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# An Introduction to Finite Reinsurance / Risk Transfer Issues

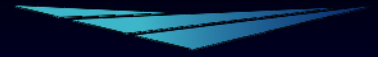
**Caribbean Actuarial Association**

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# Agenda

- Introduction and History
- Overview of Finite Structures
- Risk Transfer Analysis
- Recent Developments



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# Introduction and History

# Roles of Reinsurance

- Reinsurance can be purchased for one or many different reasons
  - Financing
  - Capacity
  - Stabilization
  - Catastrophe Protection
- *Ideally*, does not change underlying nature of the business being reinsured
- Spreads insured risks to additional parties

## Timeline

- 1985-86: Hard market, pollution exclusion
- Late 1980's: Market shows signs of softening
  - Reinsurers are looking for ways to cap their exposure
- 1989-90: Centre Re is formed
  - “In exchange for putting a limit on our liability, we offer our clients the possibility of sharing in the profitability of the contract” Centre Re 1989 Annual Report
- 1992
  - Hurricane Andrew
  - FAS113 is adopted



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# Overview of Finite Structures

# Key Characteristics

- Risk Aggregation
  - Multi-line
  - Multi-year
- Limit of Liability
  - Protects reinsurer
- Time Value of Money
- Profit Sharing
  - Experience account
  - Additional premiums

# Examples of Finite Structures

- Retroactive Reinsurance
  - Loss Portfolio Transfer (LPT)
  - Adverse Loss Development Cover (ALDC)
- Prospective Reinsurance
  - Finite Quota Share
  - Aggregate Excess of Loss (Stop Loss)
  - Traditional contracts with varying degrees of “finite” features
  - Combination of coverage

