SCALARS IN THE IAIS AGGREGATION METHOD: CAN EMPIRICAL DATA BE USEFUL?

Steve Jackson
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Agenda

- Background on Scalars and Excess Relative Ratios (ERR)
- Background on the Academy and Scalars
- FRB and Scalars
- Data
  - Probabilities of Default (PoD) in France, Canada & the USA
  - Data on Solvency in France, Canada & the USA
  - Data Matching
- Methodology
- Comparing Results for Scalars based on PoD compared to ERR
- Takeaways

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Background on Scalars and Excess Relative Ratios

- International Capital Standard (ICS) 2.0: adopted by the International Association of Insurance Supervisors (IAIS) in December 2024
- Aggregation Method (AM): accepted by the IAIS as an acceptable alternative implementation of the ICS
- US Group Capital Calculation (GCC): adopted by the NAIC in December 2020, developed in parallel with the AM of the ICS
- Scalars in the AM and GCC: IAIS AM Work Group and NAIC GCC Work Group adopt Excess Relative Ratios
- Excess Relative Ratios (ERR): adjust available and required capital to produce the same average solvency ratio in each jurisdiction while keeping the excess capital (i.e. the amount by which available exceeds required capital) unchanged for each individual entity.

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Background on the Academy and Scalars

- Aggregating Regulatory Capital Requirements across Jurisdictions: Theoretical and Practical Considerations (April 2021)
- Reviewed three families of scalars based on assumptions, one based on data
- Of the assumption-based methods, some form of excess relative ratio is best
- Three general conclusions:
  - Methodologies based on observable data are preferable to methodologies based on assumption, other things being equal
  - Almost all methodologies will be prone to increased imperfection if regulatory regimes change after scalars have been estimated
  - All of the methodologies discussed are and will be imperfect

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Federal Reserve Board (FRB) and Scalars

- Federal Reserve Board (FRB), Comparing Capital Requirements in Different Regulatory Frameworks (September 2019)
  - For the "building block approach," defined scalars based on the equivalence of probabilities of default for US banks and insurers
- Insurance Policy Advisory Committee, FRB, Discussion of Scalars in Reference to the US Developed Aggregation Method for Calculating Group Capital for Internationally Active Insurance Groups (February 2024)
  - Assessed the Excess Relative Ratio method for scalars
  - Failed in effort to assess a probability of default method for international insurance scalars

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Data: Probabilities of Default (PoD) in France, Canada & the USA

Empirical method for estimating scalars, developed by the FRB, requires data on defaults or the probability of defaults, and data on solvency ratios.

DATA on Probabilities of Default from 2008-2021:

- Credit Research Initiative, National University of Singapore, Probability of Default
- **The Probability of Default Model for Insurance Companies in the United States of America, Canada, and France (November 2022)**

Data: Solvency in France, Canada & the USA

Data on Solvency:

France: S&P Capital IQ Pro [Ratio: Eligible Own Funds/Solvency Capital Requirement, 2016-2021]

Canada: Office of the Superintendent of Financial Institutions (OSFI) [For Life Insurers: Life Insurers Capital Adequacy Test (LICAT), Core Ratio, 2018-2021; For Casualty Insurers: Minimum Capital Test (MCT) Ratio; 2008-2021]

USA: S&P Capital IQ Pro [Risk Based Capital (RBC), Authorized Control Level Ratio, 1996-2021]

Data Matching

- Because our analysis involved the relationship between two sets of data derived from different sources, we required a method of matching the data on probabilities of default to the corresponding solvency ratio for each company.
- The only common fields in the two databases were: the country (USA, Canada, France); the line of business (Life, Casualty); and the name of the company (often abbreviated in different ways).
- To assist in matching, we used Google Gemini to match and provide confidence scores for each match. Based on this matching and human verification, we identified the following number of insurance companies for analysis:

Country	Life Insurers	Casualty Insurers
Canada	80 (2018-2021)	81 (2008-2021)
France	90 (2016-2021)	101 (2016-2021)
USA	273 (1996-2021)	2,614 (1996-2021)

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Methodology

Because we have learned that solvency ratios above a certain level do not contain information about changes in the probability of default, for each country, each line of business, we have calculated the solvency ratio which provides the highest R^2 with the largest number of company-years to analyze.

