (4) | Size | **-0.05** | **-0.05** | 0.00 | 1.00 | | | | | | | | | | | | | |
| (5) | Geo Div | **-0.09** | **-0.05** | **-0.02** | **0.48** | 1.00 | | | | | | | | | | | | |
| (6) | Lob Div | **-0.11** | **-0.14** | -0.01 | **0.30** | **0.24** | 1.00 | | | | | | | | | | | |
| (7) | Growth | **-0.06** | **-0.05** | **0.03** | **-0.03** | -0.01 | **-0.04** | 1.00 | | | | | | | | | | |
| (8) | RBC | 0.02 | **0.02** | **-0.04** | **-0.21** | **-0.09** | **-0.11** | **-0.07** | 1.00 | | | | | | | | | |
| (9) | %Longtail | **0.06** | **0.10** | **0.02** | **0.03** | **-0.06** | **0.05** | **0.00** | **-0.14** | 1.00 | | | | | | | | |
| (10) | ReinsUtil | **-0.06** | **-0.04** | **0.05** | **-0.13** | **-0.06** | **0.03** | **0.01** | **-0.10** | 0.00 | 1.00 | | | | | | | |
| (11) | SmallPrft | **-0.03** | **-0.03** | 0.00 | -0.02 | 0.00 | 0.00 | 0.04 | **-0.02** | 0.00 | 0.00 | 1.00 | | | | | | |
| (12) | Profit | **0.08** | **0.07** | **-0.06** | **0.12** | **0.05** | **0.07** | **-0.08** | **0.05** | **0.06** | **-0.09** | **0.11** | 1.00 | | | | | |
| (13) | SmallLoss | **-0.12** | **-0.11** | **0.06** | **-0.09** | **-0.03** | **-0.01** | **0.12** | **-0.11** | **0.03** | **0.08** | **-0.09** | -0.77 | 1.00 | | | | |
| (14) | HighTax | **0.10** | **0.08** | -0.00 | **0.15** | **0.06** | **0.04** | **-0.04** | -0.02 | 0.01 | **-0.05** | **-0.04** | **0.06** | **-0.08** | 1.00 | | | |
| (15) | Mutual | **0.06** | **0.03** | **0.04** | **-0.06** | **-0.20** | **0.22** | **-0.05** | **-0.03** | **0.06** | **0.04** | 0.01 | **0.02** | 0.01 | 0.01 | 1.00 | | |
| (16) | Other | **0.09** | **0.12** | **0.03** | **-0.07** | -0.02 | **-0.22** | 0.01 | -0.02 | **0.17** | **0.05** | 0.02 | **-0.05** | **0.03** | **0.03** | **-0.17** | 1.00 | |
| (17) | Group | **-0.11** | **-0.13** | **-0.03** | **0.43** | **0.31** | **0.15** | 0.00 | **0.04** | **-0.09** | **-0.21** | **-0.02** | **0.06** | **-0.04** | **-0.06** | **-0.25** | **-0.23** | 1.00 |

*RE Asset* = the KFS reserve error scaled by total assets; *RE DvRs* = the KFS reserve error scaled by five-year developed reserves; *New Note* = binary variable equal to 1 for firms that issued a surplus note in year t; *Size* = natural log of total assets; *Geo Div* = one minus the geographic HHI, based on premiums written in 50 U.S. states and the District of Columbia; *Lob Div* = one minus the line-of-business HHI, based on premiums written in 23 lines of business; *Growth* = the percentage change in net premiums written from the prior year to the current year; *RBC* = risk-based capital measure, equal to the ratio of total adjusted capital to authorized control level capital; *%Longtail* = the proportion of premiums written in long-tail lines of business; *ReinsUtil* = the ratio of reinsurance ceded to non-affiliates to total direct premiums written plus reinsurance assumed from non-affiliates; *SmallPrft* = binary variable equal to 1 for firms whose return on assets lie within the first five percent of the distribution to the right of zero; *Profit* = binary variable equal to 1 for firms in the top 95 percent of the distribution to the right of zero; *SmallLoss* = binary variable equal to 1 for firms in the first five percent of the distribution to the left of zero; *HighTax* = binary variable equal to 1 for firms which paid taxes in year *t*; *Mutual* = binary variable equal to 1 for insurers of the mutual organizational form; *Other* = binary variable equal to 1 for insurers that are not of the mutual or stock organizational forms; *Group* = binary variable equal to 1 for firms that are members of an insurance group.

