

Insurer Solvency: Recent Bank Failures, Risk Based Capital and Mortgage-Backed Securities

Introduction

As of this writing, First Republic Bank, Signature Bank and Silicon Valley Bank have failed. At the most basic level these banks failed because of elevated interest rates. Let's quickly discuss how banks work. A bank receives deposits from its customers and these deposits are a liability for the bank since these deposits belong to its customer. With the funds from deposits, the bank invests in assets (such as bonds). The bond price is the present value of its future payments (coupons and principal) at the market interest rate. As interest rates increase, bond prices decline and that is current problem for banks. In general, financial companies do not recognize the gains or losses until the bonds are sold. However, banks were forced to sell assets when customers requested their deposits back and were forced to sell their assets at a loss. This is disintermediation risk or the risk that customers will request their funds back. Customers may request their funds back to chase higher yields when interest rates are rising. Banks are expected to have risk management practices and hold sufficient capital to prevent losses from certain adverse events. However, these measures were clearly not sufficient.

Now what do bank failures have to do with insurance? Like banks, insurance companies are exposed to interest rate risk. In addition, insurance companies too have capital requirements that act as a buffer. The insurance industry is regulated by the states and the states generally create regulations in line with the semi-regulatory body, the National Association of Insurance Commissioners ("NAIC"). The NAIC developed a Risk-Based Capital formula that determines the minimum capital an insurance company must hold. This formula is designed to reflect the risks that insurance companies take. If the insurance company's capital levels fall below certain thresholds, they face regulatory scrutiny and may even have their assets seized by the regulators. For the remainder of this paper, I will focus on life insurance as life insurance companies tend to be more exposed to asset-related risks and this is the area I am most familiar with.

The life insurance Risk-Based Capital formula has four main components. 1) Asset risk reflects the risk that the insurance company will not be able to recover payments from the assets it owns. 2) Insurance risk reflects the risk that the liability cash flows from the insurance contract will be too high. 3) Interest rate risk is the risk that changes in interest rates will result in losses for the insurance company. 4) General business risks. Asset risk is arguably the most prevalent component for life insurers. Life insurance contracts are long term contracts which means that life insurers must hold significant long-term assets to back their reserves. If these assets default, then the insurance company will sustain losses and may not be able to pay policyholder benefits.

The asset risk component for each asset is set to the book value multiplied by the bond's risk charge which is based on the NAIC's rating for each bond. NAIC ratings are typically linked to the bond's credit rating determined by a statistical rating organization such as Moody's. An exception is mortgage-backed securities which were decoupled from statistical ratings and the NAIC rating are now based on a modeling technique implemented after the financial crisis (Paez, 2021).

This brings us to the main topic of our conversation. During the financial crisis, insurers were no different from other financial institutions in that they were exposed to securitized assets such as mortgage-backed securities¹. One insurance company, American Insurance Group, became insolvent and ultimately got bailed because it insured collateralized debt obligations whose underlying value was linked to the housing market (O'Harrow & Dennis, 2008). As a result of the declining housing market, many mortgage assets were downgraded by statistical rating organizations. When assets are downgraded, they are deemed riskier and typically garner a larger RBC risk charge. However, after the downgrades, NAIC regulators decided to switch methodologies for residential mortgage-backed securities ("RMBS") and commercial mortgage-backed securities ("CMBS") which provided capital relief to the insurance industry (Abramov, et al, 2016).

This choice provides capital relief because insurance company's RBC thresholds decreased relative to the old methodology which means insurance company RBC ratios would increase (all else equal). Revised NAIC ratings for RMBS and CMBS were based on models developed by Blackrock and PIMCO. Blackrock was initially responsible for CMBS and PIMCO for RMBS (Abramov, et al, 2016). However, in 2015, Blackrock was given responsibility for both CMBS and RMBS by the NAIC (Abramov, et al, 2016). As a result of transitioning to these revised company's ratings, insurers were able to reduce capital requirements by roughly \$19.4 billion in 2012 when compared to the old methodology (Becker & Opp, 2013).

