The Use of Captive Reinsurance in Life Insurance

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Abstract

On-going debate has recently accelerated over the use of captive reinsurance arrangements in life insurance. A June 2013 report by the New York State Department of Financial Services asserts that such "shadow insurance" arrangements hide financial weakness, placing the broader financial system at risk. A recent study by Koijen and Yogo suggests that appropriate recognition of liabilities for "shadow insurance" arrangements would substantially reduce life insurers' capital ratios and financial ratings and that expected costs from life insurer insolvencies are much higher than implied by current financial ratings. A contrary view emphasizes that captive reinsurance arrangements are an important tool for efficiently managing capital and the gap between statutory and economic reserves for certain products, which are closely monitored by regulators and rating agencies, thus facilitating lower prices and more insurance protection without excessive insolvency risk.

This study provides a review and analysis of captive reinsurance arrangements in life insurance to provide insight into whether they are likely to pose significant risk to policyholders and taxpayers. It describes how captive arrangements are used to manage capital and reserves, regulatory scrutiny of the arrangements, and extensive evaluation of the arrangements by insurance rating agencies, demonstrating that their development has not taken place in the shadows. It explains how the Koijen and Yogo study fails to properly consider rating agency scrutiny of captive arrangements and, given important flaws in design and analysis, substantially overstates any increase in risk from the arrangements.

Introduction

The financial crisis and its aftermath have contributed to enormous debate and dozens if not hundreds of research and policy studies about the causes of the crisis and appropriate regulatory responses. Particular attention has been focused on the scope of financial institutions' systemic risk and potential for excessive risk-taking. The collapse of many banks' structured investment vehicles and the federal government bailout of American International Group (AIG) have led to heightened concern and scrutiny with financial institutions' "off balance sheet" activities and whether those activities present hidden risks that could threaten the financial system.

In life insurance, on-going debate has recently accelerated over the growing use of captive reinsurance arrangements in capital management. The arrangements have primarily developed in response to the adoption in the early 2000s of large increases in regulatory ("statutory") reserve requirements for certain products, which determine the amount of liabilities that an insurer must report for any excess of potential future claims over premiums. Borrowing language from the debate over "shadow banking," a June 2013 report by the New York State Department of Financial Services (NYSDFS 2013) asserts that such "shadow insurance" arrangements involve "shell" corporations, often located offshore, which are engaged in financial "alchemy" with little public disclosure to hide financial weakness and inflate capital ratios, placing the broader financial system at risk, with parallels to the subprime crisis and AIG bailout. A 2014 working paper by Koijen and Yogo in turn suggests that appropriate recognition of liabilities for "shadow insurance" arrangements would substantially reduce life insurers' capital ratios and financial ratings, that expected capital impairment rates are much higher than implied by current financial ratings, and that the expected cost of life insurer insolvencies could be as high as $70 billion.

According to the "shadow insurance" view, captive reinsurance arrangements are used to circumvent statutory reserve (liability) requirements, substantially understating insurers' insolvency risk, with inadequate regulatory oversight and scrutiny by insurance rating agencies. The purported consequences include increased insolvency risk and the sale of too much low-priced but risky insurance protection, with the potential for large spillovers on policyholders, taxpayers, and the financial system. A contrary view emphasizes the early 2000s' revisions in statutory reserve requirements, which required many insurers to report reserves substantially in excess of estimated economic values of liabilities for certain policies. According to this view, diverse captive reinsurance arrangements are an important tool for efficiently managing capital and the gap between statutory and economic reserves, which are closely monitored by regulators and rating agencies, thus facilitating lower prices and more insurance protection without excessive insolvency risk.

To address alleged abuses, the NYSDFS study recommended a national moratorium on new captive arrangements pending development of improved disclosure and uniform regulation. A subsequent National Association of Insurance Commissioners (NAIC) study group white paper on captive arrangements recommends improved disclosure, greater uniformity of regulation, and a number of areas for further study, without a moratorium or significant new restrictions (NAIC 2013). The report also discusses how adoption by the NAIC of "Principle-Based Reserving" (PBR) for life insurance reserves would reduce incentives for the use of captive arrangements (also see Rector & Associates 2014).[1]

The present study provides a review and analysis of captive reinsurance arrangements in life insurance to provide insight into whether they are likely to pose significant risk to policyholders and taxpayers, including an evaluation of the analysis and estimates of the risk presented by captive reinsurance by Koijen and Yogo (2014).[2] I begin with brief overview of insurance capital management, capital regulation, and the reserve issue. Given that background, the next section summarizes broadly how captive arrangements are used to manage capital and reserves, regulation of the arrangements, and evaluation of the arrangements by leading insurance rating agencies, including A.M. Best, Standard & Poor's, and Moody's. I then provide a summary and critique of the Koijen and Yogo study, concluding that it fails to consider properly rating agency scrutiny of captive arrangements and, given important flaws in design and analysis, substantially overstates any increase in risk from the arrangements.[3]