**TABLE 4**
Decision to Issue Surplus Notes

| | (1) | | (2) | |
|---|---|---|---|---|
| Variable | Coefficient | Std. Error | Coefficient | Std. Error |
| RE Asset | -1.5351*** | 0.4207 | | |
| RE DevRes | | | -0.9335** | 0.3850 |
| Size | 0.0278 | 0.0260 | 0.0285 | 0.0257 |
| Geo Div | -0.1658 | 0.1038 | -0.1573 | 0.1032 |
| Lob Div | -0.1658 | 0.1235 | -0.1599 | 0.1222 |
| Growth | 0.0687* | 0.0408 | 0.0672 | 0.0410 |
| RBC | -0.0226* | 0.0132 | -0.0238* | 0.0136 |
| Pct Longtail | 0.1731 | 0.1455 | 0.1819 | 0.1455 |
| ReinsUtil | 0.3883*** | 0.1320 | 0.4013*** | 0.1317 |
| Small Profit | -0.2807 | 0.1776 | -0.2853 | 0.1772 |
| Profit | -0.4367*** | 0.1015 | -0.4405*** | 0.1010 |
| Small Loss | -0.1131 | 0.1030 | -0.1090 | 0.1023 |
| High Tax | 0.1106* | 0.0631 | 0.1075* | 0.0631 |
| Mutual | 0.4555*** | 0.0835 | 0.4310*** | 0.0835 |
| Other | 0.3042** | 0.1302 | 0.2905** | 0.1307 |
| Group | -0.0066 | 0.0885 | -0.0080 | 0.0879 |
| Constant | -2.3461*** | 0.4942 | -2.3476*** | 0.4923 |
| | | | | |
| Observations | 13,125 | | 13,125 | |
| Wald $Chi^2$ | 214.82*** | | 206.59*** | |
| Pseudo $R^2$ | 0.1145 | | 0.1093 | |

*, **, and *** represent statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively. All models include (unreported) year control variables and standard errors are clustered at the firm level. All independent variables are lagged one year (*t-1*). The dependent variable is *New Note* which is equal to 1 for firms that issue a surplus note in year *t*. All independent variables are defined in Table 2.

**TABLE 5**
Probability of Surplus Note Issuance

| Variable | Coefficient | Std. Error | a. P(Note = 1 at x = 1) | b. P(Note = 1 at x = 0) | MFX (a-b) | a/b |
|---|---|---|---|---|---|---|
| Under RE Asset | 0.2385*** | 0.0630 | 0.0149 | 0.0079 | 0.0070 | 1.8861 |
| Large | 0.1754 | 0.1101 | 0.0151 | 0.0096 | 0.0055 | 1.5729 |
| One State | -0.0973 | 0.0773 | 0.0084 | 0.0109 | -0.0025 | 0.7706 |
| One Line | -0.0821 | 0.0967 | 0.0084 | 0.0105 | -0.0021 | 0.8000 |
| Growth | 0.0943*** | 0.0360 | - | - | 0.0025 | - |
| Low RBC | 0.4122*** | 0.0877 | 0.0254 | 0.0090 | 0.0164 | 2.8222 |
| Longtail | 0.0919 | 0.0709 | 0.0115 | 0.0090 | 0.0025 | 1.2778 |
| ReinsUtil | 0.3714*** | 0.1267 | - | - | 0.0099 | - |
| Small Profit | -0.2605 | 0.1762 | 0.0050 | 0.0103 | -0.0053 | 0.4854 |
| Profit | -0.4589*** | 0.0976 | 0.0072 | 0.0234 | -0.0162 | 0.3077 |
| Small Loss | -0.1059 | 0.1023 | 0.0080 | 0.0106 | -0.0026 | 0.7547 |
| High Tax | 0.0944 | 0.0608 | 0.0089 | 0.0114 | -0.0025 | 0.7807 |
| Mutual | 0.4679*** | 0.0822 | 0.0245 | 0.0074 | 0.0171 | 3.3108 |
| Other | 0.2696** | 0.1303 | 0.0189 | 0.0095 | 0.0094 | 1.9895 |
| Group | -0.0345 | 0.0855 | 0.0098 | 0.0107 | -0.0009 | 0.9159 |
| Constant | -2.2472*** | 0.1398 | | | | |
| Observations | 13,125 | | | | | |
| Wald $Chi^2$ | 181.22*** | | | | | |
| Pseudo $R^2$ | 0.091 | | | | | |

