Incorporate Third Party Scoring in Accelerated Underwriting

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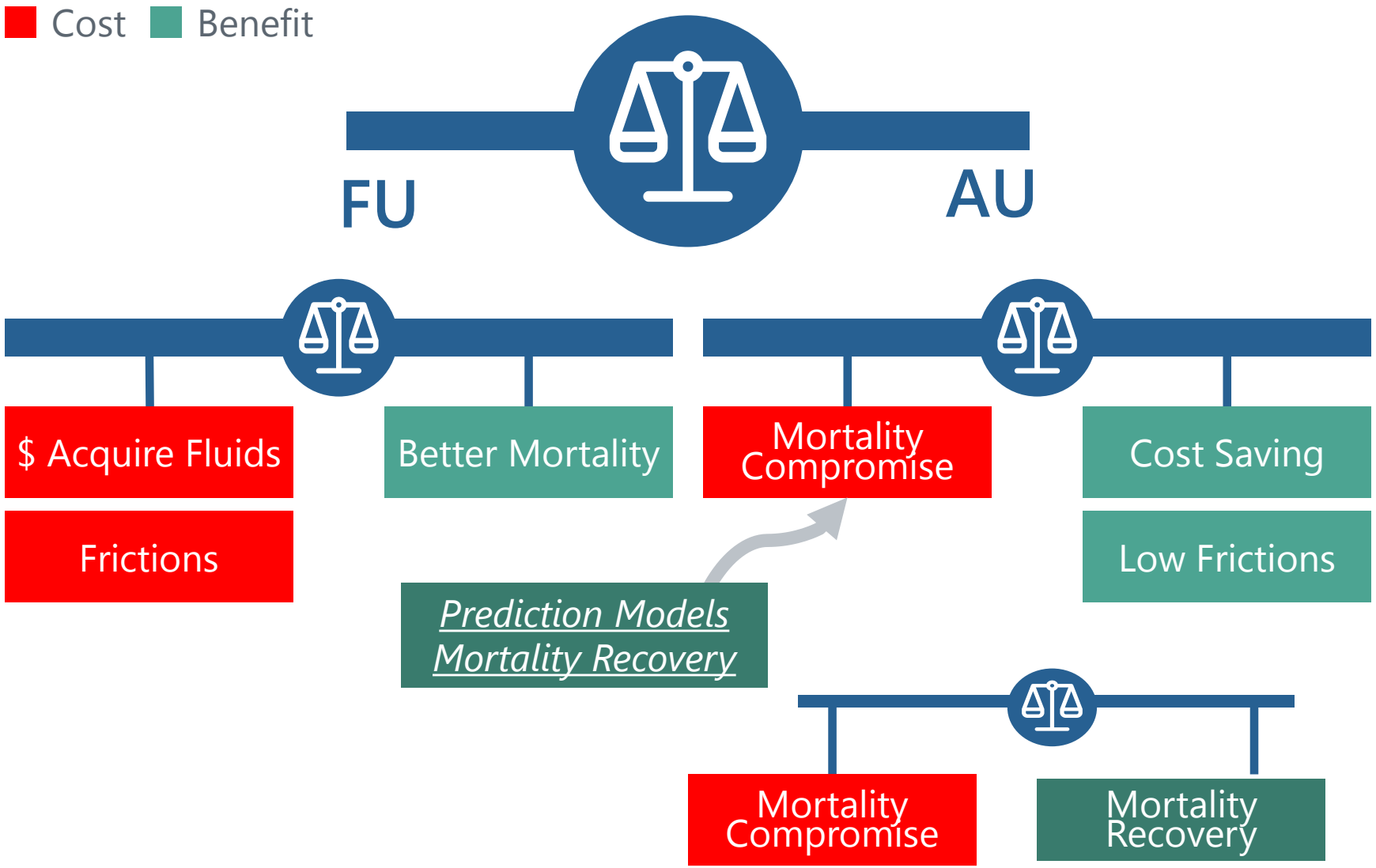
Accelerated Underwriting (AU)

Remove paramedical exams and laboratory fluid requirements from Full Underwriting (FU) yet preserve FU pricing (close to mortality neutral)

Cost vs. Benefit



Three Key Questions

1. What is the mortality compromise/slippage of not having fluids and paramedical exam?
2. How much of mortality recovery/compensated by AU models?

