

Whither Scenarios

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Corporate Models

- Modeling Input
- Linkage
- Modeling Output

Modeling Input

- Economic Scenarios Generation
- Liability
 - Plan Design
 - Behavioral assumptions
 - Experience assumptions
 - Company policy

Modeling Input, Cont.

- Asset Models
 - Defaults
 - Prepayment
 - Investment and disinvestment strategy

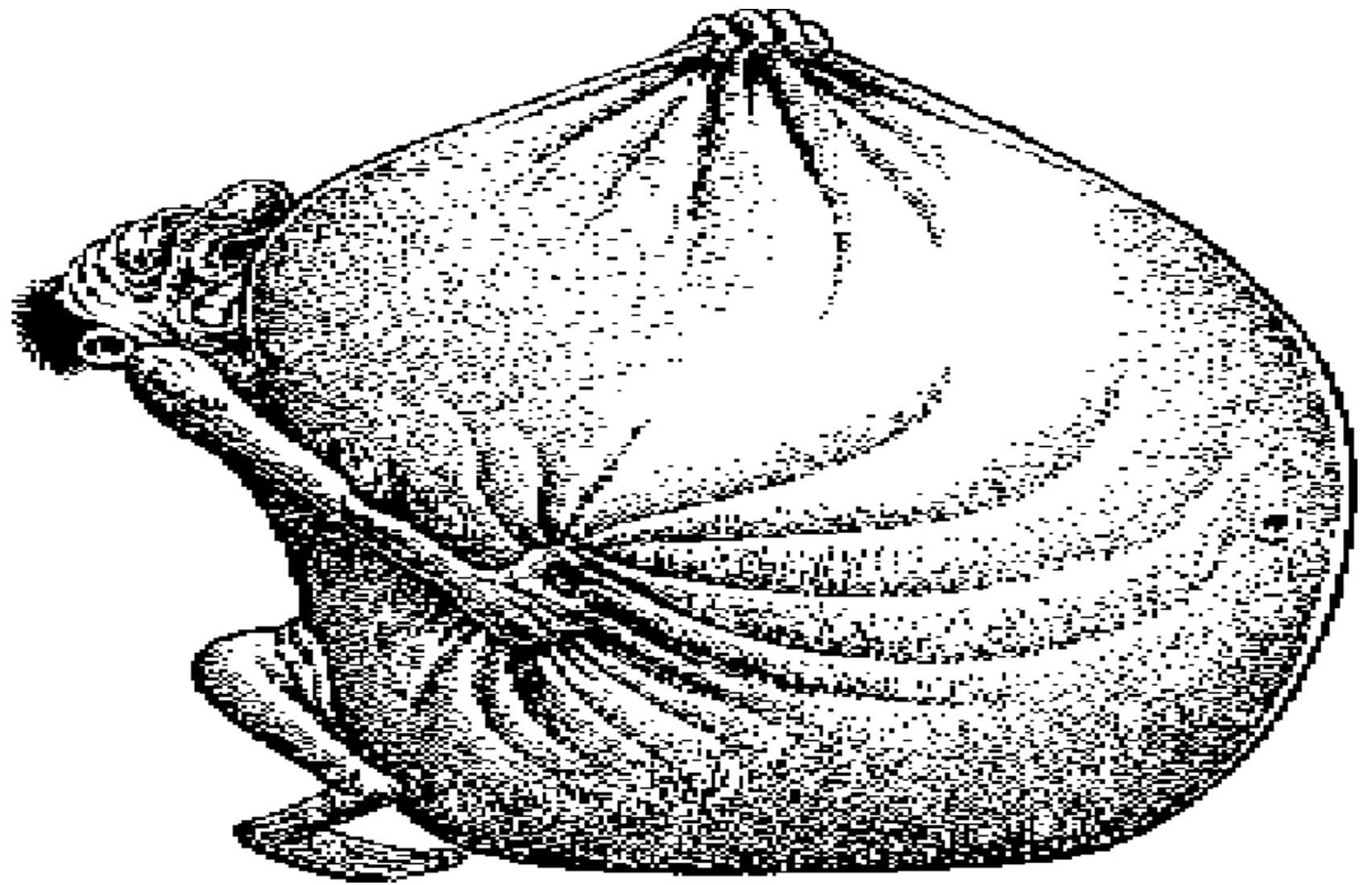
Linkage

- Taxes
- Reserves
- Risk Based Capital
- Corporate Transfer

Output Stage

- Surplus
- Distributable Earnings

Straining Gnats and Swallowing Camels



Majority of Analysis is on the Output Stage

- Fitting Parametric Models
 - Generalized Type II Beta Distribution
 - Extreme Value Statistics
- Fitting Non-Parametric Models
- Fitting Semi-Parametric Models

Resampling and Extreme Value Statistics

- Determine type of tail.
- Model extreme tails
 - How effective?
 - Necromancy

Problems with Output only Modeling

- Finding the proper number of scenarios
- Finding the proper distribution
- Finding the proper fitting algorithm
- Is the fitting algorithm robust or not
- Misestimation of the support
- Measuring the influence of using a parametric model
- No linkage with input.

