
U.S. life insurers' responses to the financial crisis: a review of the research



Greg Niehaus

Professor of Insurance and Finance, Darla Moore School of Business,
University of South Carolina

Chia-Chun Chiang

Ph.D. student, Darla Moore School of Business, University of South Carolina

Abstract

Understanding how institutions were impacted by the financial crisis and how they responded is important for developing risk management plans that are capable of dealing with potential future crises. This paper therefore examines the impact of the financial crisis on U.S. life insurers and reviews the research on how life insurers responded to the crisis. Most life insurers were not significantly affected by the crisis, but some suffered large operating and investment losses. Regarding responses, the paper distinguishes activities that increased economic capital as well as statutory capital (e.g., cutting dividends and obtaining capital infusions) from activities that increased statutory capital without having a direct positive impact on economic capital (e.g., selling policies at a discount relative to fair value and selling securities at fire sale prices).

1. Introduction

The financial crisis is clearly a defining period for financial institutions. The impact was widespread, influencing the management and regulation of commercial banks, investment banks, derivative markets, and insurance companies. The focus of this paper is on the impact of the financial crisis on life insurers in the U.S. The objective is to review, using the results of academic and government research, and with the benefit of hindsight, how life insurers in the U.S. responded to the financial crisis and some of the side effects of these responses.

When thinking about how to manage the risk of a potential loss, it can be useful to distinguish actions that are taken prior to the resolution of the uncertainty regarding the potential loss - ex ante decisions, from those that are taken if a loss materializes - ex post decisions. Ideally, risk managers would evaluate alternative ex ante actions as well as contingent ex post actions, and develop an action plan based on the relative costs and benefits. Of course, sometimes unexpected events occur for which there was no planning and therefore no ex post contingency plans to draw upon. In these situations, organizations need to respond in the best way possible. Our purpose is to summarize how life insurers responded to the large negative economic capital shocks that they experienced during the financial crisis, i.e., their ex post risk management actions. We cannot determine whether these responses were planned or not; nevertheless, an understanding of the actions taken by these institutions and the repercussions of those actions can help risk managers, regulators, and policy makers assess the benefits of alternative risk management plans for the future, whether they be at the institution level or the public policy level.

The analysis begins by assessing the impact of the financial crisis on U.S. life insurers' operating income and asset portfolios (unrealized capital gains). This analysis indicates that while some insurance groups and companies needed to take significant actions to counteract the impact of the financial crisis, the majority of companies did not need to respond in meaningful ways. The main focus of the paper is on the response of the insurers that were significantly impacted.

Even though most of these companies were in little danger of violating regulatory capital standards, the insurers that suffered large operating and investment losses in 2008 took significant actions to replenish capital. The responses included lowering external and internal dividends [Berry-Stolze et al. (2014) and Niehaus (2015)], raising external capital [Berry-Stolze et al. (2014)], shifting internal capital from other entities in the group [Niehaus (2015)], and in a few cases, obtaining capital infusions from the federal government [GAO (2013) and Massad (2012)]. There is also some evidence that insurers reduced their asset risk during the financial crisis, relative to the prior period, by "reaching for yield" less [Becker and Ivashina (2015)]. All of these responses affect the level and risk of economic capital and statutory capital similarly, and are consistent with a desire to protect franchise value and maintain product demand varying with the level and variability of capital.¹

Research has also uncovered evidence of insurers taking actions to increase statutory capital even though these actions did not directly increase economic capital. Responses of this nature include lowering prices below actuarial value during a period when the statutory liability that insurers recorded from selling policies was significantly below the economic value of the liability [Kojien and Yogo (2015)], lobbying state regulatory authorities to obtain statutory capital relief [GAO (2013)], selling bonds with embedded capital gains that allowed insurers to report higher assets than if they had continued to hold these bonds [Ellul et al. (2014)], and selling bonds that had been downgraded at fire sale prices to increase risk-based capital ratios [Merrill et al. (2014)]. While the focus on statutory capital (in some cases, at the expense of economic capital) can be explained by customers, investors, financial advisors, and rating agencies using statutory capital to assess insurer financial strength, further research and commentary by practitioners on this topic can help identify other explanations for, and effects of, this behavior.

¹ Of course, most consumers do not monitor insurer capital. Instead, information is provided by rating agencies. In the absence of the insurers' responses, rating agencies would have likely downgraded insurers' financial strength ratings [see Society of Actuaries (2004) and Kojien and Yogo (2015)].

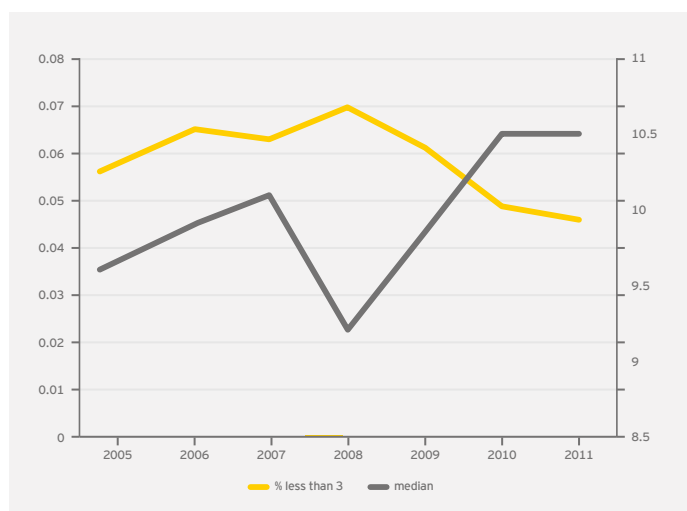


Figure 1: NAIC risk-based capital ratios
Percentage of companies with ratios less than 3 (left-hand axis and yellow line) and median ratio for U.S. life insurers (right-hand axis and grey line)

