External Financing in the Life Insurance Industry: Evidence from the Financial Crisis*

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Abstract

The financial crisis and subsequent recession generated sizable operating losses for life insurance companies, yet the consequences were far less significant than for other financial intermediaries. The ability to quickly generate new capital through external issuance and dividend reductions let life insurers maintain healthy levels of equity capital. We use this experience to examine the causes and consequences of external capital issuance by U.S. life insurance companies. We show that, in general, new capital is issued both to support the growth of new business and to replace capital depleted by operating losses. This second channel is particularly important during macroeconomic recessions. Notably, we do not find any evidence that insurers had difficulty generating new capital, unlike other financial service providers that required large amounts of public support. For life insurers, what changed following the financial crisis was the demand to raise external capital; but the supply of external capital appears to have remained constant.

JEL: G22, G32

Introduction

On the heels of the financial crisis and subsequent recession, U.S. life insurance companies raised roughly $32 billion in new capital during 2008 and 2009, nearly three times the amount raised during the prior five years. New issuance was concentrated in insurers specializing in annuities, who suffered particularly large drops in profitability due to their exposure to equity markets through variable annuity products.[1] The large influx of new capital let life insurers maintain capitalization levels close to their historical levels, despite vastly reduced retained earnings.

In this research, we examine the causes and consequences of external capital issuance by U.S. life insurance companies from 1997 through 2010, paying special attention to the two recessions that occurred during this period. We show that capital issuance is driven by two distinct forces: (1) the need to fund additional growth that cannot be supported by existing capital and retained earnings, and (2) the need to replace capital that has been depleted by losses from existing business. In regression results, we show that new issuance is concentrated in firms with significant growth in premium written, negative net income, and low levels of capital. Importantly, there is *no evidence* that the relationship between depleted capital and equity issuance is different during recessionary periods, including 2008 and 2009. What changed following the financial crisis was the need to raise external capital; but the ability to tap external capital markets appears to have remained constant.

We show these results using the universe of life insurance companies that file regulatory reports with the National Association of Insurance Commissioners (NAIC). Our data is compiled from the statutory accounting reports collected by the NAIC. Using data from insurer balance sheets, statements of cash flow, and summary of operations, we construct indicators of capital

[1] These products often offered a guaranteed minimum rate of return on the investment component of the annuity, which insurers did not completely hedge.

issuance for new paid-in capital and surplus notes. New paid-in capital includes common equity and preferred equity, and surplus notes refers to a subordinated-debt instrument that is treated like capital for regulatory purposes. Using fixed effects and pooled logit regression models, we identify the partial correlations between capital issuance and insurer-level characteristics that proxy for growth opportunities and capital shocks. We show that firms with more growth options are more likely to issue new capital, and firms with moderate levels of capital that experience negative net income are more likely to issue new capital.

We also examine the correlations between insurer characteristics and the decision to cut dividends to stockholders, which is an alternative means to boost capital levels. We find that firms cut dividends in response to low net income, but do not adjust dividends to support growth opportunities. During 2009, life insurers significantly cut dividend payments, which was a second means for them to boost capitalization following the large shock in 2008.

In all of our analysis, we compare three distinct time periods: 2001-02, 2008-09, and all other years. This approach allows us to examine the stability of the estimated relationships across very different macroeconomic periods. We focus specifically on two comparisons: (1) the difference between the two recessionary periods (2001-02, 2008-09) and the other years, and (2) the difference between the two recessionary periods. We find that nearly all of the estimated relationships remain stable, suggesting that the same underlying forces are at play in all periods. The differences we observe between the two recessionary periods seem to be driven by the fact that the recent recession resulted in a larger shock to life insurers' profitability and capitalization levels than the previous one. Given this shock, it is not surprising that a large number of insurers raised new equity during this period.

We also explore the choice between surplus notes and other capital. Conditional on issuing some new capital, we regress an indicator of surplus note issuance on a set of insurer-

level characteristics. We show that mutuals are more likely to issue surplus notes and that larger insurers are more likely to issue surplus notes. However, these relationships are less strong during the recent recession, suggesting that new capital market developments have opened access to surplus notes as an alternative source of capital in recent years.

Finally, we examine the consequences of new capital issuance. Our results show that firms issuing new capital tend to experience growth in premiums and assets, and also build their capital levels. Issuers of new capital also are more likely to cut their dividends, confirming that insurers use both sources of capital to replenish lost capital. Importantly, these relationships are all stronger during the 2008-09 recession, suggesting that access to external capital was particularly valuable during this period.

Our results have a direct implication for government policy that was enacted by the U.S. Treasury following the crisis. In May of 2009, the Treasury's Troubled Asset Relief Program (TARP) was extended to life insurers, providing them with access to government-provided capital.[2] Two of the largest life insurers – The Hartford and Lincoln National – chose to solicit and receive TARP funds.[3,4,5] The typical justification for government-provided capital is that turmoil in financial markets effectively prohibited some firms from raising external capital. Our results do not point to any disruption in the supply-side of capital markets; alternatively, capital

[2] The law permitted TARP to provide funds to life insurers with bank holding company status or a thrift subsidiary.

[3] The Hartford received $3.4 billion, and Lincoln National received $950 million (source: SNL Financial's TARP Participant List).

[4] The federal government bailout of American International Group (AIG) was also partially financed with TARP funds. However, as Harrington (2009) documents in his detailed case study, AIG had a unique structure including a subsidiary that wrote credit default swaps (CDS). The CDS portfolio of this London-based subsidiary created the large losses that ultimately triggered the bailout. As a result, AIG should not be viewed as a typical life insurer. The effect of the AIG bailout on the stock returns of AIG's competitors is analyzed in Egginton et al. (2010) and Grace (2011); the effect of the bailout and subsequent government ownership on AIG's pricing strategy is examined in Eckles and Hilliard (2011).

[5] Four more insurers – Allstate, Ameriprise Financial, Principal Financial, and Prudential Financial – applied for and were authorized to receive TARP funds but ultimately decided against receiving the funds. Glenworth Financial applied for TARP funding but the application was rejected. See Harrington (2009) and Grace (2011) for more on TARP and life insurers.

issuance appeared to function very much like it had in the past. Furthermore, the experience during the 2001-02 period foreshadowed the events in the more recent recession: life insurers experienced large negative shocks to profitability but issued private capital to smooth capitalization levels. The ability to maintain adequate capital likely explains why the life insurance industry has recently experienced only a small increase in insolvencies and modest premium growth despite large negative net income in 2008.

Our results stand in some contrast to the experience in the banking industry, where Acharya et al. (2011) show that banks did not replenish their capital following large losses. Although banks raised substantial capital during 2007-09, much of the capital raised was preferred equity and subordinated debt, which is less flexible than common equity. Acharya et al. (2011) suggest that the depleted levels of capital may explain some of the apparent reluctance of banks to significantly expand lending. Additionally, despite widespread access to TARP funds, banks continued to pay dividends to common stockholders, which further eroded the base of common equity capital. Alternatively, we show that insurers cut dividends appreciably in 2009, and although insurers raised a fair amount of capital through surplus notes, much of the new capital was common equity.

Our research contributes to the growing body of literature on systemic risk in the financial services industries.[6] There are a number of studies that develop measures of systemic risk based on observable co-movements of financial institutions' stock returns (see, e.g., Adrian and Brunnermeier, 2010; Acharya et al., 2010; Billio et al., 2011; Chen et al., 2011; Girardi and

[6] There are various definitions of systemic risk. While the term is sometimes used to refer to a large macroeconomic shock, there seems to be a growing consensus that systemic risk refers to situations with substantial "interconnectedness" between firms and the associated risk of contagion (Harrington, 2009). De Bandt and Hartmann (2000) state "At the heart of the concept is the notion of "contagion", a particularly strong propagation of failures from one institution, market or system to another" (p. 8). Similarly, the Committee on Capital Markets Regulation (2009) focuses on a contagion and potential domino effects in its definition of systemic risk; it defines systemic risk as "the risk of collapse of an entire system or entire market, exacerbated by links and interdependencies, where the failure of a single entity or cluster of entities can cause *cascading* failure" (p. ES-3). In addition, the Group of 10 (2001) requires a systemic risk to have a "significant adverse effect on the real economy."

Ergun, 2011; Huang, Zhou, and Zhu, 2011). In addition, Billio et al. (2011) use Granger-causality tests and document that stock returns of insurance companies have significant impact on stock returns of other financial institutions and vice versa. Similarly, Chen et al. (2011) find evidence that insurers' systemic risk measures have significant impact on the systemic risk measures of other financial institutions; the reverse Granger-causality relationship, however, seems to be much stronger. While these studies document the interconnectedness of the financial services industries, the chosen methodology does not allow disentangling whether the insurance industry is a source or victim of systemic risk.[7] To establish the insurance industry as a source of systemic risk, it is necessary to show the channel of contagion through which the failure of one firm results in a chain reaction of failures of other firms. For the property-liability insurance industry, Cummins, Feng, and Weiss (2011) and Park and Xie (2011) examine reinsurance relationships as a possible channel of contagion. While insurance companies' stock returns as well as their probability of a rating downgrade are negatively affected by an increase in their reinsurance credit risk exposure, the economic significance of this effect is negligible, since larger insurance companies usually diversify their reinsurance program across multiple reinsurers (Park and Xie, 2011). In a similar vein, our research examines the access to external financing – or the lack thereof – as a possible source of contagion creating systemic risk within the life insurance industry. Our result that life insurers' ability to restore depleted capital levels by issuing equity remained constant during different recessionary periods, including 2008 and 2009, is *in*consistent with a contagion effect creating systemic risk in the life insurance industry.[8]

[7] The Granger-causality test cannot establish causality in a theoretical sense. In a classical example, a rooster's crowing every morning just before the sun rises "Granger causes" the sun to rise.

