Models to Improve Premium Rate Setting and Purchasing for Aggregate and Specific Medical Stop Loss

(US patents 7,392,201, 7,249,040 and patents pending)

Presented at:

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Overview

- Background
  - Audience
  - Stop loss terms
- Estimating Expected Claims Costs
- Pricing CapCost™ (first dollar medical) and Specific coverage
- Budgeting for medical costs and buying Specific coverage
- Summary

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Strategy—Winning by Changing the Rules

- Using better information (all medical claims and diagnoses)
- Forecasting claim cost more accurately using proprietary Clinical/Statistical Models
- Modifying the distribution system—review all groups in medical plan or TPA then quote on groups with the greatest profit potential

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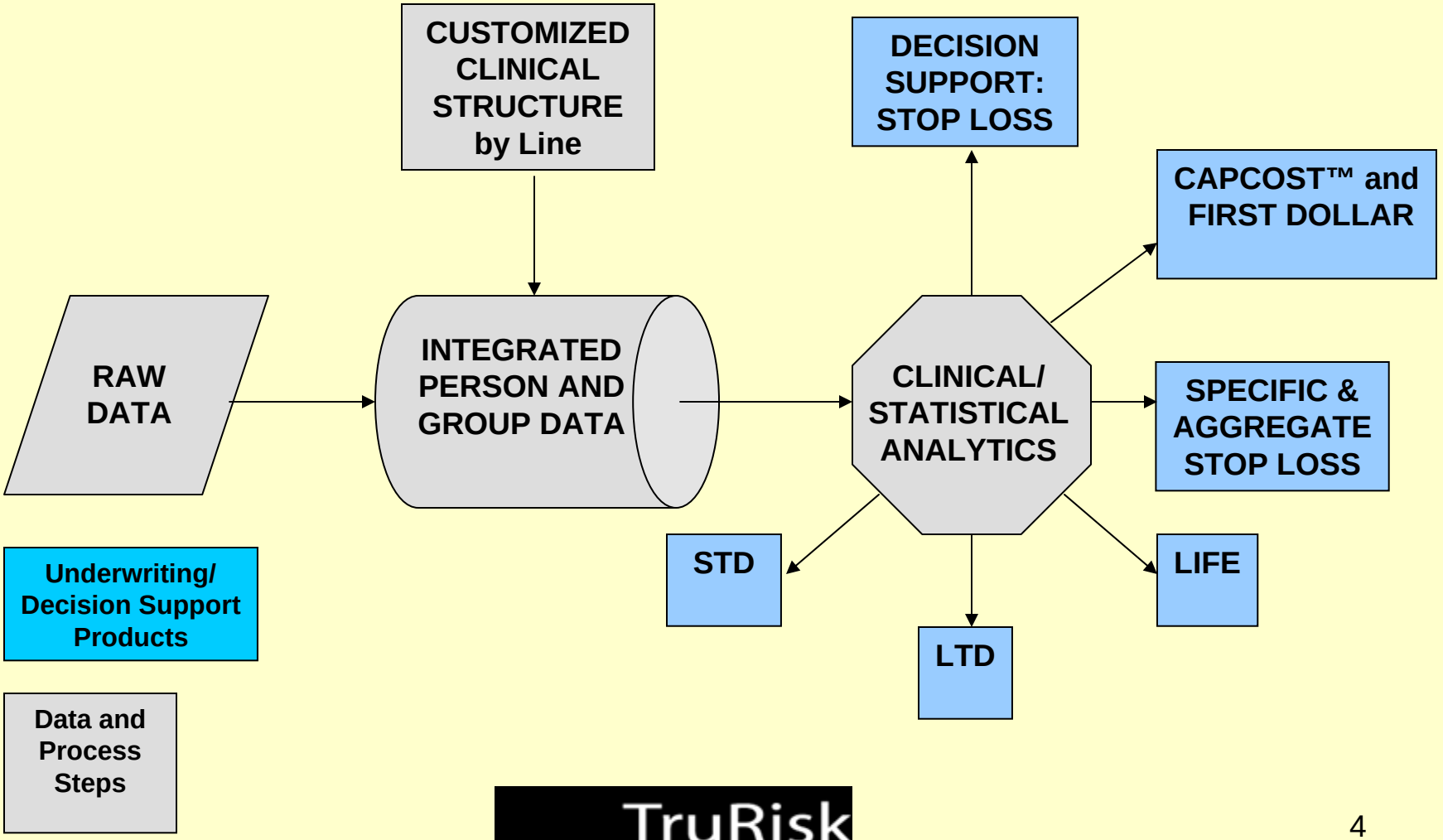
More Accurate Risk Selection—
All Lines, All Groups



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Paradigm Shift

- Evaluate risk and target favorable groups using Clinical/Statistical Models
  - Provide more accurate pricing
  - Lower loss ratio and its variability
- Lower future risks—target high risk employees for disease management

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Medical Stop Loss Coverage

- Traditional coverage—usually paid
  - Specific
    - Very high person level deductible—$100,000-$300,000
    - 80-95% of premium
  - Aggregate—125% of Expected Claims Costs (ECC) attachment point, exclusive of Spec
- CapCost™
  - No Spec
  - Aggregate—110% attachment point

What is CapCost™?

- Aggregate only (10% corridor) medical stop loss product with no Specific coverage—all claims go toward attachment point
- Corresponding premium less than traditional Aggregate plus Specific coverage (target is 10-40% lower premium)
- Each group is medically underwritten using predictive models which include ***all*** medical claims and eligibility records plus traditional factors
- Designed for target market of self insured employers with 200 to 2,500 + employees

CapCost™ Provides Total Budget Protection for Self Insured Employers

- Satisfies greatest need (budget protection) of self insured employers better than traditional Aggregate plus Specific stop loss coverage
- Lower premium
- No “lasering”

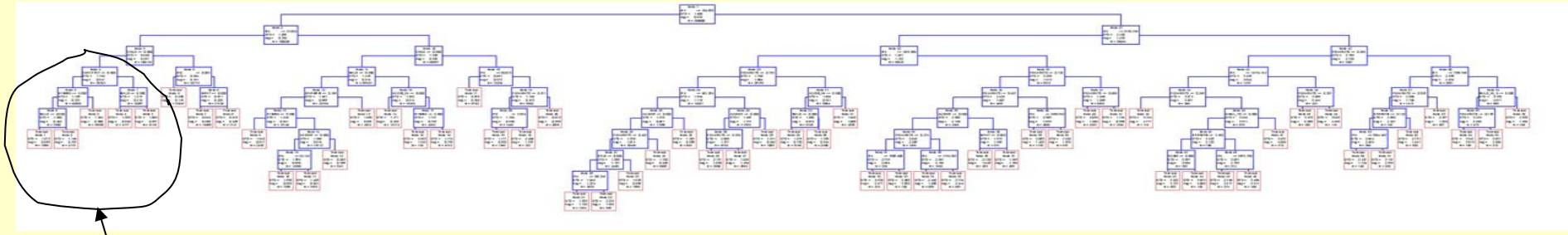
Overview—Estimating Expected Claims Costs

