Risk Transfer

Lynne Bloom

June 4th, 2012

Antitrust Notice

- The Casualty Actuarial Society is committed to adhering strictly to the letter and spirit of the antitrust laws. Seminars conducted under the auspices of the CAS are designed solely to provide a forum for the expression of various points of view on topics described in the programs or agendas for such meetings.

- Under no circumstances shall CAS seminars be used as a means for competing companies or firms to reach any understanding – expressed or implied – that restricts competition or in any way impairs the ability of members to exercise independent business judgment regarding matters affecting competition.

- It is the responsibility of all seminar participants to be aware of antitrust regulations, to prevent any written or verbal discussions that appear to violate these laws, and to adhere in every respect to the CAS antitrust compliance policy.

Overview of Discussion

- Risk Transfer Evolution
- Risk Transfer Testing Methods
- Sample Contract
- Transfer Pricing vs. Risk Transfer
- Transfer Pricing Example

Basic Guidelines Revisited

- SSAP 62 / FAS 113
  - a. The reinsurer assumes significant insurance risk under the reinsured portions of the underlying insurance agreements; and
  - b. It is reasonably possible that the reinsurer may realize a significant loss from the transaction.
- Significant insurance risk - the probability of a significant variation in both the amount and timing of payments by the reinsurer is more than remote.
- Reasonably possible = more than remote.

pwc

Testing

- Evaluation of reasonably possible significant loss
  - Present value of all cash flows between the ceding and assuming companies under reasonably possible outcomes
- Interest Rate
  - The same interest rate for each reasonably possible outcome tested.
  - A constant interest rate shall be used in determining those present values because the possibility of investment income varying from expectations is not an element of insurance risk.
  - Judgment
- Paragraph 11b - reinsurer assumes “substantially all” Risk

2007 AAA Practice Note

Excluded from scope of Testing

1. Contracts with No Amounts Recoverable
2. Certain Older Contracts: Pre January 1, 1994
3. Reasonably Self-Evident Contracts

To avoid the time and expense associated with unnecessary analyses.

Reasonably Self Evident

Reasonably self-evident Characteristics:

- The potential loss to the reinsurer is much larger than the premium for the coverage provided;
- The contractual terms and conditions of coverage are standardized for the classification or type of contract; and
- The contract does not include provisions that enable the reinsurer to recover all or a significant portion of the covered losses.

- In most instances, if a contract satisfies all three of these characteristics, the substance and economic purpose of the contract is generally considered to be risk transfer.

Not Reasonably Self Evident

Not likely to be:

- The premium approaches the present value of the coverage provided;
- The contract is "manuscripted" using terms of coverage that are not standard for contracts within the classification or type of contract; or
- The contract includes provisions that enable the reinsurer to recover all or a significant portion of the covered losses.

Typically RSE

- Quota Share even with “remote” Aggregate caps
- Facultative and Treaty excess of loss contracts
  - With no or minimal risk-limiting
  - With relatively low rates on line
  - As the premium approaches the present value of the limit of coverage may not be RSE
- Property catastrophe and casualty clash contracts
  - With no or minimal risk limiting features apart from a reinstatement premium
  - Must be single year

Typically Not RSE

- Aggregate excess of loss contracts
- Contracts with experience accounts, experience rating refunds, or similar provisions
  - Features must have economic impact
- Multiple year contracts
  - With provisions that protect the reinsurer from changes in exposure over the contract period
  - May have features that adjust the terms of later years explicitly or implicitly based on results in earlier years
- Quota share contracts with risk-limiting features:
  - Loss retention corridors
  - Sliding scale commissions
  - Loss ratio caps (not remote)
  - Sub-limits

Not as Clear

- Profit commissions do not affect the downside
  - Does a quota share that normally would pass under paragraph 11(b) become RSE if it has a profit commission only?
  - Not clear because this was not the original intention of the exception
  - However aggregate loss ratio caps that are considered extremely remote (i.e., they do not affect the pricing) do not invalidate the exception

Testing Variables

- A mean and coefficient of variation of losses
- Adjustments for parameter risk
- An assumed distribution of such losses;
- Selected payout patterns, as well as variation in such patterns
- Interest rate (usually risk free)

pwc

Parameter Risk

- In practice:
  - Most subjective parameter
  - Least well documented
  - Implicitly difficult to measure
  - General industry ratios of entire variance/process variance are 1.25 – 2.00, but can run as high as 4.00
  - Examples of papers providing parameter variance estimation guidance
    - England - Verrall bootstrapping paper provides some guidance (estimation risk vs. process risk)
    - Wang transform for estimation can also be used
      - F*(x) =Φ[Inverse Φ (F(x)) x .5]
      - Variance of new distribution includes parameter
  - In practice it is ad hoc and these methods are not used