[8] Our findings are consistent with Grace's (2011) analysis of all insurance companies that received TARP funds or openly discussed applying for TARP; there does not even seem to be evidence of contagion between this set of potentially systemically important insurance companies. Cummins, Wei, and Xie (2011) conduct an event study of operational risk events on non-announcing banks and insurance companies. They document negative inter-sector spillover effects; however, the spillover effects can be explained by firm characteristics and are, hence, information-based rather than driven by "pure" contagion. Harrington (2011) argues that insurance companies are fundamentally

Along the way, our research also provides novel evidence on the general factors that are correlated with the choice to issue new capital. We show that insurers organized as mutuals are less likely to issue new capital, confirming the long-held notion that mutual have less access to capital (see, for example, Erhemjamts and Leverty (2010) for a recent paper showing that access to external capital has contributed to the recent wave of de-mutualizations). However, we also show that mutuals appear to suffer less during economic downturns, which provides a natural hedge that reduces their need for external capital. We show that listed firms tend to issue new capital more frequently, although this effect is mitigated during recessions. Finally, we show that insurers that predominately write life insurance tend to issue external capital less often, which reflects their very stable capital bases and the general lack of growth opportunities.

The paper proceeds as follows. The next section provides a summary of trends in capitalization and profitability for the life insurance industry as a whole. We separate the industry into segments based on the amount of business arising from annuities versus life insurance. The following section provides a conceptual background and some institutional details. The subsequent section describes our data and methodology, and the ensuing section presents our results. The final section concludes.

Time Series Trends in the Life Insurance Industry

We begin by illustrating the impact of the financial crisis and subsequent recession on the income and capital positions of life insurers. Figure 1 plots a measure of profitability for three types of insurers for the period from 1997 through 2010. We measure profitability using the return on assets (ROA), which is the ratio of total net income (including realized and unrealized

different from banks, including a relatively strong market discipline and a much lower potential for systemic risk. Similarly, Weiss (2010) and the Geneva Association (2010) argue that the core business model of insurance companies does not create systemic risk.

capital gains) to total general account assets. The dotted blue line is for insurers predominately engaged in writing life insurance; the solid blue line is for insurers predominately engaged in writing annuities; and the dotted green line is for insurers that write a mixture of life insurance and annuity business.[9]

Figure 1 shows that insurer profits fell sharply in 2008, particularly for annuity providers. For annuity providers, ROA bottomed at roughly -2.2% in 2008, a drop of over 3 percentage points from the prior years. Life insurers also experienced a drop in ROA during 2008, but the fall was less dramatic. Notably, annuity providers also experienced a sharp fall in ROA during the 2001 recession. Life insurers and annuity providers are exposed to the broader business cycle through several channels. First, growth in personal disposable income is positively correlated with growth in premiums, suggesting that life insurance is a normal good; consumers and businesses cut back on spending on most goods, including insurance, when income falls. Second, the asset-side of life insurers balance sheets is heavily exposed to changes in asset prices, particularly interest rates, credit spreads, and equity values. To the extent that insurers do not hold assets that are perfectly immunized by their liabilities, decreases in asset prices that happen during recessions lead to lower income. This was particularly problematic during the recent recession, as assets with credit-risk experienced particularly deep decreases. Third, many annuity-providers offer products with return guarantees that proved difficult to hedge, leading to large increases in reserves to fund those promises. Finally, many insurance products offer redemption options that permit customers to withdrawal their funds, and a spate of redemptions left insurers with fewer profitable assets.

[9] We use the classification provided by SNL, the vendor providing access to the underlying NAIC data, which is described below. We have confirmed that the SNL classification corresponds well with insurers' actual premiums written in each line of business.

For our present purposes, there are two important takeaways from Figure 1. First, the crisis presented a real shock to life insurers. This provides us with an opportunity to assess the ability of insurers to tap external equity markets during times of market stress. Second, the prior recession provides a useful benchmark since insurers experienced a smaller, yet still noticeable, negative shock during that period. We will examine the behavior of insurers during three distinct time periods: the most recent recession (2008 – 2009), the prior recession (2001 – 2002), and all other years in our sample.

Figure 2 shows average leverage ratios for the three sets of insurers from 1997 through 2010. We use the ratio of total capital to total admitted general account assets. Consistent with industry practice, we include the asset valuation reserve (AVR) and the interest maintenance reserve (IMR) in our measure of capital.[10] The AVR is a liability account that provides a buffer against losses due to counterparty defaults and capital losses from equity investments. The IMR is a similar liability account that includes all realized capital gains and losses related to the sale of "interest related" securities, particularly bonds. Since there is no particular claimant to these liabilities, it is logical to include these as funds available to equityholders, who will take the first loss due to changes in interest rates or the credit quality of assets. More importantly, the AVR experienced significant changes during 2008 and 2009 that would distort changes in capital if not included in the total.[11]

Despite the large swings in profitability documented in Figure 1, Figure 2 shows that the average level of leverage has remained relatively stable over this period. The contrast with

[10] This is also common practice by rating agencies.

[11] In aggregate, the AVR was reduced substantially during 2008. Based on the Statutory Accounting Principles, investment losses are debited to the AVR beginning with the first dollar of losses. If the reserve is depleted completely, any additional losses are debited to surplus. Insurers are required to restore the reserve if it falls below its target level. However, an insurer only needs to contribute one-fifth of the difference between the target level and the actual reserve balance, so is permitted up to five years to reach the target. Due to this accounting mechanism, new capital raised after large realized losses need not immediately restore the AVR. Some insurers issuing new capital in 2008 achieved increases in other forms of capital while simultaneously lowering the AVR.

Figure 1 is particularly striking for annuity providers: they tend to have the most volatile income yet the least volatile leverage. This contrast strongly suggests that life insurers, particularly annuity providers, are able to smooth shocks to income so that they have little impact on their capital.

One mechanism for smoothing the shocks to income is issuance of external capital, which we document in Figure 3. The figure plots the fraction of each type of insurer that issued some form of external capital, including common stock, preferred stock, and surplus notes. Although surplus notes have some features like subordinated debt, we include them as capital since they are subordinated to policyholders' claims.[12] The figure shows that insurers frequently issue external capital, particularly during periods of low income. For example, the share of annuity providers raising external equity increased from under 30 percent in 2007 to over 50 percent in 2008, and remained about 40 percent in 2009. Apparently, life insurers had little trouble tapping capital markets to prevent the shock to net income from substantially impacting their capitalization levels.

We highlight this further in Table 1, which summarizes the sources and uses of capital for life insurers from 1997 through 2010. The table highlights the nature of the shock that occurred in 2008; net income including capital gains was *negative* $31.3 billion. During 2008, life insurers shed over $20 billion in surplus, despite issuing almost $16 billion in new capital. New capital issuance continued in 2009, when capital raised, including surplus notes, exceeded $16 billion. Although the recent crisis was undoubtedly an extremely turbulent time for life insurers, the experience shares similarities with the 2001-02 period. In particular, aggregate external financing increased when net income fell in 2001 and 2002, and dividends paid decreased.

[12] Surplus notes are like debt in that the issuer promises to pay coupons and the security has a finite maturity. For tax purposes, the coupon payments are deductible. However, the issuer can defer coupon payments in many cases, and in the case of default, policyholders would be paid before holders of surplus notes. For regulatory purposes, surplus notes are treated like equity capital.

The bottom three panels summarize the sources and uses of capital during three distinct time periods for each of the three sets of insurers highlighted in Figures 1 through 3. These panels confirm that annuity providers experience the largest shock during economic downturns. During the two most recent recessions, annuity providers suffered significantly worse than insurers that provide mostly life insurance. However, annuity providers also issued significantly more external equity, which allowed them to increase total surplus despite large negative net income.

The remainder of our empirical analysis examines changes in capitalization at the level of the individual insurer, which allows us to refine the analysis by zooming in on the factors that influence the decision to issue external capital, the type of capital offered, and the use of proceeds. In all of our analyses, we distinguish between times of stress and "normal times," which we define as all years other than times of stress. For our sample period, we have two periods of stress: years 2001-2002 and years 2008-2009. Before proceeding to that analysis, we first briefly provide a conceptual background on capital structure for financial institutions by reviewing the existing literature.

The Role of Capital in Insurance Companies

In a world with perfect capital markets and no other frictions, Doherty and Tinic (1982) extend the classic Modigliani-Miller irrelevance result to show that changing the level of capital inside an insurance company cannot create value. However, several market imperfections and additional considerations have been identified that would make capital structure important for insurers.