*, **, and *** represent statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively. All independent variables are lagged one year (*t-1*). The column titled P(Note = 1 at x = 1) is the probability of surplus note issuance for a given binary variable equal to 1, holding all other independent variables constant. The column titled "MFX" reports the marginal effects. The column titled "a/b" reports the ratio of the probability of issuing surplus notes for firms with a given binary variable equal to 1, divided by the probability of issuing surplus notes for firms with a binary variable equal to 0. The dependent variable is *New Note* which is equal to 1 for firms that issue a surplus note in year *t*. *Under RE Asset* = binary variable equal to 1 for insurers that under-reserve (i.e., have a negative reserve error); *Large* = binary variable equal to 1 for the top 10 percent of firms in terms of size; *One State* (*Line*) = binary variable equal to 1 for insurers that only write business in a single state (line); *Low RBC* = binary variable equal to 1 for firms that lie within the first 10 percent of the distribution of RBC for the sample; *Longtail* = binary variable equal to 1 for firms that write at least 75 percent of their business in long-tail lines of business. All other independent variables are defined in Table 2.

**TABLE 6**
Determinants of Surplus Note Issuance Amount

| | Heckman Selection Model | | Ordinary Least Squares | |
|---|---|---|---|---|
| Variable | (1) | (2) | (3) | (4) |
| RE Asset | -0.0166 | | -0.0629 | |
| | (0.1234) | | (0.1064) | |
| RE DevRes | | -0.0734 | | -0.1023 |
| | | (0.1207) | | (0.1157) |
| Size | -0.0127** | -0.0126** | -0.0116* | -0.0116** |
| | (0.0058) | (0.0058) | (0.0059) | (0.0059) |
| Geo Div | -0.0410 | -0.0412 | -0.04501 | -0.0444 |
| | (0.0269) | (0.0268) | (0.0278) | (0.0278) |
| LobDiv | 0.0154 | 0.0127 | 0.0146 | 0.0121 |
| | (0.0313) | (0.0314) | (0.0333) | (0.0334) |
| Growth | -0.0247* | -0.0249* | -0.0229 | -0.0234 |
| | (0.0147) | (0.0146) | (0.0153) | (0.0153) |
| RBC | 0.0091*** | 0.0090*** | 0.0075*** | 0.0076*** |
| | (0.0033) | (0.0033) | (0.0022) | (0.0022) |
| Pct Longtail | 0.0099 | 0.0116 | 0.0178 | 0.0185 |
| | (0.0389) | (0.0389) | (0.0393) | (0.0392) |
| ReinsUtil | 0.0482 | 0.0471 | 0.0562 | 0.0538 |
| | (0.0391) | (0.0391) | (0.0395) | (0.0395) |
| Mutual | -0.0720** | -0.0701** | -0.0591*** | -0.0597*** |
| | (0.0288) | (0.0279) | (0.0219) | (0.0217) |
| Other | -0.0121 | -0.0125 | -0.0053 | -0.0071 |
| | (0.0298) | (0.0293) | (0.0296) | (0.0295) |
| Group | 0.0126 | 0.01183 | 0.0104 | 0.0099 |
| | (0.0211) | (0.0211) | (0.0222) | (0.0221) |
| Lambda | -0.0330 | -0.0281 | | |
| | 0.0517 | 0.0515 | | |
| Constant | 0.4308** | 0.4147** | 0.3178*** | 0.3190*** |
| | (0.2054) | (0.2037) | (0.1109) | (0.1099) |
| Observations | 13,125 | 13,125 | 182 | 182 |
| Censored Obs | 12,943 | 12,943 | | |
| Wald $Chi^2$ | 57.12*** | 56.68*** | | |
| F-Statistic | | | 2.69*** | 2.72*** |
| $R^2$ | | | 0.271 | 0.273 |

*, **, and *** denote statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively. All models are estimated with (unreported) year control variables. All independent variables are lagged one year (*t-1*). The dependent variable is equal to the size of the surplus note issuance in a given year, scaled by prior year total assets. *Lambda* represents the inverse Mill's ratio obtained from (unreported) first-stage probit model. All other independent variables are defined in Table 2.

