The Actuarial Profession
making financial sense of the future

GIRO conference and exhibition 2010
Allan Kaufman and Emiliano Ruffini

Equitas Part VII Business Transfer

© 2010 The Actuarial Profession • www.actuaries.org.uk

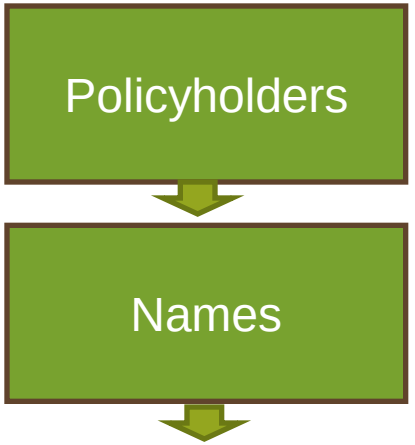
Overview

- The 2009 Part VII Transfer of Equitas presented numerous technical issues related to capital adequacy testing. Some these have Solvency II implications.
- We address two such issue today:
  - Risk of reserve inadequacy over annual time horizons
  - Use of Expected Policyholder Deficit on fat tailed distributions

Our Agenda

- Background on Equitas Transfer
- Liability Modelling
- Use of Expected Policyholder Deficit
- Solvency II implications (covered along the way)

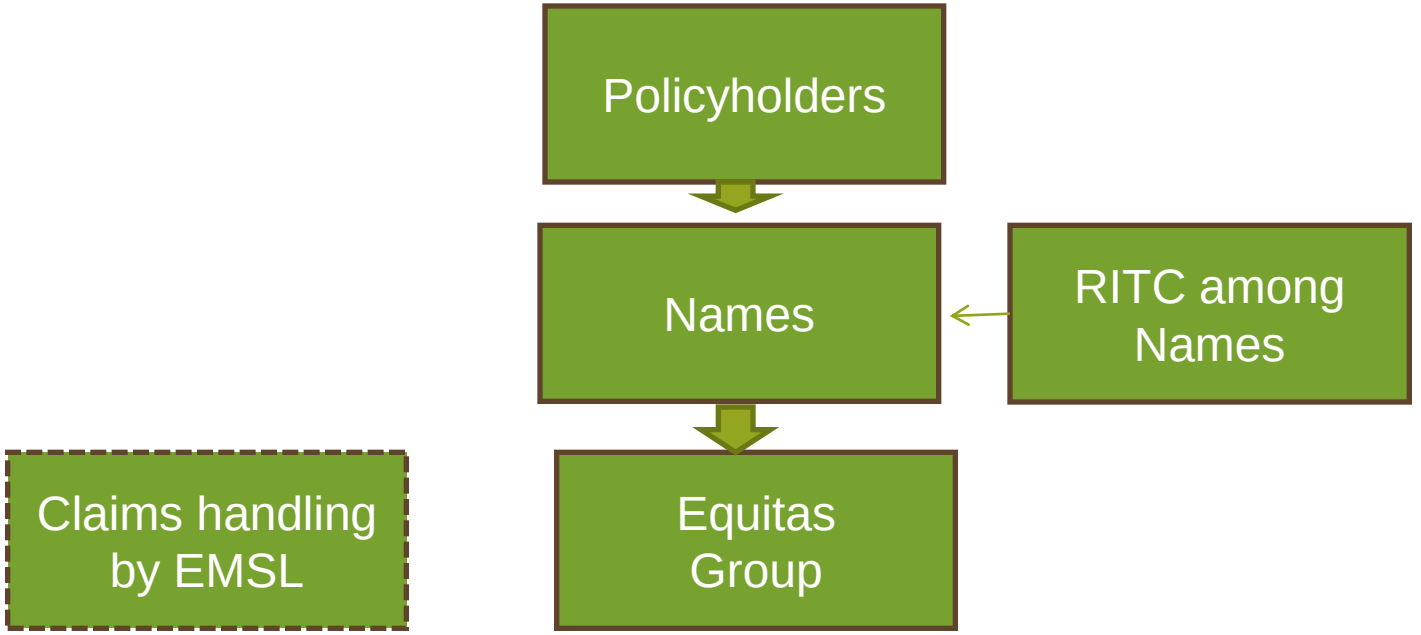
Lloyds' s prior to1992



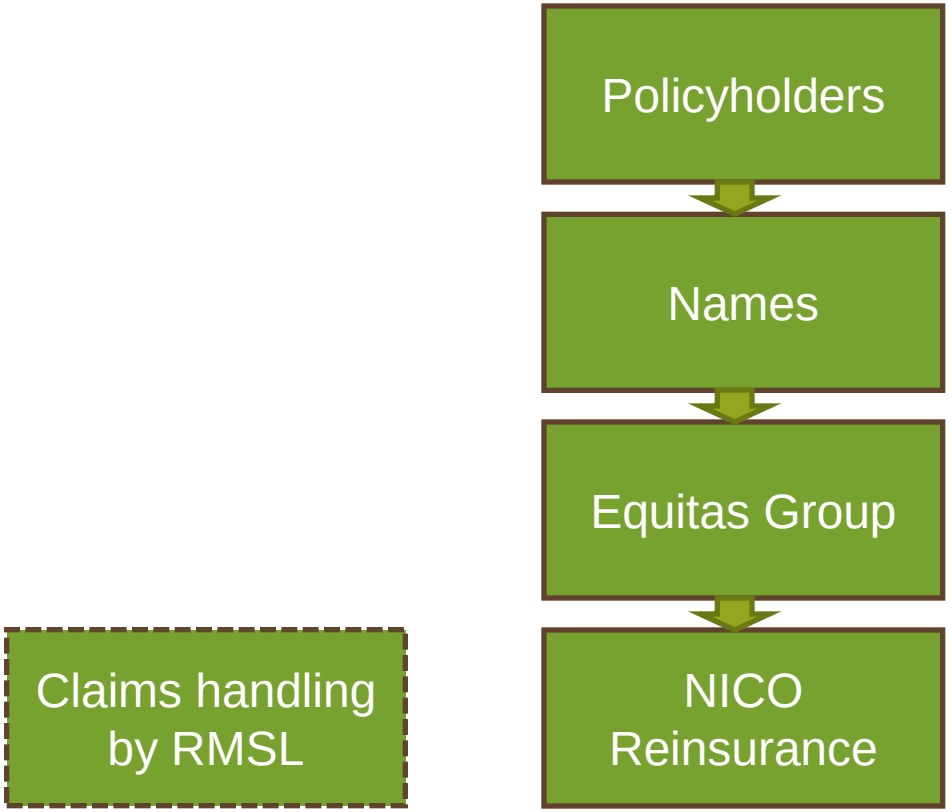
Claims handling by individual syndicates