BCAR	Implied balance sheet strength rating
1.75	A++
1.60	A+
1.45	A
1.30	A-
1.20	B++
1.10	B+
1.00	B
0.90	B-
0.80	C++
0.70	C+
0.60	C
0.50	C-
< 0.50	D

Table 1: A. M. Best Guidelines for the relationship between BCAR and balance sheet strength ratings

2. Impact of the financial crisis on U.S. life insurers

2.1 Conceptual framework

The major impacts of the financial crisis on life insurers can be traced to several key economic indicators: lower stock prices, higher credit spreads on corporate and mortgage bonds, lower U.S. Treasury bond rates, and increased market volatility in general. In this section, we outline from a conceptual perspective the impact that these economic variables had on insurers' economic capital and statutory capital. By economic capital, we mean the value of capital based on the market values of assets and measuring liabilities as the present value of expected claim payments on policies already written discounted using market risk-free interest rates.² Statutory capital is the measure of capital found when using U.S. statutory accounting principles.

Because they are important for understanding the impact on and/or response of insurers to the financial crisis, we also analyze risk-based capital measures. Risk-based capital can be thought of as a measure of capital that an entity (e.g., the National Association of Insurance Commissioners (NAIC) or a rating agency) deems to be appropriate for an insurer given its risk profile. As the riskiness of

the insurer's activities increase, risk-based capital increases. The ratio of actual capital to risk-based capital, therefore, provides a measure of whether the actual amount of capital is sufficient given the risk of the insurer's activities.

Risk-based capital ratios are utilized by regulators and rating agencies to assess the likelihood that insurers will be able to fulfill the promises that they have made to policyholders. In the U.S., the NAIC risk-based capital measure is scaled in such a way that the actual amount of capital held by insurers is usually many times greater than the NAIC risk-based capital measure, implying that the NAIC risk-based capital ratio (actual capital to risk-based capital) is many times greater than one. If the ratio falls below two, regulatory intervention is required in the U.S.

To provide a sense of the values of typical NAIC risk-based capital ratios and how they changed during the financial crisis, Figure 1 illustrates the median NAIC RBC ratio for all life insurance companies from 2005 to 2011 and the percentage of companies with an NAIC risk-based capital ratio below three. The median value reaches a minimum of 9.2 in 2008 and the percentage of companies with NAIC RBC ratios below three reaches a maximum

² This definition is similar in spirit but not the same as other industry professions define economic capital. See e.g., Society of Actuaries (2004) and Ward et al. (2013).

of 7.0 percent in 2008. While these metrics suggest that life insurer capital dropped in 2008, both metrics quickly rebounded. As we discuss below, the rebound in capital can be attributed in large part to the response of life insurers and government during the crisis.

Rating agencies also use risk-based capital ratios, along with other information, when assigning life insurer ratings. For example, A. M. Best calculates what they call the Best's Capital Adequacy Ratio (BCAR), which is the ratio of the capital held by an insurer to the amount of capital that A.M. Best deems to be required given the insurer's risk (A. M. Best 2014). The BCAR ratings are scaled in such a way that insurers with ratios greater than one are deemed to be "secure" and those with ratios less than one are deemed to be "vulnerable." More importantly, A.M. Best publishes the guidelines that they use to relate BCAR ratios to their ratings of an insurer's "balance sheet strength." Table 1 replicates the guidelines reported in 2014.

The important point to highlight is that insurers may be far from violating the NAIC minimum risk-based capital standard of two, but still be concerned that their capital has fallen or their risk has increased. This is because (1) more insurers are concerned about protecting franchise value and (2) consumer demand is sensitive to the financial strength of the insurer. Rating agencies (such as A. M. Best) play a prominent role in the communication of insurers' financial strength to consumers [see e.g., Eling (2012) and Epermanis and Harrington (2006)]. In addition, insurers, especially publicly traded stock insurers, are concerned with investor perceptions.

2.2 Economic factors impacting life insurers during the financial crisis

There were a number of factors that impacted life insurers during the financial crisis, which are outlined below.

- ▶ Lower stock prices: the decline in equity values during the financial crisis had minimal impact on most life insurers' assets simply because they held relatively few equity securities on their general account. However, prior to the financial crisis some insurers had sold variable annuities that promised purchasers that they would receive a guaranteed amount even if the separate account value fell below the

guaranteed amount. Since most separate account assets are invested in stock market securities, when equity values fell, the values of separate accounts fell as well. Thus, the expected payments on the guarantees increased, which increased the economic value of insurer's liabilities and therefore decreased economic capital, all else equal. Statutory capital is similarly impacted by lower stock prices.³

- ▶ Higher credit spreads: the increased credit spreads and corresponding downgrades of fixed income securities reduced the market value of bonds and mortgage-backed securities and thereby reduced the economic value of insurers' capital. Provided the bonds were still rated in NAIC category 1-5⁴, life insurers did not have to recognize the lost value for statutory accounting purposes and instead could continue to report the value of bonds at amortized cost. In this case, statutory capital would not have declined as result of increased credit spreads. For bonds with an NAIC rating of 6, however, the bonds would have to be valued at the lower of amortized cost and fair value. In this case, the decline in the value of bonds held by life insurers lowered statutory capital. Regardless of whether downgrades of securities impacts statutory capital, downgrades will increase risk-based capital (the denominator in the risk-based capital ratio) if the downgrade places the security in a higher risk classification. This in turn will decrease the risk-based capital ratio.⁵
- ▶ Higher volatility: increased uncertainty and market volatility increases the value of options embedded in life insurance and annuity products, which in turn increases economic liabilities. The effect of higher market volatility also increased statutory reserves (liabilities) for variable annuities starting in 2009, but this effect would not have been incorporated into reserves prior to 2009.