**TABLE 7**
Univariate Comparison of Surplus Note Issuers and Non-Issuers

*Panel A: RE Asset*

| Time Relative to Issuance | 1. New Note = 1 | 2. New Note = 0 | Difference (1-2) |
|---|---|---|---|
| Year Before Issuance | -0.0244 | 0.0099 | -0.0343*** |
| Year of Issuance | -0.0146 | 0.0098 | -0.0244*** |
| Year Following Issuance | 0.0012 | 0.0095 | -0.0083* |

*Panel B: RE DevRes*

| Time Relative to Issuance | 1. New Note = 1 | 2. New Note = 0 | Difference (1-2) |
|---|---|---|---|
| Year Before Issuance | -0.0073 | 0.0225 | -0.0299*** |
| Year of Issuance | -0.0023 | 0.0225 | -0.0247*** |
| Year Following Issuance | 0.0129 | 0.0222 | -0.0094 |

*, **, and *** represent statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively. The column titled "New Note = 1" contains mean values for firms that reported a surplus note value of zero in their prior year annual statements and reported a positive value in the current period. The column titled "New Note = 0" contains mean values for firms reported a surplus note value of zero in a given year. The column titled "Difference (1-2)" contains the difference in means between the firms that issued surplus notes and those that did not issue surplus notes.

**TABLE 8**
Surplus Note Issuance and Earnings Management – Reserve Errors Scaled by Total Assets

| | (1) | | (2) | | (3) | |
|---|---|---|---|---|---|---|
| Variable | Coefficient | Std. Error | Coefficient | Std. Error | Coefficient | Std. Error |
| New Note | -0.0089*** | 0.0012 | | | | |
| New Note t+1 | | | -0.0072*** | 0.0014 | | |
| New Note t-1 | | | | | -0.0006 | 0.0012 |
| Size | 0.0000 | 0.0001 | 0.0002 | 0.0001 | 0.0002 | 0.0001 |
| GeoDiv | -0.0058*** | 0.0007 | -0.0064*** | 0.0007 | -0.0063*** | 0.0007 |
| LobDiv | -0.0155*** | 0.0009 | -0.0166*** | 0.0010 | -0.0148*** | 0.0009 |
| Growth | -0.0036*** | 0.0001 | -0.0031*** | 0.0001 | -0.0035*** | 0.0001 |
| RBC | -0.0000** | 0.0000 | -0.0000*** | 0.0000 | -0.0000** | 0.0000 |
| Pct Longtail | 0.0073*** | 0.0008 | 0.0095*** | 0.0008 | 0.0068*** | 0.0008 |
| ReinsUtil | -0.0107*** | 0.0006 | -0.0114*** | 0.0006 | -0.0107*** | 0.0005 |
| Small Profit | -0.0001 | 0.0008 | -0.0006 | 0.0008 | -0.0004 | 0.0008 |
| Profit | 0.0013** | 0.0006 | 0.0015** | 0.0006 | 0.0015** | 0.0006 |
| Small Loss | 0.0005 | 0.0006 | 0.0011 | 0.0007 | 0.0007 | 0.0007 |
| High Tax | 0.0015*** | 0.0002 | 0.0016*** | 0.0002 | 0.0016*** | 0.0006 |
| Mutual | 0.0125*** | 0.0008 | 0.0110*** | 0.0008 | 0.0122*** | 0.0008 |
| Other | 0.0231*** | 0.0011 | 0.0210*** | 0.0011 | 0.0258*** | 0.0010 |
| Group | -0.0042*** | 0.0005 | -0.0062*** | 0.0006 | -0.0034*** | 0.0006 |
| Constant | 0.0214*** | 0.0026 | 0.0211*** | 0.0026 | 0.0207*** | 0.0026 |
| Observations | 15,329 | | 15,320 | | 15,329 | |
| Wald $Chi^2$ | 15571.48*** | | 16091.63*** | | 15005.28*** | |