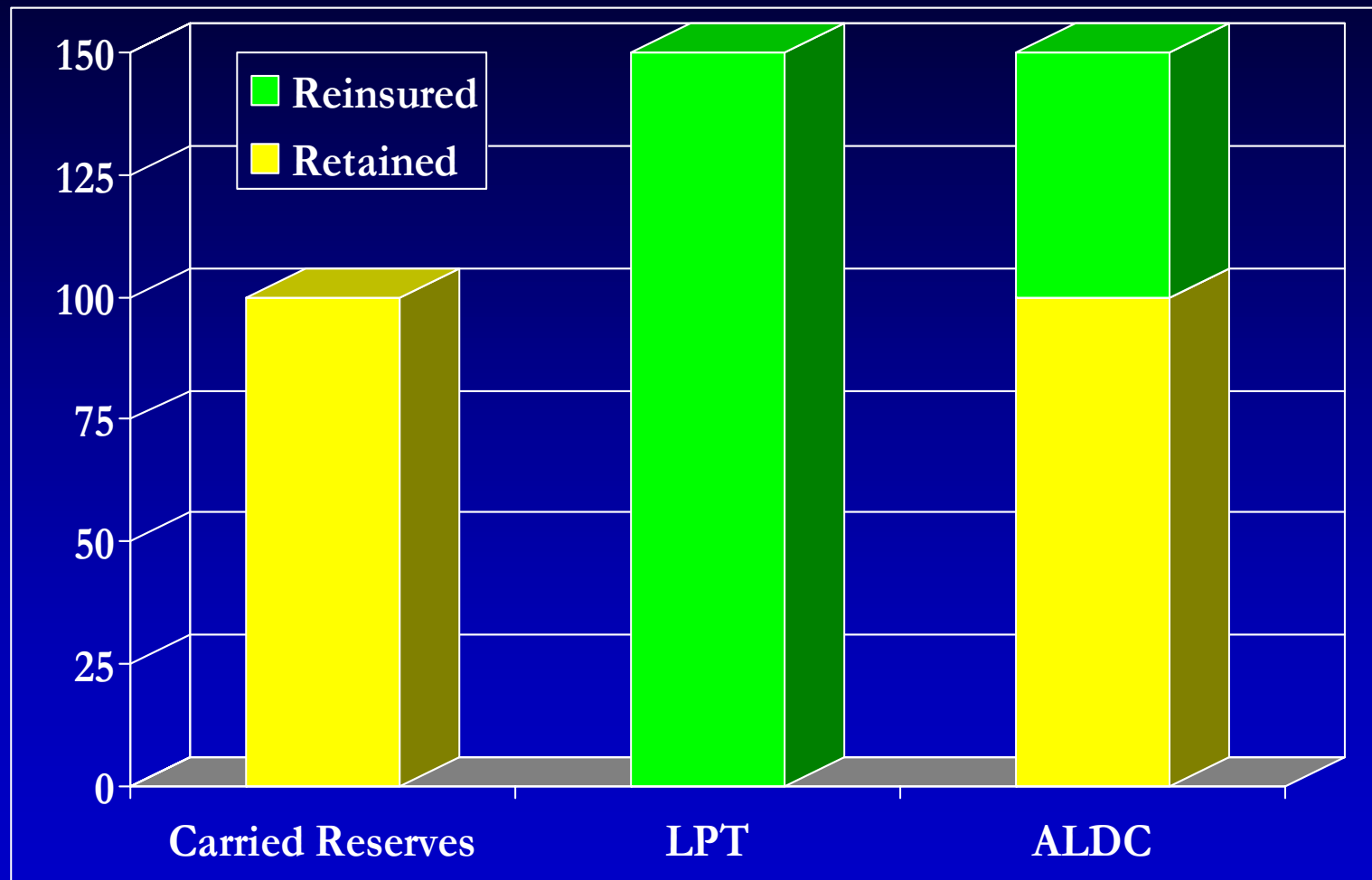
## Finite Contract Provisions

- Experience accounts
- Retrospectively Rated
- Profit commissions
- Aggregate limits
- Loss ratio corridors
- Cancellation provisions
- Delays in payments
- Adjustable premium, limit or commission
- Side agreements (verbal or contractual)
- Primary purpose is to manipulate financial statements

## Retroactive Reinsurance – Basics

- Reinsurer accepts ceding company's reserve uncertainty in exchange for a fixed premium
- Pricing based on:
  - Reserve level
  - Expected payment pattern of reserves
  - Variability of reserves and payment pattern
  - Expected interest rate
  - Reinsurer's capital costs and risk margin

# Retroactive Reinsurance - Schematic



# Loss Portfolio Transfer

- Contract provisions
  - Aggregate limit
  - Experience account refunds
  - Commutation provisions
- Benefits
  - “Transfer” existing reserves to reinsurer (reduce reserve leverage)
  - May protect from adverse development
  - Establish “fixed” current price for uncertain future reserves to a certain level

## Loss Portfolio Transfer Example

- Premium = \$120 million
- Limit = \$150 million
- Reinsurer's Margin = 3.0% (\$3.6 million)
- Crediting Interest Rate = 2.0%
- Experience account refund @ commutation =  
Premium - Margin - Losses + Interest

# Adverse Loss Development

- Contract provisions
  - Aggregate limit
  - Possible experience account refunds
  - Commutation provisions
- Benefits
  - Protection from adverse development
  - Establish “fixed” current price for uncertain future reserves to a certain level

## Adverse Loss Development Example

- Premium = \$40 million
- Limit = \$50 million excess of \$100 million
- Reinsurer's margin = 5.0% (\$2.0 million)
- Crediting Interest Rate = 2.5%
- Experience account refund @ commutation =  
Premium - Margin - Losses + Interest

## Finite Quota Share

- Reinsurer accepts percentage of cedant's premiums and losses in exchange for ceding commission
- Contract Provisions
  - Sliding scale commission
  - Loss ratio corridor
  - Aggregate limit