3 In the U.S., variable annuities with guaranteed benefits are subject to reserve requirements known as Actuarial Guideline (AG) 34, and 39 before 2009 and subject to AG 43 afterwards. While earlier requirements specified predetermined asset return scenarios, the latter requirement allows insurers to use stochastic reserve calculations based on real world expectations to some extent. Either way, on the valuation date if the account value drops compared to previous account value, then the reserve for variable annuities increases because the gaps between account value and guaranteed value increases, causing statutory capital to fall after a stock price drop.

4 The NAIC rating categories range from 1 to 6 with 1 being the highest credit quality.

5 Insurers holding mortgage-backed securities (MBS) received some relief from this effect in 2009 (for residential MBS) and 2010 (for commercial MBS) when the NAIC changed how they calculated NAIC risk-based capital for MBS. See Becker and Opp (2014) and Hanley and Nikolova (2013) for analyses of how insurers changed their investment decisions following the NAIC rule change. In particular, Becker and Opp (2014) show that insurers purchased more lower-rated MBS, and Hanley and Nikolova (2014) show that insurers were more likely to hold on to downgraded MBS after the rule change.

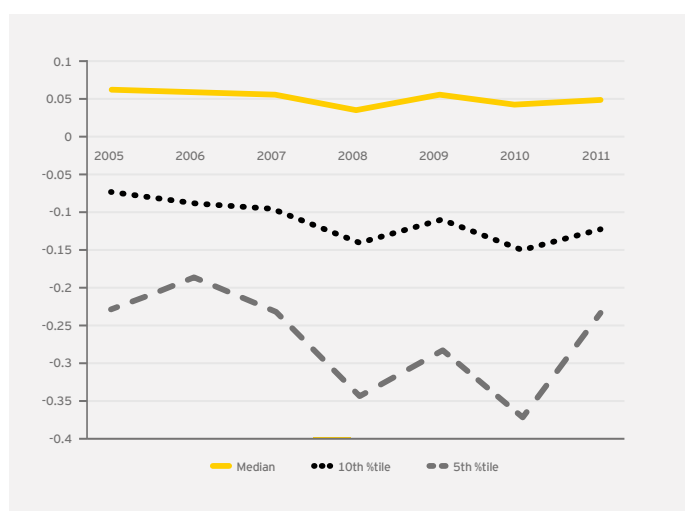


Figure 2: Operating income divided by prior year capital (median, 10th percentile, and 5th percentile values)

► Lower Treasury rates: in response to the economic crisis, interest rates on U.S. government bonds fell during the financial crisis. The impact of falling Treasury rates on the economic value of life insurers depends on the extent to which their assets and liabilities had similar sensitivities (durations) to interest rate changes. If the interest rate sensitivity of liabilities was greater (less) than that of assets, then the drop in interest rates would have increased the economic value of liabilities more (less) than the value of assets, and economic capital would have declined (increased).

The marginal impact of lower Treasury rates on statutory capital is more complicated because the value of statutory assets and liabilities do not necessarily change as interest rates change. Given that statutory measures of liabilities are based on the interest rate prevailing at the time business is written, statutory liabilities would not have increased as much as the economic value of liabilities as a result of lower interest rates. Similarly, for bonds in NAIC rating categories 1-5, the marginal impact of lower Treasury rates would not have increased their statutory value because that is reported using amortized cost. However, for bonds in NAIC category 6, their statutory value is reported using the lower of amortized cost and fair value. The marginal

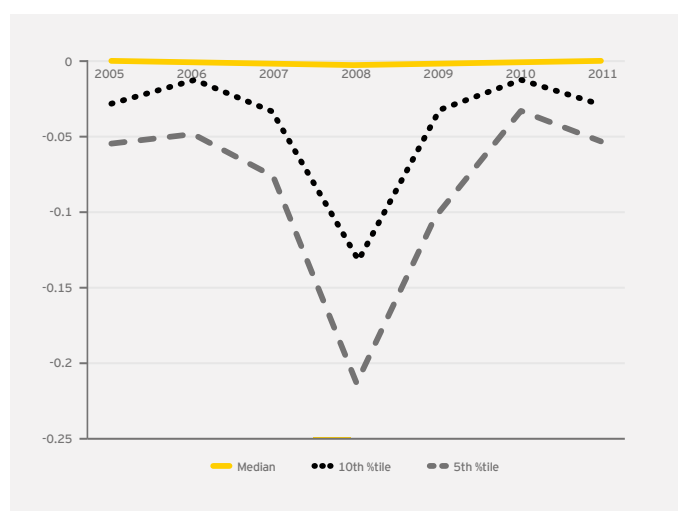


Figure 3: Unrealized capital gains divided by prior year capital (median, 10th percentile, and 5th percentile)

impact of lower Treasury rates on these bonds would have offset to some extent the impact of increased credit spreads that these bonds experienced during the same time period.

To summarize, there were changes to several economic variables during the financial crisis that had potentially negative implications for the economic capital of life insurers. The extent to which these changes also had a negative impact on statutory capital varies because statutory capital does not always change with changes in economic values. In the next section, we illustrate that the operating income and investment performance of the majority of U.S. life insurers were not significantly affected by these factors. However, some U.S. life insurers were significantly adversely affected and they tended to be the larger companies.