Two capital market imperfections have been highlighted are relevant for insurance companies. First, it is costly for insurers to *hold* capital, meaning that money invested as insurer

capital could more efficiently be invested elsewhere. As an example, Harrington and Niehaus (2003) show that corporate income taxes can considerably increase the cost of holding capital as compared with an alternative pass-through savings vehicle that does not pay corporate income taxes. Another example is agency costs due to conflicts of interests between owners and managers; managers may not use capital in the owners' best interest (Jensen, 1986; Bertrand and Mullainathan, 2003). Second, insurers may face costs of *issuing* new capital, meaning that internal sources of funds are cheaper than external sources (Myers and Majluf, 1984). Froot (2008) shows how these two capital market frictions can lead to an optimal capital structure that trades of the costs of holding capital with the increased chance of paying the cost of issuing new capital in the future. Without access to new financing following a shock, an insurer may be forced to forgo highly rewarding investment opportunities, particularly if consumers are sensitive to the credit risk of the insurer (Froot, Schaftstein, and Stein, 1993). Froot (2008) also shows how the negatively skewed nature of insurance loss distributions and excessive consumer demand elasticity with respect to the insurer default probability contribute to make the insurer more conservative in capital management.[13]

Costs associated with financial distress can encourage capital conservatism. In addition to the direct costs resulting from insolvency, such as legal fees and regulatory costs, owners and managers of a life insurer also face costs arising before insolvency. For instance, a damaged reputation may limit an insurer's ability to retain relationships with important employees or customers. Hence, quasi-rents from investments in human resources and establishing distribution

[13] There is substantial empirical evidence on the risk-sensitivity of insurance demand, particularly for property-liability insurers. There are a number of studies documenting a negative relationship between insurance prices and insurer insolvency risk (see, e.g., Sommer, 1996; Cummins and Danzon, 1997; Phillips, Cummins, and Allen, 1998). Epermanis and Harrington (2006) show that U.S. property-liability insurers' premium revenue declines flowing rating downgrades; Eling and Schmit (2011) document the same relationship in the German insurance industry. For life insurers specifically, Zanjani (2002) documents that policyholder termination rates increase with insurer insolvency risk, and Baranoff and Sager (2007) show that the number of policies written by life insurance companies declines after rating downgrades.

channels and a brand name could be lost, depleting the insurer's franchise value (see, e.g., Harrington and Danzon, 1994). Since franchise value depends on quasi-rents from expected *future* business, an insurer's desire to protect its franchise value should strengthen the incentive for reduced risk-taking and capital conservatism driven by risk-sensitive demand.[14] Moreover, because insurers are strictly regulated, they tend to incur escalating regulatory costs as they encounter financial difficulties. The nature of risk-based capital regulations, which require regulators to take specified actions if the ratio of the insurer's capital falls below a predetermined threshold, push insurers to hold additional capital. Although risk-based capital constraints are not binding for most insurers, the possibility of future regulatory action encourages insurers to hold a cushion to minimize the chance of approaching the threshold.

In addition to financial distress costs, growth opportunities create incentives for insurers to raise additional capital. Growing existing business lines or expanding into new product or geographical markets requires additional capital to back the new policyholders' claims.[15] Overall, we expect insurer capital issuances to be positively related to financial distress costs and growth opportunities.

[14] Supporting the view that insurance companies have incentives to protect their franchise value, Yu et al. (2008) find a negative relationship between franchise value and investment risk-taking of insurance companies. In addition, Fenn and Cole (1994) and Brewer and Jackson (2002) show that stock prices of life insurance companies with risky investments declined substantially during the 1989-1991 junk bond and commercial real estate market crunch, whereas life insurers with fewer risky investments experienced a lesser decline. Halek and Eckles (2010) examine the effect of rating changes on insurer stock returns and find an asymmetric effect: downgrades decrease stock prices by roughly seven percent, but upgrades have little significant effect.

[15] A number of studies document that large premium growth increases the insolvency risk of insurance companies (see, e.g., Grace, Harrington, and Klein, 1995; Bohn and Hall, 1999); these studies provide indirect evidence for the need of insurance companies to back business growth with additional capital.

Data and Methodology

Sample Selection

We use company-level data from the statutory filings of insurance companies with state regulators for the years 1996 to 2010. We begin with the universe of all insurers filing the NAIC life insurance annual statement, which we subsequently limit for a variety of reasons. First, we exclude all insurers that do not write predominately life insurance or annuities.[16] This primarily eliminates accident and health insurers but also removes insurers that are primarily reinsurers. Next, we drop insurer-year observations with negative or zero surplus, total assets, and net premiums written. We then remove from our sample those firms organized as something other than a stock or mutual company. Since we use one-year lagged versions of a variety of variables, we exclude firm-year observations for which the preceding year of data is not available. Finally, we remove the American International Group (AIG) from the sample; as documented by Harrington (2009), AIG was heavily involved in the credit default swaps (CDS) business and should not be viewed as a typical life insurer.[17] Our final sample consists of 6,960 firm-year observations over the period 1997 through 2010.

Capital Issuance Regression Model

We use regression analysis to test our hypotheses regarding the determinants of equity and surplus notes issuance. Because the majority of the insurers does not issue any new capital in a given year (see Table 2), we focus on the choice to issue external capital rather than the total amount of capital raised. Specifically, we form an indicator variable that is set to one if an insurer issues new capital and estimate limited-dependent variable models to measure conditional

[16] We use the classification provided by SNL to classify insurers.

[17] All of our conclusions are robust to including AIG.

correlations between various explanatory variables and the probability that a firm issues capital. To exploit the panel nature of our data, we estimate both pooled logit regression models and insurer fixed effects logit models.[18]

Our analysis explicitly focuses on whether the relationship between depleted capital and equity issuance is different during the two recessionary periods (2001-02, 2008-09) than during all other years. To capture any differences across the three time periods, we interact all independent variables in the regression model with three indicator variables that denote the three separate time periods. Such a model specification allows the estimated coefficients of all independent variables to vary across time periods; and the significance of differences in the regression coefficients between time periods can easily be determined with a Wald test. The specification of the model is as follows:

$$\begin{aligned} Capital\ Issuance_{i,t} = \alpha &+ \beta_1' Distress\ Costs_{i,t-1} \times Recession1_t + \beta_2 Growth_{i,t-1} \times Recession1_t \\ &+ \beta_3' X_{i,t-1} \times Recession1_t \\ &+ \beta_4' Distress\ Costs_{i,t-1} \times Recession2_t + \beta_5 Growth_{i,t-1} \times Recession2_t \\ &+ \beta_6' X_{i,t-1} \times Recession2_t \\ &+ \beta_7' Distress\ Costs_{i,t-1} \times Other\ Years_t + \beta_8 Growth_{i,t-1} \times Other\ Years_t \\ &+ \beta_9' X_{i,t-1} \times Other\ Years_t + \varepsilon_{i,t} \end{aligned} \quad (1)$$

where $Capital\ Issuance_{i,t}$ is an indicator variable coded as 1 if insurer *i* issues new capital in year *t*, zero otherwise, $Distress\ Costs_{i,t-1}$ is a vector of variables measuring insurer *i*'s financial distress costs, $Growth_{i,t-1}$ is the one year growth in net premiums written, $Recession1_t$ is an indicator variable coded as 1 for the years 2001 and 2002, $Recession2_t$ is an indicator variable coded as 1 for the years 2008 and 2009, $Other\ Years_t$ is an indicator variable coded as 1 for all other years in

[18] We use a logit model because there is no consistent estimator of a FE probit model.

the sample, $X_{i,t-1}$ is a vector of control variables, and $\varepsilon_{i,t}$ is a random error term. The exact definitions of all variables used in the analysis are provided in Table 2, and the following sections discuss the variable selection.

We use five variables to serve as proxies for the exposure to financial distress, all measured as of year *t-1*. The first measure is the insurer's regulatory risk based capital (RBC) ratio, which we include in logged form. Insurers with higher RBC ratios are financially stronger than insurers with lower RBC ratios, so we expect a negative relationship between an insurer's RBC ratio and the probability of issuing new capital. To capture any non-linear effects of low and very low levels of the RBC ratio on capital issuance decisions, we include two indicator variables coded equal to 1 if an insurer's RBC ratio in year *t*-1 is between 200 and 300, or below 200. The omitted category is financially strong insurers with an RBC ratio in excess of 300. We choose these cutoffs because they represent thresholds that trigger regulatory action. Since insurer profitability is positively associated with financial strength and solvency (see, e.g., MacMinn and Witt, 1987; Sharpe and Stadnik, 2007), we include a profitability measure in our model. Specifically, our fourth variable is the return on assets (ROA), which is calculated as the ratio of net income to total general account assets. To specifically capture any additional effect of a negative net income, we also include an indicator variable coded equal to 1 if the insurer's net income is negative in year *t*-1. We expect a positive relationship between negative income and an insurer's probability of issuing new capital. Our maintained assumption is that business choices are determined before any capital decisions, and that business choices define a firm's profitability and financial strength; so we treat the business decisions and resulting financial performance as exogenous.

The vector of control variables includes a measure of insurer size. Larger insurers may find it easier to deal with fixed costs associated with capital issuance. We measure size as the

natural logarithm of total general account assets. To control for differences in business mix, we include two indicator variables classifying companies as insurers that are predominantly engaged in writing annuities business and insurers that write a mix of life insurance and annuity business. The omitted category is insurers that are predominantly engaged in writing life insurance. Finally, we control for several organizational features of the insurers by including indicator variables for whether the insurer is organized as a mutual, is a member of a larger insurer group, and is listed on a stock exchange.[19]

Since we are combining data over a large period of calendar time, our model includes year dummies to control for any general time trends. To account for possible autocorrelation of observations within an insurer, we adjust standard errors for clustering at the firm-level. To control for any possible omitted firm-specific effects, we also estimate Equation (1) as a FE logit regression and present both the pooled and FE results. In the FE specification, all time-invariant control variables are dropped from the model, and only insurers with variation in the dependent $Capital\ Issuance_{i,t}$ variable are included in the FE logit estimation (Chamberlain, 1980).