Methodologies for Testing

- 10/1o rule – still widely used
- ERD > 1% – Used more and more often as a standard method, usually in combination with 10/10
- Break even EUD Comparison – haven't seen in practice but similar to ERD
- Underwriting margin graph – used more and more often – easy to apply, harder to interpret
- Other Methods – not used and not well defined (further Research)
  - Wang Transform
  - Risk Coverage Ratio

pwc

Formulae

- VAR – Total Loss at a given percentile
- TVAR – Average Loss above a given percentile – better measure with unusually high tail losses
- ERD – PV Average Loss x p(loss) / premium which is same as TVAR above breakeven point
- EUD - Average Loss x p(loss) / Premium
- RCR - PV Average Loss x p(loss) / Expected Gain
  - no defined threshold
- Wang – Define $F^*(x) = 1 – [1-F(x)]^{.5}$
  - Therefore $E^*(x) > E(x)$
  - $RTD = E^*(x) – E(x)$
  - Premium benchmark should be αRTD
  - Further research needed

Example Contract

- Homeowners Quota Share
  - Non Cat Loss distribution is lognormal and has CV of 15%
  - Non Cat expected loss ratio = 60%
  - $200,000 premium is 50% ceded
  - 1 in 20 year Cat Loss = 20,000
  - 1 in 100 year Cat loss = 25,000
  - Ceding company expenses are 30% of total premium
  - Sliding Scale Commission:

Loss Ratio (%)	Commission (%)
80.00	28.00
70.00	33.00
60.00	38.00

Distribution and Expected Values

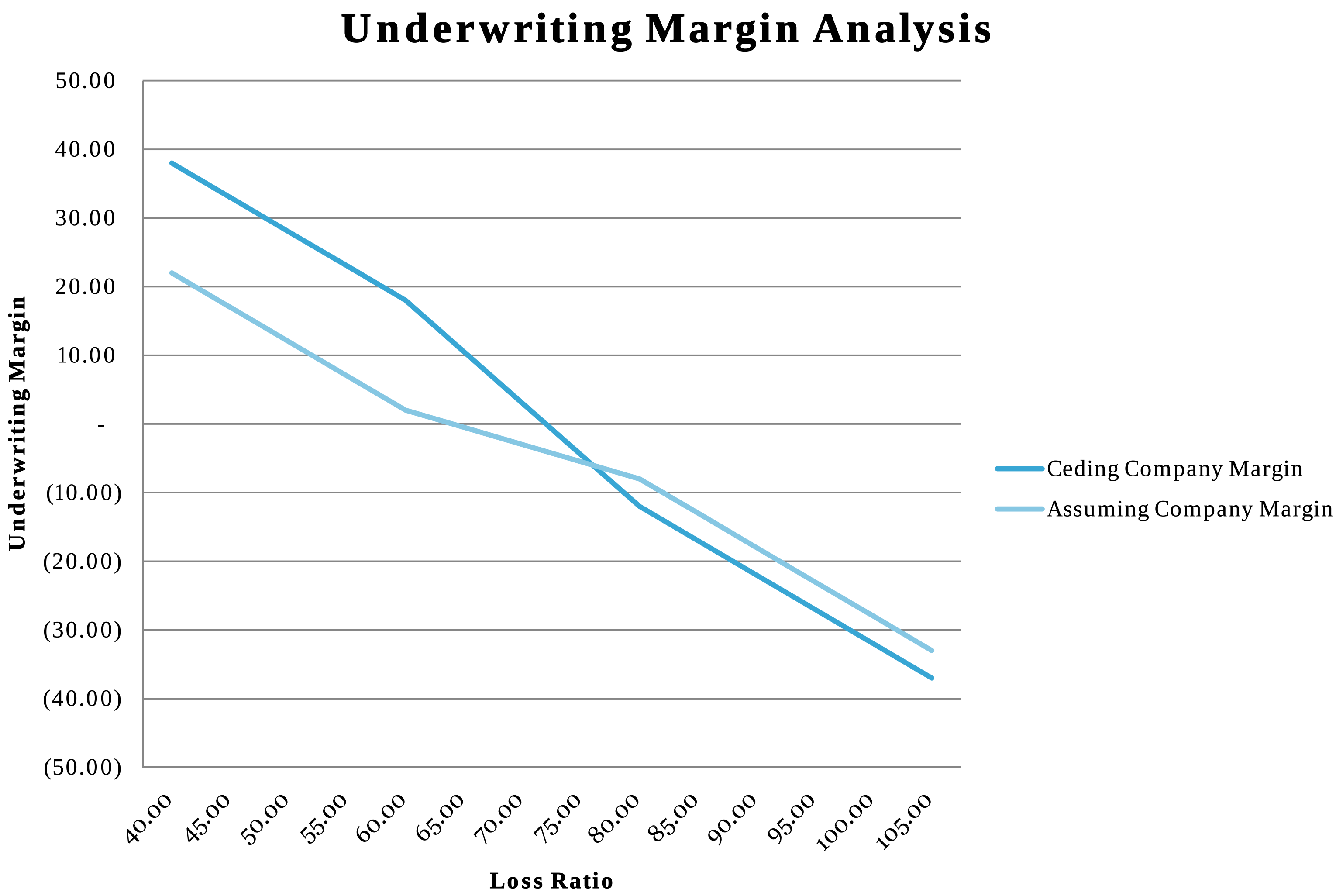
Percentile	Non Cat Plus Cat Losses	Commission
10.00	49,532	38.00
20.00	52,682	38.00
30.00	55,152	38.00
40.00	57,347	38.00
50.00	59,838	38.00
60.00	62,049	36.98
70.00	65,092	35.45
80.00	68,550	33.72
90.00	74,740	30.63
95.00	80,152	28.00
99.00	96,427	28.00
Expected	61,163	35.92