More generally, and in contrast to alarmist analyses with inappropriate analogies to the subprime mortgage fiasco and attendant financial crisis, the development and oversight of captive reinsurance arrangements have not taken place in the shadows. Issues associated with life insurance statutory reserve requirements in an environment of long-term improvements in mortality have been discussed extensively for at least two decades. Gaps between statutory and economic reserves and their potential adverse effects on the prices and affordability of certain life insurance policies have been discussed extensively since the early 2000s. The use of captive reinsurance arrangements has received substantial scrutiny by regulators and rating agencies. The arrangements require regulatory approval, generally by two different regulators and often accompanied by independent actuarial analysis.[4] Rating agencies have been evaluating the arrangements' potential effects on insurers' financial strength for at least a decade. The NAIC white paper on the use and regulation of the arrangements provides no indication that they have produced substantial, hidden risks, and there is no credible evidence that the arrangements have been overlooked by regulators or rating agencies or significantly increase insolvency risk.

Capital Management, Regulation, and Reserves

Insurance company capital (and "surplus") can be broadly defined in economic terms as the amount of assets held in excess of liabilities, which serves as a buffer to help assure that policyholders' claims will be paid if asset returns are lower than expected and/or claim costs turn out to be higher than expected. Specific calculations of regulatory capital for accounting purposes are based on Statutory Accounting Principles (SAP). Reported regulatory capital differs from capital calculated according to Generally Accepted Accounting Principles (GAAP), which generally are less conservative than SAP. The term "economic capital" is often used to describe capital calculated with the best economic estimates of asset and liability values, which need not correspond with either SAP or GAAP values.

Other things being equal, insurers that hold more capital in relation to their liabilities have lower insolvency risk and receive higher financial strength ratings than insurers with less capital. Strong financial strength ratings help insurers attract customers who care about security; they are a prerequisite in many cases for attracting a large customer base. Holding more capital is costly to insurers, thus on average requiring higher premiums to cover the increased costs. Insurers have strong incentives to manage capital efficiently to reduce costs and provide more attractive prices for any given level of financial strength. In addition to competitive market pressure for adequate capital and strong financial ratings, states impose complex minimum risk-based capital (RBC) requirements for insurers. Insurers that fail to meet the RBC minimums face various levels of regulatory intervention. Most life insurers hold capital substantially in excess of the RBC minimums in order to achieve high financial strength ratings, attract risk-sensitive customers, and reduce the likelihood of regulatory intervention or insolvency.

Because expected mortality rates increase with age, long-term life insurance policies with level premiums over time involve the payment of premiums in excess of mortality costs during the early life of policies to fund claim payments in later years when mortality costs are expected to exceed the level premiums. The sale of level premium policies generates economic liabilities equal to the excess of the discounted value of expected future claims over expected future premiums. SAP and GAAP specify complex rules for calculating accounting liabilities, known as policy reserves. The more conservative the required assumptions, the greater is the required reserve. SAP rules are more conservative than GAAP, producing larger SAP than GAAP reserves.

The actuarial mortality tables that are required for statutory reserve calculations are conservative and updated infrequently. Given inherent conservatism, lags in adjustment, long-term improvements in mortality and anticipated further improvements, and changes in insurers' underwriting standards, statutory reserves can significantly exceed economic reserves for certain life insurance products. The gaps between statutory and economic reserves motivate insurers to take actions to offset potential reductions in reported capital.

During the 1990s regulators became concerned with strategies that some insurers were using to reduce statutory reserves for certain level premium term policies and associated strains on capital associated with improved mortality. An insurer, for example, might have specified a relatively low level premium, with the contractual ability to increase premiums up to a higher maximum amount in later years under extraordinary circumstances. Calculation of reserves using those higher maximums would reduce statutory reserves. After extensive debate, the NAIC adopted new reserve requirements for level premium term life insurance policies in 2000 that effectively required significantly higher reserves (known as XXX reserves) and which were subsequently adopted in most states.[5] The new requirements were widely predicted to substantially increase the gap between statutory and economic reserves, putting upward pressure on term life insurance rates, even after the adoption of a revised mortality table (which occurred in 2001). Figure 1 illustrates the potential gap between XXX statutory and economic reserves for a 20-year level premium term policy. In 2003, the NAIC adopted new reserve requirements (known as AXXX reserves) for certain universal life policies with secondary guarantees, which in turn were adopted by most states.