- Develop clinical/statistical forecasting model(s) using all first dollar medical claims and eligibility
- Apply model to most recent data (12 months typically)
- Score and add trend
- Renormalize, if necessary

Data Requirements

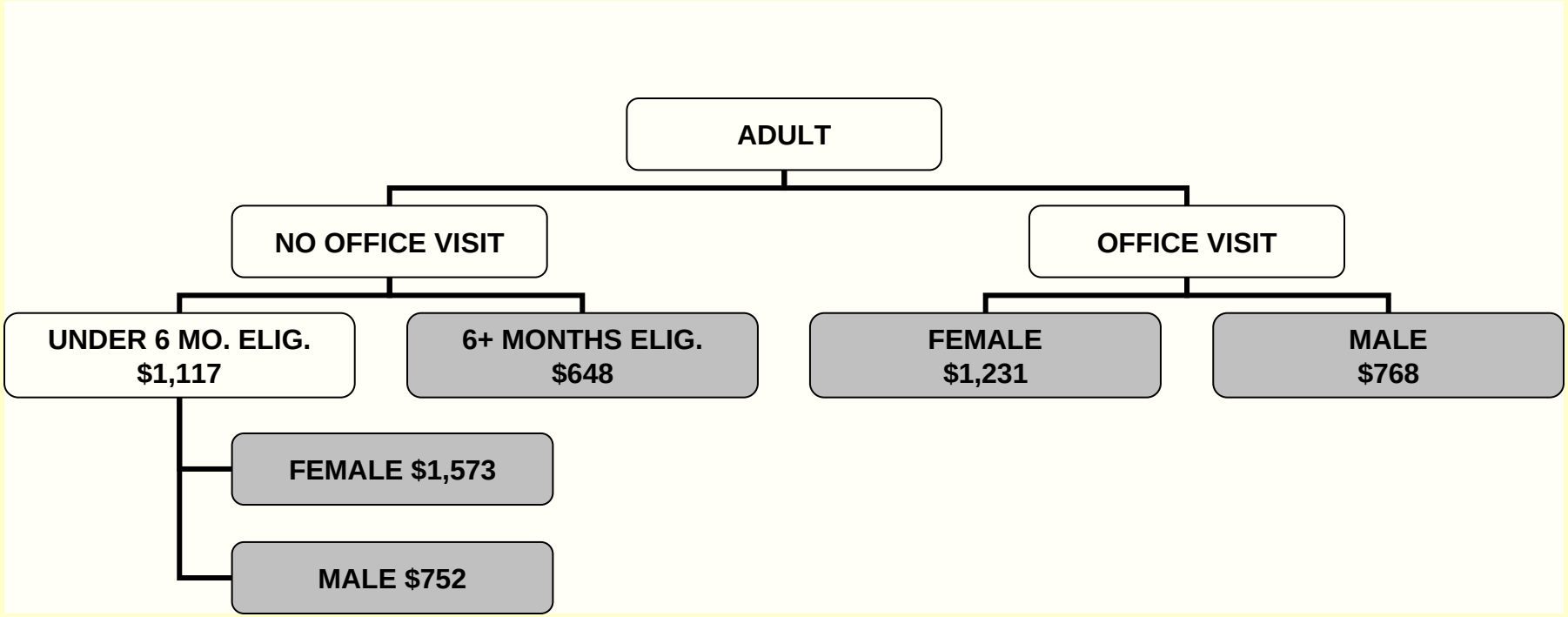
- Medical claims: linkage through encrypted ID needed
  - Charges and payments with incurred and paid dates
  - CPT and ICD-9 codes
  - Place and type of service and provider type
- Eligibility: linkage through encrypted ID needed
  - Demographics for employees and dependents
  - Relationship to employee and coverage type
  - Start and termination dates
- Employer
  - Renewal date
  - Desire current stop loss terms
  - Date of first coverage

Regression Tree for Person Level Expected Mean Medical Claim Costs— Example for Low Cost Predictions