pwc

Results of Risk Transfer Testing

- 90^{th} percentile loss is all non-cat – 10% chance of a 3.04% loss – does not pass
- ERD = 1.1% > 1% - passes
- EUD comparison - passes
  - Assuming Company 1.7%
  - Ceding Company 1.6%

Margin Analysis



Transfer Pricing – how does it relate?

- When an insurer cedes to a non-US affiliate, the IRS requires documentation that the contract was priced at "arms length"
- This is due to the loss of tax revenue
- If assuming affiliate is in Bermuda, for example, tax savings can be achieved by overpayment of premium
- "Price" is equal to the rate on line for excess contracts and the ceding commission for quota share contracts

pwc

Transfer Pricing Methods

- Market/Industry comparisons
  - Rates on line
  - Combined Ratios
  - Ceding commission
- Similar comparisons to other third party contracts the reinsurer may write
  - Difficult because no two reinsurance contracts are the same
- Return on Capital Approaches
- For Quota Shares comparison of expected profit to ceding and assuming companies (profit Split method)
- Other Ad hoc Methods such as regressing a relationship between contract variability and combined ratio for either third party contracts written by same assuming company or the industry as a whole

pwc

Overlap of Variables and Key Concepts

- Return on Capital
  - Assumed Loss Distribution
  - Variance with Parameter Risk (same degree of scrutiny required)
  - TVAR or VAR can be used
  - Risk free interest rates
  - Payout pattern
  - In addition, an estimate of the assuming companies diversification and target rate of return is required
- Profit Split
  - Very similar to breakeven and underwriting measures used for risk transfer same basic concept although application is different
- Methods which relate risk to margin share the same concepts and hurdles as risk transfer

Capital Considerations ROC Method

- Can use economic capital
  - VAR or TVAR at 99.5 for example
  - Must consider possible portfolio diversification benefits
- Can also use an industry premium to surplus ratio or premium to reserve ratio
- Assumption should be consistent with selection of capital charge

Example Transfer Pricing

- Same Contract
- Used Return on Economic Capital Method and Profit Split method
- Other parameters the same
- Assume capital charge of 5%

pwc

Distribution and Expected Values

Percentile	Non Cat Plus Cat Losses	Commission
10.00	49,532	38.00
20.00	52,682	38.00
30.00	55,152	38.00
40.00	57,347	38.00
50.00	59,838	38.00
60.00	62,049	36.98
70.00	65,092	35.45
80.00	68,550	33.72
90.00	74,740	30.63
95.00	80,152	28.00
99.00	96,427	28.00
Expected	61,163	35.92

pwc

ROEC using VAR 99.5

Expected Loss Ratio 61.2%

Calendar Year	Paid Loss (%)	Duration Matched Rate (%)	Discount Factor To Time Zero	Disc. Percent Paid	Percent Outs.	Disc. Percent Outs.	Disc. Outs. Loss	Needed Capital	Capital Charge at 5.00%	Disc. Capital Charge
			1.0000		100.00	96.87	59,252	34,397		
2012	50.00	0.20	0.9990	49.95	50.00	46.97	28,729	17,352	1,515	1,513
2013	20.00	0.81	0.9880	19.76	30.00	27.49	16,815	9,707	1,562	1,543
2014	10.00	1.42	0.9654	9.65	20.00	18.14	11,094	6,277	874	843
2015	5.00	1.95	0.9347	4.67	15.00	13.73	8,399	4,840	565	528
2016	5.00	2.44	0.8971	4.49	10.00	9.31	5,694	3,383	436	391
2017	5.00	2.87	0.8561	4.28	5.00	4.75	2,908	1,794	304	261
2018	5.00	3.22	0.8141	4.07	0.00	0.00	0	0	161	131

Total Charge	5,210
Economic Premium	64,462
Nominal Premium	100,000
Implied Commission	**35.54%**
Expected Contract Commission	**35.92%**
Actual Economic Premium	64,077

pwc

Profit Split Method

	Ceding Company	Assuming Company
Premium	100,000	100,000
Expenses	(60,000)	N/A
Expected Commission	35,923	(35,923)
Expected Losses	(59,252)	(59,252)
Margin	16.7%	4.8%
After Tax Margin	11.3%	4.8%