Captive Reinsurance Arrangements and their Regulation

The adoption of XXX and AXXX statutory reserves produced substantial pressure for insurers to adopt new methods of capital management to deal with the resulting capital strain from providing competitively priced products based on projected mortality, leading to the development and expansion of captive reinsurance arrangements, which have continued to grow over time. The arrangements are predominantly used to manage the difference between statutory XXX/AXXX reserves and economic reserves, although in recent years their use has also grown for certain variable annuity contracts.

With captive reinsurance, the insurer writing the policy (the "ceding" insurer) enters into a reinsurance agreement with an affiliated reinsurer that is wholly-owned by the insurer or its parent. Some captives are domiciled and regulated onshore in one of the states that has established specific rules and regulations to facilitate captive arrangements. Other captives are located offshore and subject to regulation and taxation in offshore jurisdictions. If certain conditions are met, and depending on the specific form of reinsurance, these sometimes complex and often customized arrangements allow the ceding insurer either to take credit for reserves ceded to the captive or in some transactions reduce its required RBC while keeping the reserves on the ceding insurer's balance sheet. The ceding insurer receives such credit if the captive is "authorized" by regulators in the ceding insurer's state of domicile. If the captive is "unauthorized," the ceding insurer generally receives credit provided that the captive's obligations are backed by a qualified letter of credit (LOC) from an accredited bank, by the ceding insurer withholding specified funds on its balance sheet, or by placing assets in a reinsurance trust account. Some states also allow credit if the ceding insurer's parent guarantees the transaction.

The estimated amount of economic (vs. statutory) reserves under arrangements with unauthorized captives is fully collateralized by assets held by the ceding insurer or placed in a trust. LOCs are the predominant arrangement for backing the estimated gap between statutory and economic reserves. The LOCs have commonly been guaranteed by the ceding insurer's parent, although that practice has recently declined, along with an increased use of non-recourse LOCs.[6] According to an August 2013 Moody's report (Moody's Investor Service 2013; also see Koijen and Yogo, 2014), at year-end 2012, life insurers reported $169 billion of reserve credits from business ceded to unauthorized affiliates and another $155 billion of reinsurance with unauthorized affiliates which provided some capital relief without reducing reported reserves.[7] The total of $324 billion represented 12% of total reserves and equaled about 85% of total capital and surplus.

In addition to meeting regulatory requirements for the ceding insurer to receive reserve or RBC credit under SAP and state regulation, captive reinsurance arrangements must be approved by the ceding insurer's primary state regulator, which often includes independent actuarial analysis of the transaction and estimated economic reserves. Transactions with domestic (onshore) captives also must be approved by the captive's domiciliary state regulator, again often with an independent actuarial analysis.

Monitoring by Rating Agencies

The use of captive reinsurance arrangements to manage life insurance reserves and capital has received extensive discussion by leading insurance rating agencies for at least a decade, including reports dealing with the recent controversy over the growth and security of such arrangements. Among other issues, rating agency evaluations have considered the extent to which reserves managed with captive arrangements are isolated from the rest of the ceding insurer's business, with dedicated funding and de minimus risk of default.

The NYSDFS report, however, contains no mention of rating agency scrutiny of captive reinsurance.[8] It instead implies that financial ratings will naively reflect capital ratios that are purportedly overstated due to the arrangements. The Koijen and Yogo (2014) study contains no discussion of or citations to rating agency discussions of XXX/AXXX reserves and captive reinsurance arrangements. Yet the study concludes that rating agencies do not consider the risks of such arrangements, and the study's risk and cost estimates are based on that conclusion. The following discussion highlights relevant rating agency publications that deal with captive reinsurance.

A.M. Best Company

The A.M. Best Company bases its insurance financial strength ratings on quantitative and qualitative analysis, including discussions with management and calculation of Best's Capital Adequacy Ratio (BCAR). The BCAR is the ratio of "adjusted capital" to estimated required capital from Best's proprietary risk-based capital model. The BCAR system allows for discretionary adjustments in estimated required capital to reflect risk characteristics not otherwise reflected in the model. In the context of the growing use of captive reinsurance securitizations, a November 2006 A.M. Best report "Review of BCAR Treatment for XXX Captives" indicates that "A.M. Best has been monitoring the evolution of XXX solutions and its impact on direct writers' [ceding insurers'] capital strength," including consideration of transaction features "that could result in sending reserves back to the parent company." The report continued: "Assuming A.M. Best is comfortable with stress testing, the assumptions used in the transaction, and with the stand-alone BCAR of the captive, no additional charges will be made to the ceding company's published BCAR."