*, ** and *** denote statistical significance at the 10, 5 and 1 percent levels, respectively. All models include unreported year control variables. Unless otherwise noted, all independent variables are contemporaneous. The dependent variable is the KFS reserve error scaled by total assets (*KFS Asset*). *New Note* = binary variable equal to 1 for firms that issue a surplus note in year *t*. *New Note t+1* = binary variable equal to 1 for firms that will issue a surplus note in the next year; *New Note t-1* = binary variable equal to 1 for firms that issued a surplus note in the prior year. All other independent variables are defined in Table 2.

**TABLE 9**
Surplus Note Issuance and Earnings Management – Reserve Errors Scaled by Developed Reserves

| | (1) | | (2) | | (3) | |
|---|---|---|---|---|---|---|
| Variable | Coefficient | Std. Error | Coefficient | Std. Error | Coefficient | Std. Error |
| New Note | -0.0192*** | 0.0008 | | | | |
| New Note t+1 | | | -0.0054*** | 0.0013 | | |
| New Note t-1 | | | | | 0.0007 | 0.0012 |
| Size | -0.0003 | 0.0002 | -0.0006*** | 0.0002 | -0.0006*** | 0.0002 |
| GeoDiv | 0.0010 | 0.0010 | 0.0003 | 0.0010 | -0.0000 | 0.0010 |
| LobDiv | -0.0214*** | 0.0010 | -0.0267*** | 0.0009 | -0.0219*** | 0.0010 |
| Growth | -0.0040*** | 0.0002 | -0.0027*** | 0.0002 | -0.0041*** | 0.0002 |
| RBC | 0.0000*** | 0.0000 | 0.0000*** | 0.0000 | 0.0001*** | 0.0000 |
| Pct Longtail | 0.0148*** | 0.0009 | 0.0209*** | 0.0008 | 0.0163*** | 0.0009 |
| ReinsUtil | -0.0064*** | 0.0008 | -0.0129*** | 0.0008 | -0.0086*** | 0.0008 |
| Small Profit | -0.0037*** | 0.0008 | -0.0041*** | 0.0008 | -0.0042*** | 0.0008 |
| Profit | 0.0024*** | 0.0006 | 0.0021*** | 0.0006 | 0.0019*** | 0.0006 |
| Small Loss | -0.0010 | 0.0006 | -0.0000 | 0.0006 | -0.0006 | 0.0006 |
| High Tax | 0.0001 | 0.0003 | 0.0003 | 0.0003 | 0.0014*** | 0.0003 |
| Mutual | 0.0088*** | 0.0008 | 0.0077*** | 0.0007 | 0.0098*** | 0.0007 |
| Other | 0.0394*** | 0.0014 | 0.0310*** | 0.0016 | 0.0369*** | 0.0017 |
| Group | -0.0107*** | 0.0006 | -0.0099*** | 0.0007 | -0.0075*** | 0.0007 |
| Constant | 0.0270*** | 0.0034 | 0.0343*** | 0.0034 | 0.0336*** | 0.0035 |
| Observations | 15,329 | | 15,320 | | 15,329 | |
| Wald $Chi^2$ | 19562.16*** | | 553717.23*** | | 59834.16*** | |

*, ** and *** denote statistical significance at the 10, 5 and 1 percent levels, respectively. All models include unreported year control variables. Unless otherwise noted, all independent variables are contemporaneous. The dependent variable is the KFS reserve error scaled by total assets (*KFS Asset*). *New Note* = binary variable equal to 1 for firms that issue a surplus note in year *t*. *New Note t+1* = binary variable equal to 1 for firms that will issue a surplus note in the next year; *New Note t-1* = binary variable equal to 1 for firms that issued a surplus note in the prior year. All other independent variables are defined in Table 2.