2.3 What was the impact of the financial crisis on U.S. life insurers?

We use two metrics to describe the impact of the financial crisis on life insurers:⁶

► Operating income divided by prior year capital (OpInc/Capital): This is a measure of the return on equity from insurance operations. Note, this metric excludes income from realized capital gains.

⁶ The data presented in the paper are from the NAIC annual filings by life insurers.

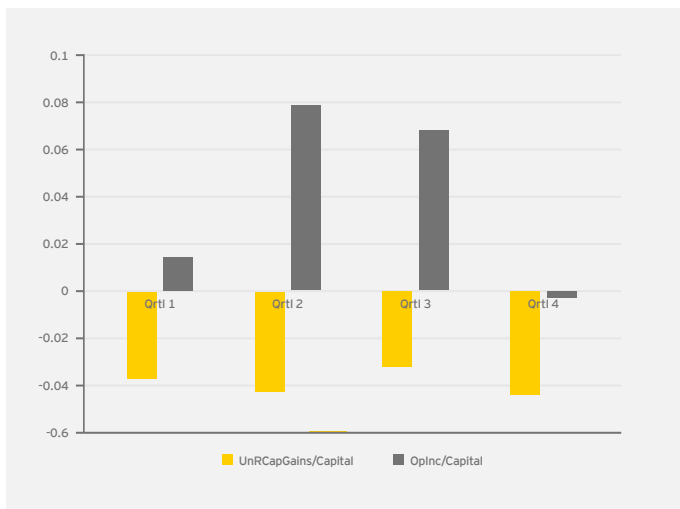


Figure 4: Life insurer operating income and unrealized capital gains in 2008 as a percentage of prior year capital for asset size quartiles

- ▶ The change in unrealized capital gains divided by prior year capital (UnRCapGains/Capital): This is a measure of the annual return on equity from investment operations. This metric does not give the complete investment performance as it excludes the annual performance of securities that were sold during the year.

We calculate these ratios for each U.S. life insurance company from 2005 to 2011.⁷

Figure 2 illustrates how the median, 10th percentile value, and 5th percentile value for the distribution of OpInc/Capital varies around the financial crisis. All three characteristics drop in 2008, but the median value remains positive. Also, the drop in the median value is only 1.7 percent (from 5.6 percent in 2007 to 3.9 percent in 2008). The 10th and 5th percentile values have larger drops in 2008 than the median value. The 10th percentile value drops by 4.2 percent (from -9.7 percent to -13.9 percent) and the 5th percentile value drops by 11.1 percent (from -23.2 percent to -34.3 percent). These data suggest that the financial crisis had large negative effects on the operating income of some life insurers, but the operating income of the majority of life insurers was minimally affected.

⁷ Prior year capital is reported as capital and surplus plus the interest maintenance reserve and the asset valuation reserve.

Issue date	Issuer	Proceeds (U.S. \$m)	Type	Curr.
12/02/08	Manulife Financial Corp	1,707	Common Shs.	CAN
11/18/09	Manulife Financial Corp	2,371	Common Shs.	CAN
09/08/09	Fairfax Financial Holdings Ltd.	1,000	Sub Voting Shs.	U.S.
02/03/09	ING Canada Inc.	1,629	Common Shs.	CAN
08/21/09	American Equity Inv.	50	Common Shs.	U.S.
12/22/09	American Equity Inv.	52	Cont Conv Con.	U.S.
04/28/09	Delphi Financial Group Inc.	53	Common Shs.	U.S.
08/18/09	Delphi Financial Group Inc.	63	Class A Ord Shs.	U.S.
09/15/09	Genworth Financial Inc.	564	Class A Ord Shs.	U.S.
10/08/08	MetLife Inc.	1,988	Common Shs.	U.S.
05/14/09	Protective Life Corp	122	Common Shs.	U.S.
06/02/09	Prudential Financial Inc.	1,250	Common Shs.	U.S.
10/29/08	Reinsurance Grp of America	302	Class A Ord Shs.	U.S.
10/14/09	Conseco Inc.	177	Cvt Senior Nts.	U.S.
11/13/09	Conseco Inc.	78	Common Shs.	U.S.
12/16/09	Conseco Inc.	214	Common Shs.	U.S.
05/11/09	Principal Financial Group Inc.	1,000	Common Shs.	U.S.
05/12/08	AIG	6,500	Common Shs.	U.S.
05/12/08	AIG	5,400	Convertible Bds.	U.S.
	Total	24,517		

Table 2: Public equity issues by life insurers in 2008 and 2009

Figure 3 presents the median, 10th percentile value and 5th percentile value for the distribution of UnRCapGains/Capital from 2005 through 2011. The impact of the financial crisis on capital gains is more striking than the impact on operating income. The median value of unrealized capital gains remains at about zero throughout the time period. However, the 10th percentile. However, the 10th percentile value drops from -3.3% to -13.1% and the 5th percentile value drops from -7.8% to -21.2% in 2008. These data indicate that the financial crisis had a large

Year	# of life insurers	Issuing surplus notes		Amount issued (in U.S.\$ m)	
		#	%	Average	Aggregate
2005	948	27	2.8%	0.8	814
2006	912	21	2.3%	-0.2	-143
2007	907	22	2.4%	1.1	1,026
2008	874	38	4.3%	3.8	3,305
2009	847	28	3.3%	7.5	6,354
2010	822	24	2.9%	3.1	2,523
2011	806	19	2.4%	-0.8	-68

Table 3: Life insurers' issuance of surplus notes

negative effect on the investment portfolios of some life insurers, but the effect on most insurers' portfolios was relatively modest.