When discussing life insurance captives and XXX/AXXX reserves, A.M. Best's March 25, 2013 report "Understanding BCAR for Life/Health Insurers" notes: "As part of A.M. Best's standard review of an entity's financial strength, the impact on BCAR, along with other capital ratios from such transactions, is assessed." The report continues:

> For A.M. Best to properly review the relationship between a captive and the direct writer, and to provide the appropriate treatment in the BCAR model, A.M. Best reviews the structure of the transaction and the schematics of the organizational structure / capital structure of the captive. In addition, A.M. Best reviews terms and provisions of any guarantees to determine other risks present in these transactions.

The clear indication is that Best's ratings of ceding insurers reflect analysis of the potential effects of captive transactions.

A June 2013 *Best's Briefing* "Shedding Light on Captive Reinsurers," released soon after the NYSDFS report, explained that "A.M. Best will continue to look through these transactions, and analyze groups on a consolidated basis using its capital model, BCAR, regardless of which affiliate entity assumes the risk." The briefing also indicated that the organization "reviews the product creditworthiness of each carrier's lines of business that use internal reinsurance captives," including, in addition to term life and universal life with secondary guarantees, variable annuities with guaranteed living benefits and long-term care insurance.

Finally, an October 2013 *Best's Special Report* "Rating Factors for Organizations Using Life Captive Reinsurers" indicates that Best's "adheres to analytical processes and rating factors that are relevant

for life insurance organizations using captive reinsurers," including analysis of captive transactions on a consolidated basis using the BCAR. The report also indicates that Best's considers the potential effects of decreasing LOC capacity or increasing LOC costs on the risk of the arrangement and that it evaluates "differences in the quality of collateral involved in these funding solutions — such as reinsurance trusts, long-term LOCs, short-term LOCs, contingent LOCs and parental guarantees." The report concludes: "A.M. Best's rating process entails a full understanding of insurance companies' use of U.S. and offshore captives, and incorporates — through both quantitative and qualitative assessments — how the captive impacts an issuing insurance group's balance sheet strength." Whether viewed individually or in aggregate, these studies clearly belie any assumption that Best's ratings of ceding insurers ignores the potential effects of captive transactions.

Standard & Poor's

A March 2004 Standard & Poor's (S&P) report "Evaluating the Effect of Regulation XXX on Insurers' Capital" contains detailed discussion of how improvements in expected mortality experience contributed to substantial increases in statutory vs. economic reserves for certain products, how XXX requirements amplified those increases, and how the requirements affected insurers differentially based on their product mixes, underwriting standards, and product designs. The report also summarized how alternative funding solutions involving affiliated reinsurers, trusts, and LOCs affected S&P evaluation of capital adequacy. A follow-up report dated December 2004 discussed in detail criteria for evaluating reserve funding solutions involving securitization, including criteria for treating such funding as financial leverage and the detailed stress testing required to evaluate economic reserves.

A March 2006 report elaborates how S&P would treat short-term funding solutions to XXX/AXXX reserve requirements, re-financing risks associated with short-term LOCs, how the market for multi-year LOCs had expanded significantly, and specific criteria for treating the solutions as financial leverage in its evaluations based on maturity of the LOCs. A February 2012 S&P report "The Changing Landscape of XXX/AXXX Reserve Requirements will Challenge U.S. Insurers" reviews the predominant use of short-term LOCs in funding solutions in the early 2000s, the growth of securitized arrangements during 2003-2007, and the predominance of LOCs after 2007, with increasing terms to maturity and decreased prices. The February 2012 report notes:

> One constant we have observed is that the likelihood of a draw [on the LOC] is remote. Typically, for the XXX deals, there would have to be extended mortality in excess of 150% per annum. . . . The AXXX issues would need combinations of extended low interest rate environment periods such as exist now, and lapse and mortality experience that differed significantly from expectations.[9]

Moody's Investors Service

A January 2004 Moody's Investor Service report "Hidden Credit Risks of Regulation XXX/Guideline AXXX Reinsurance Programs" contains a detailed review of the reserve requirements and credit risks associated with captive reinsurance solutions involving LOCs and reinsurance trusts. The report discusses in detail potential risks associated with short-term LOCs in the form of possible LOC capacity squeezes and/or increases in LOC prices. Similarly, it discusses risks associated with possible financing capacity squeezes and price increases from using reinsurance trusts.

An August 2013 Moody's report "The Captive Triangle: Where Life Insurers' Reserve and Capital Requirements Disappear" provides detailed discussion of captive reinsurance arrangements, the magnitude of reserve transactions, how the arrangements may increase capital efficiency, and how they can increase an insurer's credit risk. It discusses possible credit negatives from such arrangements, including lack of transparency, funding risks, and light regulation of captives in some jurisdictions, and possible credit positives, including increasing regulatory scrutiny and the potential for increased transparency of captive transactions. The report notes that "While the use of captives by the industry is incorporated in our analysis, a growing reliance on captives places incremental negative pressure on the industry." But it specifically states that credit negatives associated with captives are "already incorporated into ratings."