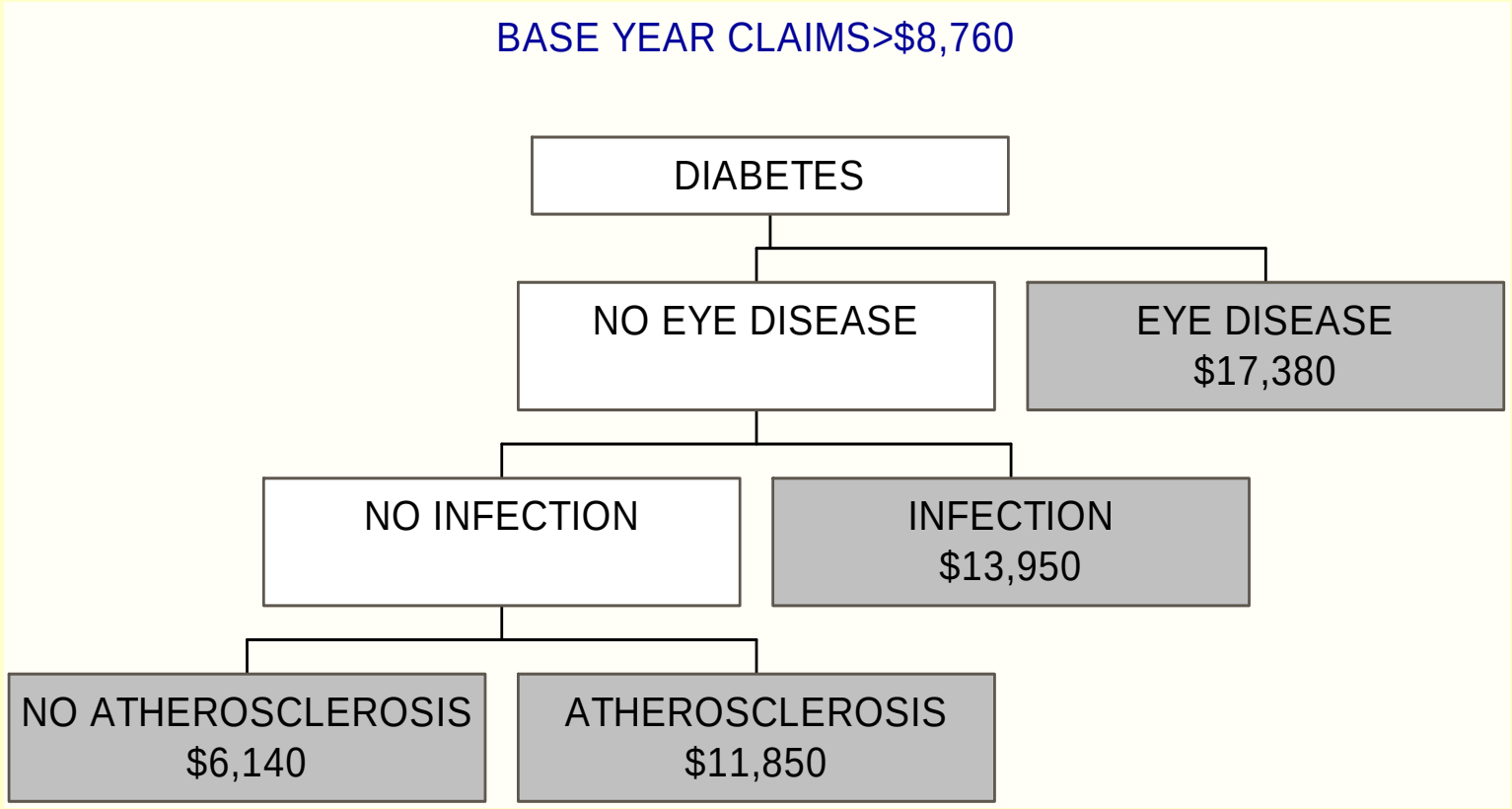


Very low cost adults

Tree for Very Low Cost Adults—
$0 Payments in Base Year



Tree for High Cost Diabetics



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Group Level Predictions

- Roll-up of person level predictions to group
- Group characteristics: discounts, size, historical costs, etc.
- Cross validation used with trees
- Hybrid models to smooth predictions
- Compound trend added to predictions

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Group Level Cost Forecasting—
TruRisk Models vs. Experience

- Lower r^2 for TruRisk
- Smaller mean absolute error for TruRisk

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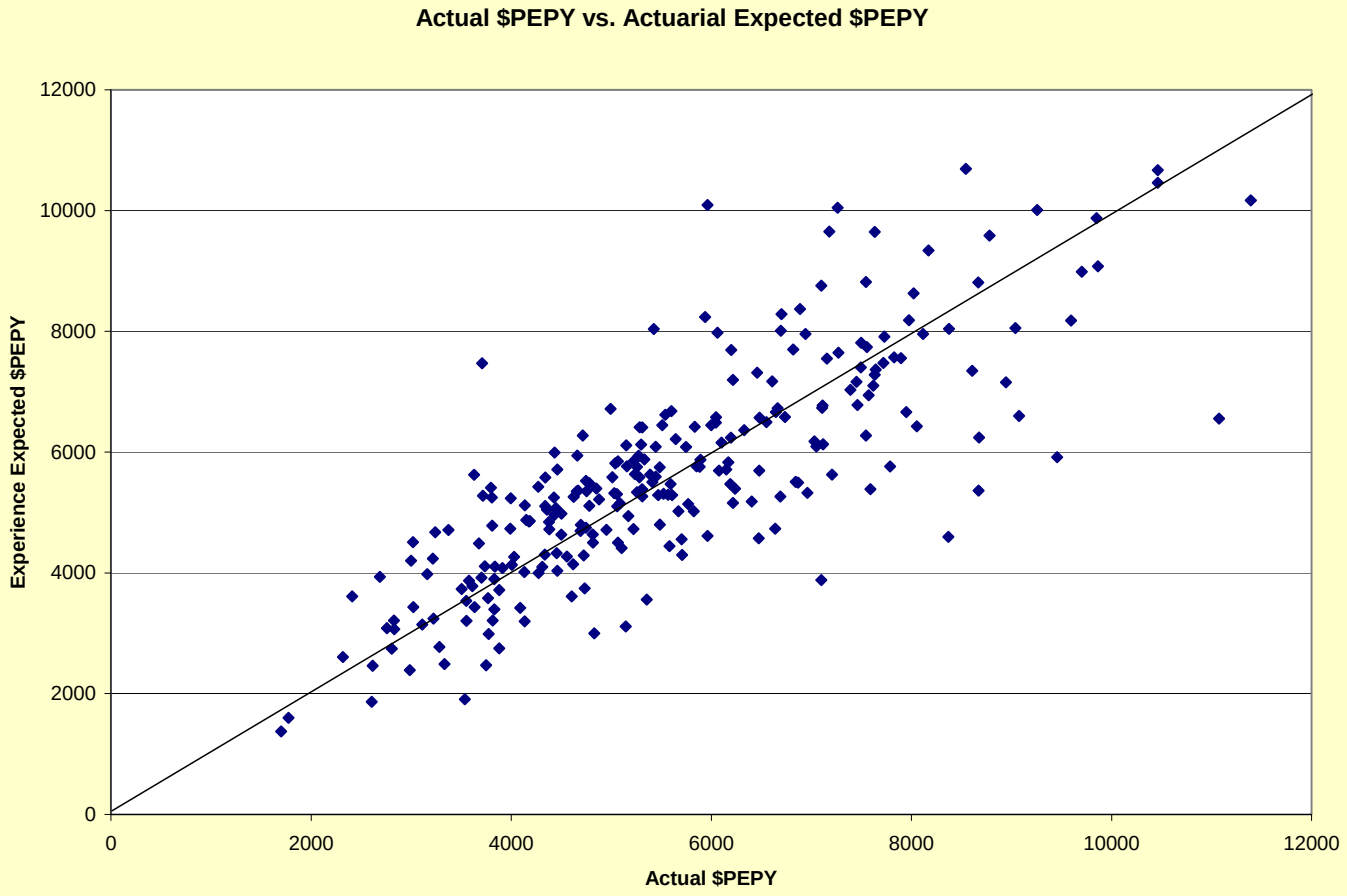
Developmental Models Used for Underwriting 2006 CapCost™

- 254 groups with about 1,000 EEs/group (250-5,000EEs)
- Mean Absolute Error (MAE) Comparison
  - MAE Experience based model=12.3%
  - MAE TruRisk's model=9.6%
  - TruRisk reduces MAE 21.6%
- Regression comparison (weighted by group size)
  - Experience based model adjusted r^2=.72
  - TruRisk's model adjusted r^2=.82