   Three mortality recovery mechanisms by AU models:

   1. Identify features where the protective values of fluids and paramedical exam are lower.
   2. Use *additional* requirements (credit, Rx score) to differentiate mortality.
   3. Strengthens/tightens other underwriting requirements.

3. How much does AU impact applicants' movement between FU and AU products?

It is all about by how much.

1. Mortality Compromise/Slippage

- Mortality Compromise=Protective Values of Fluids/Exam
  - Hyperlipidemia, HBP, Kidney Function, Liver Function, undiagnosed diabetes, smoking
  - Sentinel effects
- How to Study This?
  - Retrospective company-specific study of FU business — *Simulate* AU results by ignoring the values of fluids and paramedical exam

	AU						
FU	S Prefered	Preferred	STD	Rated	Decline	Sub Total	Mortality
S Preferred	40					40	60%
Preferred	3	29				32	80%
STD	1	2	11			14	100%
Rated	0	1	1	5		7	200%
Decline	0	1	0	0	6	7	500%
Sub Total	44	33	12	5	6	100	
Mortality	62%	98%	108%	200%	500%		

Aggregate mortality excluding decline			
	Mortality	Expected	Ratio
AU	88%	80%	110%
FU	83%	83%	100%

Retrospective Study of Protective Values

Challenges

- Unable to study sentinel effects
- Difficulty to determine exclusivity of UW decision attributable to Fluids/Exam
- No self-reported BP and Lipid in most FU applications

Additional Studies on PV of Fluids/Exam

- Mortality Slippage on Standard and Better Class (in aggregate)

- Industrywide mortality comparison FU vs. Simplified products
  - Confounded by SES/face amount
- Industrywide lab/exam results study
  - Prevalence of impairments and associated debits
  - Over-estimate the exclusivity
- Assuming a “break-even” point (PV=Cost)
  - For example, at age 45, male at face of 100K, 12% mortality saving equal to $100 present value over 20 years

2. Mortality Recovery by AU Models

Three Mechanisms

1

Identify features where the protective values of fluids and paramedical exam are lower.

2

Use additional requirements (credit, Rx score) to differentiate morality.

3

Strengthens/Tightens other underwriting criteria.

2.1 Mortality Recovery

Identify features while protective value of fluids and paramedical are low

- Predictive models that predict
  - Abnormal lab/BP
  - Smoking
  - FU decisions
- BE on applications to increase disclosure
- Limit AU to certain age and face amount band
- Access EMR, Medical Claims data

By how much and how to study it?

2.2 Mortality Recovery

Use *additional* requirements such as…

LexisNexis Risk Classifier (LN_RC) and Milliman Rx Risk Score

Mortality differentiation that goes *beyond* conventional medical FU (*independent* impact from FU)

How to quantify this?

2.3 Mortality Recovery

Tighten up other underwriting criteria to shift class distributions to higher risk class

Before

	AU						
FU	S Prefered	Preferred	STD	Rated	Decline	Sub Total	Mortality
S Preferred	40					40	60%
Preferred	3	29				32	80%
STD	1	2	11			14	100%
Rated	0	1	1	5		7	200%
Decline	0	1	0	0	6	7	500%
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Mortality	62%	98%	108%	200%	500%		

Aggregate mortality excluding decline			
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AU	88%	80%	110%
FU	83%	83%	100%

After

	AU						
FU	S Prefered	Preferred	STD	Rated	Decline	Sub Total	Mortality
S Preferred	30	5	5			40	60%
Preferred	1	22	6	3		32	80%
STD	1	2	11			14	100%
Rated	0	1	1	5		7	200%
Decline	0	1	0	0	6	7	500%
Sub Total	32	31	23	8	6	100	
Mortality	62%	95%	90%	155%	500%		

Aggregate mortality excluding decline			
	Mortality	Expected	Ratio
AU	88%	88%	100%
FU	83%	83%	100%

How does it impact taken-up rate?