We also estimate Equation (1) with two alternative dependent variables. We examine the determinants of dividend cuts by replacing the depended variable in the baseline specification with the $Dividend\ Cut_{i,t}$ indicator variable coded equal to 1 if insurer *i* decreases dividends paid to its stockholders in year *t* as compared with year *t-1*. Cutting dividends to stockholders is an alternative means to boost capital levels. Since cutting dividends is only available to stock insurance companies that paid dividends in the prior year, we include only those insurers in the estimation sample.

[19] The organizational features included in the regression model have been shown to impact insurers' business decisions. Berry-Stölzle et al. (2012), for example, show that an insurer's line of business diversification strategy depends on whether the insurer is organized as a mutual, is a member of a group, and is listed on a stock exchange.

Finally, we examine insurers' choice to issue surplus notes as opposed to paid-in common or preferred equity capital. To be precise, we estimate Equation (1) for the subsample of insurers issuing some new capital, and examine the dependent variable $Issuance\,of\,Surplus\,Notes_{i,t}$, which is an indicator variable coded equal to 1 if insurer *i* issued surplus notes in year *t*, with the alternative being common capital stock or preferred capital stock.

Consequences of Capital Issuance Regressions

Our analysis of the consequences of capital issuance on insurers is based on an insurer fixed-effects regression model. We examine four outcome variables in detail: (1) the natural logarithm of insurer *i*'s net premiums written in year *t*+1; (2) the natural logarithm of total surplus, including the interest maintenance reserve and asset valuation reserve; (3) the natural logarithm of total general accounts assets; and (4) an indicator variable equal to 1 if insurer *i* is paying dividends to shareholders in year *t*+1. More precisely, we estimate the following model separately for the four outcome variables $Outcome_{i,k,t+1}, k = 1,2,3,4$:

$$\begin{aligned} Outcome_{i,k,t+1} = {} & \alpha_i + \beta_1 Capital\ Issuance\ in\ 2001,2002_{i,t} \\ & + \beta_2 Capital\ Issuance\ in\ 2008,2009_{i,t} \\ & + \beta_3 Capital\ Issuance\ in\ Other\ Years_{i,t} + \beta_4' X_{i,t} + \varepsilon_{i,t} \end{aligned} \tag{2}$$

In this specification, $Capital\ Issuance\ in\ 2001,2002_{i,t}$ is an indicator variable equal to 1 if an insurer issues capital in year 2001 or 2002; $Capital\ Issuance\ in\ 2008,2009_{i,t}$ is an indicator variable equal to 1 if an insurer issues capital in year 2008 or 2009; and $Capital\ Issuance\ in\ Other\ Years_{i,t}$ is an indicator variable equal to 1 if an insurer issues capital in any of the other years. This specification lets us determine if the consequences of capital issuance are different in the three sub-periods. X is a vector of control variables, and $\varepsilon_{i,t}$ is a

random error term. The model is estimated with firm and year fixed-effects, and standard errors are adjusted for clustering at the firm-level.

Five control variables are included in Equation (2), which are the variables used to measure financial distress in Equation (1): the natural logarithm of the RBC ratio, two indicators for low and very low levels of the RBC ratio, the ratio of net income to assets, and an indicator for negative net income. We do not include either the natural logarithm of total assets or a measure of premium growth as independent variables in the model because we use these variables as dependent variables in Equation (2). Time-invariant firm specific indicator variables are omitted due to the fixed-effects specification.

Results

Table 2 shows summary statistics for the variables used in the regression analysis. All monetary values are inflation adjusted and converted to constant 2000 US$. On average, about 22 percent of insurers issue new capital in a given year. The majority of new issuance is common or preferred equity, as only about 3 percent of insurers issue surplus notes in a given year. Twenty-six percent of insurers report a negative net income in a given year, and the average return on assets is rather low at 1.2%, reflecting the two recessionary periods included in our sample. There is abundant variation in the independent variables that provides an opportunity to estimate the associations between capital decisions and our proxies for distress and growth opportunities.

Which Insurers Issue New Capital

Table 3 presents the results from the logit regressions model specified in Equation (1), for both a pooled and a fixed-effects model. For the pooled specification, column 1 presents the

estimated coefficients for the non-recessionary years, and columns 2 and 3 present the estimated coefficients for two recessionary periods. Column 4 presents the p-values of a Wald test for equality of the estimated coefficients across the three time periods. Only the coefficients of the *Annuity Writer* indicator variable are significantly different across the three time periods, and this is only at the 10 percent level. Although all three of the coefficients are positive and significant, indicating that annuity writers are more likely to issue capital than insurers predominantly writing life insurance, the coefficients for the two recessionary time periods are about twice as large as the coefficient for all other years, indicating that annuity writers are even more likely to issue capital during recessionary periods. This multivariate result is in line with the aggregate industry-level time series trend presented in Figure 3.

Our two main hypotheses focus on the effect of financial distress and growth opportunities on insurers' decision to issue capital. Consistent with the theoretical prediction, insurers with low and very low levels of regulatory capital as measure by the RBC ratio are more likely to issue capital in all time periods. The estimated coefficients suggest that insurers with RBC between 200 and 300 have about twice the odds of issuing capital as other insurers, with the odds increasing to nearly 2.5 times for insurers with RBC below 200. Similarly, the estimated coefficient on the *Negative net income* indicator is positive and significant in all three time periods, indicating a positive relationship between operating losses and an insurer's decision to issue capital. In the same vein, the coefficient on *Net Income/Assets* is negative, confirming that profitable insurers are less likely to issue new capital. Overall, these results support the prediction that insurers use capital issuance to restore capital levels depleted by operating losses to avoid the negative impact of costs associated with financial distress.[20] Most importantly, we cannot reject the joint null hypothesis that the coefficients of our five proxies for financial

[20] Our findings for life insurers' capital issuances are consistent with the findings of Elyasiani, Mester, and Pagano's (2011) for major capital issuances of banks.

distress costs are equal across the three time periods (p=0.272, 0.389). Therefore, we conclude that there is *no evidence* that the relationship between depleted capital and capital issuance is different during recessionary periods in general, and the 2008-2009 financial crisis in particular.

These conclusions are confirmed by the insurer fixed-effect specification, which identifies correlations on changes over time within a given insurer. Other than the estimated coefficient on *Ln(RBC Ratio)*, none of the other estimated coefficients is markedly different. Moreover, there remains no evidence of significant differences across time periods.

Our measure for insurers' growth opportunities is the one-year growth in net premiums written. The estimated coefficient on this variable is positive and significant in all three time periods, supporting the theoretical prediction that growth opportunities are positively associated with a firm's decision to raise additional capital. The estimated coefficients suggest that a two standard deviation change in premium growth is associated with about a 50 percent increases in the odds ratio for capital issuance. A Wald test cannot reject the null hypothesis that the coefficients of our measure for growth opportunities are equal across the three time periods (p=0.629, 0.666). Furthermore, we cannot reject the joint null hypothesis that the coefficients on the proxy for growth opportunities and the coefficients on our five measure of financial distress costs are equal across the three time periods (p=0.297, 0.489). Therefore, we conclude that there is *no evidence* that the economic factors associated with insurers' decisions to issue capital are different during recessionary periods, including 2008-2009. The conclusions regarding growth opportunities are confirmed in the fixed-effects regression.

With respect to the control variables, there are a number of additional, interesting correlations. First, insurer size is strongly positively related to the likelihood of issuing new capital in the pooled regression, but negatively related in the fixed-effects regression. The difference suggests that correlations across firms are different than within firm. Second, mutual

insurers are generally less likely to issue new capital, and this effect seems to be more pronounced during the 2008-2009 recession. Third, members of a group are more likely to issue capital, particularly during the the 2008-2009 recession. We return to this issue later. And fourth, insurers listed at a stock exchange are more likely to issue capital, although the effect is a bit smaller during recessions.

Which Insurers Cut Dividends

Table 4 shows coefficient estimates from the pooled logit and fixed effects regressions specified in Equation (1), using an indicator of whether an insurer cuts its dividends to shareholders as the dependent variable. Since the results from the two different specifications are qualitatively the same, we omit a detailed discussion of the pooled logit results and just focus on the FE results.

Compared with the results on capital issuance, we find only a weak relationship between our proxies for financial distress and the likelihood that insurers cut their dividends. The most significant relationship is with the level of regulatory capital, as measured by the natural logarithm of the RBC ratio. Insurers with higher RBC are significantly less likely to cut dividends in all three time periods. Using the point estimate from the non-recessionary years, a two standard deviation increase in the logarithm of the RBC ratio results in about a one-third decrease in the odds of a dividend cut. The point estimates from the recessionary years suggests a larger effect, but the difference in the point estimates is not statistically significant. The coefficient estimates on the other proxies for financial distress suggest only a weak correspondence with dividend policy. The indicators for low and very low RBC are not significantly different from zero, and the coefficient on the ratio of net income to assets is weakly negative and measured with substantial error. The coefficient on the *Negative Net Income*

indicator is generally positive, suggesting that insurers with negative net income are indeed more likely to cut their dividends. The point estimate is negative for the 2008-2009 crisis period, but the estimate is fairly noisy. Given that almost one-half of insurers had negative net income during the recent crisis, we suspect that the coarse indicator variable loses some explanatory power during this period. In total, the estimates suggest that dividends are not a predominate means for insurers to manage their capitalization, though insurers do cut dividends in response to very low earnings or low levels of capitalization. Most important for our purposes, however, is that these relationships remained stable across the entire sample period.