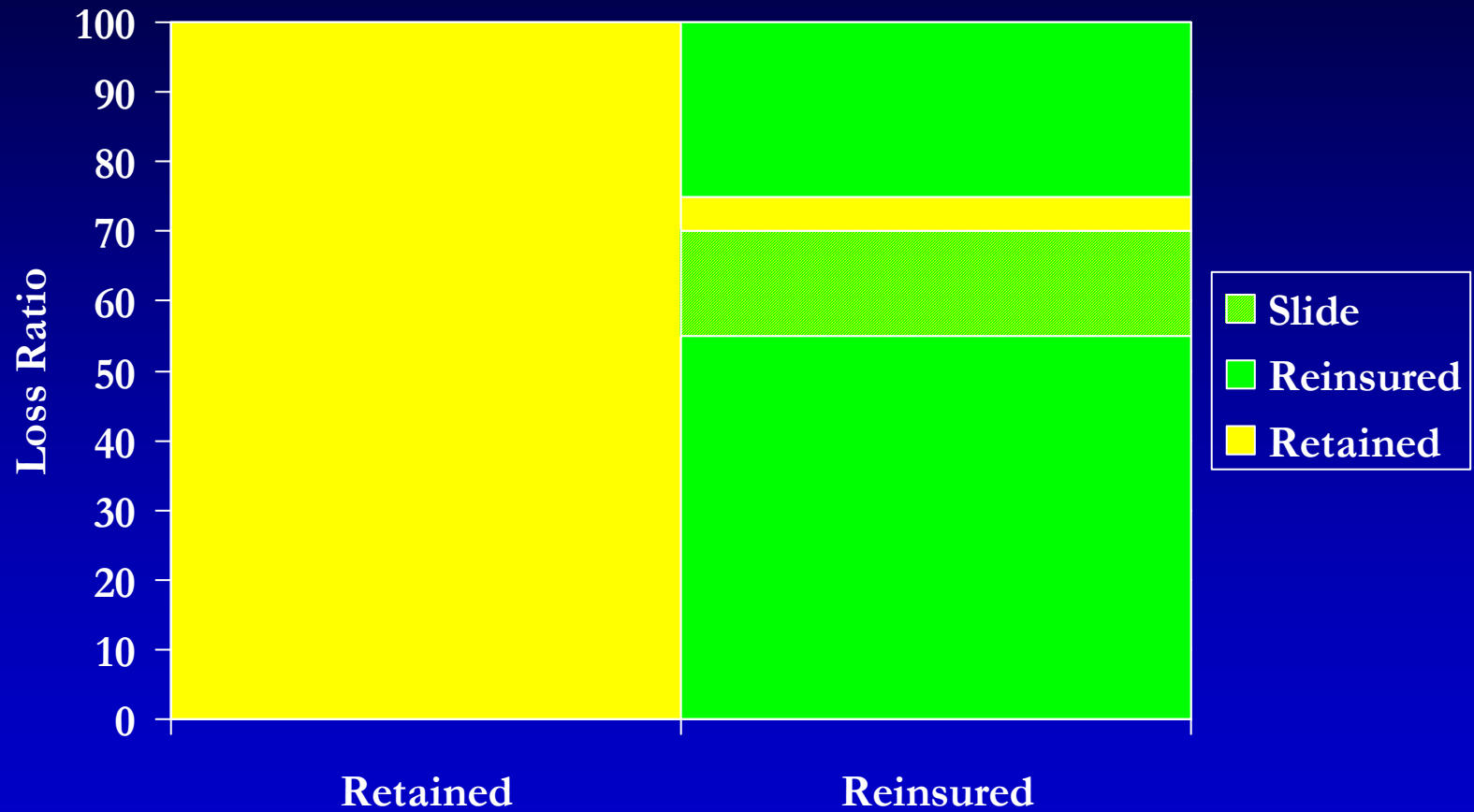
# Finite Quota Share

- Pricing based on:
  - Expected loss ratio
  - Size of slide, corridor and aggregate limit
  - Reinsurer's capital charge
- Benefits
  - Surplus relief from ceding commission
  - "Transfer" premium to reinsurer (reduce premium leverage)