This was not necessarily solely designed to be a corporate giveaway to insurance companies. There is an argument that by providing capital relief in hard economic environments and by imposing stringent capital requirement during economic growth, the regulator can promote a counter cyclical environment that will smooth the ups and downs of the business cycle. Further, by providing capital relief, regulators may have in theory prevented fire sales of these downgraded assets which could have further destabilized markets (Becker, Opp, & Saidi, 2022). By imposing lax capital requirements during down years, companies are better able to rebound from economic downturns. However, lax capital requirements during down years should be balanced with stringent capital requirement during growth years. By imposing stringent capital requirements during growth years, companies can be better prepared to handle economic downturns. However, during the growth years from roughly 2010 to 2020 the capital models were not adjusted to be counter cyclical as I have described. The NAIC has made strides recently after the Covid-19 pandemic (VSETF, 2022 & Paez, 2021) but, this may have been too late into the business cycle.

The RBC Model

Before digging into the drawbacks using Blackrock's capital models, we must discuss the mechanics of the RBC formula. For life insurers, the company action level RBC is calculated with the following formula;

¹ When a bank makes a mortgage loan, the mortgage is an asset for the bank. It is common practice for banks to combine their loans and sell the future mortgage payments to investors. In theory, by having multiple underlying mortgages the investor can achieve diversification. This process is known as securitization.

$$CAL\ RBC = C_0 + C_4 + \sqrt{(C_{1o} + C_3)^2 + C_{1cs}^2 + C_2^2}$$

Where $C_0 =$ Subsidiary Risk, $C_{1o} =$ Fixed Income Asset Risk,

$C_{1cs} =$ Equity Asset Risk, $C_2 =$ Insurance Risk, $C_3 =$ Interest Rate Risk,

$C_4 =$ General Business Risk

A company's ACL RBC ratio is calculated as its Total Adjusted Capital / ACL RBC. The ACL RBC is calculated by dividing the CAL RBC by 2. The Total Adjusted Capital represents the insurance company's capital and surplus (assets – liabilities) with some adjustments². If the company's ACL RBC ratio falls below 200% (Company Action Level ("CAL")), it will come under regulatory scrutiny and be required to submit a plan to increase capital levels. If it falls below 100% (known as Authorized Control Level ("ACL")), the regulator may seize the insurance company's assets if the regulator deems it is in the best interests of policyholders and creditors. If the ratio falls below 70% (Mandatory Control Level) than the regulator is required to take control of the insurance company.

We will now dig deep into the fixed income asset risk component. Fundamentally for each asset the C-1o is the risk factor times the adjusted carrying value/book value. The C-1o requirement is calculated for each asset held by the insurance company with additional adjustments³. The adjusted carrying value is the amount that is currently recognized by the insurance company. The risk factor is based on the NAIC ratings. The NAIC ratings are based on the statistical rating organization's credit ratings for most asset classes. Recently, the NAIC expanded its number of ratings to 20 ratings from 6 ratings (Paez, 2017). The table below summarizes the RBC factors for each NAIC rating and its mapping to S&P credit ratings. However, for RMBS and CMBS, the NAIC ratings are based on Blackrock modeling.

Table 1: C-1o RBC Charges					
NAIC Category	Moody's Rating	C-1o Charge	NAIC Category	Moody's Rating	C-1o Charge
NAIC 1A	Aaa	0.158%	NAIC 3A	Ba1	3.151%
NAIC 1B	Aa1	0.271%	NAIC 3B	Ba2	4.537%
NAIC 1C	Aa2	0.419%	NAIC 3C	Ba3	6.017%
NAIC 1D	Aa3	0.523%	NAIC 4A	B1	7.386%
NAIC 1E	A1	0.657%	NAIC 4B	B2	9.535%
NAIC 1F	A2	0.816%	NAIC 4C	B3	12.428%
NAIC 1G	A3	1.016%	NAIC 5A	Caa1	16.942%
NAIC 2A	Baa1	1.261%	NAIC 5B	Caa2	23.798%
NAIC 2B	Baa2	1.523%	NAIC 5C	Caa3	30.000%
NAIC 2C	Baa3	2.168%	NAIC 6	In Default	30.000%

² Adjustments of the Asset Valuation Reserve and ½ of the dividend liability are both added to the capital and surplus (Bennet, 2015).