Regarding the relationship with growth opportunities, we find no evidence that insurers cut dividends in order to fund new growth. The coefficient on *Growth in Net Premiums Written* variable is not significant in any of the three time periods. Cutting dividends appears to be reserved for periods when internally generated funds are very low; and new growth is funded exclusively by new capital issuance.

When comparing the drivers of dividend cuts across the three time periods, we cannot reject the joint null hypothesis that the coefficients of the five measure of financial distress costs and the coefficient of the proxy for growth opportunities are equal across the three time periods (p=0.198, 0.673). In other words, we do *not* find any evidence that the economic factors associated with insurers' decisions to cut dividends are different during recessionary periods and normal periods.

Which Insurers Issue Surplus Notes

Table 5 presents results from a pooled, logit estimation of Equation (1) for just the sample of insurers that issued external capital. The dependent variable is an indicator that the choice of capital was surplus notes, with the alternative being preferred or common equity. Overall, we

find that mutual insurers are more likely to issue surplus notes and that insurers that are members of a group are less likely to issue surplus notes. These results are not surprising since mutuals can only issue new capital through surplus notes, and members of groups have access to paid-in capital through affiliated insurers.[21]

Unlike with total capital issuance, we do find some significant differences in the estimated relationships across the time periods. We can reject the null hypothesis that the estimated coefficients are the same on the distress cost variables (p=0.047) and for the distress cost and growth opportunities variable (p=0.03). Since there are significant differences between the three time periods, we discuss them separately. Insurers with low capitalization seemed to prefer surplus notes during the 2001-2002 recession, but much less so during other time period.[22] On the other hand, the coefficient on the growth in net premiums written variable is much more negative in 2001-2002, indicating that insurers with substantial business growth issued rather preferred and common stock than surplus notes during the 2001-2002 period. Much of the difference in the models is that there appear to be no strong relationships with any of our proxies during the recent recession, suggesting that new capital market developments have opened access to surplus notes as an alternative source of capital in recent years.

Consequences of External Capital Issuance

Table 6 explores the consequences of capital issuance on insurers. The table presents coefficient estimates from insurer fixed-effects regressions of four outcomes in year *t+1* on some control variables and three indicator variables that the insurer issued external capital in year *t* (see

[21] Dumm and Hoyt (1999) analyze surplus notes utilization of life insurance companies for the 1992 through 1995 period. Their main findings are that mutual insurers, member of insurance groups, insurers with higher risk and lower capitalization are more likely to issues surplus notes. Note, that our analysis differs from Dumm and Hoyt (1999) in that we focus on the choice of a surplus notes issuance conditional on issuing any kind of external capital.

[22] Surplus notes issuances as a fraction of external capital issuances increased from 11% during 2001-2002 to 14% during 2008-2009.

Equation (2)). We use three indicators to explicitly distinguish between capital issuance during 2001-2002, 2008-2009, and all other years. The four output variables examined are the natural logarithm of net premium written, surplus, and assets and an indicator that the insurer is paying dividends. For the first three regressions, since the specifications are fixed-effects regressions with a logged dependent variable, the estimated coefficients can be interpreted as growth elasticities. For the dividend payer regression, the regression is a linear probability model, so the estimated coefficient can be interpreted as the impact on the probability that the firm pays a dividend.[23]

The results show that, in general, firms issuing new capital experience significant growth in premiums, surplus, and assets; and capital issuers become less likely to pay dividends the following year. All of the estimated effects are stronger during recessions, particularly the most recent crisis. For example, new capital issuer grew their premiums written by 12% during non-recession times, but by 28% during 2002-03 and by 43% during 2009-10.[24] Similarly, asset and surplus growth were notably stronger following issuance that happened during the recessions. The evidence confirms that insurers use new capital issuance to fund growth and replenish capital, particularly during times when net income is low.

Controlling for the Group Affiliation of Insurers

Our analysis of external capital issuance focuses on individual insurance companies. Some of these companies are members of an insurance group, and members of a group may have easier ability to obtain capital from a parent or affiliate. There is a substantial body of literature on capital transfers within conglomerates (e.g., Stein, 1997; Campello, 2002) that highlights this

[23] We use a linear probability model because standard estimators of limited dependent variable models (e.g. probit) are inconsistent with a large number of fixed-effects.

[24] These years refer to the years *following* issuance.

advantage. For the property-liability insurance industry, Powell, Sommer, and Eckles (2008) document the existence of active internal capital markets. They further document that internal capital markets in insurer groups are efficient in the sense that capital gets allocated to the subsidiaries with the highest expected rates of return. Our results beg the question of whether life insurers are relying on *internal* capital markets to fund business growth and restore depleted capital levels, or whether life insurers are really able to tap *external* capital markets.

To control for possible internal capital market transfers within insurer groups or any other positive effects of group membership, we add three-way interaction terms between the group indicator, the time period indicators, and the proxies for financial distress and growth opportunities to Equation (1).[25] Table 7 presents the pooled, logit regression results for this extended model. None of the coefficients on the three-way interaction terms with the group indicator is significantly different from zero. Moreover, using a Wald test, we cannot reject the joint null hypothesis that all coefficients of these three-way interaction terms are equal to zero ($p=0.376$). Furthermore, after controlling for a possible moderating effect of group membership, our main conclusions still hold. Growth in net premiums written, depleted capital, and negative net income are positively associated with an insurer's decision to issue capital, and we do *not* find any evidence that the relationship between depleted capital and capital issuance is different during recessionary periods, including 2008-2009. We find no evidence that our results are driven by internal capital market transfers within insurer groups.

Conclusion

This research examines the causes and consequences of external capital issuance by U.S. life insurance companies over the 1997 through 2010 period, paying special attention to the

[25] Unfortunately, statutory accounting does not identify the source of any new capital.

2008-2009 financial crisis. Theory predicts capital issuance to be driven by either the need to replace depleted capital or the need to fund additional growth that cannot be supported by internally generated capital. Consistent with this prediction, our regression analysis shows that new capital issuance is concentrated in firms with low levels of capitalization, firms with negative net income, and firms with substantial growth opportunities. Most importantly, there is *no evidence* that the relationship between depleted capital and capital issuance is different during the 2008-2009 financial crisis. In other words, there is *no evidence* that insurers had difficulties obtaining new capital, unlike other financial services firms that required a publicly financed bailout. While some insurance companies may have experienced an additional demand for external capital during the financial crisis, the supply of capital seems to have remained constant.

This research has important public policy implication. First, if there was no disruption in life insurance companies' access to external capital, the extension of the Treasury's Troubled Asset Relief Program (TARP) to life insurers in May of 2009 was unnecessary. Second, if life insurance companies were able to weather the financial crisis like other economic downturns in the past, there is no obvious need to respond to the crisis with additional regulations. Indeed, our results show that earnings and capitalization quickly returned to the pre-crisis levels.

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Figure 1. Life Insurers' Return on Assets: 1997 - 2010

This figure plots the ratio of total net income to total admitted general account assets for the sample of life insurers described in the text. The solid red line is for insurers that write predominately annuities; the dotted blue line is for insurers that write predominately life insurance; and the dashed green line is for insurers that write a mix of annuities and life insurance.