## Finite Quota Share Example

- Provisional ceding commission = 35%  
minimum = 25% @ 70% loss ratio  
maximum = 40% @ 55% loss ratio
- Loss corridor between 70% and 75% loss ratio
- Reinsurer's margin = 5% between 55% loss ratio and 75% loss ratio
- Aggregate Limit = 100% loss ratio

# 50% Finite Quota Share Example



# Aggregate Excess of Loss

- Reinsurer provides corridor of protection over cedant's expected results in exchange for fixed premium
- Contract Provisions
  - Aggregate limit
  - Experience account refunds

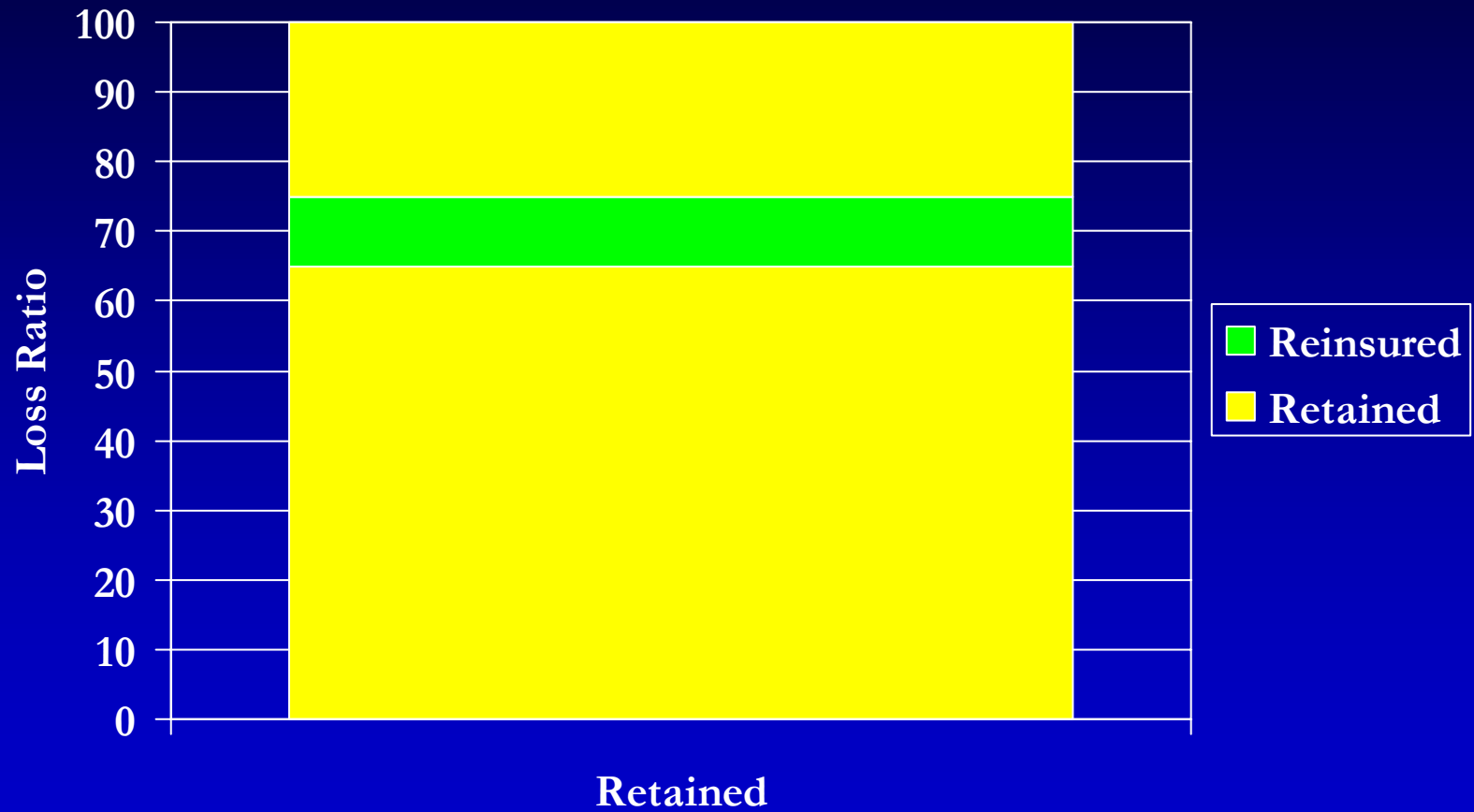
# Aggregate Excess of Loss

- Pricing based on:
  - Expected loss ratio results
  - Variability of loss ratio
  - Size of experience account refund
  - Interest rates
- Benefits
  - Aggregate protection of underwriting results

## Aggregate Excess of Loss Example

- 10 loss ratio points in excess of a 65% loss ratio (maximum of \$9 million)
- Maximum subject premium = \$90 million
- Reinsurance premium = \$6 million
- Reinsurer's Margin = 10.0% (\$600,000)
- Crediting Interest Rate = 2.5%
- Experience account refund @ commutation =  
Premium - Margin - Losses + Interest

# Aggregate Excess of Loss Example

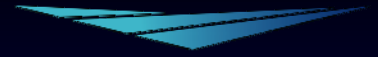


## Traditional and Combination Coverage

- Many “traditional” reinsurance contracts include “finite” features:
  - Corridors, Aggregate limits, Adjustable commissions, etc.
- Some finite contracts include traditional coverage to add risk
  - finite quota share
  - excess occurrence (cat) coverage

# Buyer Motivations

- Portfolio effect
- Economics of long-tail business
- Risk retention
- Traditional reinsurance availability
  - Reasonable prices
  - Profitability of underlying book
- Growth/Exit