Reinsurance to Close (RITC) arranged between Names in Closed Year Syndicates and Names in Open Year Syndicates (No joint or several responsibility)

Equitas - 1996

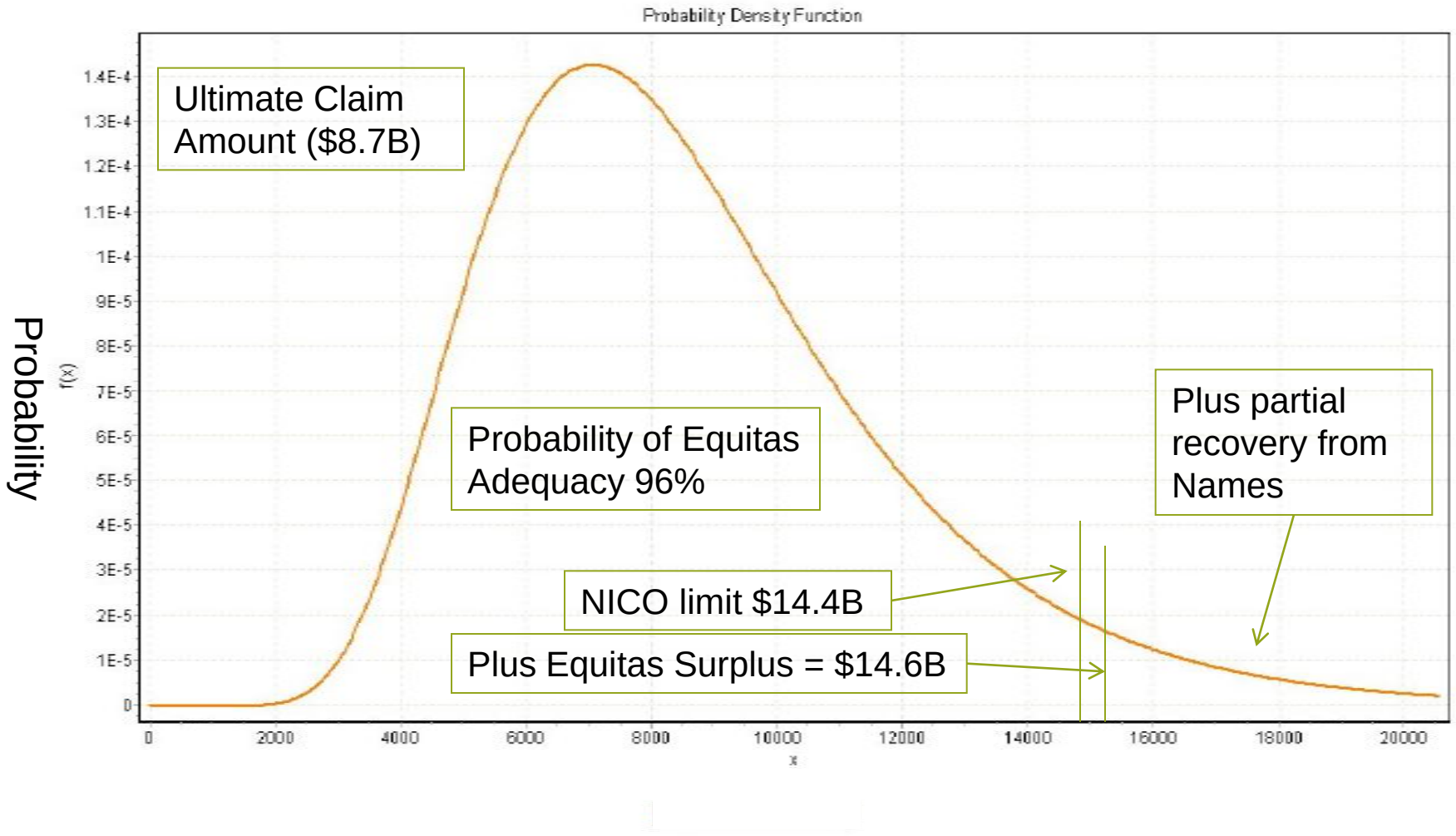


Equitas - 2007: Phase I Reinsurance – Pre-Transfer