2006 Experience Model vs. Actual $PEPY



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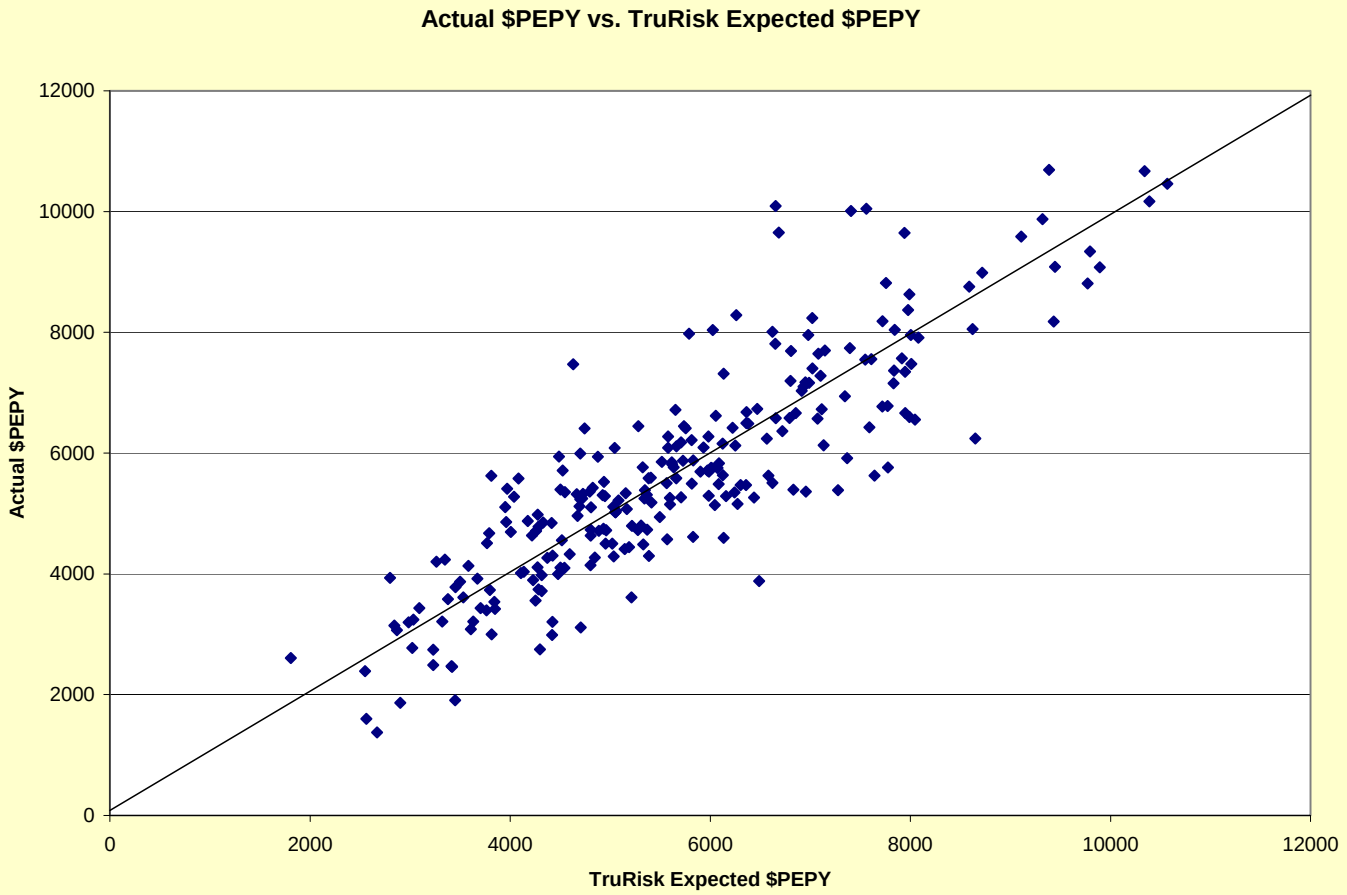
2006 TruRisk's Model vs. Actual $PEPY



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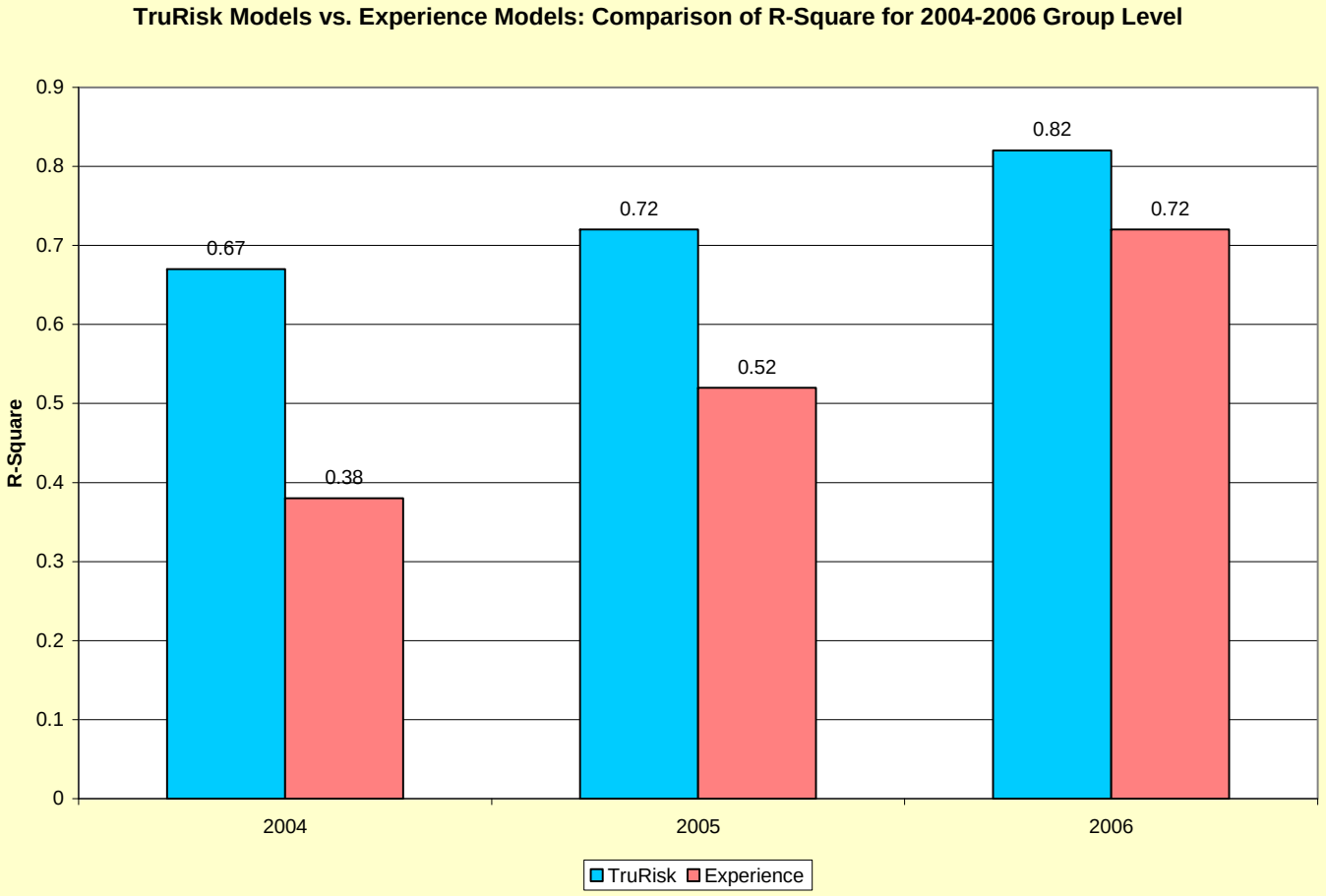
r^2 Comparison—TruRisk vs. Experience at Group Level by Year