A potential concern with the metrics that we just examined is that the large changes as a percentage of prior year capital in 2008 (e.g., the firms in the lowest decile) could be due to small companies with low capital. If so, while the percentage changes for some insurers are large, the overall impact on the industry could be relatively small. To address this issue, we divide the sample into quartiles based on the value of total general account assets and calculate the mean value of $Oplnc/Capital$ and $UnRCapGains/Capital$ for each quartile. The results are depicted in Figure 4. Each quartile has a negative average $UnRCapGains/Capital$ ratio and the value varies little across the quartiles. Operating performance in 2008 displays greater variability across the quartiles, but it is not monotonically related to the size quartiles.⁸

3. Response of U.S. life insurers to the financial crisis

We now summarize the research regarding life insurers' responses to the financial crisis. We would expect insurers that have experienced a negative capital shock to replenish capital

⁸ Another potential concern with the metrics presented in this section is that they are heavily influenced by the life insurers in the AIG group. Therefore, we remove AIG's subsidiaries from the data and recalculate the metrics in Figure 4. There are minimal changes to the graphs when AIG is removed.

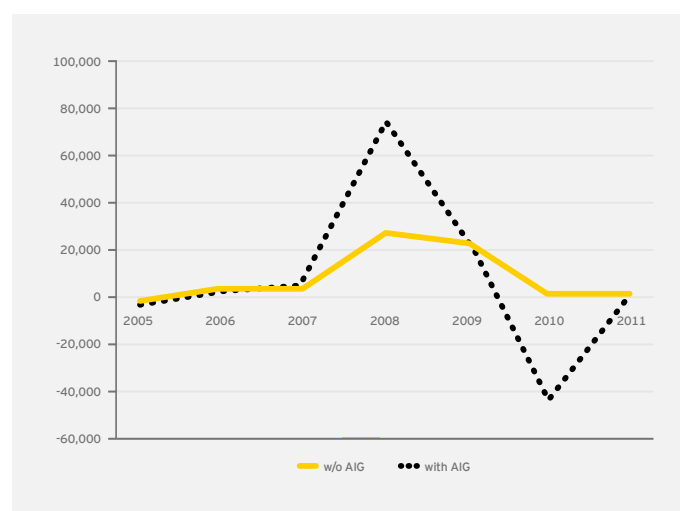


Figure 5: Life insurers' aggregate change in paid-in capital and surplus (in U.S.\$ millions)

in the least expensive way possible.⁹ Most likely, the least costly response to a negative capital shock is to reduce the dividend payments to equity holders. We expect the next lowest cost method would be to obtain capital from other entities in the group if possible. After exhausting those avenues, we would expect insurers to seek capital in the capital markets by issuing debt or equity. As a last resort, we would expect firms to seek funding from the government.

3.1 Cutting dividends

Berry-Stolzle et al. (2014) show that life insurers responded to the financial crisis by cutting shareholder dividends. For example, the percentage of annuity providers that decreased dividends relative to the prior year, conditional on the insurer paying positive dividends in the prior year, increased from about 43 percent in 2007 to 50 percent in 2008 to over 80 percent in 2009. Our calculations indicate that for all insurers filing the life annual statement in the U.S. aggregate shareholder dividends dropped by about U.S.\$3.7 billion in 2008 and by close to U.S.\$15 billion in 2009 (not tabulated). Moreover, the large drop in shareholder dividends in 2009 remains after deleting AIG companies from the analysis.

⁹ The idea that insurers would follow a "pecking order" of lowest to highest cost methods of raising capital during the financial crisis was explicitly made by Motohiro Yogo in conference discussion at the 2014 Western Economic Association meetings in Denver, Colorado.

Niehaus (2015) examines internal shareholder dividends versus total shareholder dividends for a sample of life insurers. Consistent with the aggregate data, it was found that both total shareholder dividends and internal shareholder dividends drop in 2009. Moreover, internal dividends as a percentage of total dividends drop in 2008 and 2009 compared to other years, suggesting that life insurers are less reluctant to decrease internal dividends than external dividends.

Of all of the responses to the financial crisis that we examine, dividend cutting appears to have the most breadth in terms of the number of insurers. The widespread use of dividend cutting to bolster capital is not surprising given that dividend cuts are associated with relatively low costs when many companies in the industry are doing the same. In addition, cutting internal shareholder dividends is cheaper than cutting external shareholder dividends.

3.2 Obtaining new capital

A central issue in the academic corporate finance literature is to what degree frictions in capital markets limit the extent to which corporations can access new capital. If there are periods in which access to capital markets is restricted, then real economic activity can be hindered. In the context of the life insurance industry, capital is an important input that is needed to credibly write insurance policies. Consequently, if there are periods, such as the 2008 and 2009 financial crisis, in which insurers' access to capital markets is restricted, then insurers' capacity for writing insurance can be impaired, especially those insurers that suffered very poor operating or investment performance.