**TABLE 10**

Issued Surplus Notes Summary Statistics (n = 182)

| Variable | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|
| Interest Rate | 0.0642 | 0.0177 | 0.0000 | 0.1100 |
| RE Assets | -0.0252 | 0.0884 | -0.3120 | 0.2218 |
| RE DevRes | -0.0075 | 0.0798 | -0.2009 | 0.3347 |
| Best2 | 0.4231 | 0.4954 | 0.0000 | 1.0000 |
| Best3 | 0.1868 | 0.3908 | 0.0000 | 1.0000 |
| Best4 | 0.1044 | 0.3066 | 0.0000 | 1.0000 |
| Amt Issued | 0.1062 | 0.1208 | 0.0096 | 0.9604 |
| Fixed Interest | 0.5934 | 0.4926 | 0.0000 | 1.0000 |
| Size | 18.5385 | 1.9555 | 14.6156 | 23.1609 |
| Geo Div | 0.3838 | 0.3520 | 0.0000 | 0.9568 |
| Lob Div | 0.4060 | 0.2974 | 0.0000 | 0.8621 |
| Growth | 0.2347 | 0.6163 | -1.0000 | 4.0779 |
| RBC | 5.6680 | 4.1861 | 1.2213 | 33.9151 |
| Pct Longtail | 0.7508 | 0.2278 | 0.0000 | 1.0000 |
| ReinsUtil | 0.2566 | 0.2461 | -0.0060 | 0.9910 |
| Mutual | 0.4121 | 0.4936 | 0.0000 | 1.0000 |
| Other | 0.1209 | 0.3269 | 0.0000 | 1.0000 |
| Group | 0.6044 | 0.4903 | 0.0000 | 1.0000 |

*Interest Rate* = the interest rate associated with a given surplus note in the year of issuance; *RE Asset* = the KFS reserve error scaled by total assets; *RE DevRes* = the KFS reserve error scaled by five-year developed reserves; Best2 = binary variable equal to 1 for insurers with an A.M. Best rating of A or A-; Best3 = binary variable equal to 1 for insurers with an A.M. Best rating of B++ or B+; Best4 = binary variable equal to 1 for insurers with an A.M. Best rating of B or lower; *Amt Issued* = the dollar amount of the surplus note issued, scaled by prior year total assets; Fixed Interest = binary variable equal to 1 for insurers that issued a surplus note with a fixed interest rate; *Size* = natural log of total assets; *Geo Div* = one minus the geographic HHI, based on premiums written in 50 U.S. states and the District of Columbia; *Lob Div* = one minus the line-of-business HHI, based on premiums written in 23 lines of business; *Growth* = the percentage change in net premiums written from the prior year to the current year; *RBC* = risk-based capital measure, equal to the ratio of total adjusted capital to authorized control level capital; *Pct Longtail* = the proportion of premiums written in long-tail lines of business; *ReinsUtil* = the ratio of reinsurance ceded to non-affiliates to total direct premiums written plus reinsurance assumed from non-affiliates; *Mutual* = binary variable equal to 1 for insurers of the mutual organizational form; *Other* = binary variable equal to 1 for insurers that are not of the mutual or stock organizational forms; *Group* = binary variable equal to 1 for firms that are members of an insurance group.