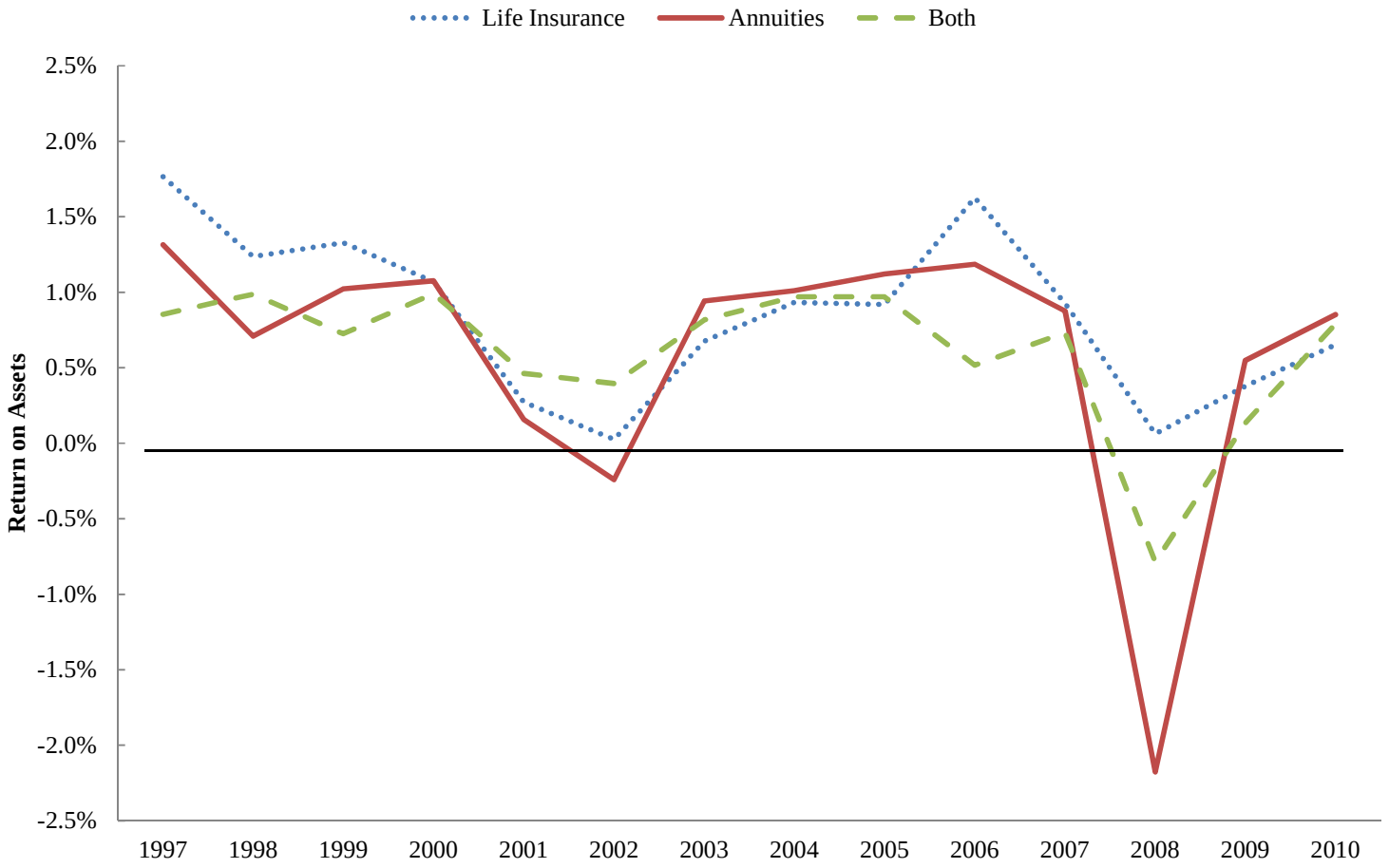

Figure 2. Life Insurers' Capitalization: 1997 - 2010

This figure plots the ratio of total capital (including surplus notes) to total admitted general account assets for the sample of life insurers described in the text. The solid red line is for insurers that write predominately annuities; the dotted blue line is for insurers that write predominately life insurance; and the dashed green line is for insurers that write a mix of annuities and life insurance.

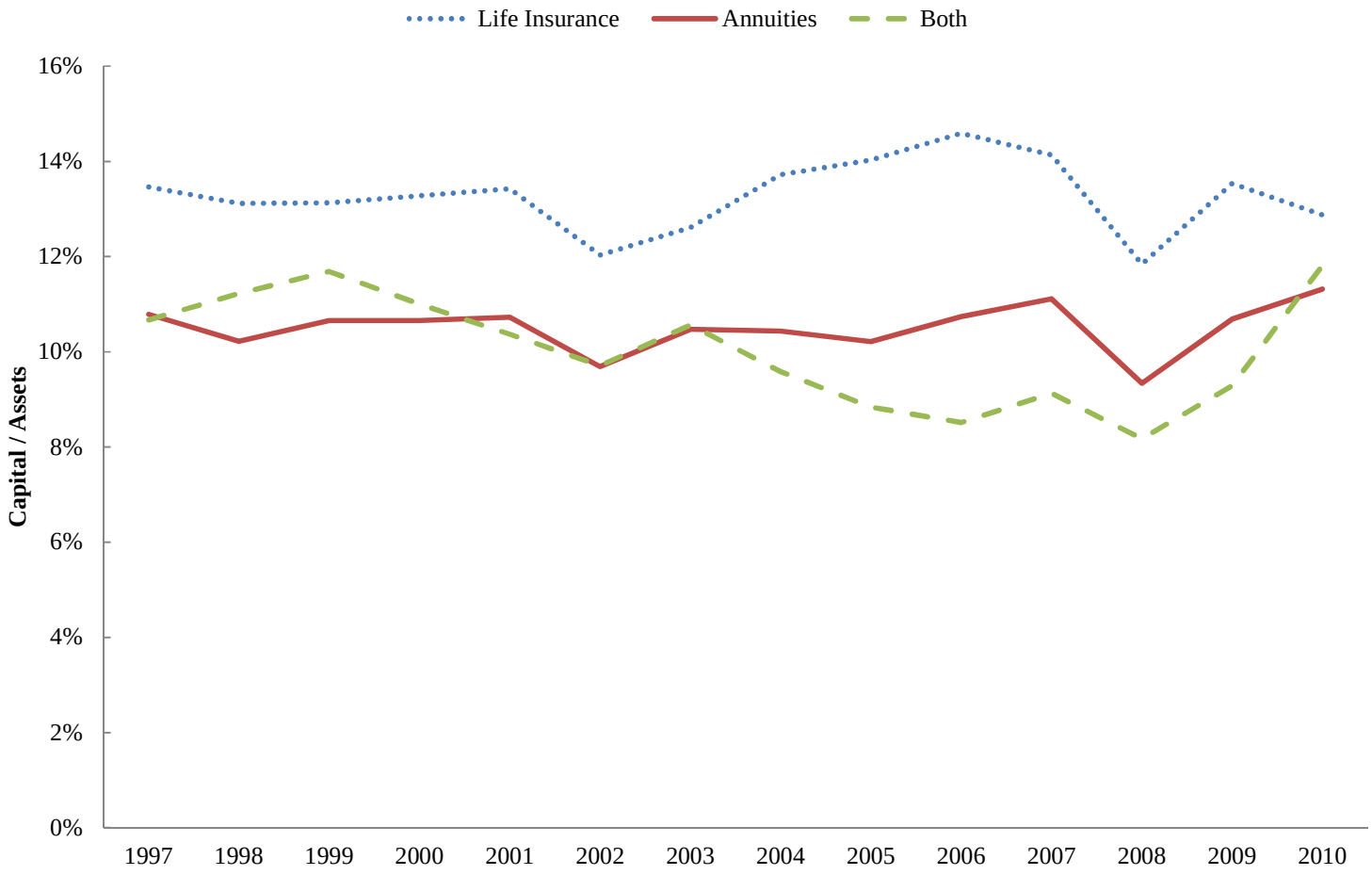

Figure 3. Life Insurers' Capital Raising: 1997 - 2010

This figure plots the percentage of life insurers raising external capital (including surplus notes) for the sample of life insurers described in the text. The solid red line is for insurers that write predominately annuities; the dotted blue line is for insurers that write predominately life insurance; and the dashed green line is for insurers that write a mix of annuities and life insurance.

Table 1. Sources and Uses of Capital

This table shows the aggregate dollar amount (in billions of 2000 dollars) of changes in surplus for the life insurance industry. The total change in surplus includes changes in the interest maintenance reserve and the asset valuation reserve, which are included in *Other Changes*. *NI incl. Cap Gains* refers to total net income including realized and unrealized capital gains. *Paid-In Capital* includes common stock and preferred stock, and *Surplus Notes* includes net issuance of surplus notes. The three panels at the bottom show aggregates for three time periods for three distinct sets of insurers: insurers that predominately write life insurance, insurers that predominately write annuities, and insurers that write a mixture of both. The row labeled "All other" refers to all years other than 2001, 2002, 2008, and 2009.

	Change in Surplus	NI incl. Cap Gains	Surplus Notes	Paid-In Capital	Dividends Paid	Other Changes
1997	22.3	23.5	0.9	5.5	-14.7	7.1
1998	10.5	12.9	2.8	4.6	-15.6	5.9
1999	8.9	15.2	-0.1	3.3	-18.4	8.9
2000	3.0	8.2	0.0	10.4	-18.4	2.8
2001	2.4	-2.7	0.0	9.6	-17.3	12.8
2002	0.7	-7.2	1.0	10.9	-17.0	13.1
2003	21.3	20.6	0.5	4.3	-15.9	11.7
2004	17.6	18.5	0.0	4.8	-11.7	6.1
2005	4.5	16.4	0.3	-0.6	-10.2	-1.4
2006	12.1	25.1	-0.6	1.4	-12.8	-0.9
2007	11.9	15.9	0.3	0.5	-13.2	8.4
2008	-21.5	-31.3	2.1	13.5	-10.5	4.8
2009	27.2	5.9	2.9	13.2	-8.6	13.8
2010	18.4	19.7	1.7	0.6	-10.5	6.8
Life Insurance						
2001 - 02	1.6	-3.0	0.1	7.8	-11.7	8.3
2008 - 09	-1.6	-2.2	0.2	4.3	-10.2	6.3
All other	41.5	56.9	1.3	16.9	-55.3	21.7
Annuities						
2001 - 02	3.8	-7.0	1.1	10.2	-11.9	11.3
2008 - 09	5.2	-21.4	4.3	19.0	-7.1	10.3
All other	66.3	80.6	3.0	14.3	-45.8	14.1
Both						
2001 - 02	-2.2	0.0	-0.2	2.4	-10.8	6.3
2008 - 09	2.1	-1.8	0.4	3.4	-1.8	1.9
All other	22.7	38.3	1.5	3.6	-40.3	19.6