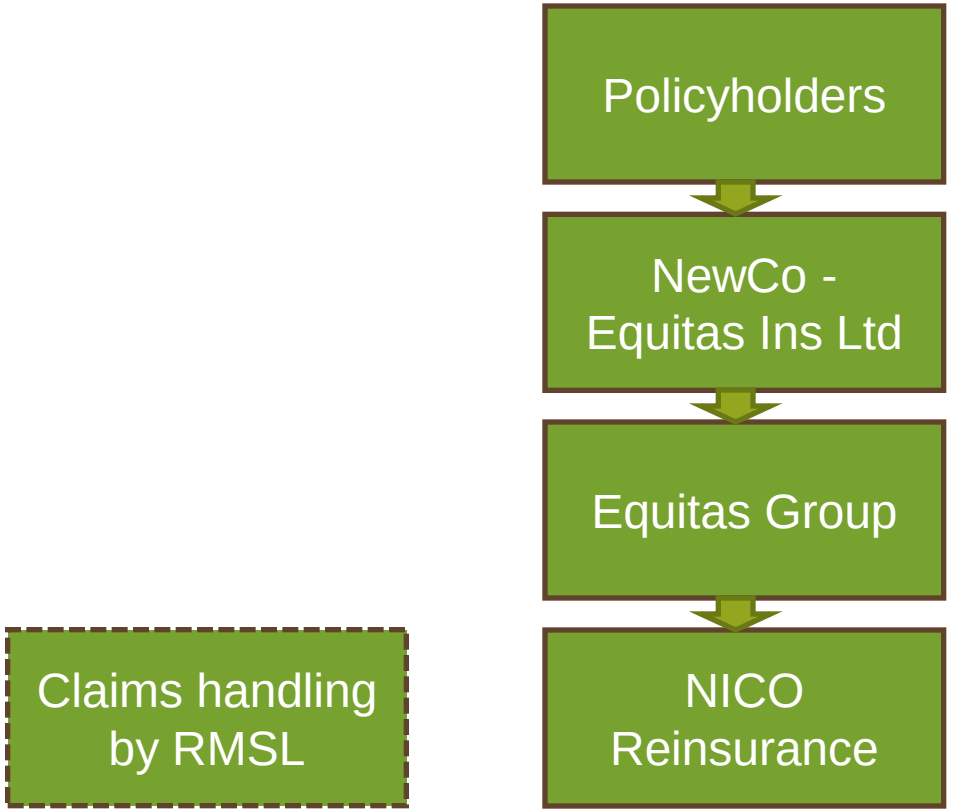


<← $5.7B XS liability at 31 March 2006;
Net of reinsurance;
Gross of discount

Equitas Position After Phase 1



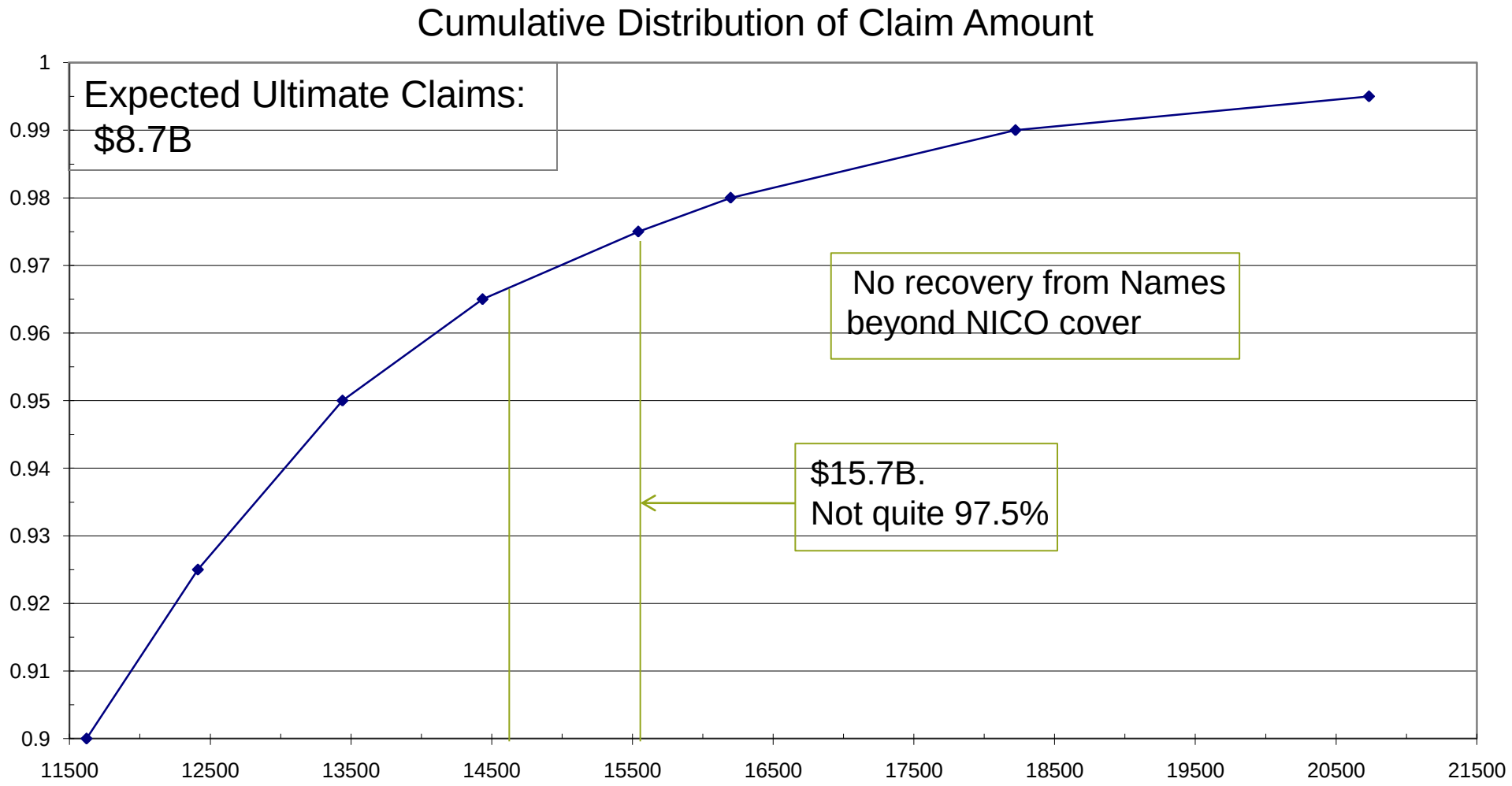
Equitas - 2009: Phase II NICO – Post Transfer