Insurance companies obtaining new capital

Berry-Stolzle et al. (2014) show that life insurance companies, especially those with relatively low earnings, substantially increased their paid-in capital and surplus during the financial crisis, suggesting that these companies were able to raise external capital.¹⁰ In Figure 5, we present the change in aggregate statutory paid-in capital and surplus for life insurers from 2005 to 2011. Consistent with the findings of Berry-Stolzle et al. (2014, p529), there is a large increase in paid-in capital and surplus in 2008 of U.S.\$75 billion for the industry, with about U.S.\$50 billion of this amount attributable to AIG's life subsidiaries. As is well known (and described in more detail

¹⁰ Their measure of external capital includes surplus notes.

below), most of the funds raised by AIG came from the U.S. federal government. Still, even ignoring AIG, life companies substantially increased their paid-in capital and surplus in 2008 and to a slightly lesser extent in 2009. This is why Berry-Stolzle et al. conclude that they "do not find any evidence that insurers had difficulty generating new capital" during the financial crisis.

To address the potential concern that part of the increase in capital and surplus came from other insurers within the same group as opposed to sources external to the group, Berry-Stolzle et al. (2014, p530) consolidate the paid-in capital and surplus of all life insurers in each group and show that consolidated paid-in capital and surplus also increased substantially during the financial crisis. Moreover, using regression analysis, they demonstrate that the relationships between the amount of capital raised by insurers and insurers' characteristics did not change during the financial crisis compared to other time periods. They conclude that life insurers' "ability to tap external capital markets appears to have remained constant" during 2008 and 2009 relative to earlier periods and that their "measures of external capital issuance are not confounded by internal capital transfers within groups."

This conclusion, however, needs to be interpreted carefully, because their measure of external capital issuance does not equal the amount of capital that was obtained from investors external to the group. Instead, their measure of external capital issuance equals the amount of capital that was obtained from entities external to the life insurance industry. Thus, these entities could be entities within the group that are not life insurers or investors external to the group (i.e., outside investors). In other words, "external capital" means "external to the life industry," not external to the firm.

Niehaus (2015) analyzes internal capital transfers among entities within groups that contain life insurers and shows that during the financial crisis there was a substantial amount of internal capital transfers from non-insurance entities (most likely the holding companies) to life insurers in the same group. In his sample, 75 percent of the total paid-in capital and surplus received by life insurers in 2008 was from entities internal to the group, suggesting that much of the "external" capital documented by Berry-Stolzle et al. (2014) was from entities internal to the group but external to the life insurance industry. The internal

Program	Insurers receiving funds
Commercial Paper Funding Facility	9 holding companies borrowed U.S.\$11 billion
Term Asset-Backed Securities Loan Facility	6 companies borrowed U.S.\$3.6 billion
Term Auction Facility	MetLife borrowed U.S.\$18.9 billion
Troubled Asset Relief Program (TARP), the Capital Purchase Program	Hartford (U.S.\$3.4b for preferred stock and warrants) Lincoln National (U.S.\$0.95b for preferred stock and warrants)
NY Fed & Treasury's Combined programs for AIG	AIG was given access to U.S.\$182.3 billion <ul style="list-style-type: none"> ▸ Loans: U.S.\$112.5 billion ▸ Preferred stock: U.S.\$22.3 billion ▸ Common stock: U.S.\$47.5 billion

Table 4: U.S. federal government programs to enhance capital and liquidity at financial institutions

Source: GAO (2013) and Massad (2012)

capital transfers documented by Niehaus (2015) also have to be interpreted carefully, as some of the internal capital that was transferred to life insurers could have previously been raised externally (from outside investors) by the holding company and then transferred internally to the life insurance subsidiaries.

While the existing research does not completely sort out the exact source of new capital, the research clearly indicates that life insurers that suffered declines in performance during 2008 took steps to raise capital from sources internal and external to their groups.

Public equity issues

To identify the extent to which publicly-held life insurance companies and groups raised capital by issuing equity securities to the public during 2008 and 2009, we extracted all equity issues by life insurers in the U.S. and Canada from the Security Data Corporation (SDC) file of security issues. Table 2 reports some basic information on the 13 companies that issued equity, including securities convertible to equity. In total, about U.S.\$24.5 billion of equity was raised in 2008 and 2009, indicating that some insurance groups (companies) were able to access the public equity markets during the financial crisis. It is important to highlight that almost half of the equity capital that is listed in Table 2 comes from AIG in May 2008, which is prior

	Net income	Capital
2006	\$15.9	\$-1,504.1
2007	-160.9	377.6
2008	1,516.0	8,904.2
2009	-1,014.7	2,048.7
2010	68.3	2,477.6
2011	-331.9	2,658.7

Table 5: Impact of prescribed and permitted accounting practices on life insurers' net income and capital (in U.S.\$ millions)

Source: GAO (2013)

to their revelation of a U.S.\$25 billion loss on their credit default swap book in August of 2008 and their downgrade of three levels in September 2008.

Surplus notes

Another way that insurers raised external capital was by issuing surplus notes. Table 3 reports the number and percentage of life insurers that issued surplus notes each year from 2005 to 2011. The percentage of insurers that issued surplus notes reached its peak in 2008 at 4.3 percent. Table 3 also reports that the aggregate amount of surplus notes issued in 2008 and 2009 totaled almost U.S.\$10 billion. These results indicate that some life insurers were able to access the debt markets during the financial crisis.

Berry-Stolzle et al. (2014) estimate a model for the likelihood that a life insurer would issue surplus notes conditional on it increasing its paid-in capital and surplus. In other words, they examine variables that explain the choice of surplus notes versus other methods of increasing paid-in capital and surplus (issuing external equity or obtaining capital from other entities in the group). They find that during the financial crisis, insurers with poorer performance and that specialized in annuities were more likely to raise capital by issuing surplus notes.