Table 2. Summary Statistics

This table reports summary statistics for variables used in the subsequent analysis. All monetary values are inflation adjusted and converted to constant 2000 US$. *Capital issuance* is a dummy variable indicating issuance of some external equity. *Surplus note issuance* is a dummy variable indicating issuance of surplus notes. *Paid-in capital issuance* is a dummy variable indicating issuance of new paid-in capital. *Dividend Cut* is a dummy variable indicating dividends paid are below the level paid in the prior year, conditional on being positive in the prior year. *Ln(premium)* is the natural logarithm of total direct written premium; *Ln(surplus)* is the natural logarithm of total surplus, including the interest maintenance reserve and asset valuation reserve; *Ln(assets)* is the natural logarithm of total general account assets. *Indicator: dividend payer* is a dummy variable indicating positive payment of dividends to stockholders. *RBC Ratio* is the risk-based capital ratio. *Net income / Assets* is the ratio of net income to general account assets; *Indicator: negative net income* is a dummy variable indicating negative net income. *Growth in net premium written* is the year-on-year percentage change in net written premiums. *Indicator: Annuity writer* is a dummy variably classifying companies as insurers that are predominantly engaged in writing annuities business, and *Indicator: Annuity & life writer* is a dummy variably classifying companies as insurers that write a mix of life insurance and annuity business. *Indicator: Mutual* is a dummy variable indicating a mutual insurer; *Indicator: Member of group* is a dummy variable indicating an insurer that is a subsidiary of a larger insurance group; and *Indicator: Listed* is a dummy variable indicating an insurer listed on a stock exchange.

	N	Mean	Standard Deviation	10^{th} Percentile	Median	90^{th} Percentile
Capital issuance	6,945	0.220	0.414	0.000	0.000	1.000
Surplus note issuance	6,945	0.032	0.175	0.000	0.000	0.000
Paid-in capital issuance	6,945	0.200	0.400	0.000	0.000	1.000
Dividend Cut	2,220	0.664	0.472	0.000	1.000	1.000
Ln(premium)	6,945	2.650	3.420	-1.980	3.140	6.830
Ln(surplus)	6,928	3.420	2.460	0.132	3.530	6.540
Ln(assets)	6,945	5.060	2.830	1.300	5.380	8.640
Indicator: dividend payer	6,945	0.325	0.469	0.000	0.000	1.000
RBC Ratio	6,559	1587.000	5208.000	231.000	455.000	2290.000
Net income / Assets	6,945	0.012	0.035	-0.021	0.009	0.051
Indicator: negative net income	6,945	0.260	0.438	0.000	0.000	1.000
Growth in net premium written	6,945	0.056	0.443	-0.361	-0.018	0.572
Indicator: Annuity writer	6,945	0.201	0.401	0.000	0.000	1.000
Indicator: Annuity & life writer	6,945	0.099	0.298	0.000	0.000	0.000
Indicator: Mutual	6,945	0.079	0.270	0.000	0.000	0.000
Indicator: Member of group	6,945	0.628	0.483	0.000	1.000	1.000
Indicator: Listed	6,945	0.375	0.484	0.000	0.000	1.000

Table 3. Which Insurers Issue New Capital

This table reports estimated coefficients from a single pooled logit regression and a single fixed effects (FE) logit regression with *Capital Issuance* as the dependent variable. *Capital Issuance* is a dummy variable equal to 1 if the firm issued external capital, including surplus notes and other paid-in capital. Both specifications include year dummy variables (not reported). All independent variables are measured as of the end of the prior period and described in Table 2. Each independent variable is interacted with dummy variables for three time periods: 2001-2002, 2008-2009, and all other years. The estimated coefficients are reported in the respective columns. The column "Wald test" reports the p-value for a Wald test of the equality of the coefficients across the three time periods. Standard errors are robust to arbitrary heteroskedasticity and adjusted for clustering at the insurer level. *, **, and *** denote statistical significance at the 10, 5, and 1 percent levels, respectively.

	Pooled Regression				FE Regression			
	All other yrs	2001-2002	2008-2009	Wald test	All other yrs	2001-2002	2008-2009	Wald test
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ln(RBC Ratio) $_{t-1}$	0.044	-0.166	-0.280	0.198	-0.303**	-0.411*	-0.495**	0.582
	(0.094)	(0.160)	(0.278)		(0.123)	(0.221)	(0.213)	
Indicator: 200<RBC<300	0.723***	0.757***	0.034	0.148	0.469***	0.670**	-0.173	0.143
	(0.140)	(0.242)	(0.351)		(0.155)	(0.292)	(0.349)	
Indicator: RBC<200	0.829***	0.855**	0.656	0.960	1.207***	0.771	1.131**	0.714
	(0.233)	(0.418)	(0.614)		(0.288)	(0.501)	(0.574)	
(Net income/Assets) $_{t-1}$	-5.753**	-5.662	-1.534	0.703	-4.167*	-2.681	-3.941	0.942
	(2.704)	(4.730)	(4.872)		(2.240)	(3.966)	(4.463)	
Indicator: Negative net income $_{t-1}$	0.844***	1.110***	0.714***	0.516	0.594***	1.015***	0.182	0.157
	(0.147)	(0.263)	(0.268)		(0.157)	(0.300)	(0.318)	
Growth in net premium written $_{t-1}$	0.481***	0.618***	0.351*	0.629	0.303***	0.494***	0.412	0.666
	(0.093)	(0.181)	(0.213)		(0.107)	(0.191)	(0.281)	
Ln(assets) $_{t-1}$	0.146***	0.127**	0.167***	0.852	-0.487***	-0.448***	-0.343***	0.034
	(0.036)	(0.052)	(0.056)		(0.102)	(0.113)	(0.108)	
Indicator: Annuity writer	0.448***	0.826***	0.878***	0.081*				
	(0.148)	(0.252)	(0.239)					
Indicator: Annuity & life writer	0.546**	0.379	0.570*	0.841				
	(0.219)	(0.327)	(0.321)					
Indicator: Mutual	-0.535*	-0.357	-1.024**	0.182				
	(0.286)	(0.375)	(0.408)					
Indicator: Member of Group	0.133	0.201	0.561**	0.296				
	(0.167)	(0.255)	(0.262)					
Indicator: Listed	0.410***	0.289	0.262	0.717				
	(0.139)	(0.201)	(0.205)					
Year Dummy Variables		Yes				Yes		
Observations		5,859				3,666		
Pseudo R^2		0.152				0.084		
p-value for model equality,		0.090*				0.057*		
Distress Costs and Growth vars.		0.297				0.489		
Distress Costs vars.		0.272				0.389		

Table 4. Which Insurers Cut Dividends

This table reports estimated coefficients from a single pooled logit regression and a single fixed effects (FE) logit regression with *Dividend Cut* as the dependent variable. *Dividend Cut* is a dummy variable equal to 1 if the firm reduced the level of stockholder dividends paid from the prior year. The sample is restricted to stock insurers that paid dividends during the prior year. Both specifications include year dummy variables (not reported). All independent variables are measured as of the end of the prior period and described in Table 2. Each independent variable is interacted with dummy variables for three time periods: 2001-2002, 2008-2009, and all other years. The estimated coefficients are reported in the respective columns. The column "Wald test" reports the p-value for a Wald test of the equality of the coefficients across the three time periods. Standard errors are robust to arbitrary heteroskedasticity and adjusted for clustering at the insurer level. *, **, and *** denote statistical significance at the 10, 5, and 1 percent levels, respectively.

	Pooled Regression				FE Regression			
	All other yrs	2001-2002	2008-2009	Wald test	All other yrs	2001-2002	2008-2009	Wald test
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ln(RBC Ratio) $_{t-1}$	0.118	-0.364*	-0.206	0.067*	-0.402*	-0.842**	-0.600*	0.321
	(0.109)	(0.197)	(0.234)		(0.223)	(0.332)	(0.316)	
Indicator: 200<RBC<300	0.035	-0.040	-0.305	0.849	-0.355	-0.328	-0.204	0.975
	(0.172)	(0.357)	(0.585)		(0.244)	(0.445)	(0.657)	
Indicator: RBC<200	0.649	1.107	-0.668	0.508	0.255	0.545	12.803	0.974
	(0.418)	(1.086)	(1.276)		(0.509)	(1.255)	(801.264)	
(Net income/Assets) $_{t-1}$	-7.162***	-4.692	-8.107*	0.848	-4.436	0.158	-3.140	0.771
	(2.314)	(4.598)	(4.482)		(3.529)	(6.409)	(6.469)	
Indicator: Negative net income $_{t-1}$	0.510**	1.392**	-0.364	0.057*	0.514*	1.282**	-0.346	0.142
	(0.253)	(0.581)	(0.442)		(0.293)	(0.624)	(0.559)	
Growth in net premium written $_{t-1}$	0.140	-0.108	-0.622	0.268	0.108	-0.239	-0.382	0.531
	(0.171)	(0.289)	(0.467)		(0.211)	(0.318)	(0.528)	
Ln(assets) $_{t-1}$	-0.107***	-0.081	-0.171**	0.700	-0.432**	-0.361	-0.322	0.376
	(0.038)	(0.082)	(0.085)		(0.204)	(0.222)	(0.210)	
Indicator: Annuity writer	-0.387**	-0.443	0.698	0.042**				
	(0.189)	(0.353)	(0.427)					
Indicator: Annuity & life writer	-0.150	-0.369	0.495	0.308				
	(0.200)	(0.379)	(0.428)					
Indicator: Member of Group	-0.017	0.411	0.561	0.123				
	(0.158)	(0.333)	(0.352)					
Indicator: Listed	-0.157	-0.295	0.407	0.274				
	(0.146)	(0.281)	(0.390)					
Year Dummy Variables		Yes				Yes		
Observations		1,918				1,525		
Pseudo R^2		0.060				0.064		
p-value for model equality,		0.017**				0.518		
Distress Costs and Growth vars.		0.198				0.673		
Distress Costs vars.		0.176				0.624		