Koijen and Yogo's "Shadow Insurance" Study

The 2014 working paper by Koijen and Yogo documents substantial growth in affiliated reinsurance in the life insurance sector during 2002-2012. The authors focus their empirical analysis on what they call "shadow insurance," which they define as reinsurance with unauthorized, affiliated reinsurers that are not rated by A.M. Best. They conduct a statistical analysis that purports to show that A.M. Best ratings of the ceding insurers (or their parents) do not reflect the use of "shadow insurance." Given that conjecture, the study performs a series of calculations to estimate how A.M. Best Company ratings would decline and implied capital impairment rates would increase for insurers using affiliated, unauthorized, and unrated reinsurance if BCARs are adjusted for such use... The authors' basic story is that insolvency probabilities are significantly higher for life insurers using affiliated, unauthorized, and unrated reinsurance than is implied by current financial ratings, producing a substantial expected cost of default for the industry.

To elaborate, using data on the "term structure of impairment rates" from A.M. Best (A.M. Best, March 28, 2013) and assumed percentage shortfalls of assets versus liabilities conditional on default, the authors estimate a (discounted) expected total cost of default for the industry of $9 billion when the calculations are based on current A.M. Best ratings. Using ratings adjusted by the authors for affiliated, unauthorized, and unrated reinsurance, however, the expected total cost increases to $28 billion assuming a 10 percent loss conditional on default and $70 billion assuming a 25 percent loss conditional on default, which the authors compare to an estimated life/health insurance guaranty fund capacity of $56 billion. Those expected cost estimates are huge. Even the $9 billion estimate based on current (unadjusted) Best ratings is large in relation to historical default experience in the industry.

My evaluation of the Koijen and Yogo study focuses on the validity of their ratings analysis and associated estimates of expected default costs from reinsurance arrangements with affiliated, unauthorized, and unrated reinsurers. I use the term "affiliated, unauthorized, and unrated reinsurance" to refer to such arrangements, as opposed to "shadow insurance." The Koijen and Yogo analysis can be summarized as follows:

1. The authors present statistical evidence from a regression model that purports to show that Best's ratings do not reflect the risks associated with affiliated, unauthorized, and unrated reinsurance and are therefore too low for insurers that use such arrangements.

2. The authors adjust Best's BCAR downward for each insurer with affiliated, unauthorized, and unrated reinsurance.

3 The authors decrease Best's financial strength ratings for insurers with affiliated, unauthorized, and unrated reinsurance to reflect the downward adjustments in BCAR based on Best's guidelines for the relationship between ratings and BCAR.

4. The authors use Best's analysis of historical "impairment rates" to calculate implied impairment rates for all insurers, using the downward adjusted Best's ratings for insurers with affiliated, unauthorized, and unrated reinsurance.

5. The implied impairment rates are multiplied by assumed shortfalls of assets versus liabilities conditional on default and summed over insurers to estimate aggregate expected default costs and the increase in aggregate expected costs from the use of affiliated, unauthorized, and unrated reinsurance.

My review of this procedure concludes:

■ The empirical analysis in step 1 has important flaws and is not credible.

■ Even if the step 1 analysis were credible, the downward adjustment to BCARs in step 2 is very likely excessive, which in turn leads to excessive downward adjustments in Best's ratings in step 3.

■ Even apart from bias in steps 1-3, the impairment rates used in step 4 significantly overstate expected default (insolvency) rates.

■ The assumed percentage loss conditional on default used in step 5 is at the very high end of historical experience and very likely overstates potential losses from any increase in insolvency risk from captive arrangements.

As a result, the Koijen-Yogo estimates of expected costs from affiliated, unauthorized, and unrated reinsurance substantially overstate the risk from such arrangements. The following discussion elaborates each point.

Do Best's Ratings Reflect Captive Reinsurance Arrangements?

When motivating their ratings analysis, Koijen and Yogo (pp. 9-10) state "We suspect that the current rating methodology has not kept pace with recent developments in shadow insurance, which is economically different from traditional reinsurance." "To verify this empirically" the authors conduct a regression analysis of the relationship between Best ratings and affiliated, unauthorized, and unrated reinsurance with annual data at the company level during 2002 and 2012. Koijen and Yogo first convert each company's Best letter rating to a numerical index using Best's Life/Health BCAR Guidelines (shown in Table 1). The authors then use that numerical index as a dependent variable in a regression model to estimate whether — controlling for the company's reported BCAR and several other variables — companies with *any* affiliated, unauthorized, and unrated reinsurance on average had different values of the numerical ratings index than companies without any affiliated, unauthorized, and unrated reinsurance. Based on finding no statistically reliable relationship with the indicator for affiliated, unauthorized, and unrated reinsurance, the authors conclude that Best ratings do not consider risks associated with such arrangements. This analysis, however, has a number of flaws that make it uninformative.