³ C-1o includes a concentration risk and size factor adjustments. The concentration risk punishes insurers whose portfolio is heavily concentrated in its top 10 issuers. The size factor applies a factor to the aggregate C-1o based on the number of unique issuers in an insurer's bond portfolio.

The first step for determining the NAIC rating for CMBS/RMBS is to determine the expected loss. This is a percentage of par value and is the weighted average of losses realized from 4⁴ deterministic scenarios (Optimistic, Baseline, Conservative and Most Conservative). $1 -$ the projected loss is equal to the intrinsic price. The next step is to determine the price breakpoints based on the intrinsic price and the NAIC's prescribed breakpoints. The breakpoints for each NAIC rating are the intrinsic price / $(1 - \text{Expected Loss for given NAIC rating})$. The carrying value is then compared to the breakpoints to determine the NAIC rating. The RBC charge is equal to the carrying value multiplied by the revised NAIC rating risk charge. The NAIC has recently adopted changes to this formula due to short-comings exposed by the pandemic which are illustrated in appendix 1⁵.

Problems with this Framework

I will now present some of my criticisms with this approach. My criticisms are as follows;

- 1) Potential for a conflicts of interest
- 2) Pro-Cyclical
- 3) Conflict with the theory of regulatory capital

BlackRock is the largest asset manager in the world with \$9.6 Trillion in assets under management (BlackRock, 2023). BlackRock are purported experts in the mortgage-backed securities market. For example, in 2020 the Federal Reserve hired BlackRock to execute its CMBS purchase program during the pandemic (Schroeder & Price, 2020). Further, BlackRock trades CMBS and RMBS (Schroeder & Price, 2020 & BlackRock, 2023). My contention here is that BlackRock has a financial interest in the MBS market. Therefore, their models may be biased in order for insurance companies to continue to invest in RMBS and CMBS. Insurance companies are one of the largest institutional investors of RMBS and CMBS. For context, as of 12/31/2021, life insurers were holding \$205 Billion in CMBS and \$205 Billion in RMBS (NAIC, 2022). Combined, CMBS and RMBS made up over 8% of total invested assets for life insurers (NAIC, 2022).

As I alluded to earlier, after the financial crisis the NAIC switched its RBC methodology for CMBS and RMBS. NAIC ratings for these assets were no longer linked to credit ratings which allowed insurers to avoid the negative impact that would have been realized from the credit rating downgrades for RMBS and to a lesser extent CMBS. As I have previously stated, I do not take issue with providing capital relief in economic downturns. However, during growth periods, capital requirements should be more stringent to be counter cyclical. Stringent capital requirements will lead to insurers holding more assets to back their reserves which will act as a safety net which can be used to cover economic downturns⁶.

⁴ The NAIC has recently updated the number of scenarios from 4 to 8 (VSETF, 2022).

⁵ Adjusted breakpoints mapping is now based on intrinsic price rather than the carrying price, more detail and an example in the appendix.

⁶ The NAIC has updated the CMBS projected loss methodology to attempt to be more counter-cyclical (during growth years) (VSETF, 2022).

An older NAIC research paper characterized the decision to abandon statistical agency credit ratings as follows, “During the nadir of the financial crisis, the NAIC made a crucial and courageous decision to forego using nationally recognized statistical rating organization (NRSRO) credit ratings to set capital requirements on RMBS.” (CIPR 2016). Disagreeing with the nationally recognized statistical rating organization’s rating is fine however, this was ultimately a subsidy. As I have stated previously, I agree with providing capital relief in times of economic duress. However, let’s not kid ourselves and state that this was motivated by courage rather than assuaging corporate interests. Further, this change also applied to new issues of MBS which further incentivizes continued purchase of RMBS and CMBS. In addition, this change may have encouraged private equity (“PE”) investment into insurance as PE is more than willing to take substantial asset-related risks (Kirti and Sarin, 2020)⁷.