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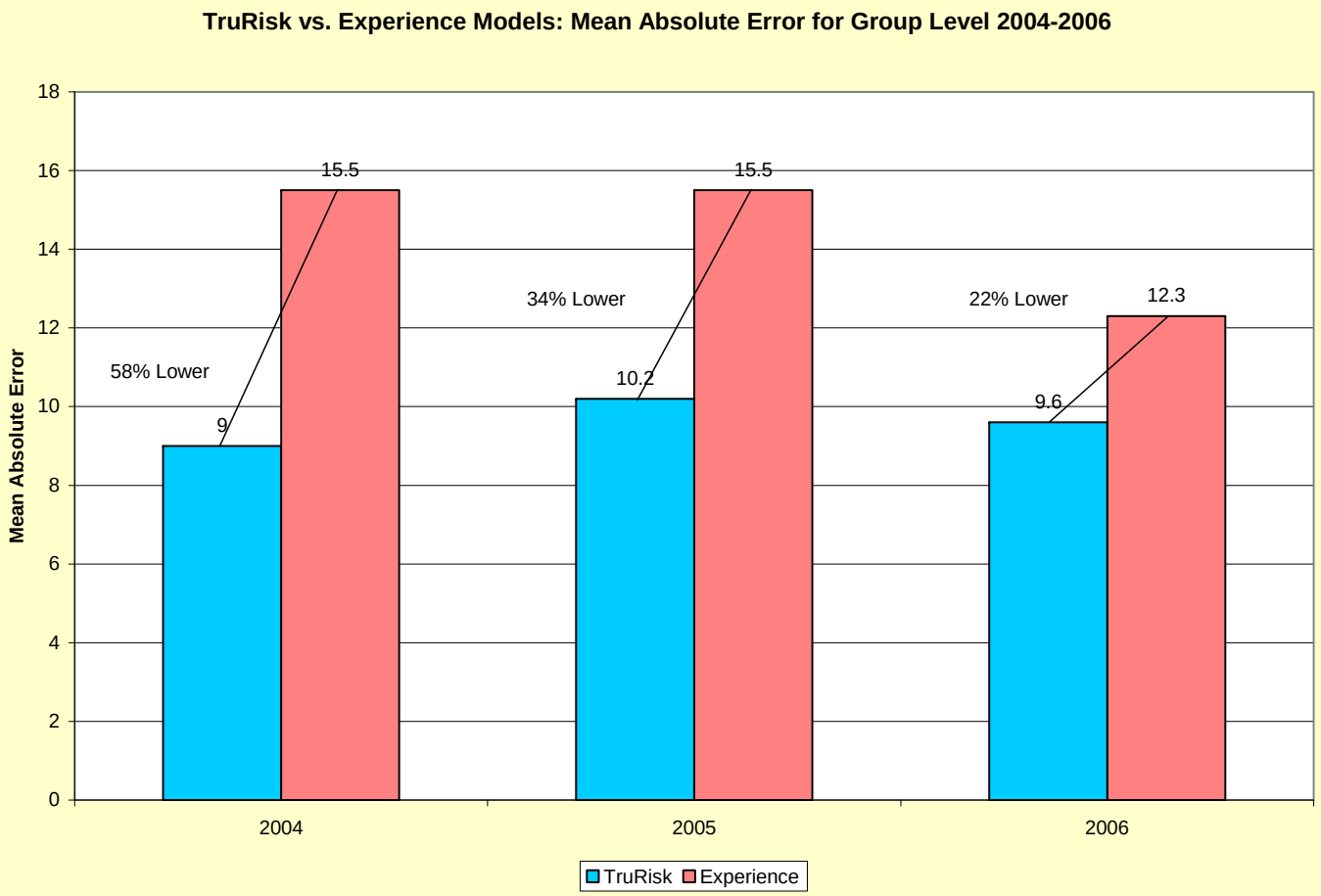
Mean Absolute Error Comparison—TruRisk vs. Experience by Year



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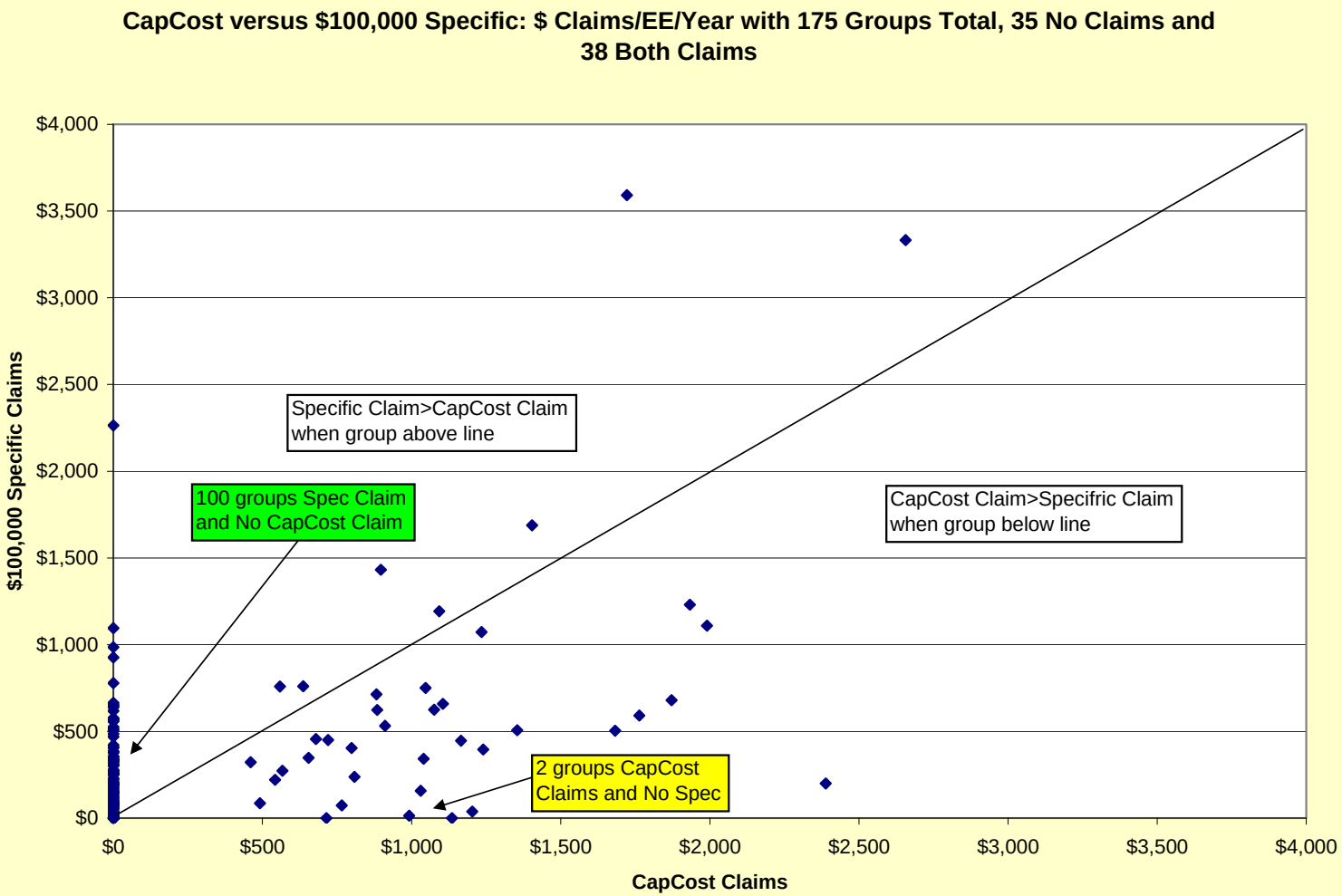
CapCost™ Dramatically Lowers the Medical Loss Ratio

