Risk Transfer Basics

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Risk Transfer and Attestation

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Outline

- Accounting Rules
- Theory of Risk Transfer
- Examples

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Accounting Rules (1)

- FASB 113 (Dec 1992), paragraph 9
  - Applies to "short-duration" reinsurance contracts
  - Insurance risk comprises both amount and timing of loss
  - Reasonable possibility of significant loss to reinsurer, according to discounted cash flows (e.g., "10/10" rule)
- EITF 93-6 ("Emerg Issue Task Force": May 1993)
  - Guidance on multi-year contracts
  - Funded CAT covers: must accrue future premiums
  - Criteria for "short-duration" SEC may challenge short-duration when longer than three years.

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Accounting Rules (2)

- SSAP 62 ("Stmt Stat Acct Prin": Jan 2001)
  - Usually agrees with FAS
  - 9-month rule: late-executed contracts deemed retroactive
  - Balance-sheet/income-statement differences from FAS
- IFRS 4 ("Intl Fin Rpt Std": March 2004)
  - Requires "unbundling" in certain cases; i.e., separating deposit and insurance features, aka bifurcation.
- Recent Developments (2005-2006)
  - General Interrogatory "Attestation Supplement" (CEO/CFO)
  - Moriarty: Deposit-account dollar-trading at 90th percentile
  - FASB seeks comments on bifurcation (May 2006)
  - ASB Risk-Transfer ASOP proposed (Aug 2006)

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Theory of Risk Transfer

- Insurance versus Finance
- Diversification and Insurance Risk
- Bernoulli Risks and Dollar-Trading
- Qualitative Judgment
- Bifurcation

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Insurance Versus Finance (1)

- Finance: Stochastic funding **F** (pre or post) equals the present value of loss **L**
- Insurance: Paying non-stochastic premium **P** (aka, margin) to one who will pay loss **L** (e = expense, π = profit)
- Mixture

$$PV[\boldsymbol{F}] = PV[\boldsymbol{L}]$$
$$PV[\boldsymbol{P}] = E[PV[\boldsymbol{L}]] + e + \pi$$
$$PV[\boldsymbol{F} + \boldsymbol{P}] = PV[\boldsymbol{L}_f] + E[PV[\boldsymbol{L}_i]] + e_i + \pi_i$$

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Insurance Versus Finance (2)

- Funding, before or after the loss:
  - Prefunding/Saving: pay too much up front, get money back
  - Postfunding/Borrowing: pay too little up front, must pay more later

- Is the following deal insurance or finance?
  - Pay \$100 on 1/1/AY. We'll deposit it in an account at 5% p.a. From it we'll cover your AY losses until the account zeroes.
  - Would a commutation clause change the answer? (i.e., any money unspent is yours)

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Diversification and Insurance Risk

- x/y risk-transfer criterion (x% chance of y% underwriting loss):

  $Prob[\text{CombRatio} \geq 100\%+y\%] \geq x\%$
- With *TCR* and *PLR* can be made equivalent to:
- $Prob[L \geq E[L] + z \times E[L]] \geq x\%$
- If n IID exposure units, $Std[L] \propto sqrt(n)$
- By Law of Large Numbers: $\underset{n\to\infty}{plim}\dfrac{L}{E[L]}=1$

- Diversification (apart from correlation and parameter uncertainty) eventually will fail any x/y criterion (space or time diversification)

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Bernoulli Risks and Dollar Trading

- Bernoulli loss L: probability p of \$$x$ loss
  - Risk is truly transferred except when p equals 0 or 1.
  - As $p \to 1$, premium (with expenses) might exceed x.
  - Can there be any limit on expected profit π?

- Add amount $c > 0$: $M = c + L$. **Is c financed and L insured?**

- If $Prob[L \geq c] = 1 - \varepsilon$ (Moriarty suggests 90%), then amount c is "dollar-traded."

- Should we deny risk transfer to dollars traded? **No**, since:
  - Most quota-share contracts dollar trade; zero loss is impossible.
  - Diversification: for $k < 1$, $\underset{n\to\infty}{lim}\,Prob[L \geq kE[L]]=1$

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Qualitative Judgment

- Common Implication: "Paying too much for risk transfer destroys risk transfer." Does this make sense?
  - Would paying too little for RT destroy RT?
  - "Paid way too much for my car!" Did I actually buy it?
  - "Got a great deal on my car!" Did I actually buy it?

- **Truth**: *Constant premium for stochastic loss indicates risk transfer, even if the premium is outrageously high or low.*
  $\Rightarrow$ Profit varying –1-to-1 with loss indicates risk transfer, even if profit never changes sign. (cf. deal on slide 8)

- Corollary: Qualitative analysis, rather than quantitative.
  - Optimism not damaging: "We can't lose on this deal!"
  - Scenarios without subjective probabilities
  - "Is Poisson frequency 0.7 or 1.0?" "Mean severity \$100k or \$125k?" Critical for pricing, unrealistic/irrelevant to risk-transfer analysis.