First, the analysis rests on the assumption that the use of affiliated, unauthorized, and unrated reinsurance necessarily increases an insurer's insolvency risk and therefore should reduce its financial strength rating, without providing any evidence to support that assumption. Second, and in contrast to A.M. Best descriptions of its analysis, the authors' analysis assumes that BCARs do not reflect any adjustments for captive reinsurance arrangements. The authors include a company's BCAR as a control variable in their statistical model. If, as is indicated by A.M. Best, the BCAR includes adjustments for any increased risk associated with captive reinsurance, the effects of captive reinsurance would already be reflected in the ceding entity's BCAR. Controlling for the BCAR, insurers with affiliated, unauthorized, and unrated reinsurance would then not be expected to have different ratings than those without. Thus, the authors' conclusion that the lack of a significant relationship between the numerical ratings index and the use of any affiliated, unauthorized, and unrated reinsurance depends on the assumption that BCAR does not consider such arrangements. But the lack of a statistically reliable estimated relationship would also be expected if Best's rating fully reflected any risk from the arrangements.[10]

Third, an empirical model of the relationship between ratings and captive reinsurance arrangements should consider the magnitude of a company's use of captive reinsurance and not simply whether the company engages in any captive reinsurance.[11] Ideally, the model would also consider specific characteristics of the agreements that could be related to their riskiness, such as the type of reinsurance, the type of collateral, conditions concerning recourse, the presence of a parental guarantee, the capitalization of the captive, and so on. While data may not be available for all characteristics that could affect risk, information is generally available on the type of reinsurance and whether the arrangement involves a reinsurance trust or LOC.

Fourth, the Koijen-Yogo model allows for the possibility that leverage, liabilities, liquidity, stock ownership, and return on equity could affect ratings for any given level of BCAR. The question arises as to why they do not also allow for the possible influence of other company characteristics that might affect ratings, as has been done in prior research on the determinants of insurer ratings. Their parsimonious specification increases the possibility that omitted determinants of ratings could be masking any relationship between the numerical index and the presence of affiliated, unauthorized, and unrated reinsurance (under the authors' assumption that BCAR does not already reflect any increased risk form the arrangements.).[12]

Adjusting the BCAR for "Shadow Insurance"

Under the assumption that reported BCARs (and ratings) inappropriately fail to reflect risks from affiliated, unauthorized, and unrated reinsurance, Koijen and Yogo adjust reported BCARs downwards for insurers with such arrangements as follows:

> Adjusted BCAR = Reported BCAR x Reported Reserves / (Reported Reserves + Shadow Reserves)

They then convert the Adjusted BCAR to a letter rating using the guidelines in Table 1.

This procedure has at least three flaws. First, the adjustment inappropriately assumes that captive reinsurance arrangements used to manage redundant reserves provide no security whatsoever to the ceding insurer, which certainly is an extreme assumption for some if not many arrangements. Second, it does not distinguish among the types of arrangements with regard to potential differences in credit risk, such as the captive's capitalization and the extent to which reserves are kept on the ceding insurer's balance sheet. Third, recalculating ceding insurers' financial statements to remove the effects of affiliated, unauthorized, and unrated reinsurance and then applying the BCAR (or NAIC RBC) formula would not involve the proportional adjustment used by Koijen and Yogo. BCAR (and NAIC RBC) formulas are complex and nonlinear to allow for less than perfect correlation among the types of risks reflected in the model (see Table 2), implying a less than proportionate change in the capital ratio if reserves associated with captive reinsurance were brought back into the calculations. I regard it likely that Koijen and Yogo's crude adjustment would overstate the purely formulaic effect from eliminating captive reinsurance.

Impairment Rates and Loss Conditional on Default

After adjusting Best's letter ratings downward for insurers with affiliated, unauthorized, and unrated reinsurance, Koijen and Yogo calculate implied capital impairment rates for the adjusted ratings using the historical relationship between Best's ratings and insurance company impairment rates during 1997-2012. The implied impairment rates are then multiplied by an assumed percentage loss given default to estimate (discounted) expected default costs.

This procedure does not consider that the impairment rates reported by A.M. Best overstate insolvency rates, which suggests that the impairment rates used by Koijen and Yogo to estimate expected default costs are biased substantially upwards. According to the A.M. Best Impairment Study (2013):

> "[I]mpairment" is a substantially wider category of financial distress than an event of default. In particular, impairment frequently occurs when an insurer still is able to meet its current policyholder obligations, yet regulators have become sufficiently concerned . . . to intervene in the insurer's business. This leads to substantially higher impairment rates at any given rating level than would be observed purely using default data.