As I have mentioned before, the new MBS methodology is based on how carrying values compare to the intrinsic value calculated by BlackRock. The BlackRock methodology is based on an expected loss framework which is calculated as the weighted average of losses experienced on 4 (revised to 8) economic scenarios which include an optimistic, baseline, adverse and most adverse scenarios. Capital requirements are designed to protect against tail risk rather than just expected losses (Becker, Opp & Saidi, 2022). So perhaps, it may be better to tailor capital requirements to the adverse scenarios. Further, based on the new methodology, assets held at well below their par value can achieve an NAIC 1.A categorization. The par value is the price of bond if the coupon rate is the same as the market rate used to price the bond. As such the par value would be equal to the principal payment⁸. For assets held well below par, this creates an implicit assumption that the insurer will not experience any further losses above the losses already recognized. In other words, if the security has experienced losses and the insurer has written down these impairments, it is assumed the security will not experience significantly more deterioration. However, this conceptually does not make sense assuming that assets that experienced impairments will continue to experience impairments⁹. To the NAIC’s credit they have recently adjusted capital requirements of RMBS and CMBS to be linked to the intrinsic price rather than the carrying value (Paez, 2021).

Conclusion

This brings us back to where we started this conversation, current economic events, namely failing banks. While, insurance companies are exposed rising interest rates, I would say they are less at risk than banks. Rising interest rates may lead some policyholders to lapse their policies and choose a new product with higher rates. The insurance company would owe the policyholders the cash surrender value and would need to sell assets to pay the policyholder. Since interest rates have increased, the insurance company would be forced to sell assets at a realized loss. This risk is known as disintermediation risk. Insurance companies may also be

⁷ See Appendix 3 for more detail.

⁸ Par Value of a Bond = $P(n) = P(n) * v(n) + \sum_k^n c(k) * v(k)$, where $P(n)$ is the principal payment, $c(k)$ is the coupon payment payable at time k and $v(t)$ is the discount factor at time t based on an interest rate equal to the coupon rate ($c(k) / P(n)$).

⁹ i.e., I am assuming a markov process where the current state of an asset is predictive of its future state, see link for more information on [Markov Processes](#)

exposed to losses if the bonds they own default because their issuers are hurt by high interest rates (e.g., Bonds issued by Silicon Valley Bank are worth less today than 2 years ago). However, this story is not the same across the insurance industry. Some insurance companies with large reserve buildup (such as life insurance carriers and long-term care carriers) actually benefit from an increase in interest rates. This is because in the future they will buy assets and these assets will yield more if interest rates are higher. I do not necessarily believe that rising rates will cause insurers to be vulnerable to disintermediation risk that the banking sector has struggled with recently. This may especially be the case if insurers have a mix of annuities products and life products. Annuities are more prone to disintermediation risk and life insurance products generally benefit from higher interest rates.

However, the capital relief provided to insurers after the financial crisis persisted during the US' recovery years. As such insurers may not be holding enough capital backing RMBS and CMBS. I must caveat that as of year-end 2021, 88% of insurers ACL RBC ratios are above 1,000%, so insurers may be able to weather a storm, especially considering MBS is not the largest asset class that insurers invest in (NAIC, 2022). Further, the NAIC has adjusted its model to expected loss model to be more counter cyclical which is encouraging but perhaps late (VSETF, 2022).