**TABLE 11**

Reserve Errors and Interest Rates – Reserve Errors Scaled by Total Assets

| Variable | Full Sample | Unaffiliated Firms | Affiliated Firms |
|---|---|---|---|
| RE Asset | 0.0160 | 0.0299 | -0.0373 |
| | (0.0159) | (0.0275) | (0.0234) |
| Best2 | 0.0031 | 0.0098 | 0.0007 |
| | (0.0032) | (0.0068) | (0.0040) |
| Best3 | 0.0048 | 0.0138** | -0.0033 |
| | (0.0038) | (0.0059) | (0.0054) |
| Best4 | 0.0051 | 0.0158* | -0.0106 |
| | (0.0051) | (0.0081) | (0.0081) |
| Amt Issued | -0.0162 | -0.0557*** | 0.0041 |
| | (0.0114) | (0.0162) | (0.01609) |
| Fixed Interest | 0.0060** | 0.0011 | 0.0102*** |
| | (0.0027) | (0.0046) | (0.0037) |
| Size | 0.0014* | -0.0044* | 0.0014 |
| | (0.0008) | (0.0025) | (0.0011) |
| Geo Div | -0.0035 | 0.0039 | -0.0060 |
| | (0.0041) | (0.0070) | (0.0054) |
| Lob Div | -0.0082* | -0.01312 | -0.0071 |
| | (0.0049) | (0.0093) | (0.0062) |
| Growth | -0.0002 | 0.0035 | -0.0080* |
| | (0.0022) | (0.0027) | (0.0045) |
| RBC | 0.0003 | 0.0002 | 0.0001 |
| | (0.0003) | (0.0004) | (0.0005) |
| Pct Longtail | -0.0021 | 0.0008 | 0.0046 |
| | (0.0058) | (0.0106) | (0.0078) |
| ReinsUtil | 0.0023 | 0.0061 | 0.0073 |
| | (0.0060) | (0.0108) | (0.0079) |
| Mutual | 0.0031 | 0.0057 | 0.0060 |
| | (0.0032) | (0.0054) | (0.0042) |
| Other | 0.0023 | -0.0046 | 0.0062 |
| | (0.0042) | (0.0076) | (0.0057) |
| Constant | 0.0527*** | 0.1531*** | 0.0343 |
| | (0.0167) | (0.0405) | (0.0238) |
| Observations | 182 | 71 | 111 |
| F-Statistic | 2.79*** | 3.01*** | 2.21*** |
| $R^2$ | 0.319 | 0.626 | 0.406 |

*, **, and *** denote statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively. The dependent variable for each model is the interest note associated with the issued surplus note in the year of issuance. All models include (unreported) year control variables. Variable definitions are provided in Table 10.

**TABLE 12**

Reserve Errors and Interest Rates – Reserve Errors Scaled by Total Assets

| Variable | Ful Sample | Unaffiliated Firms | Affiliated Firms |
|---|---|---|---|
| RE DevRes | 0.0193 | 0.0212 | -0.0255 |
| | (0.0167) | (0.0239) | (0.0266) |
| Best2 | 0.0029 | 0.0091 | 0.0014 |
| | (0.0032) | (0.0067) | (0.0040) |
| Best3 | 0.0049 | 0.0144** | -0.0029 |
| | (0.0038) | (0.0058) | (0.0055) |
| Best4 | 0.0042 | 0.0153* | -0.0062 |
| | (0.0050) | (0.0082) | (0.0074) |
| Amt Issued | -0.0160 | -0.0570*** | 0.0038 |
| | (0.0114) | (0.0162) | (0.0163) |
| Fixed Interest | 0.0062** | 7.004e-04 | 0.0098** |
| | (0.0027) | (0.0046) | (0.0037) |
| Size | 0.0014* | -0.0043* | 0.0015 |
| | (0.0008) | (0.0025) | (0.0011) |
| Geo Div | -0.0035 | 0.0033 | -0.0064 |
| | (0.0041) | (0.0069) | (0.0055) |
| Lob Div | -0.0078 | -0.0138 | -0.0075 |
| | (0.0049) | (0.0092) | (0.0062) |
| Growth | -0.0002 | 0.0033 | -0.0079* |
| | (0.0022) | (0.0027) | (0.0045) |
| RBC | 0.0003 | 0.0002 | 0.0001 |
| | (0.0003) | (0.0004) | (0.0006) |
| Pct Longtail | -0.0022 | -0.0010 | 0.0046 |
| | (0.0058) | (0.0106) | (0.0079) |
| ReinsUtil | 0.0023 | 0.0060 | 0.0081 |
| | (0.0060) | (0.0109) | (0.0079) |
| Mutual | 0.0033 | 0.0064 | 0.0052 |
| | (0.0032) | (0.0054) | (0.0041) |
| Other | 0.0026 | -0.0039 | 0.0053 |
| | (0.0042) | (0.0076) | (0.0058) |
| Constant | 0.0524*** | 0.1520*** | 0.03380 |
| | (0.0166) | (0.0407) | (0.0241) |
| Observations | 182 | 71 | 111 |
| F-Statistic | 2.81*** | 2.97*** | 2.11*** |
| $R^2$ | 0.320 | 0.623 | 0.395 |

*, **, and *** denote statistical significance at the 10 percent, 5 percent, and 1 percent levels, respectively. The dependent variable for each model is the interest note associated with the issued surplus note in the year of issuance. All models include (unreported) year control variables. Variable definitions are provided in Table 10.