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# Risk Transfer Analysis

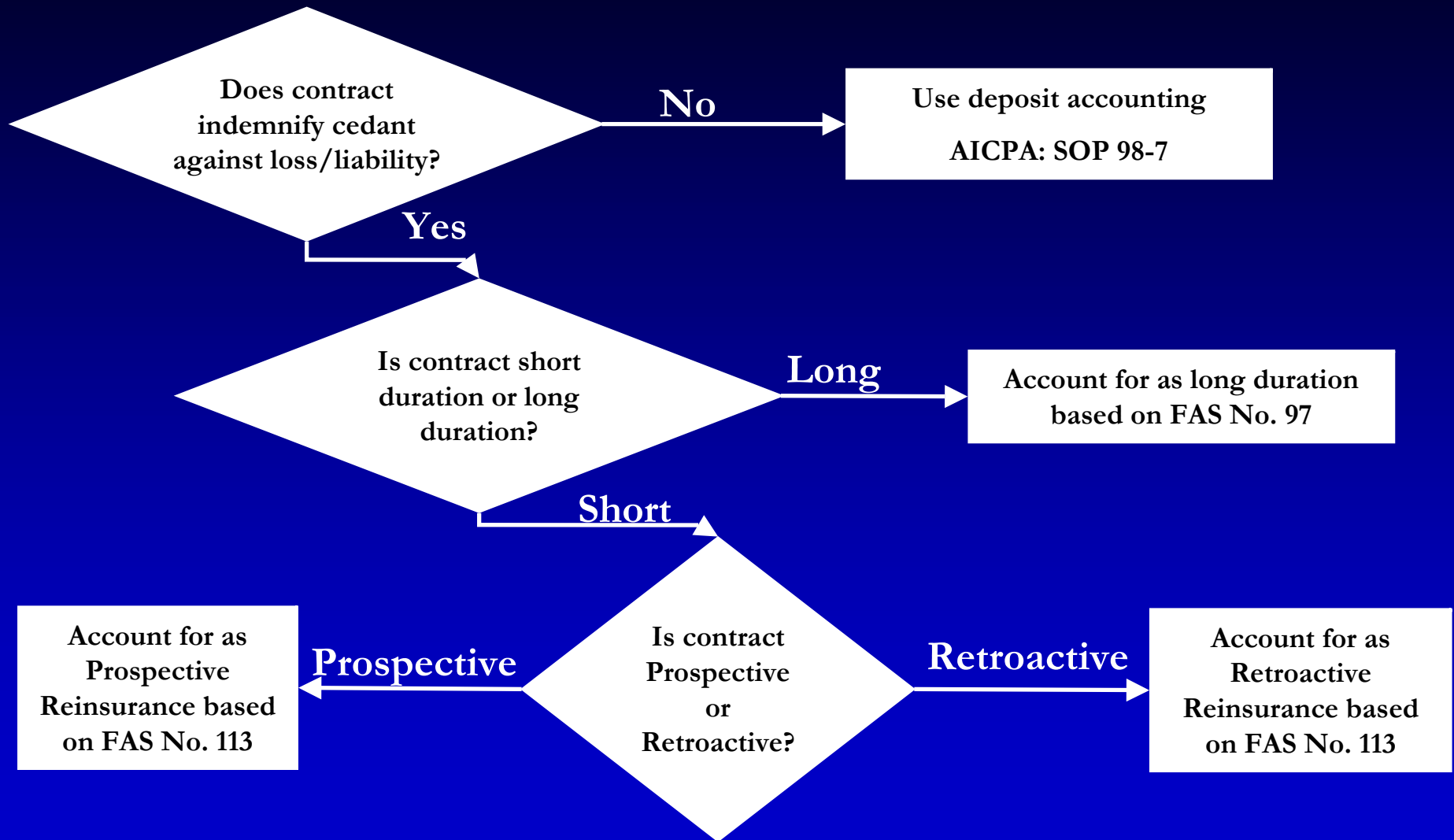
# Reinsurance Accounting

- Statement of Financial Accounting Standards 113  
(US GAAP)
- Statement of Statutory Accounting Principles 62  
(US SAP)

Both outline determination of whether contract is reinsurance and if so, the appropriate accounting treatment

- Financial Services Authority
  - After analysis, proposals for the future supervision and reporting of financial engineering
- European Union
  - Reinsurance Directive

# SFAS 113 (& SSAP 62) Decision Tree



## What Does FAS 113 and SSAP 62 Define?

- Does not define:
  - Significant insurance risk
  - Reasonably possible
  - Remote
- Does define:
  - cash flows evaluated must be those between reinsurer and reinsured, therefore excluding:
    - Reinsurance brokerage
    - Internal expenses
    - Cost of investment funds (transferred vs. withheld)

## Steps to Evaluating Risk Transfer

- Does contract transfer “substantially all insurance risk?”
  - Is literally all of the risk transferred?
  - No caps on reinsurers downside risk
  - Limited corridors, sliding scale commissions
  - Timely reimbursements
  - For example: pure quota share contracts
- If so, then no need to test risk transfer since it is assumed to exist
- If not, then must test risk transfer

## What Types of Risks are Considered

- Underwriting
  - Underlying uncertainty of insurance liabilities
- Timing
  - Uncertainty of when claims will occur and need to be paid
- Parameter (model) risk
  - Uncertainty associated with picking the wrong parameters in the model
- **Interest rate risk - changes in interest rate over life of contract - NOT CONSIDERED**

## Prospective versus Retroactive

- Prospective – assumption of future events
- Retroactive – assumption future risks related to past events
- Contract having both elements must be accounted for separately or as retroactive
- Retroactive also includes:
  - Claims-made reinsurance of occurrence insurance
  - Prospective reinsurance not finalized within nine months of inception