Table 5. Which Insurers Issue Surplus Notes

This table reports estimated coefficients from a single pooled logit regression model for the subsample of firms that issued external capital. The dependent variable is a dummy variable equal to 1 if the firm issued surplus notes, with the alternative being common capital stock or preferred capital stock. The specification includes year dummy variables (not reported). All independent variables are measured as of the end of the prior period and described in Table 2. Each independent variable is interacted with dummy variables for three time periods: 2001-2002, 2008-2009, and all other years. The estimated coefficients are reported in the respective columns. The column "Wald test" reports the p-value for a Wald test of the equality of the coefficients across the three time periods. Standard errors are robust to arbitrary heteroskedasticity and adjusted for clustering at the insurer level. *, **, and *** denote statistical significance at the 10, 5, and 1 percent levels, respectively.

	Issuance of Surplus Notes $_{t}$			
	All other yrs	2001-2002	2008-2009	Wald test
	(1)	(2)	(3)	(4)
Ln(RBC Ratio) $_{t-1}$	0.264	-0.003	-0.474	0.364
	(0.230)	(0.692)	(0.504)	
Indicator: 200<RBC<300	-0.320	1.186**	-1.254	0.010**
	(0.309)	(0.549)	(0.941)	
Indicator: RBC<200	0.178	1.445	-1.438	0.253
	(0.558)	(0.947)	(1.457)	
(Net income/Assets) $_{t-1}$	-6.825	-2.002	5.968	0.457
	(6.430)	(8.042)	(8.497)	
Indicator: Negative net income $_{t-1}$	-0.418	0.016	-0.082	0.776
	(0.324)	(0.677)	(0.544)	
Growth in net premium written $_{t-1}$	-0.133	-0.908***	-0.146	0.116
	(0.216)	(0.346)	(0.494)	
Ln(assets) $_{t-1}$	0.414***	0.306	0.221	0.376
	(0.115)	(0.191)	(0.162)	
Indicator: Annuity writer	0.589	0.289	-0.043	0.459
	(0.388)	(0.654)	(0.531)	
Indicator: Annuity & life writer	0.472	0.060	0.042	0.717
	(0.407)	(0.923)	(0.708)	
Indicator: Mutual	2.113***	4.292***	1.802	0.061*
	(0.432)	(0.895)	(1.129)	
Indicator: Member of Group	-1.207***	-1.798**	0.095	0.159
	(0.383)	(0.723)	(0.743)	
Indicator: Listed	-0.644*	-0.012	-0.457	0.520
	(0.389)	(0.533)	(0.478)	
Year dummy variables		Yes		
Observations		1,341		
Pseudo R^2		0.221		
p-value for model equality,		0.016**		
Distress Costs and Growth vars.		0.030**		
Distress Costs vars.		0.047**		

Table 6. Consequences of External Capital Issuance

This table reports estimated coefficients from fixed effects OLS regression models for various dependent variables. All independent variables are measured as of the end of the prior period and described in Table 2. The regressions include year dummies (not reported). Standard errors are robust to arbitrary heteroskedasticity and adjusted for clustering at the insurer level. *, **, and *** denote statistical significance at the 10, 5, and 1 percent levels, respectively.

	Ln(NPW) $_{t+1}$	Ln(Surplus) $_{t+1}$	Ln(Assets) $_{t+1}$	Dividend payer $_{t+1}$
	(1)	(2)	(3)	(4)
Capital issuance: 2001-02	0.278***	0.095***	0.046	-0.057**
	(0.059)	(0.032)	(0.041)	(0.029)
Capital issuance: 2008-09	0.432***	0.351***	0.275***	-0.116***
	(0.094)	(0.055)	(0.055)	(0.036)
Capital issuance: other years	0.117**	0.073***	0.057**	-0.050***
	(0.057)	(0.023)	(0.025)	(0.018)
Ln(RBC Ratio) $_{t}$	-0.595***	-0.089*	-0.315***	0.017
	(0.077)	(0.046)	(0.052)	(0.014)
Indicator: 200<RBC<300	-0.168**	-0.097***	-0.053	0.001
	(0.067)	(0.031)	(0.034)	(0.021)
Indicator: RBC<200	-0.372***	-0.216***	-0.232***	0.002
	(0.120)	(0.071)	(0.070)	(0.038)
(Net income/Assets) $_{t}$	-1.033	1.232***	0.632	0.675***
	(1.041)	(0.409)	(0.529)	(0.236)
Indicator: Negative net income $_{t}$	0.015	-0.088***	-0.053*	-0.052***
	(0.050)	(0.026)	(0.030)	(0.016)
Constant	6.859***	4.243***	7.505***	0.925***
	(0.512)	(0.309)	(0.348)	(0.092)
Year dummy variables	Yes	Yes	Yes	Yes
Observations	5,784	5,909	5,915	6,550
R^2	0.117	0.067	0.131	0.180

Table 7. The Moderating Effect of Group Affiliation

This table reports estimated coefficients from a single pooled logit regression model with *Capital Issuance* as the dependent variable. *Capital Issuance* is a dummy variable equal to 1 if the firm issued external capital, including surplus notes and other paid-in capital. The specification includes year dummy variables (not reported). All independent variables are measured as of the end of the prior period and described in Table 2. Each independent variable is interacted with dummy variables for three time periods: 2001-2002, 2008-2009, and all other years. The estimated coefficients are reported in the respective columns. Compared with Table 3, this specification includes the interaction of several variables with an indicator that the insurer is a member of a group. The column "Wald test" reports the p-value for a Wald test of the equality of the coefficients across the three time periods. Standard errors are robust to arbitrary heteroskedasticity and adjusted for clustering at the insurer level. *, **, and *** denote statistical significance at the 10, 5, and 1 percent levels, respectively.

	Capital Issuance $_{t}$			
	All other yrs	2001-2002	2008-2009	Wald test
	(1)	(2)	(3)	(4)
Ln(RBC Ratio) $_{t-1}$	0.114	-0.133	0.030	0.507
	(0.130)	(0.218)	(0.340)	
Indicator: 200<RBC<300	0.780***	0.019	0.550	0.292
	(0.267)	(0.456)	(0.694)	
Indicator: RBC<200	0.580	-0.084	0.925	0.609
	(0.372)	(0.645)	(0.850)	
(Net income/Assets) $_{t-1}$	-10.711*	-2.088	-21.492	0.613
	(6.339)	(9.750)	(20.249)	
Indicator: Negative net income $_{t-1}$	0.764***	1.502***	0.298	0.260
	(0.283)	(0.523)	(0.577)	
Growth in net premium written $_{t-1}$	0.725***	0.948**	-0.693	0.254
	(0.198)	(0.411)	(0.927)	
Ln(assets) $_{t-1}$	0.140***	0.109**	0.167***	0.732
	(0.037)	(0.054)	(0.058)	
Indicator: Annuity writer	0.448***	0.853***	0.905***	0.062*
	(0.147)	(0.252)	(0.249)	
Indicator: Annuity & life writer	0.545**	0.417	0.569*	0.902
	(0.218)	(0.325)	(0.320)	
Indicator: Mutual	-0.539*	-0.354	-1.053**	0.176
	(0.288)	(0.387)	(0.413)	
Indicator: Member of Group	1.044	1.364	2.840	0.817
	(1.151)	(2.077)	(3.178)	
Indicator: Listed	0.412***	0.318	0.262	0.754
	(0.139)	(0.207)	(0.207)	
Interaction: Ln(RBC Ratio) $_{t-1}$	-0.151	-0.201	-0.387	0.856
x Group member	(0.171)	(0.313)	(0.486)	
Interaction: 200<RBC<300	-0.100	0.876	-0.646	0.180
x Group member	(0.305)	(0.539)	(0.783)	
Interaction: RBC<200	0.375	1.358	-0.356	0.420
x Group member	(0.464)	(0.833)	(1.073)	
Interaction: (Net income/Assets) $_{t-1}$	6.351	-6.400	22.639	0.407
x Group member	(7.003)	(11.078)	(20.767)	
Interaction: Negative net income	0.086	-0.528	0.503	0.475
x Group member	(0.321)	(0.605)	(0.643)	
Interaction: Premium Growth	-0.304	-0.386	1.166	0.291
x Group member	(0.222)	(0.440)	(0.962)	
Year Dummy Variables		Yes		
Observations		5,859		
Pseudo R^2		0.157		
p-value for model equality,		0.200		
Distress Costs and Growth vars.		0.541		
Distress Costs vars.		0.691		
All group interactions = 0		0.376		