Federal government programs for providing capital

Part of the paid-in capital and surplus discussed above was provided by the federal government through various programs to provide capital and liquidity to financial institutions. Table 4¹¹ summarizes the amount of funds and the recipients of those funds. Ignoring AIG for a moment, most of the funds provided to insurers were through short-term credit facilities. With respect to equity stakes, the federal government injected U.S.\$3.4 billion into The Hartford, U.S.\$0.95 billion into Lincoln National and U.S.\$69.8 billion into AIG in exchange for various combinations of preferred stock, warrants, and common stock.

Given that taking assistance (capital) from the federal government results in increased federal regulation and is likely to be a negative signal to consumers and investors, Kojien and Yogo (2015) argue that it is unlikely that insurers would seek assistance unless they were financially constrained and found it costly to raise funds in the capital market. Thus, the evidence on insurers taking government assistance can be interpreted as indicating that at least some insurance groups faced significant frictions in the capital markets.

3.3 Efforts to increase statutory capital

The previous sections identify insurer responses to the financial crisis that increased economic capital. Those actions also increased statutory capital. In this section, we discuss efforts by insurers to increase statutory capital even though the direct impact on economic capital could have been neutral or in some cases negative. Indirectly, these efforts could benefit the entity to the extent that consumers, investors and or rating agencies use statutory capital as a signal about the financial soundness of the insurer.

State statutory accounting capital relief

In response to lobbying efforts by some life insurers, a number of states provided statutory capital relief to insurers by allowing them to account for certain items differently than previously allowed. "Prescribed" practices provide all insurers domiciled in a state the option to use accounting practices that differ from NAIC statutory accounting practices, and "permitted" practices allow specific companies to use accounting practices that differ

from NAIC statutory accounting practices [GAO (2013)].¹² Prescribed and permitted practices allowed insurers to report higher statutory capital than they otherwise would have been able to do, but these practices did nothing directly to shore-up economic capital.¹³

The U.S. General Accounting Office [GAO (2013)] provides additional analysis and discussion of prescribed and permitted practices and their impact on insurer capital. Table 5, which summarizes the impact of these accounting practices on life insurers' net income and statutory capital from 2006 to 2011, is taken from the GAO report. In 2008, these practices increased life insurers' statutory capital by over U.S.\$8.9 billion. In contrast, in the two years immediately prior to the financial crisis, prescribed and permitted practices either decreased statutory capital or increased it by less than U.S.\$0.5 billion.

Selling policies at prices below actuarial value

Kojien and Yogo (2015) provide an interesting analysis of life insurers' pricing of policies during the latter months of 2008 and early part of 2009. Recall, interest rates dropped rather dramatically in the latter part of 2008. For example, the ten-year Treasury rate dropped from 5.26 percent in June 2007 to 2.2 percent at the end of 2008 (St. Louis Federal Reserve Economic Data). Financial economics implies that as interest rates drop, the price of long-term life insurance and annuity products should increase in price. Kojien and Yogo (2015) provide evidence that prices of these products moved in the opposite direction.

Their explanation contains two main components. First, statutory accounting for life insurers and annuity providers requires that they value the liability created from writing new contracts using a discount rate that is a function of the 12-month moving average of Moody's composite yields on seasoned corporate bonds.¹⁴ As a consequence, the discount rate for valuation purposes only slowly adjusts to recent movements in interest rates, and importantly, during a period of declining interest rates, the discount rate used to value the liability for statutory accounting purposes is higher

11 In addition, the Federal Home Loan Bank System provided advances to insurers involved in housing finance during the crisis, just as it had done prior to the crisis. In 2008, it provided \$54.9 billion in advances to 74 insurers, compared to \$28.7 billion for 52 companies in 2007.

12 Insurers who use prescribed and permitted practices are required to disclose the impact of the practices in the annual statement.

13 This does not imply that the prescribed and permitted practices were inappropriate. It can be argued that these practices made statutory capital better reflect the assets that were available to pay unexpected costs.

14 For example, let α equal the average of the previous 12-month Moody's composite yields on seasoned corporate bonds. Then for immediate annuities the discount rate for valuation purposes equals $0.03 + 0.8(\alpha - 0.03)$.

than market rates. This in turn implies that the value of the statutory liability is less than the economic value of the liability.

To illustrate, suppose that the economic liability from selling a policy is \$100, i.e., the present value of expected claims is \$100 using market interest rates. However, because of the statutory accounting rules, insurers record a liability for this policy of only \$90. If the insurer sells the policy for \$96 net of expenses, then the insurer records an asset of \$96 and therefore augments statutory capital by \$6. In this example, the increase of \$6 of statutory capital comes at the cost of selling a policy for \$4 less than the insurer expects to pay on the policy. In this hypothetical example, the insurer has paid \$0.66 (\$4/\$6) for each dollar of additional statutory capital.

The second component to the explanation is that some insurers were financially constrained and could not obtain capital from other sources. Kojien and Yogo (2015) argue that these insurers had an incentive to lower their price on the policies below actuarial value to increase the number of policies sold and correspondingly increase the amount of statutory capital that they could report. Competition among insurers may have led some other insurers that were not financially constrained to decrease their prices as well. On average, insurers in their sample sold 30-year term annuities at prices that were below actuarial value by 16 percent and sold universal life insurance policies at prices that were below actuarial value by 57 percent at the end of 2008 and beginning of 2009. Prices of these products during normal times are 6 to 10 percent above actuarial value.

The behavior documented by Kojien and Yogo (2015) suggests that some insurers were so constrained for capital that they were willing to pay substantially more than a dollar (sell policies at a loss) to obtain a dollar of capital. Their estimates indicate that insurers were willing to reduce profits by \$0.96 on average to increase statutory capital by \$1.00. This implies that some insurers were extraordinarily concerned with the amount of statutory capital that they would have to report during the financial crisis.