## Indemnification Against Loss

- Reinsurer assumes significant insurance risk under reinsured portions of the underlying insurance contracts
- It is reasonably possible that the reinsurer may realize a significant loss from the transaction
  - Risk must not be remote with regard to timing and amount
  - Measured using present value of cash flows
  - Actuarial analysis required

## Evaluation of Risk Transfer

- Present value of all cash flows under reasonably possible outcomes (premiums, losses & commissions)
- No regard to how cash flows are characterized
- Present values of all cash flows should be taken utilizing a single duration matched treasury yield rate
  - Same interest rate for all tested outcomes
- The “duration” can be reflective of the time between premium receipts and loss payment
- Denominator needs to reflect present value of gross premium (neither ceding commission nor brokerage may not be netted out)

# Approaches used to Evaluate Risk Transfer

- 10%-10% rule
  - 10% chance of a loss to the reinsurer of at least 10% of the present value (PV) of premium
- Worst year of ceding company experience in last 10
- Supplement with industry experience
- Variations of 10%-10%:
  - 5%-20%
  - 20%-5%

## Weaknesses of Methods

- Value-at-Risk (VaR) method at 90% ( $VaR_{90\%} \geq 10\%$ )
- Only reflects severity of losses at one point on probability distribution and ignores all other information in the tail
- Fails low frequency/high severity contracts (e.g., catastrophe covers)
- Fails some high frequency/low severity contracts (e.g., non-standard automobile)
- Deems acceptable those contracts engineered to “pass the test”

**What method should be used?**

## Better Methods

- Tail VaR (TVaR) = mean severity of PV (underwriting loss) at and beyond 90<sup>th</sup> percentile
  - Suggested by 2002 CAS VFIC paper
- Expected Reinsurer Deficit = probability of PV (underwriting loss) x average severity (ERD = Frequency x Severity, where the PV (u/w loss)  $\geq A$ )
  - Average severity = TVaR @ economic breakeven point
    - Suggested by CAS Risk Transfer Working Party 2005 with  $A = 1\%$ ? (Consistent with 10%-10% Rule)
- Why is ERD preferred?
  - Reflects full right tail risk in severity definition
  - Replaces separate Frequency and Severity requirements into single integrated measure

# Performing the Risk Transfer Test

- Deterministic vs. stochastic model?
- Model all cash flows between ceding and assuming company
  - Premiums
  - Losses
  - Commissions
  - Maintenance fees
  - Commutation payments
  - Experience refunds
  - Funds withheld

# Required Assumptions and Variability Estimates

- Premium payment
- Loss Amount (Amount)
- Parameter Risk (Amount)
- Loss Payment Pattern (Timing)
- Discount Rate (Risk free interest)

## Example Contract

- 40% Finite Quota Share of \$250 million book of business
- Gross premium = \$100 million
- Provisional ceding commission = 30%
  - Sliding from 30% to 40% @ loss ratio between 60% & 50%
- Corridor between loss ratio of 60% and 65%
- Loss ratio cap = 110%
- ELR = 60%
- Distribution of Loss Ratio = Lognormal (mean=60%, standard deviation.=18%)
- Parameter Risk
  - $\mu$  of 60% ~ Normal (60%,6%)
  - $\sigma$  of 18% ~ Normal (18%,1.8%)
- Payout Pattern variability (Uniform distribution  $\pm$  40%)