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Bifurcation

- Making a comeback (IFRS, FASB, slide 5)

- Explains common contract provisions, e.g.:
  - Retrospective rating
  - Additional premiums
  - Sliding-scale commissions
  - Profit commissions / Deficit paybacks

- Not impractical; arguably more workable than alternatives

- Remaining problem:

  After contract bifurcated, how much financing should be ignored? Is 20% financial OK. How to measure the Ins/Fin relativity?
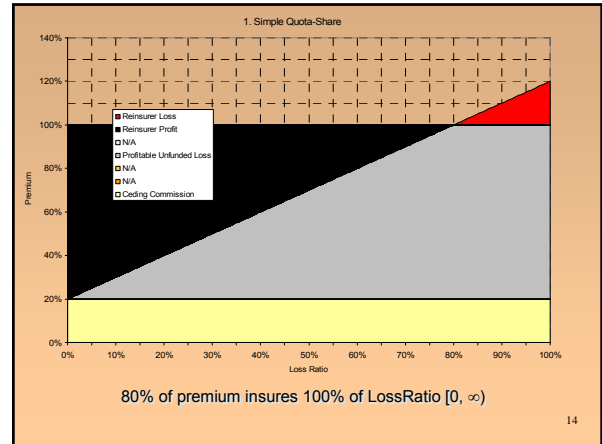
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Examples

1. Simple Quota-Share

2. QS with 100% Profit Commission

3. QS with 100% PC and 100% DeficitPayback

4. QS with 80% PC and 40% DP

  - Time value of money ignored. It would curve the lines, but would not affect the form of the charts (areas isomorphic)
  - Sliding-scale commissions, as well as non-proportional contracts can be accommodated to the following diagrams
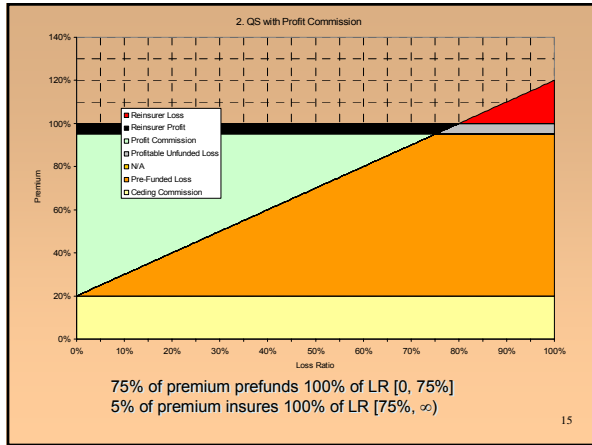
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Slide 13 — Example Inputs

Example Inputs

Name	1 Simple Quota-Share	2. QS with Profit Commission	3. QS with Profit&Deficit Provision	4. QS with Partial Profit&Deficit Provision
Ceding Commission	20%	20%	20%	20%
Reinsurer Margin	5%	5%	5%	5%
Profit Commission		100%	100%	80%
Deficit Payback			100%	40%

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Slide 14 — 1. Simple Quota-Share

1. Simple Quota-Share

Legend: Reinsurer Loss, Reinsurer Profit, N/A, Profitable Unfunded Loss, N/A, N/A, Ceding Commission

80% of premium insures 100% of LossRatio [0, ∞)

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Slide 15 — 2. QS with Profit Commission

2. QS with Profit Commission

Legend: Reinsurer Loss, Reinsurer Profit, Profit Commission, Profitable Unfunded Loss, N/A, Pre-Funded Loss, Ceding Commission

75% of premium prefunds 100% of LR [0, 75%]
5% of premium insures 100% of LR [75%, ∞)

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Slide 16 — 3. QS with Profit&Deficit Provision

3. QS with Profit&Deficit Provision

Legend: N/A, Reinsurer Profit, Profit Commission, N/A, Post-Funded Loss, Pre-Funded Loss, Ceding Commission

75% of premium prefunds 100% of LR [0, 75%]
Contingent premium postfunds 100% of LR [75%, ∞)
5% of premium insures ∅

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Slide 17 — 4. QS with Partial Profit&Deficit Provision

4. QS with Partial Profit&Deficit Provision

Legend: Reinsurer Loss, Reinsurer Profit, Profit Commission, Profitable Unfunded Loss, Post-Funded Loss, Pre-Funded Loss, Ceding Commission

60% of premium prefunds 80% of LR [0, 75%]; 15% insures 20%
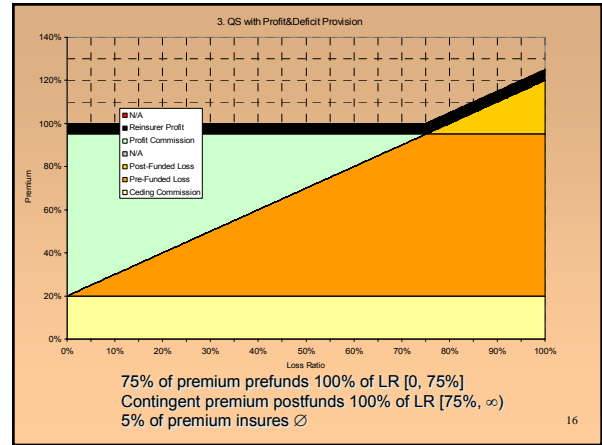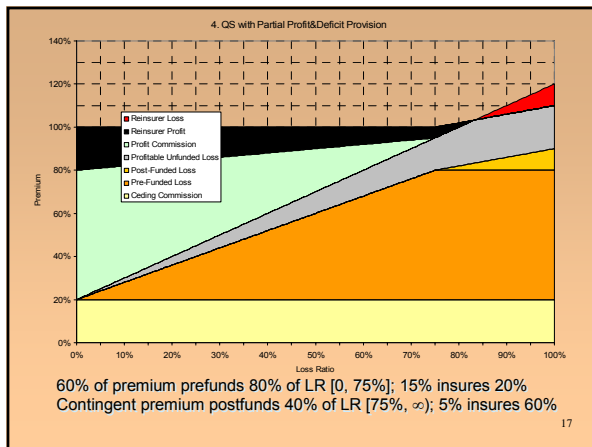Contingent premium postfunds 40% of LR [75%, ∞); 5% insures 60%

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Slide 18 — References

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