Names have no further responsibility under English law

← $7.0B ($5.7B+$1.3B) XS liability at 31 March 2006; Net of reinsurance; Gross of discount

Equitas Position After Phase 2



IE Analysis

- Normally –
  - Strength of Transferee and Transferor
- This case is different as neither (arguably) meets normal solvency standards
- Therefore, assess the extent to which policyholder position is better or worse as a result of the transfer
  - Is it ‘better’ on average?
  - Extent to which any group is worse off?

Winner and Losers – Key Variables

- Stochastic Model
  - Liability amount, timing of default, timing of payments

- Coverage Model (Shortfall given default)
  - Equitas Surplus (timing)
  - Recovery From Names
    - Mortality (timing)
    - Fragmentation (liability size, timing)

- Policyholder types
- Measurement Criteria
- Stress Testing – Liability and Other Assumptions

Liability Model – General Issues

Equitas liabilities particularly difficult to work with:

- Extremely long tail
- Timing and inflation
- Data limitations
- Many sources of material uncertainty, including
  - Judicial and legislative risk
  - Asbestos
  - And not only asbestos…
- On the other hand, outwards recoveries and asset returns somewhat less problematic

Liability Model – Modelling Issues

- Choices about modelling complexity:
  - Needed reliable output, including (especially) in the tail
  - While sufficiently simple, easy and fast to modify and run
  - Proportionate and fit for purpose
  - Policyholders security affected by timing and DIR/RI category but not by class of business
- Decided to simulate claims at aggregate not class level
- First step modelling and calibration of aggregate distribution from individual classes
- Then model through simulation emergence of uncertainty over time

Ultimate Loss Distribution

- Calibration of ultimate loss distribution arrived at in steps
  - Lognormal distributions fitted to individual classes (mean, 75th pct)
  - Aggregation using different correlation matrices
  - Compared to internal and external benchmarks
  - Also checked tail and probability of insolvency against risk analysis of potential drivers of extreme deterioration
- Inevitably, process heavily based on professional judgement

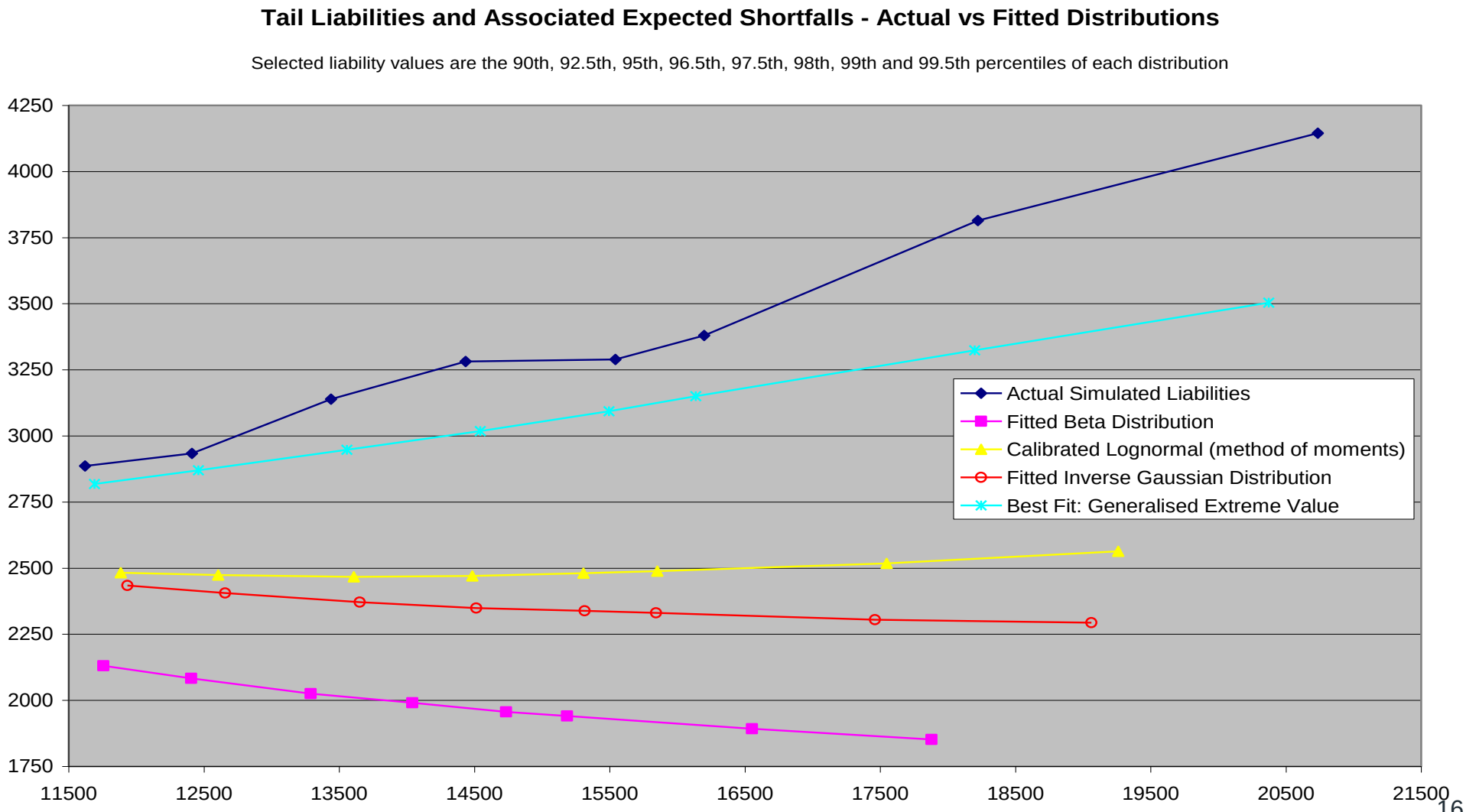
Liability Model – Stochastic Simulations