In practice, for example, life insurer capital impairments have often been followed by acquisitions of the impaired insurer by unimpaired companies without triggering insolvency or guaranty association payments.[13]

Regarding their loss given default assumptions, Koijen and Yogo describe their use of 25 percent as being "in the upper range of the historical experience," citing Gallanis (2009) based on life-health guaranty association data and analysis. The Gallanis study states:

> [M]ost life insurer insolvencies involve only small shortfalls of assets versus liabilities. The shortfalls are seldom more than 15% in larger cases, and are more typically in the range of 5% to 10%. . . .

Except in the cases of a few small life companies where management "looted" the insurers' assets, shortfalls in excess of 25% of policy liabilities are almost unheard of; shortfalls in the range of 5% to 10% are more typical.

Thus, Koijen and Yogo's 25 percent assumption might also be regarded as aggressive, further inflating their estimates of expected default costs.

Effects on Cost and Quantity of Coverage

Koijen and Yogo also estimate a "structural" model of the potential effects of affiliated, unauthorized, and unrated reinsurance on life insurers' costs, and on the "annual quantity of life insurance underwritten" (measured by gross reserves). Their estimates rely on life company premium data for 10-year guaranteed level premium term life insurance for males aged 30 "as representative of the life insurance market."[14] Based on this analysis, they estimate that marginal costs would increase by 18 percent and annual life insurance underwritten would decline by 23 percent without the arrangements.

While seemingly precise, the magnitude of the structural model estimates should be interpreted with considerable caution given the assumptions underlying the model, the limited data, and inherent statistical variation associated with such analyses. The methods used to estimate the model, for example, are known to produce highly variable estimates. Moreover, the interpretation of the estimates that captive reinsurance arrangements reduce prices and increase sales depends critically on the extent to which the arrangements actually increase risk above levels anticipated by regulators, rating agencies, and consumers. Koijen and Yogo believe that their analysis of Best's ratings implies that the estimated price reductions and quantity increases reflect inadequate pricing and excessive risk-taking. But price reductions and sales increases also are predicted if captive arrangements predominantly represent efficient responses to gaps between statutory and economic reserves for certain products. According to the latter view, elimination of the arrangements would lead to excessive prices and too little coverage being purchased, with significant adverse effects on consumers.

Conclusions

In contrast to alarmist analyses with inappropriate analogies to the subprime mortgage fiasco and attendant financial crisis, the development and oversight of captive reinsurance arrangements have not taken place in the shadows. Issues associated with life insurance regulatory reserve requirements in an environment of long-term improvements in mortality have been discussed extensively for at least two decades. Regulation XXX/AXXX reserves and their potential adverse effects on the prices and affordability of certain term and universal life insurance products have been discussed extensively since the early 2000s. The use of captive reinsurance arrangements has received significant scrutiny by regulators and rating agencies. The arrangements require regulatory approval, generally by two different regulators and often accompanied by independent actuarial analysis. Rating agencies have been considering the arrangements' potential effects on ceding insurers' financial strength for at least a decade. The use and regulation of captive reinsurance arrangements have been carefully reviewed by a special NAIC study group. While the resulting white paper suggests possible increases in disclosure and uniformity of regulation for captive reinsurance, it does not conclude that the arrangements have led to substantial and hidden risks. There is likewise no credible evidence that the arrangements have been overlooked by regulators and rating agencies or that they significantly increase insolvency risk.

Endnotes

1   Studies suggest that PBR would likely significantly reduce reported reserves for certain products for which current requirements exceed economic reserves (Milliman 2012, Towers Watson 2012). Its report on captive reinsurance notwithstanding, the NYSDFS has recognized that statutory reserves for certain products significantly exceed economic reserves and has proposed rules that would lower statutory requirements.

2   I was discussant for the Koijen and Yogo paper at the NBER Insurance Program meetings in Cambridge, Massachusetts on March 1, 2014 and provided comments to the authors. I have written numerous studies over many years on insurer capital decisions, insolvency risk, and regulation. They include analyses of risk-based capital requirements (Harrington 2004), insolvency prediction (Grace, Harrington, and Klein 1998), market discipline and rating agencies (Epermanis and Harrington 2006), the financial crisis and problems at AIG (Harrington 2009), and whether insurance poses systemic risk (Harrington 2004 and in press).