Lastly, recent trends in corporate real estate may lead to losses by CMBS. After the Covid pandemic, work from home became a trend for many white-collar workers. In turn occupancy rates for the corporate offices declined. In recent months, there have been defaults on corporate real estate loans. For example, as of May 2023, Brookfield, a large alternative asset manager has fallen behind loan payments on its 275 million CMBS loan of EY Plaza in Los Angeles (Farr, 2023). Earlier this year, Brookfield defaulted on \$784 million of loans connected to properties it owned in downtown Los Angeles (Farr, 2023). Further, much of the corporate debt repayments are funded by refinancing (Che & Repucci, 2023). Essentially companies finance debt payments with more debt. This strategy is great when the interest rates are declining, for example refinancing of mortgages was very common during the 2000s. However, in light of rising interest rates, refinancing has become more expensive. Fitch has recently reported that less companies are able to use refinancings to fund their loan obligations (Che & Repucci, 2023). My overall conclusion is as follows; capital requirements should be designed to be counter-cyclical and be tailored to protecting against adverse scenarios so that we can better smooth out the business cycle. It will be a costly problem if the US economy continues to crash every 10 years. It represents an opportunity cost (of not crashing) and will be costly for tax-payers. For example, during the great financial crisis, the banks were bailed out because they were too big to fail, all at the expense of the taxpayer.

Appendices

Appendix 1: Detailed RMBS and CMBS Methodology

In this appendix section, I provide several examples to illustrate how the capital requirements are calculated for CMBS and RMBS.

Example 1: Carrying Value > IP

This methodology uses the framework passed after the financial crisis. Recall that the NAIC is revising its framework to be based solely on intrinsic price rather than carrying value. In this example the carrying value is set to 95, above the market price. The intrinsic price is set to 90 (i.e., 10% expected loss based on par value of 100). The breakpoints are calculated as the intrinsic prices / (1 - prescribed E[L] percentages). The NAIC designation is calculated as a 3B since the carrying value is between the price breakpoints of an NAIC 3A and 3B and is charged an RBC factor of 4.54%.

Table 2: Example 1 - RBC Requirements	
Carrying Value	95
Market Price	85
Intrinsic Price	90
NAIC Rating	3B
RBC Factor	4.54%
RBC Requirement	4.31

Table 3: Price Breakpoints – Example 1

NAIC Category	E[L]	Breakpoints (IP / (E[L]))	RBC Factor
1A	0.210%	90.19	0.16%
1B	0.350%	90.32	0.27%
1C	0.470%	90.42	0.42%
1D	0.590%	90.53	0.52%
1E	0.740%	90.67	0.66%
1F	0.920%	90.84	0.82%
1G	1.140%	91.04	1.02%
2A	1.390%	91.27	1.26%
2B	1.850%	91.70	1.52%
2C	2.660%	92.46	2.17%
3A	3.840%	93.59	3.15%
3B	5.280%	95.02	4.54%
3C	6.700%	96.46	6.02%
4A	8.460%	98.32	7.39%
4B	10.980%	101.10	9.54%
4C	14.690%	105.50	12.43%
5A	20.370%	113.02	16.94%
5B	26.900%	123.12	23.80%

Example 2: Carrying Value > IP

In this example the carrying value is set to 85, equal to the market price. The intrinsic price and the breakpoints are the same as the previous example. Since the carrying value is below the intrinsic price, the NAIC designation is a 1A which results in a 0.16% RBC charge. Overall, this example highlights the benefit for insurers if they hold RMBS and CMBS at lower carrying values.

Table 4: Example 2 - RBC Requirements

Carrying Value	85
Market Price	85
Intrinsic Price	90
NAIC Rating	1A
RBC Factor	0.16%
RBC Requirement	0.13

Table 5: Price Breakpoints (Abbreviated)			
NAIC Category	E[L]	Breakpoints (IP / (E[L]))	RBC Factor
1A	0.210%	90.19	0.16%
1B	0.350%	90.32	0.27%

Example 3: 2020 Revised Price Breakpoint methodology

We will now turn to the 2020 revised framework which seeks to ignore the carrying value and focus on the intrinsic price in determining NAIC ratings. In this example the carrying value is set to 85. The intrinsic price is once again 90. However, this time, breakpoints are calculated as the 100 (Par Value) * (1 - prescribed E[L] percentages). The NAIC designation is based on the intrinsic price rather than the carrying value. As such the NAIC rating here would be a 4B since the intrinsic price is between the price breakpoints of an NAIC 4A and 4B. This results in an RBC factor of 9.54%. One may think there is an incentive to reduce carrying values to reduce capital requirements. However this small benefit is more than offset by the loss that must be recognized.