- Three sources of variability in the model:
  - Liability shocks (most important by far)
  - Inflation and
  - Randomly selected payment patterns
- Liability shocks as lognormal random walk (smoothed)
  - Annual shocks from constant lognormal, acting cumulatively on residual reserves and cashflows
  - Reflecting path dependence of impact of major drivers for long tail liability classes (e.g. legal and judicial change)
- Simple model, with residual reserves over time (essentially) unbiased estimate of future liabilities

Liability Model - Outcomes

- Model output –reserves and cashflows over 50 periods x 25,000 simulations
- Parameters chosen so that distribution of ultimate outcomes appropriately matched target distribution
  - Mean and coefficient of variation, but also checked other measures (higher percentiles, skewness, kurtosis)
- Ultimate (log) liabilities are weighted sums of annual shocks
- Difficult to study analytically
  - Checked actual best fit distribution (generalised extreme value, Frechet),
  - Looked at properties of excess shortfalls (E[X-x | X>x])
  - Found to be appropriately fat-tailed

Tail Liabilities – Excess Shortfalls



Annual and Ultimate Variability

- Simple model structure, easy to compare annual and ultimate variability
- Influenced by pattern of future payments
  - One extreme, pay all in year 1 (equal variabilities)
  - Other extreme, pay all in year 50 (ultimate variability of log reserves about 7 times higher than annual)
- Realistic cases somewhere in between
- In our model, variability of ultimate reserves at end of year 1 is about 40% of ultimate variability in year 50
- Implies year 1 97.5th percentile about 2/3 of year 50 ultimate, 99.5th percentile just over 50% of ultimate

Solvency II Perspective

Variability in "normal' case

- Bootstrapping driven by observed data
- Correlations at least in part based on actual data

Variability in Equitas Context

- Stochastically driven, rather than historical triangle driven
- Selected variabilities and correlations highly judgmental

Further aspects will be discussed in workshop

Winner and Losers – Key Variables

- Stochastic Model
  - Liability amount, timing of default, timing of payments

- Coverage Model (Shortfall given default)
  - Equitas Surplus (timing)
  - Recovery From Names
    - Mortality (timing)
    - Fragmentation (size, timing)

- Policyholder types
- Measurement Criteria
- Stress Testing - Liability and Other Assumptions

Policyholder Groups

- All Policyholders
- All Direct Policyholders
- All Reinsurance Policyholders
- Long-tail reinsurance Policyholders
- Long-tail direct policyholders

Measurement Techniques

- Probability that claims are paid in full
- If not paid in full, probability that policyholder is ‘better off’ vs. ‘worse off’
- Expected policyholder deficit

Evaluation Criteria

- “Not disadvantaged”
- Not materially disadvantaged
- Possibly materially disadvantaged