	Maximum Solvency Ratio	
Country	Life Insurers	Casualty Insurers
Canada	155	250
France	175	145
USA	500	500

Methodology, Continued

After selecting only those companies with matched data and solvency ratios less than the optimal value, we analyzed the following number of companies:

	Number of Companies	Final Analysis
Country	Life Insurers	Casualty Insurers
Canada	46 (2018-2021)	41 (2008-2021)
France	34 (2016-2021)	29 (2016-2021)
USA	39 (1996-2021)	1121 (1996-2021)

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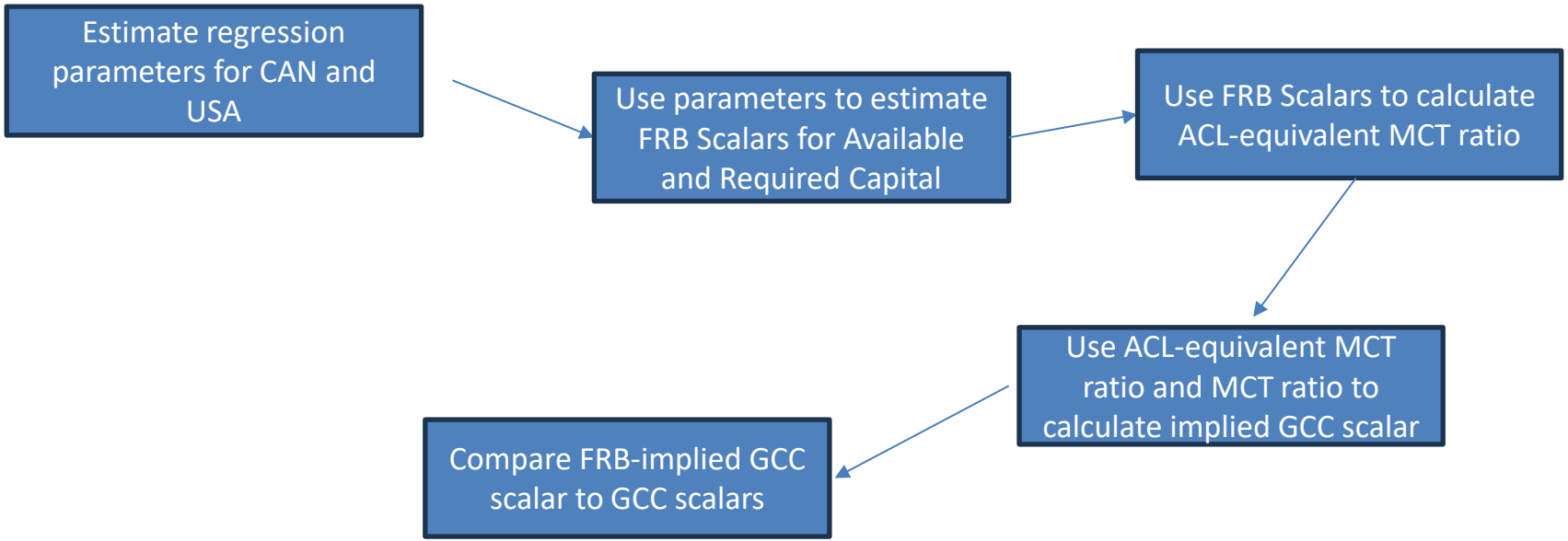
Schematic of Process: Comparing FRB-estimated scalars to GCC scalars



Illustrating the Calculations 1: Canada-USA Scalar for P&C as of 2021-2022

Step 1:

- Estimate best relationship for Canada: with a maximum cutoff for Minimum Capital Test (MCT) ratio of 250%;

  Probability of Default = 0.00575 - (0.00002048*MCT)

- Estimate best relationship for USA: with a maximum cutoff for Authorized Control Level (ACL) ratio of 500%;

  Probability of Default = 0.00576 - (0.00001035*ACL)

Illustrating the Calculations 2

Step 2:

- Calculate FRB scalar for Required Capital = b[USA]/b[CAN]

  Scalar[RC] = 0.51
- Calculate FRB scalar for Available Capital =

  {a[CAN] – a[USA]]}/b[CAN]

  Scalar[AC] = 0.49

Step 3: Use FRB Scalars to Calculate ACL Equivalent Ratio for Median MCT ratio:

Median MCT = 245%

ACL Equivalent Ratio = (1/Scalar[RC])*(MCT + Scalar[AC])

ACL Equivalent Ratio = 486%

Illustrating the Calculations 3

Step 4: To compare FRB results to GCC Scalar, begin by calculating implied scalar for required capital.

- Note: since GCC scalar applies to Required Capital, after scalar, solvency ratio will change to 1/Scalar.
- Hence: ratio of FRB post-scalar to pre-scalar solvency ratio = 1/GCC scalar
- For Canada-USA, P&C: post-scalar MCT = 486%;

486% / 245% = 1.98

1 / 1.98 = .50, implied GCC scalar

Illustrating the Calculations 4

Step 5: Compare FRB implied GCC scalar to GCC scalar:

FRB Implied Scalar: .50

GCC Scalar @200% ACL: .28

GCC Scalar @300% ACL: .53

Note: we have assumed intervention levels of 100%

Stress-testing the Scalar Estimates

For each of the two countries (CAN, FRA), for each of the two lines of business (P&C, Life), in addition to the base case where we use the Median solvency ratio in CAN or FRA, and we use the best estimates of parameters, we run four more scenarios:

1. We use the 25th percentile and the 75th percentiles of solvency ratios in CAN or FRA, with the best estimates of parameters;
2. We use the median solvency ratio, combined with the minimum slope (and associated intercept) for CAN or FRA joined to the maximum slope for USA; and
3. We use the median solvency ratio, combined with the maximum slope (and associated intercept) for CAN or FRA joined to the minimum slope for USA.