## Example: Cash flows at expected values

Calendar Quarter	Premiums	Losses	Commissions	Reinsurer Cash Flows	Discount Rate at 3%	Discounted Reinsurers Cash Flows
1Q2005	25,000	600	7,500	16,900	0.996	16,838
2Q2005	25,000	1,500	7,500	16,000	0.989	15,824
3Q2005	25,000	3,300	7,500	14,200	0.982	13,940
4Q2005	25,000	5,100	7,500	12,400	0.974	12,083
1Q2006	0	6,300	0	-6,300	0.967	-6,094
2Q2006	0	7,200	0	-7,200	0.960	-6,913
3Q2006	0	7,200	0	-7,200	0.953	-6,862
4Q2006	0	6,900	0	-6,900	0.946	-6,528
1Q2007	0	6,300	0	-6,300	0.939	-5,916
2Q2007	0	5,400	0	-5,400	0.932	-5,034
3Q2007	0	4,200	0	-4,200	0.925	-3,886
4Q2007	0	3,000	0	-3,000	0.919	-2,756
1Q2008	0	1,800	0	-1,800	0.912	-1,641
2Q2008	0	900	0	-900	0.905	-815
3Q2008	0	300	0	-300	0.898	-270
4Q2008	0	0	0	0	0.892	0
Total	100,000	60,000	30,000	10,000		11,970
Disc. Total	98,536	57,006	29,561	<b>Reinsurer Profit as a % of Disc. Prem. = 12.1%</b>		

## Example: Stressed cash flows (80% loss ratio)

Calendar Quarter	Premiums	Losses	Commissions	Reinsurer Cash Flows	Discount Rate at 3%	Discounted Reinsurers Cash Flows
1Q2005	25,000	880	7,500	16,620	0.996	16,559
2Q2005	25,000	2,195	7,500	15,306	0.989	15,137
3Q2005	25,000	4,806	7,500	12,694	0.982	12,462
4Q2005	25,000	7,377	7,500	10,123	0.974	9,864
1Q2006	0	9,022	0	-9,022	0.967	-8,727
2Q2006	0	10,176	0	-10,176	0.960	-9,770
3Q2006	0	9,962	0	-9,962	0.953	-9,495
4Q2006	0	9,309	0	-9,309	0.946	-8,807
1Q2007	0	<b>6,273</b>	0	-6,273	0.939	-5,891
2Q2007	0	<b>3,764</b>	0	-3,764	0.932	-3,509
3Q2007	0	5,009	0	-5,009	0.925	-4,635
4Q2007	0	3,336	0	-3,336	0.919	-3,064
1Q2008	0	1,853	0	-1,853	0.912	-1,690
2Q2008	0	835	0	-835	0.905	-756
3Q2008	0	201	0	-201	0.898	-180
4Q2008	0	0	0	0	0.892	0
Total	100,000	75,000	30,000	-5,000		-2,505
Disc. Total	98,536	71,481	29,561	<b>Reinsurer Profit as a % of Disc. Prem. = - 2.5%</b>		



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## Recent Developments

## Statutory Accounting Principles

- National Association of Insurance Commissioners new Disclosure Requirements: Reinsurance Attestation Supplement 20 -1
  - Adopted for 2005 financial statements
  - Require report on contract terms and management objectives of any finite reinsurance agreement that has the effect of altering surplus by more than 3%
  - Requires CEO & CFO to sign an attestation that there are no side agreements and that risk transfer has occurred based on reasonable expectations

## Other Bodies

- American Academy of Actuaries Risk Transfer Testing Practice Note
  - Advisory, non-binding guidance to general insurance actuaries regarding testing for risk transfer
- Financial Services Authority
  - After analysis, proposals for the future supervision and reporting of financial engineering
- European Union
  - Reinsurance Directive
    - Member states have until 2007 to implement
    - Contains discrete provisions relating to finite Re

## More Information.....

- American Academy of Actuaries – [www.actuary.org](http://www.actuary.org)
  - Risk Transfer Testing Practice Note
  - *“Risk Transfer in P&C Reinsurance: Report to the Casualty Task Force of the National Association of Insurance Commissioners”*
- Casualty Actuarial Society – [www.casact.org](http://www.casact.org)
  - CAS Valuation, Finance and Investments Committee, *“Accounting Rule Guidance Statement of Financial Accounting Standards No 113 – Considerations in Risk Transfer Testing”*