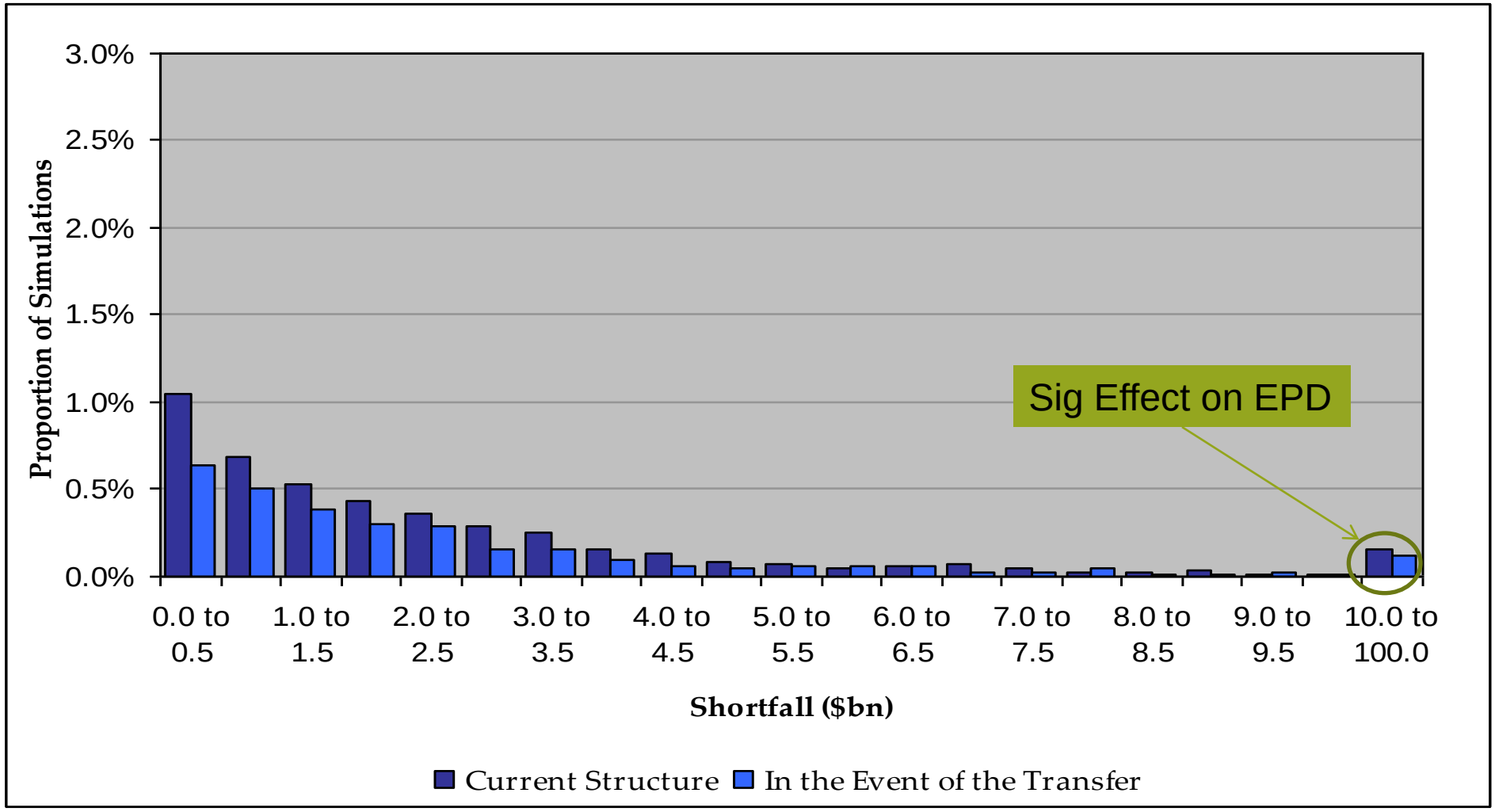
Evaluation Standards

PH Position	Better vs. Worse	Policyholder Deficit
Better off	Prob {Better} > Prob {Worse}	EPD ≤ 0%
Not Materially Disadvantaged	Prob {Worse} – Prob {Better} < 0.5% A “Solvency II standard”	Truncated EPD ≤0% Excluding 0.5% of the worst scenarios A “modified Solvency II standard”
Possibly Materially Disadvantaged	Greater differences	Greater differences