3   An earlier working paper by Koijen and Yogo (2012) estimates significant price reductions for immediate annuities and zero cash value universal life policies in late 2008, which the authors interpret as "fire sales" to improve reported capital during the financial crisis. Those estimates would appear to be heavily if not exclusively driven by the unique interest rate environment at that time: (1) very low Treasury rates, and (2) increased yields on corporate bonds. The analysis basically assumes that failure to increase premiums significantly and immediately in response to sharply lower Treasury rates and despite higher corporate bond yields constituted "fire sales" of policies. The paper also documents that companies most affected by the crisis on average shifted to safer assets, reduced shareholder dividends, and raised external capital. Such responses to reduced asset values as a result of the financial crisis would clearly be desirable from the perspective of safety and soundness. A working paper by Niehaus (2014) provides evidence that internal capital flows among life insurance affiliates surrounding the crisis on average helped to improve capital ratios of weaker affiliates, a result which also is desirable from a safety and soundness perspective.

4   Non-insurer counterparties in many captive arrangements also perform their own reserve analysis, often with actuarial consultants.

5   New York adopted similar requirements a few years earlier.

6   Securitizations in which the captives' obligations were shifted to external investors began to be used as an alternative to LOCs in the mid-2000s, but the securitization market dried up during the financial crisis.

7   Under the latter agreements, known as modified coinsurance, the reserves are retained on the ceding company's balance sheet, but the company receives some credit in RBC calculations.

8   In a commentary following the release of the NYSDFS report, Pinnacle Financial Group (2013) concluded that "to suggest that rating agencies are not aware of the issues with captives, and are not reflected appropriately in their financial strength ratings, is irresponsible."

9   In March 2014, Standard & Poor's issued a proposal for further revisions in its procedures for evaluating captive arrangements (Standard & Poor's 2014).

10 Alternatively, if the BCAR adjustments only partially reflected the arrangements' risk, the authors' estimate would still be biased against detecting any difference.

11 An October 2013 version of the Koijen and Yogo paper included in the regression model the share of "gross life and annuity reserves ceded to shadow insurers" instead of a simple indicator, included log assets instead of log liabilities, and omitted the stock ownership indicator. The coefficient on the shadow insurance measure was not significantly different from zero. It's not clear why the 2014 version changed the shadow insurance variable or other control variables. The comment about the importance of considering the characteristics of the arrangements applies in either case.

12 More technically, it's not clear why the authors do not employ a generally accepted methodology (known as fixed effects estimation) for obtaining estimates that are robust to bias that could otherwise arise from the presence of any omitted company characteristics that do not change during their sample period, but which affect ratings and could be correlated with the use of captive reinsurance. In addition, the validity of the authors' "instrumental variables" estimation procedure, which they argue guards against bias from omitted variables, depends on the questionable assumption that their instrumental variable (the "market share for term life insurance in 1999, interacted with a dummy for stock company in 1999") is not correlated with any omitted factors that influenced ratings during the sample period.

13 Regardless of the details, the distinction between impairments and insolvency might help explain why the authors' estimate such a large expected default cost in relation to historical experience using unadjusted Best ratings.

14 They normalize the sample premiums by an estimate of the contracts' actuarial value.

Table 1

A.M. Best Company Life/Health BCAR Guidelines

BCAR	Implied Balance Sheet Strength
SECURE	
175%	A++
160%	A+
145%	A
130%	A-
120%	B++
110%	B+
VUNERABLE	
100%	B
90%	B-
80%	C++
70%	C+
60%	C
50%	C-
<50	D

Source: A.M. Best Co. (March 25, 2013)

Table 2

Structural Overview of Best's Capital Adequacy Ratio (BCAR)

BCAR=Adjusted Surplus/Net Required Capital	
Adjusted Surplus	**Net Required Camptial (NRC) Components**
REPORTED SURPLUS	C-1-Non Eq: Fixed Income Securities
EQUITY ADJUSTMENTS	C-1-Eq: Equity Securities
Asset Valuation Reserves	C-2: Mortality/Morbidity
Unearned Premiums	C-3-Int: Interst Rate
Dividends Payable	C-3-Mkt: Variable Annuity Market
DEBT ADJUSTMENTS	
Surplus Notes	
OTHER ADJUSTMENTS	
Operation Losses	
IMR Amort. Following Yr.	
Off-Balance Sheet Derivatives	

$$NRC = \sqrt{(C\text{–}1\text{–Non Eq} + C\text{-}3\text{–Int})^2 + (C\text{–}1\text{–Eq} + C\text{-}3\text{-Mkt})^2 + (C\text{–}2)^2} = C\text{–}4$$
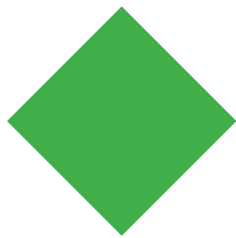
Figure 1

Illustration of Statutory Required XXX Reserves vs. Economic Reserves
20-Year Level Term Life

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Notes

The Use of Captive Reinsurance in Life Insurance