Table 6: Example 3 - RBC Requirements	
Carrying Value	85
Market Price	85
Intrinsic Price	90
NAIC Rating	4B
RBC Factor	9.54%
RBC Requirement	8.10

Table 6: Price Breakpoints – Example 3				
NAIC Category	E[L]	Breakpoints (Par Value - (E[L]))	RBC Factor	
1A	0.210%	99.79	0.16%	
1B	0.350%	99.65	0.27%	
1C	0.470%	99.53	0.42%	
1D	0.590%	99.41	0.52%	
1E	0.740%	99.26	0.66%	
1F	0.920%	99.08	0.82%	
1G	1.140%	98.86	1.02%	
2A	1.390%	98.61	1.26%	
2B	1.850%	98.15	1.52%	
2C	2.660%	97.34	2.17%	
3A	3.840%	96.16	3.15%	
3B	5.280%	94.72	4.54%	
3C	6.700%	93.30	6.02%	
4A	8.460%	91.54	7.39%	
4B	10.980%	89.02	9.54%	
4C	14.690%	85.31	12.43%	
5A	20.370%	79.63	16.94%	
5B	26.900%	73.10	23.80%	

Appendix 2: Accounting Framework of RMBS and CMBS

In addition, to the revised capital requirements the accounting treatment was revised for MBS as well (Becker, Opp & Saidi, 2022). Per SSAP 43r, the revised accounting treatment now allows insurers to mark to market assets if the MBS intrinsic price is sufficiently below the asset's current amortized cost (SSAP 43r). The threshold for life insurers is 26.5% based on NAIC 5-6 intrinsic price threshold (Becker, Opp & Saidi, 2022). This in turn lead to the insurer holding the asset at its market price which is often below its intrinsic price. In turn this will lead to the capital charge corresponding to the highest rated NAIC category (i.e., 0.16% for NAIC 1.A). In addition, insurers must recognize losses for “other than temporary impairments”. Under the old

system, the insurers would only mark to market if NAIC was rated as an NAIC 6 (junk bonds that are basically close to defaulting) for life insurers (Becker, Opp & Saidi, 2022).

Appendix 3: Private Equity Investment in Insurance

In the recent decade, Private Equity investment into the insurance industry has grown substantially. For example, PE went from investing 23 B in 2009 to 250 B in 2014 (Kirti and Sarin, 2020). PE firms typically invest in more complex assets than just corporate bonds. Examples include mortgage-backed securities, other asset-backed securities, collateralized loan obligations and alternative assets (e.g., Private Equity buyouts) (Kirti and Sarin, 2020). These complex assets typically yield more than corporate bonds. To the NAIC's credit they recently responded to increased PE investment. For year end 2022 reporting, insurers that invest heavily in complex assets, insurance companies will be required to make additional disclosures (AG 53). Complex assets are those that deemed to behave similarly to equity investments and assets deemed to have excess yield over the prescribed benchmark spreads (AG 53, 2022). Examples include structured securities, asset backed securities and collateralized loan obligations (AG 53, 2022). Further, the NAIC has signaled it further seeks to adjust the capital requirements for these complex assets to better reflect the risk of these assets based on the perceived capital arbitrage opportunities obtained when holding complex assets (Kolchinsky, Therriault & Perlman, 2022). However, regulators may have responded a little late based on the fact the Private Equity industry has drastically increased their presence penetrated the insurance after the financial crisis thanks in part to extremely low interest rates.

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