Linking Input with Output

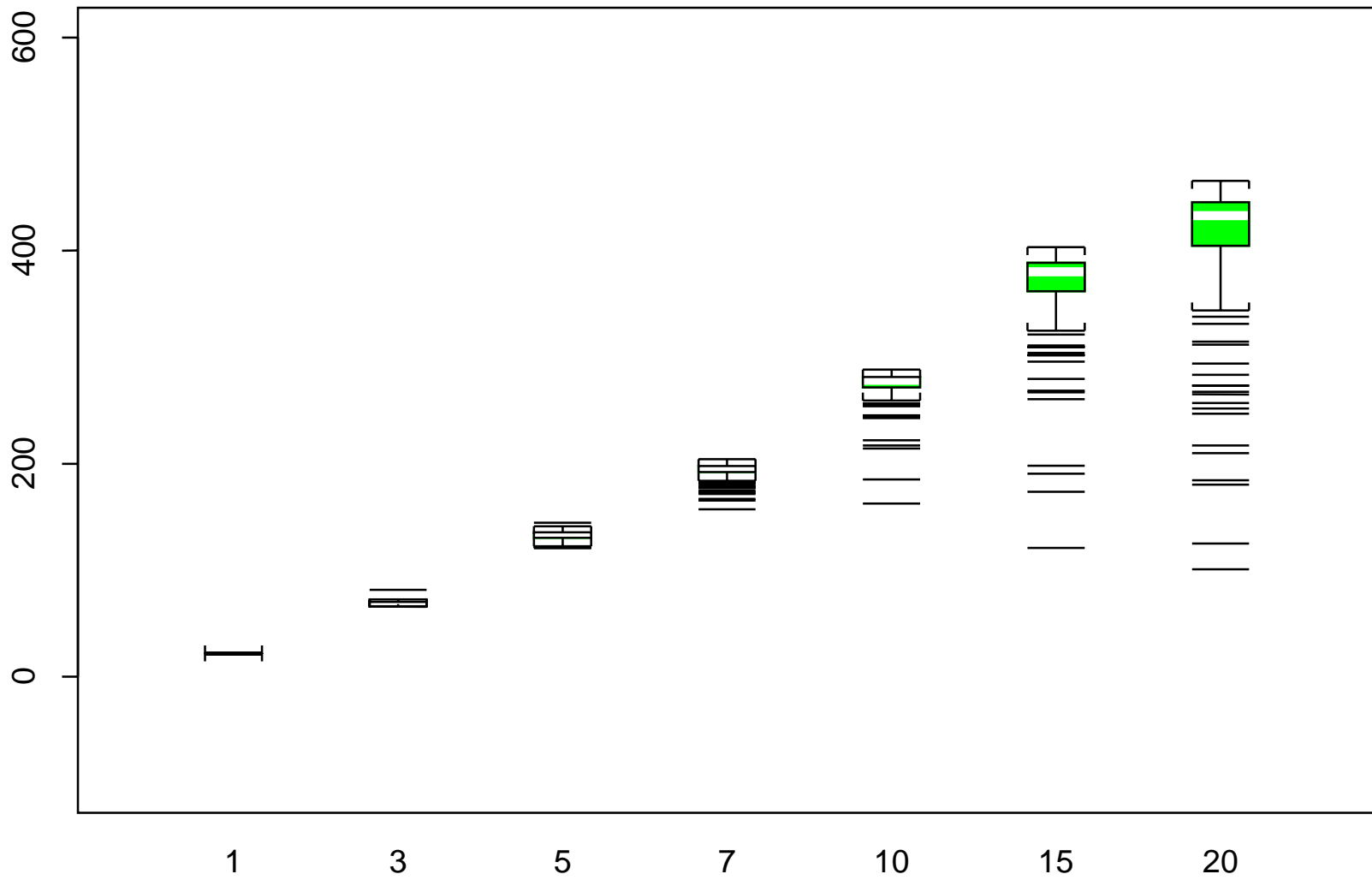
- Experimental Design
 - Deterministic Scenarios
 - Monte Carlo
 - Representative Scenarios
 - Latin squares & Panel methods
 - Low Discrepancy
 - Combinations of above
- Bayesian Hierarchical Modeling
- Quantile Regression