- Claim frequency drops from about 78% for traditional specific plus aggregate to 23% for CapCost™
- CapCost™ total claim cost is 52% of $100,000 Specific deductible total claim costs
- Claim severity (given a stop loss claim occurred) for CapCost™ is somewhat greater
- MLR reduced 10-30% (claim cost=.52/ premium=.75 => CapCost™ MLR=.69 Specific)

Claim Cost Proof: CapCost™ vs. $100,000 Spec Deductible



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Pricing CapCost™ or Estimating Cost of Guarantee

- Discount 10-40% from traditional Specific & Aggregate Premium based on group size—needed for market demand
- Back-testing
- Probability density function loss models and Monte Carlo Simulations

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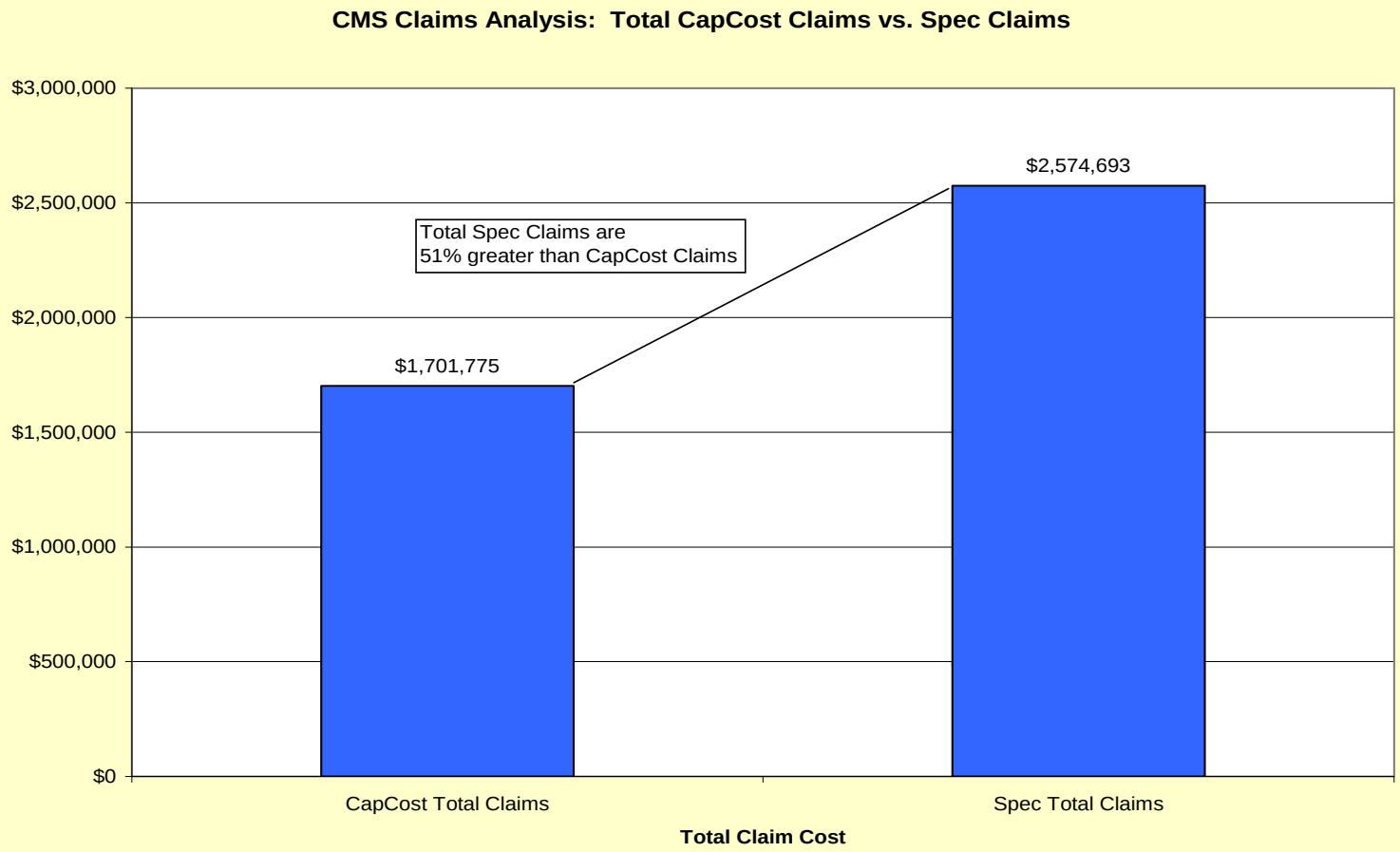
Validation of CapCost™ Back-Testing Results

- One TPA
- 20 groups
  - Renewing January 1, 2004
  - 200-1,450 EEs
  - No major change in number EEs
- CapCost™ ECC calculated using 12 months data through May, 2003 with 14% trend assumed
- CapCost offered through TPA but not promoted with broker—quotes sent in 2003
- TPA and carrier compiled actual experience for CY 2004 from Agg Reports