3.4 Asset decisions

There is also evidence that some insurers responded to their depleted capital during the financial crisis by changing

how they invested their assets. Ellul et al. (2014) examine decisions regarding downgraded asset-backed securities (ABS). Downgrades would increase the denominator of risk-based capital ratios if insurers continued to hold these securities. As a consequence, one might expect insurers to sell these securities and put the proceeds into investment-grade securities. There is, however, an additional consideration arising because of the accounting for these securities.

Whereas property and casualty (P/C) insurers are required to report securities with NAIC designations 3, 4, 5, or 6 at lower of amortized cost and fair value, life insurers are only required to report securities with an NAIC designation of 6 at lower of amortized cost and fair value. Consequently, following a downgrade that pushes an ABS into a lower NAIC designation (other than category 2 and 6), life insurers face a tradeoff: if they hold the ABS, then the denominator of NAIC risk-based capital ratio increases, but the reported value of their assets and, thus the numerator of the NAIC risk-based capital ratio remains constant. On the other hand, if they sell the ABS at a loss and reinvest the proceeds in AAA-rated securities, then the denominator of the NAIC risk-based capital ratio declines, but the life insurer will report lower assets and, thus the numerator of the NAIC risk-based capital ratio also declines. Thus, if life insurers are concerned about reporting a low NAIC risk-based capital ratio, they would be more inclined to hold downgraded securities compared to P/C insurers.

Ellul et al. (2014) examine the trading of life insurers compared to P/C insurers during the financial crisis and show that life insurers with relatively low capital ratios tended to hold the downgraded ABS compared to P/C insurers, which tended to sell these securities. Instead, life insurers were more likely to sell corporate bonds with capital gains, which bolstered their capital ratios because these bonds were previously reported at historical cost or amortized value. This evidence suggests that insurers' asset decisions during the financial crisis were influenced by the impact of their decisions on statutory capital.¹⁵

Merrill et al. (2014) also provide evidence that some insurers' investment decisions during the financial crisis were motivated

¹⁵ Interestingly, this evidence indicates that some life insurers were willing to sell bonds that had appreciated even though the interest maintenance reserve requires them to amortize the gains over time.

to influence statutory capital (and therefore their risk-based capital ratios) and that these decisions were costly in that they resulted in selling securities at fire sale prices. Similar to Ellul et al. (2014), they argue that P/C insurers had an incentive to sell residential mortgage-backed securities (RMBS) if they were capital constrained because of mark-to-market accounting. In addition, they argue that life insurers had a similar incentive to sell RMBS during the first three quarters of 2009.¹⁶ Merrill et al.'s (2014) results indicate that transactions of RMBS by P/C and life insurers during the first three quarters of 2009 were at fire sale prices. This evidence indicates that insurers sold securities at prices lower than their true value in an effort to increase their statutory capital and thus their risk-based capital ratios.

It also worth noting that the distortion in life insurers' investment decisions documented by Ellul et al. (2014), i.e., selling bonds with capital gains and holding downgraded ABS, is likely to have increased asset risk relative to the opposite strategy. On the other hand, there is also evidence that indicates that life insurers' investment decisions during the financial crisis were toward less risky assets. Becker and Ivashina (2015) show that prior to the financial crisis, life insurers with relatively low capital "reached for yield," i.e., were more inclined to purchase riskier securities with higher yields. However, they did not find this behavior during the financial crisis.

4. Summary and conclusion

Good risk management practice implies that organizations should undertake cost-effective loss prevention strategies to mitigate the likelihood of large losses occurring. However, in some cases, unexpected events occur. In these situations, organizations should be able to respond to unexpected events that cause large losses to mitigate the impact of those losses. This paper examines how the U.S. life insurance industry responded to the events of the financial crisis.

Overall, most life insurers' operating income and unrealized capital gains were not significantly affected by the drop in stock prices, increased credits spreads and lower Treasury rates that occurred during the financial crisis. However, some insurers

experienced large drops in operating income and unrealized capital losses on their investment portfolios. The insurers that were significantly negatively affected tended to be relatively large insurers that wrote a large amount of annuity business in the years prior to the crisis (of course, AIG had other issues).

In response, life insurers cut shareholder dividends, more so to other internal entities in their group than to external investors. They replenished capital by obtaining internal capital transfers from other entities in their group, and some accessed capital markets by issuing debt (surplus notes) and/or equity securities. All of these actions increased economic capital and statutory similarly.

The more interesting responses involve activities that replenished statutory capital but did not have a direct positive impact on economic capital. These activities included lobbying state regulators to allow prescribed and permitted exceptions to standard statutory accounting rules, selling life insurance and annuities at below cost, selling securities that had appreciated in value, and selling securities at fire sale prices to increase statutory capital. Insurers' focus on statutory capital (even at the expense of economic capital) can be explained by the use of reported statutory capital by consumers, investors, and rating agencies to assess insurers' financial strength, which in turn can potentially have real consequences in terms of customer demand for policies and investor demand for securities. Additional research on this issue and whether there are other explanations is warranted.

¹⁶ During 2009, the NAIC was evaluating whether to force life insurers to also mark RMBS to market. Merrill et al. (2014) argue that life insurers likely anticipated that the NAIC would adopt this policy by the end of 2009. As it turned out, at the end of 2009 the NAIC made other changes to the calculation of risk-based capital for RMBS that offset the mark-to-market effect. Consequently, the incentive for life insurers to sell RMBS was removed at the end of 2009.

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