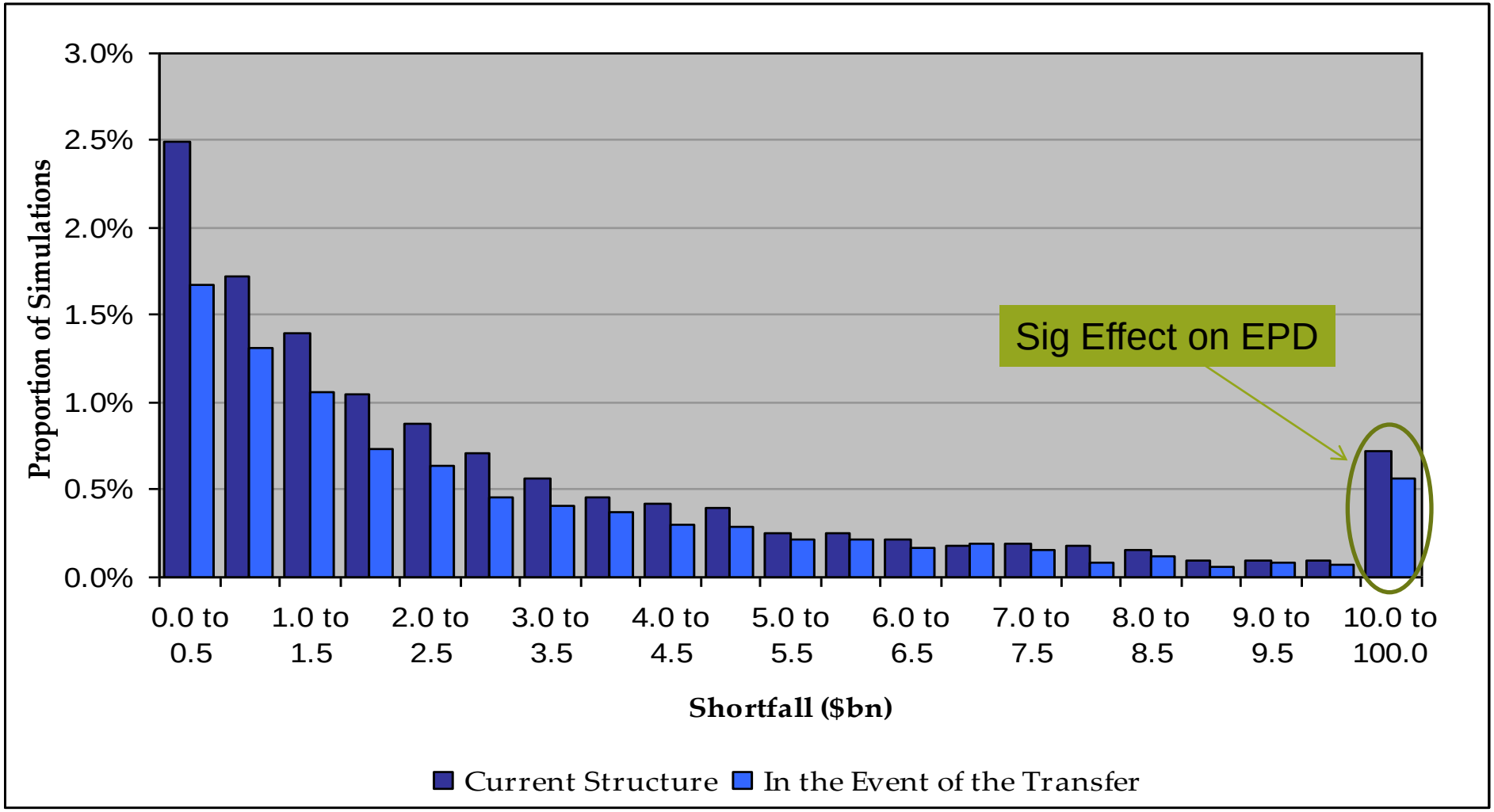
Variations in Assumptions

- Size of liability
  - Base mean vs. higher mean
  - Base variability vs. higher variability
  - Higher mean and higher variability

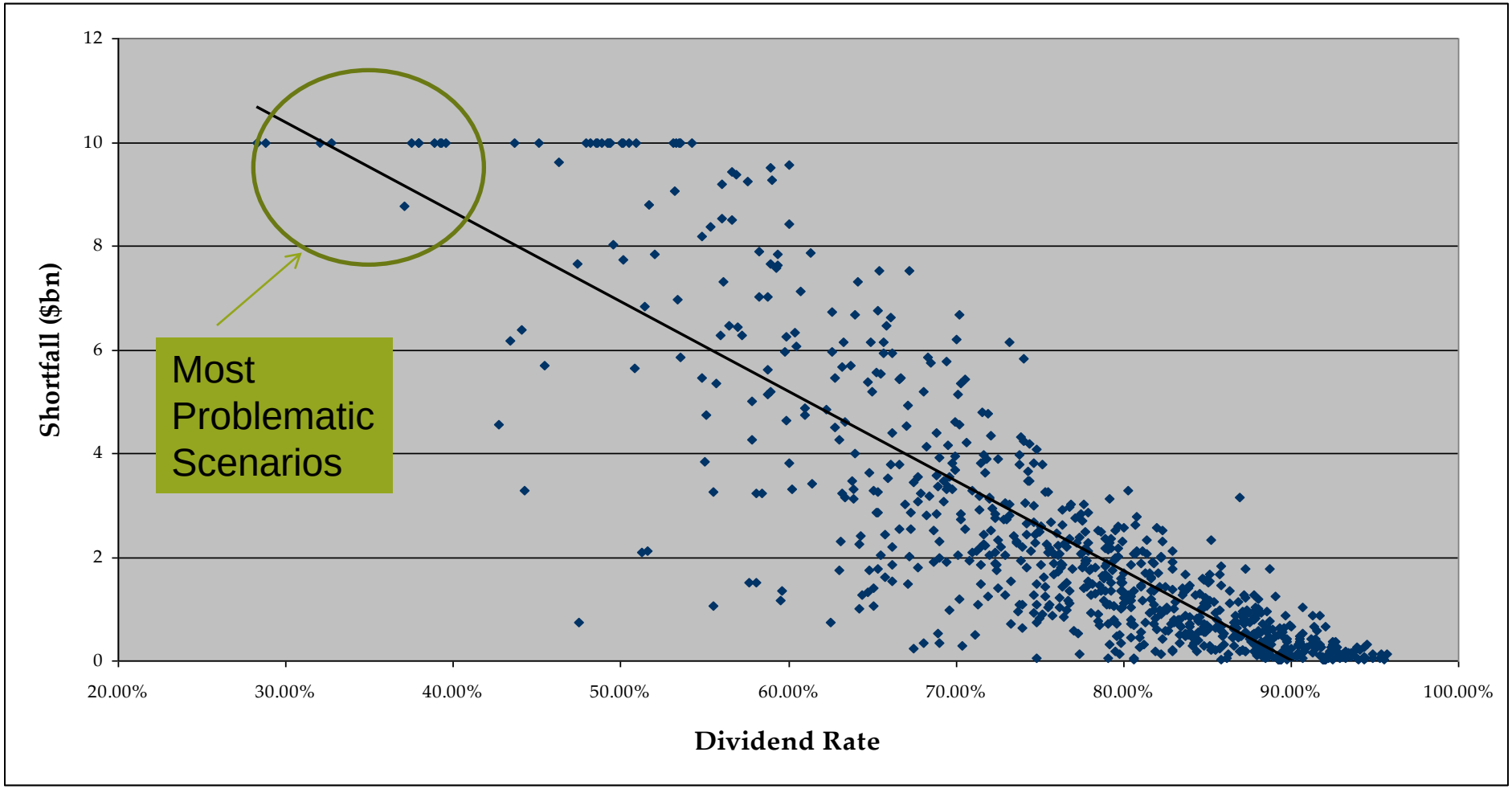
Distributions of Potential Shortfalls – Base Liability Assumptions



Distributions of Potential Shortfalls – High Mean/High Variability Liability Assumptions



Dividend Ratio in Event of Default



Reverse Stress testing – All Policyholders

Liability Assumption	Recovery Rate from Names	Change Prob Full Pay (1)	% better vs worse (2)	EPD (change) (3)	Truncated EPD (change) (4)
Base	0%	1.5%	4.50%	0.30%	
	10%	1.5%	4.40%	0.20%	
	20%	1.5%	3.60%	0.10%	0.20%
	30%	1.5%	2.80%	0.00%	0.10%
	40%	1.5%	1.60%	-0.10%	0.00%
	50%	1.5%	0.80%	-0.20%	0.00%
	75%	1.5%	-0.70%	-0.40%	0.00%
Higher Mean & Variability	0%	3.5%	12.30%	0.90%	
	10%	3.5%	12.00%	0.60%	
	20%	3.5%	8.80%	0.30%	0.30%
	30%	3.5%	5.60%	-0.10%	0.10%
	40%	3.5%	3.00%	-0.40%	-0.20%
	50%	3.5%	0.70%	-0.70%	-0.40%
	75%	3.5%	-3.20%	-1.60%	