CapCost™ Claim Costs would have been 66% of Actual Spec Claim Costs



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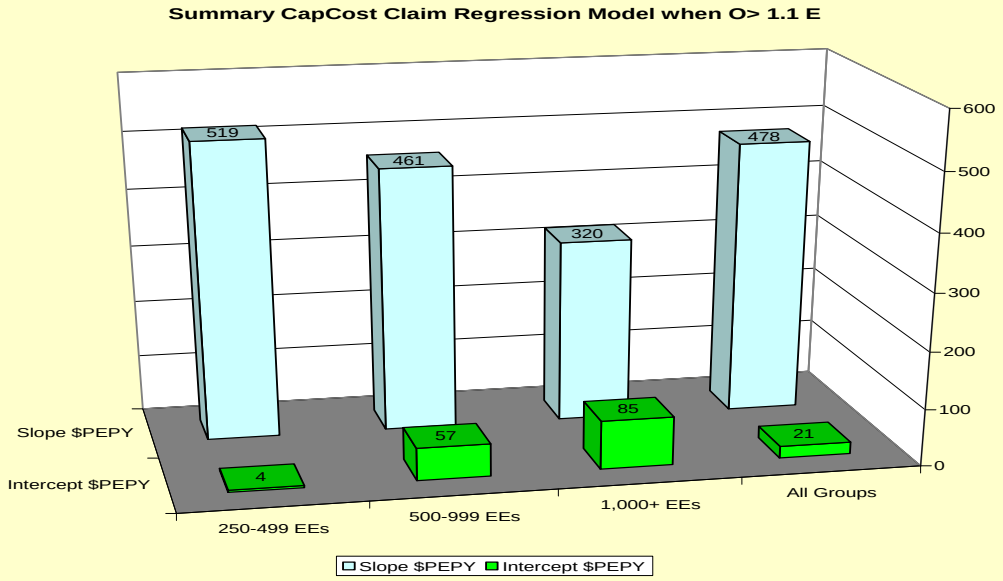
Fit of $PEPY for CapCost™ Claim Based on O/E—Each 0.1 Over 1.1



Summary ECC Regression	**Size Strata**			
Regression Weights	All Groups	1,000+ EEs	500-999 EEs	250-499 EEs
Slope: $ PEPY per Actual 0.1 over 1.1	478	320	461	519
Intercept: $PEPY	21	85	57	4
r^2	0.815	0.654	0.83	0.843

assume CapCost claims= $500/EE/year for each .1 actual>expected claims costs

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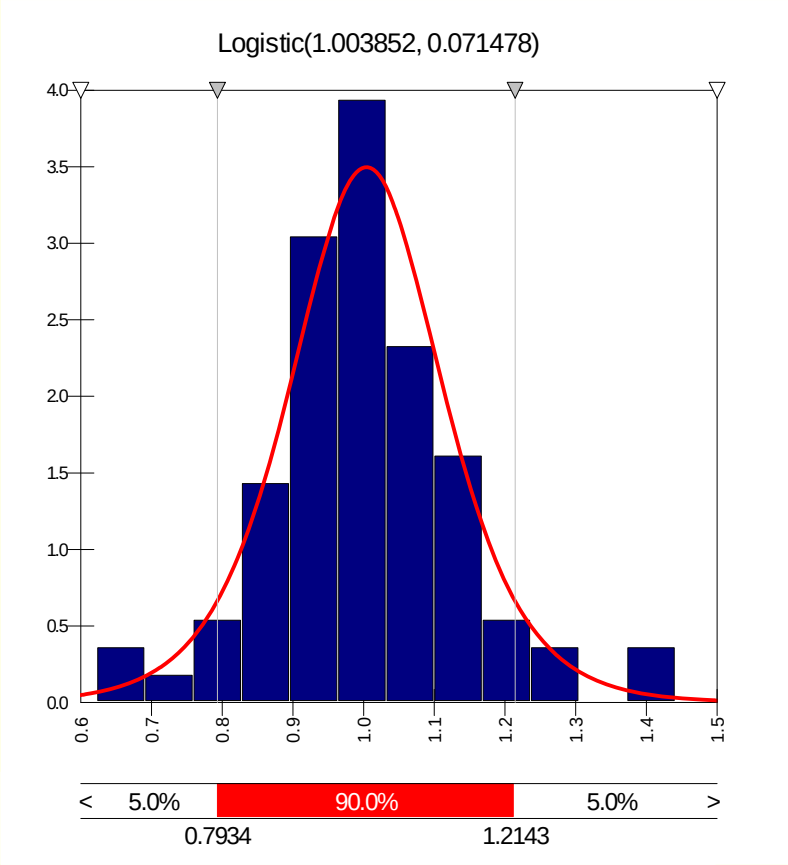
1,000+ EEs O/E Best Fit with Logistic Distribution



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Loss Ratios for Small Blocks—
Monte Carlo Simulations of 10,000 Iterations

Loss Ratios (mean)=.26 to .46
Loss Ratio (75%)=.39 to .65

$ Total Premium	**$3,250,000**	**$1,800,000**	**$2,812,500**	**$15,725,000**	**$7,862,500**
Composite Rate Group Mix with10,000 Iterations	**$325 PEPY Premium** 2000EE5cases	**$450 PEPY Premium** 400EE10cases	**$375 PEPY Premium** 750EE10cases	**Blend by EEs** Sum 20@400 20@750 10@2000 / 250-499	**Blend by EEs** Sum 10@400 10@750 5@2000 / 250-499
Loss Ratios					
Mean	**0.26**	**0.46**	**0.29**	**0.32**	**0.31**
Median	**0.14**	**0.40**	**0.24**	**0.30**	**0.28**
75%	**0.40**	**0.65**	**0.42**	**0.39**	**0.41**
90%	**0.71**	**0.91**	**0.63**	**0.49**	**0.56**