Deterministic Scenarios

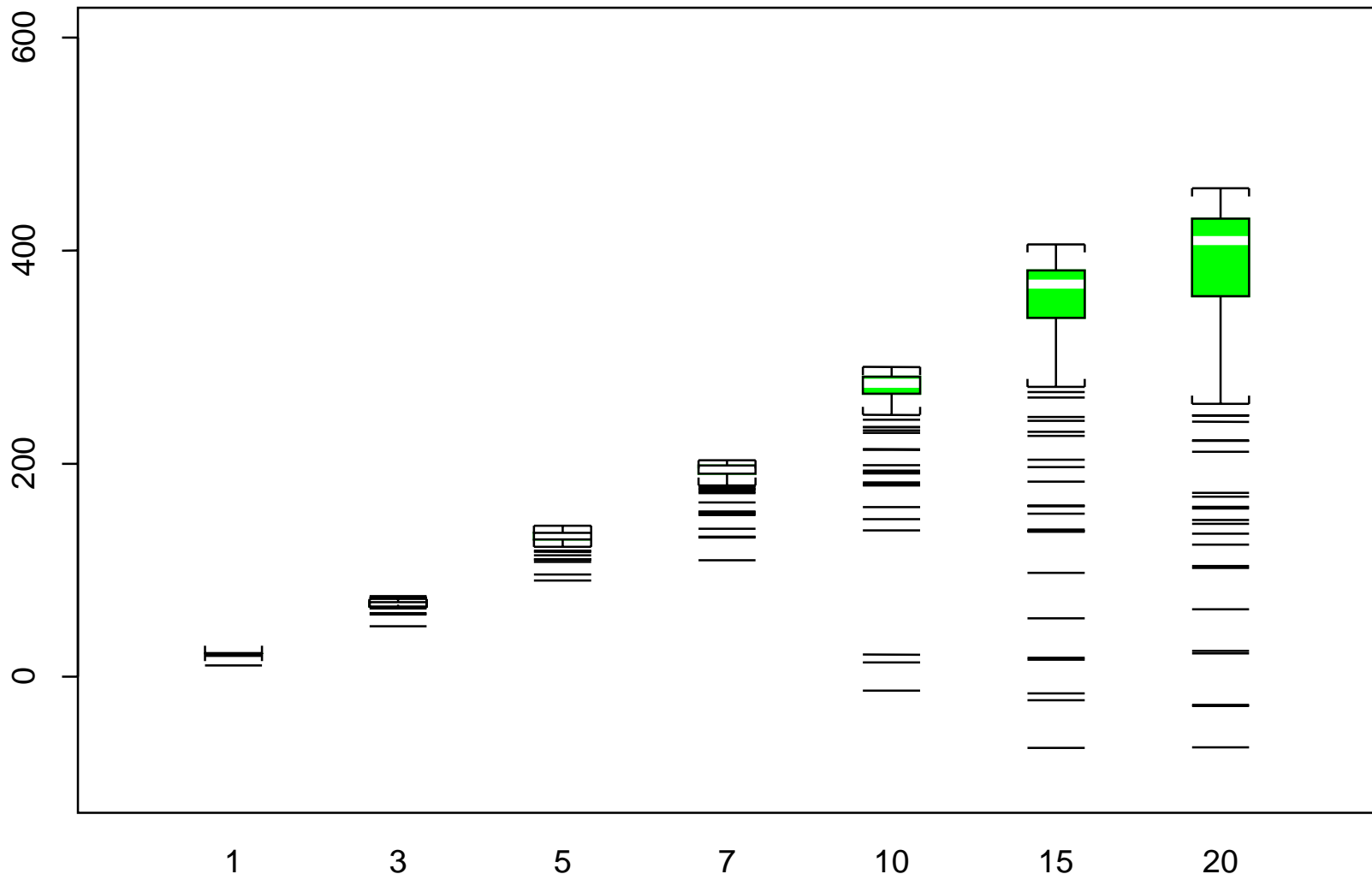
- How many?
- How do we design them?
- Is there a Black Hole Scenario?

Monte Carlo

- How do we generate?
 - Realistic
 - Risk adjusted



Log-Normal Model



Tenney Model

Monte Carlo, Cont.

- How many?
 - Nonparametric methods
- Gaps and clustering

Representative Scenarios

- Representative Scenarios
 - Sarah Christiansen
 - John Manistre

Representative Scenarios, Cont.

- Representative Scenarios
 - Tom Ho - Linear Path Space
 - Pro:
 - Pricing
 - Con:
 - Not good for CFT
 - Only works well with Single factor model

Latin Squares and Panel Methods

- Statistical models used in agriculture and medicine.
- Designed to understand the influence of a certain state crossed with another state.

Low Discrepancy Sequences

- Quasi-random numbers
 - Minimizes clustering and gaps
 - Does automatic experimental design
 - Number of scenarios related to dimension of scenario file

Low Discrepancy Sequences, Cont.

- Problems-
 - Public domain algorithms
 - Dimensional break down
 - Non linear models
 - Expensive proprietary algorithms
 - www.sequences.com

Combinations

- Combinations of Panel, Low Discrepancy in Monte Carlo generation of different interest rate generators.
 - P. Boyle, R. Caflisch and M. Davlin.

Combinations of Input and Output Modeling

- Numerix

Bayesian Hierarchical Models

- Design of a graph theory model with various distributional assumptions at the nodes of the graph.
- Requires Gibbs sampling to shoehorn the results into model

Quantile Regression

- Connects scenario attributes to various surplus quantiles
- Future Research

Hedge Portfolio

- Should really the question be:
 - What is the hedge portfolio that describes the extreme tail risk?