

Review and Comparison of Rating Agency Capital Models

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Paper Overview

Purpose

- To provide professionals interested in the financial strength of property/casualty insurance companies with a reference guide to compare the various models and reconcile the results between them

Models reviewed

- NAIC: Risk-Based Capital (RBC)
- A.M. Best Company: Best's Capital Adequacy Ratio (BCAR)
- Standard and Poor's: S&P Capital Adequacy Ratio (CAR)
- Moody's Investor Service: Moody's P&C Risk Adjusted Capital Model (MRAC)

Overall Approach

Concept:

Each model compares the calculated risk-based ***required capital*** to the company's ***actual capital*** as of a certain point in time.

Method:

RBC, BCAR and CAR apply risk-charge factors to annual statement values. MRAC uses a 99.9% confidence interval based on one year total profit/loss simulation.

Areas of Comparison

1. Insurance Product Segmentation
2. Time Horizon
3. Adjustments to Surplus
4. Risk Categories
 - Investment Risk
 - Underwriting Risk
 - Premium Risk
 - Credit Risk
 - Other Risk
5. Miscellaneous
6. Results and Interpretation
7. Future of Capital Models

Insurance Product Segmentation

- All Models use some combination of Schedule P lines

Time Horizon

- All except Moody's measure capital at a certain point in time (usually Dec. 31)

Main Adjustments to Surplus

RBC

- Non-tabular discount
- Life reserve of subsidiary
- Capital notes

BCAR

- Unearned premium reserve
- Loss reserve equity
- Fixed income equity
- Surplus notes
- Off-balance sheet losses
- Future dividends
- Potential losses (cats, etc.)

CAR

- Reserve Adequacy
- Discount of reserves
- Statutory goodwill
- Statement value of subs
- Analyst's adjustments

MRAC

- Investments
 - Bonds – book vs. market
 - 1 yr expected return
- Reinsurance
 - Recoverable penalty
 - Add back > 90 days
- Reserve Adequacy

Major Risk Categories

RATING AGENCY CAPITAL ADEQUACY MODELS

Major Risk Categories

Risk Type	Sub-category	RBC	BCAR	CAR	MRAC
Investment	Fixed Income	R 1	B 1		
Investment	Equities	R 2	B 2		
Investment	Interest Rate		B 3		
Investment				C - 1	X
Underwriting	Reserving Risk	R 4	B 5	C - 4	X
Underwriting	Premium Risk	R 5	B 6	C - 3	X
Other	Insurance Affiliates/ Off- Balance Sheet	R 0			
Other	Credit	R 3	B 4	C - 2	
Other	Reinsurance				X
Other	Other Business/ Operational		B 7	C - 5	X

Investment Risk

- RBC and BCAR – two groups – fixed income and equity risk
- CAR – single category, no explicit adjustment for diversification
- MRAC – many categories

Investment Risk (cont'd)

Bonds

- RBC, BCAR and CAR each apply their own risk charge to annual statement values by NAIC bond class
- BCAR has doubles risk charges for classes 1-3
- CAR uses internally developed charges based on default rates
- BCAR and CAR separate mortgage backed securities
- Moody's performs a Monte Carlo simulation estimating 1 year returns using 3 bond classes: US treasuries, investment grade, and high yield

Stocks

- RBC, and CAR separates preferred stocks, and common stocks
- CAR and BCAR separate affiliated from non-affiliated
- MRAC has two classifications, Common and Affiliate

Underwriting Risk Charges

RBC

- Based on analysis of Sch P parts 2, 3 for prior 9 years
- Does not separate claims made policies
- Discounted
- Adjusted for loss-sensitive business, and assumed and ceded business
- Credit for diversification of risk
- Penalty for rapid growth

BCAR

- Similar to RBC Model
- Further segregates claims made, financial reinsurance and A/E
- Adjustment for loss reserve adequacy prior to application of charge factors
- Discounted
- Adjust for stability of loss development patterns relative to industry
- Credit for diversification of risk
- Penalty for rapid growth

CAR

- Similar to RBC and BCAR
- Uses risk charge factors unadjusted from AAA Report

MRAC

- Simulation based, does each of most recent 4 years and prior 6 separately
- Separates A/E
- Uses proprietary industry payout patterns
- Accounts for correlations across accident year and line of business

Premium Risk

RBC

- Baseline risk charge, based on industry historical loss ratio and weighted with company history
- Discounted
- Adjusted for loss-sensitive business
- Credit for diversification
- Penalty for rapid growth

BCAR

- Similar to RBC
- Premium adequacy factor for each line of business based on 3 year accident year combined ratio relative to industry
- Adjusted for loss-sensitive business
- Credit for diversification
- Penalty for rapid growth

CAR

- Uses risk charge factors from AAA, measuring variability of profitability

MRAC

- Focuses on unearned premium instead of written premium
- Simulation compares discounted combined ratios to unity. Holds LAE constant
- Separates catastrophes

Credit Risk

Reinsurance Recoverables

- RBC, BCAR and CAR apply factors to recoverables from annual statement. BCAR and CAR differentiate between different ratings of reinsurers, RBC does not
- BCAR includes surcharge for insurers considered excessively dependent on unaffiliated reinsurance
- MRAC models paid recoverables and ceded reserves, ceded reserve development, ceded underwriting and ceded CATs

Other

- RBC, BCAR and CAR all apply factors to other credit risks (agent's balances, tax recoverables, investment income, etc.)

Other Risk

RBC

- Focuses on Accident and Health

BCAR

- Interest rate risk and business risk

CAR

- Other business risk:
 - Guaranty fund assessments
 - Other lines of business not captured
 - Miscellaneous appropriate risk charges

MRAC

- Operational risk:
 - Fraud
 - Systems failure
 - Litigation risk
- Simplistic approach (15% of total risk charge from other categories)

Miscellaneous

Qualitative Factors:

- BCAR, CAR and MRAC adjust for qualitative scores
- NAIC does not

Relative Contribution of Risk Categories

- RBC – U/W risk accounts for about 80% of risk industry wide
- BCAR – U/W risk accounts for about 60% of risk, investments accounts for 30% and credit for the remaining 10%

Results and Interpretation

RBC

- Covariance adjusted using square-root rule
- Total RBC then compared to Total Adjusted Capital to determine Level of Action if needed

BCAR

- Gross Required Capital (GRC) is the sum of capital from each risk category
- Net Required Capital (NRC) is covariance adjusted based on square-root rule
- $BCAR = \text{Adjusted Surplus} / NRC$
- BCAR score implies a rating

CAR

- Risk Adjusted Capital =
 - Total Adjusted Capital – asset risk – credit risk
- Required Capital = U/W risk + Rx risk + Other Bus Risk
- $CAR = \text{Risk Adjusted Capital} / \text{Required Capital}$
 - Required Capital
- CAR score implies a rating

MRAC

- Selects indicated capital from 909.9th percentile of 60,000 simulations
- $MRAC = (\text{Book Surplus} + \text{Surplus Adjustment}) / (\text{MRAC Charge } 99.9\% + \text{Surplus Adjustment})$
- Adjusted based on estimated duration of liabilities
- Logarithmic transformation of score is correlated to company ratings
- Moody's uses expected policyholder deficit to yield an implied rating

Capital Models in the Future

S&P is taking steps towards incorporating Enterprise Risk Management into the CAR rating analysis

Moody's created the first stochastic model

Fitch created a stochastic model that allows for additional product segmentation