Reverse Stress testing – Long Duration Direct Policyholders

Liability Assumption	Recovery Rate from Names	% better vs worse (1)	EPD (change) (2)	Truncated EPD (change) (3)
Base	0%	4.00%	1.00%	
	10%	3.30%	0.40%	
	20%	2.50%	-0.20%	0.50%
	30%	1.60%	-0.80%	0.30%
	40%	0.80%	-1.40%	0.00%
	50%	0.10%	-2.00%	-0.20%
	75%	-0.80%	-3.50%	
Higher Mean & Variability	0%	10.60%	1.60%	
	10%	8.80%	0.30%	
	20%	5.40%	-0.90%	0.40%
	30%	2.80%	-2.20%	-0.30%
	40%	0.70%	-3.40%	-1.00%
	50%	-1.00%	-4.70%	-1.70%
	75%	-3.80%	-7.80%	

Solvency 2 Implications

- Solvency 2 test is ‘confidence level’ 99.5% test.
- CTE(EPD) tests provide different information, but there is no agreed translation of EPD to confidence level
- Test used for Equitas, EPD, excluding 0.5% of events, provides a possible translation.

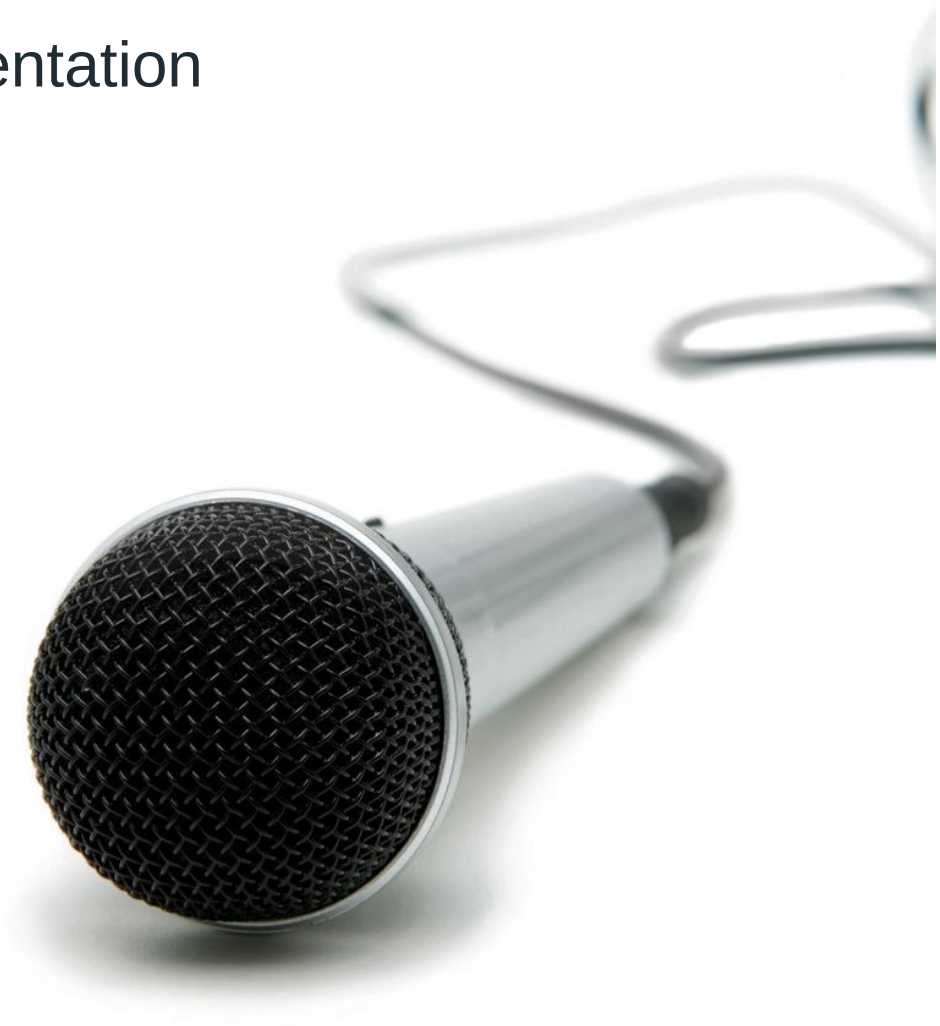
Questions or comments?

The views expressed in this presentation are those of the presenters.

Contact:

allan.kaufman@fticonsulting.com

Emiliano.Ruffini@resmsl.co.uk



Appendix 1 - Further Aspects of Transfer

1. Legal Issues

- Amendments to Part VII legislation
- Preserving Policyholder Security
  - Insolvency Priority – Direct vs. Reinsurance
  - Lloyd's Obligations
  - US Trust Funds
  - US Credit for Reinsurance
- Notifying Policyholders
- Analysis of extent to which there are PH groups that are disadvantaged (IE Report)

2. IE Analysis

A. Assuming Equitas Assets are Sufficient the issues are:

- Claims handling
- Credit for reinsurance
- Regulation
- External outwards reinsurance

IE Analysis

B. Analysis considering risk of Equitas insolvency the issues also include:

- Lloyd's obligations
- NICO security
- Trust funds
- Recoveries from Names