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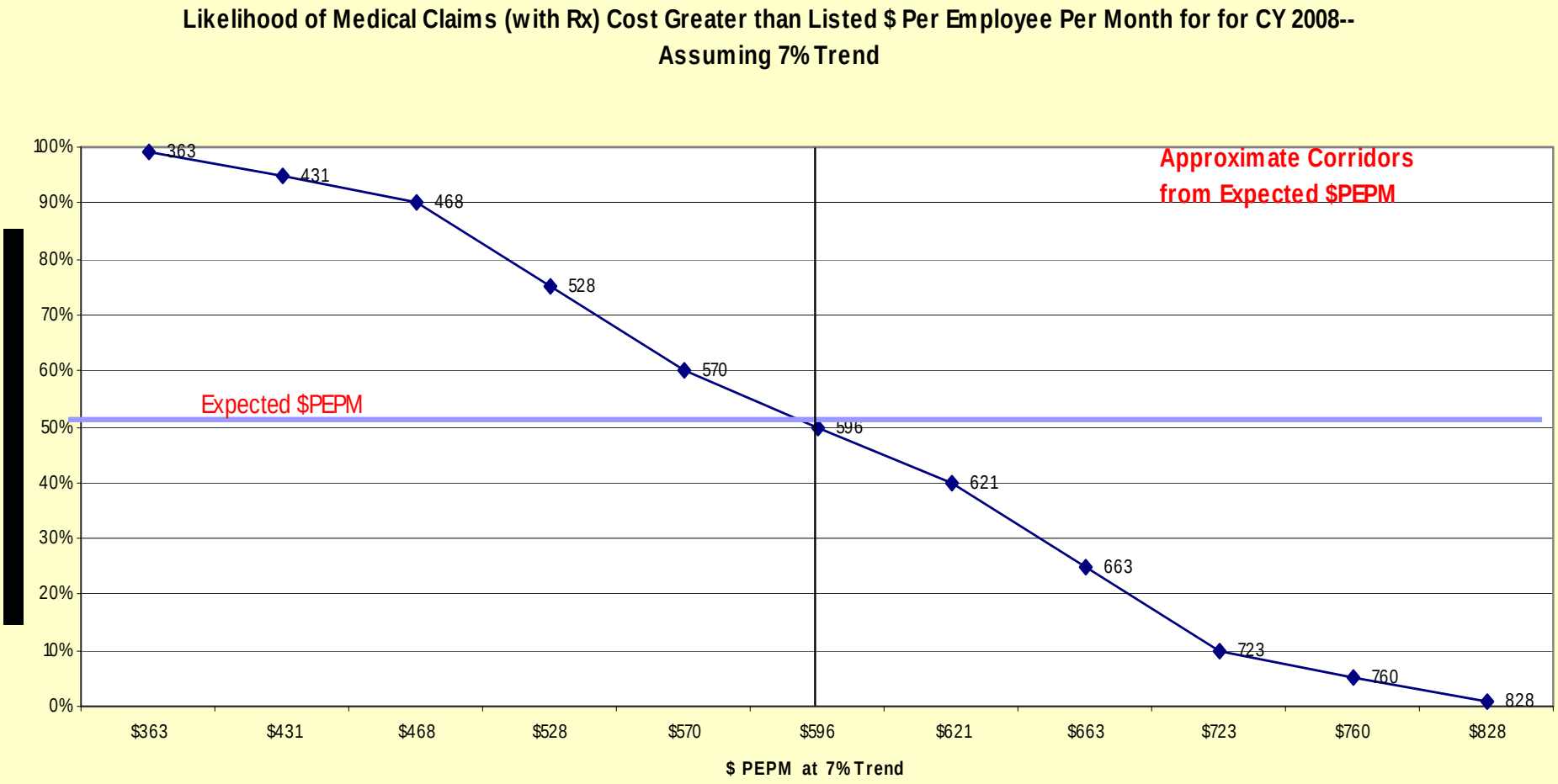
Pricing Spec Coverage

- Traditional method
  - Demographics
  - Dx and cost screens
  - Nurse review of ongoing cases for paid contracts
- Clinical/Statistical Models
  - Back-testing
  - Model and variance of expected cost and number of claims
- Blend methods using credibility theory

Budgeting—Expected $PEPM with Likelihood of Exceeding Estimate



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Buying Spec Coverage—Example

Actual and Expected Specific Claims

Specific Deductible	Expected Number Specific Claims During 2008	Actual Total $ Claims Over Deductible Last Year 6/2006-5/2007	Actual Number Claims Over Deductible Last Year 6/2006-5/2007
$100,000	33.0	$3,604,364	23
$125,000	24.0	$2,401,999	12
$150,000	17.8	$2,268,706	11
$175,000	**11.76**	**$1,617,080**	**7**
$200,000	**10.93**	**$1,423,318**	**6**
$225,000	**8.35**	**$374,706**	**1**
$250,000	6.83	$374,706	1
$275,000	5.63	$374,706	1
$300,000	4.89	$374,706	1

Buying Spec—Return and Recovery

Cost of Risk Transfer

Specific Deductible	Premium	Expected Specific Recovery	Return on Premium	Expected Cost of Risk Transfer
$175,000	**$964,564**	**$1,664,377**	**1.726**	($699,813)
$200,000	**$799,012**	**$1,381,516**	**1.729**	($582,504)
$225,000	$664,868	$933,002	1.403	($268,134)

Buying Spec—Breakeven Analysis

Breakeven Analysis by $25,000 Increments of Specific Deductible

Specific Deductible Level Comparison--Lower Specific Level	Versus Specific Deductible Level Comparison--Higher Specific Level	Premium Difference	Breakeven Point***	Number of Expected Specific Claims Next Year at Higher Deductible	Number of Actual Specific Claims Last Year at Higher Deductible
$175,000	**$200,000**	**$165,552**	**6.6**	**10.9**	**6**
$200,000	**$225,000**	$134,144	5.4	8.4	1

Summary

- Fitch Summary July 9, 2008
  - Fitch Ratings has changed its outlook on the US health/managed care insurance sector (the sector) to negative from stable…
  - The rationale for the negative outlook is supported by the following:

    Operating performance to date in 2008 indicates that several market participants are either willing to be aggressive in pricing or the ***improved predictive underwriting capabilities demonstrated over the past decade are not as strong as Fitch previously considered.***
- Detailed data and the ability to analyze it appropriately enable more aggressive pricing at lower risk
- Build what the market wants rather than what it needs

Thanks,

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A health care analytic company founded in 1998 by Greg Binns and Mark Blumberg to build and implement risk management tools for organizations taking the financial risk for providing health care.

- **Gregory S. Binns, Ph.D.**
- Career
  - Cofounder, President & CEO, TruRisk, LLC
  - VP- Development, D&B Healthcare Information, Ltd.
  - Founder and CEO, Lexecon Health Service, Inc.(sold to D&B/EDS Ltd.)
  - VP-Strategic Planning and Product Development, Phoenix-Hecht
  - Associate Director-Marketing Systems, DDB (formerly Needham, Harper, and Steers Advertising)
- Education
  - Ph.D., Mathematical Psychology, University of Michigan

- **Mark S. Blumberg, MD**
- Career
  - Cofounder, VP & Chief Scientist, TruRisk, LLC
  - Consultant to Mercer, IMS, PBGH
  - Director of Special Studies, Kaiser Permanente
  - Director of Health Systems Planning, University of California
  - First Director of Health Economics, SRI International (formerly Stanford Research Institute)
  - Member, Institute of Medicine, author of numerous publications, JAMA reviewer
- Education
  - M.D., Harvard Medical School