Stress-testing the Scalar Estimates: Results

COUNTRY	Line	Assumed Solvency Ratio	Assumed Slopes	Implied Single Scalar for Req C	GCC Scalar @200% ACL	GCC Scalar @300% ACL
CANADA - USA	Life	Median	Best	**0.08**	**0.15**	**0.25**
CANADA - USA	Life	25th percentile	Best	**0.11**	**0.15**	**0.25**
CANADA - USA	Life	75th percentile	Best	**0.08**	**0.15**	**0.25**
CANADA - USA	Life	Median	Min/Max	**0.05**	**0.15**	**0.25**
CANADA - USA	Life	Median	Max/Min	**0.27**	**0.15**	**0.25**
CANADA - USA	P&C	Median	Best	**0.50**	**0.28**	**0.53**
CANADA - USA	P&C	25th percentile	Best	**0.50**	**0.28**	**0.53**
CANADA - USA	P&C	75th percentile	Best	**0.50**	**0.28**	**0.53**
CANADA - USA	P&C	Median	Min/Max	**0.22**	**0.28**	**0.53**
CANADA - USA	P&C	Median	Max/Min	**2.97**	**0.28**	**0.53**
FRANCE-USA	Life	Median	Best	**0.08**	**0.31**	**0.54**
FRANCE-USA	Life	25th percentile	Best	**0.07**	**0.31**	**0.54**
FRANCE-USA	Life	75th percentile	Best	**0.10**	**0.31**	**0.54**
FRANCE-USA	Life	Median	Min/Max	**0.07**	**0.31**	**0.54**
FRANCE-USA	Life	Median	Max/Min	**0.30**	**0.31**	**0.54**
FRANCE-USA	P&C	Median	Best	**0.34**	**0.47**	**0.89**
FRANCE-USA	P&C	25th percentile	Best	**0.29**	**0.47**	**0.89**
FRANCE-USA	P&C	75th percentile	Best	**0.55**	**0.47**	**0.89**
FRANCE-USA	P&C	Median	Min/Max	**0.12**	**0.47**	**0.89**
FRANCE-USA	P&C	Median	Max/Min	**2.27**	**0.47**	**0.89**

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Takeaways

Recognizing that estimates presented could be improved, particularly by better matching of companies:

1. The range of estimates for each of the four scalars evaluated (P&C, Life; Canada-USA, France-USA) overlap with the GCC scalars based on ERR;
2. Certain estimates are outside the bounds of plausibility, suggesting the need for guardrails; but
3. This pilot project suggests that more effort to define scalars based on observed probabilities of default is a worthy pursuit.

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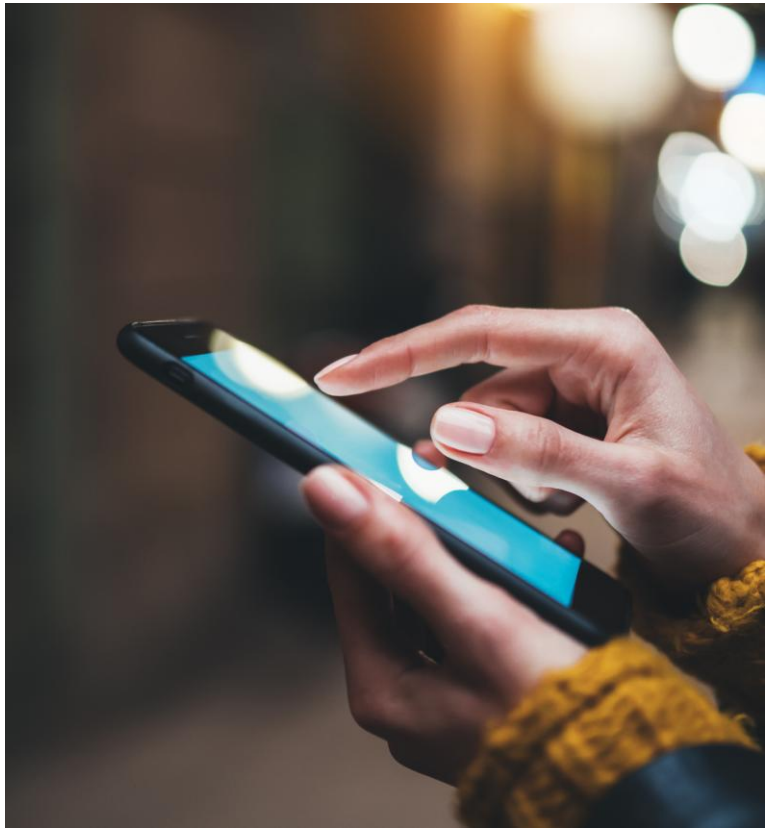

Questions?

For more information, please contact
Steve Jackson, Director of Research
sjackson@actuary.org