3. AU Impacts on Anti-Selection

Distribution Channel/Marketing

Post-issue analytic (actual vs. expected)

Random hold out study

Milliman Rx Score
LexisNexis Risk Classifier

The Milliman Rx Risk Score

Source: Milliman, 2017

LexisNexis Risk Classifier ® – Data Source

Source: LexisNexis 2017

Gen Re Evaluation of Both Scores

Analysis in Research Population

	Milliman Study	LN Study
Population	13M	7M
Deaths	231K	126K

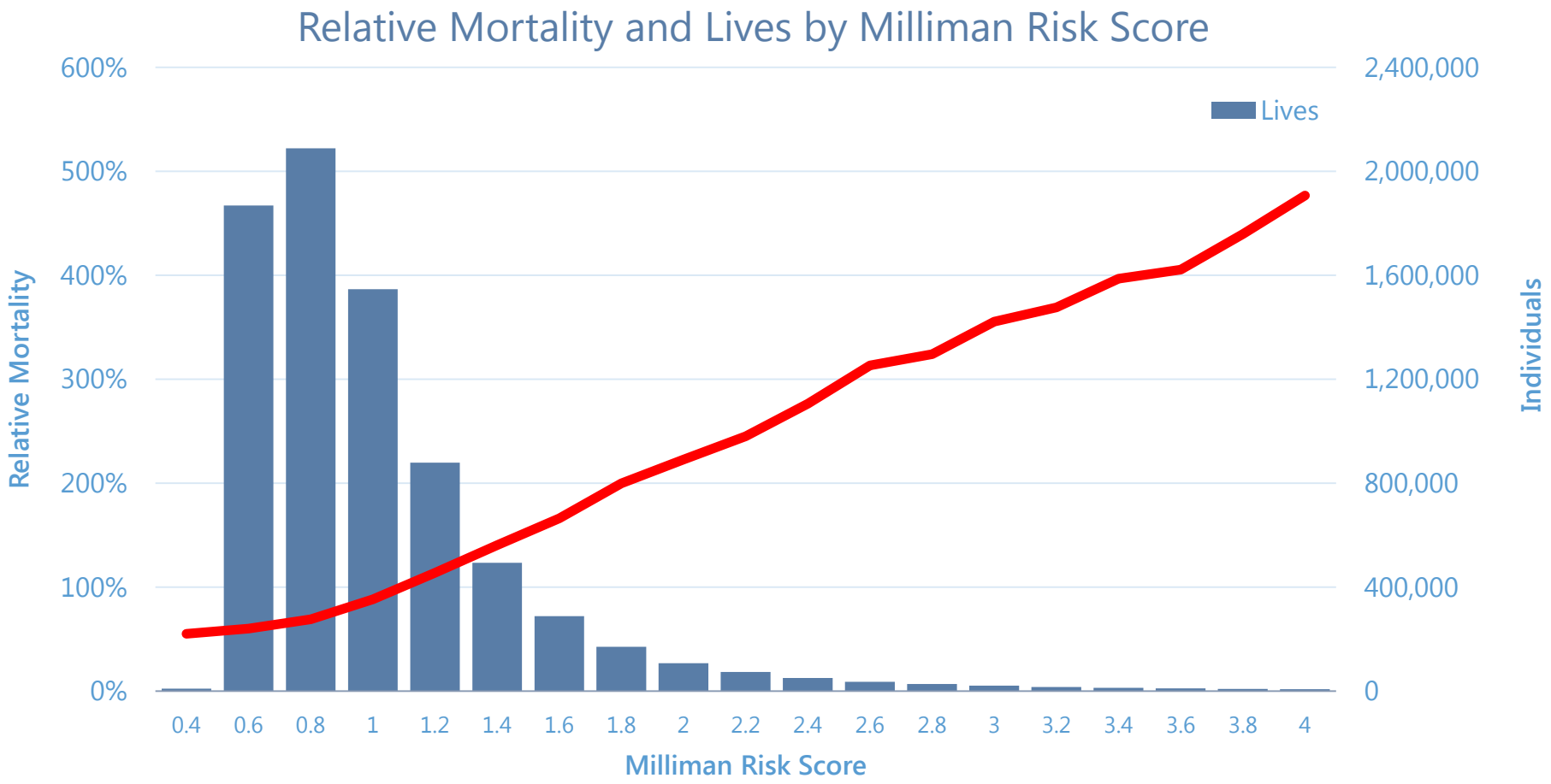
Review Studies in Target Population

- Differ from research population?
- Independent of FU?
- Overlap/Correlation with FU?

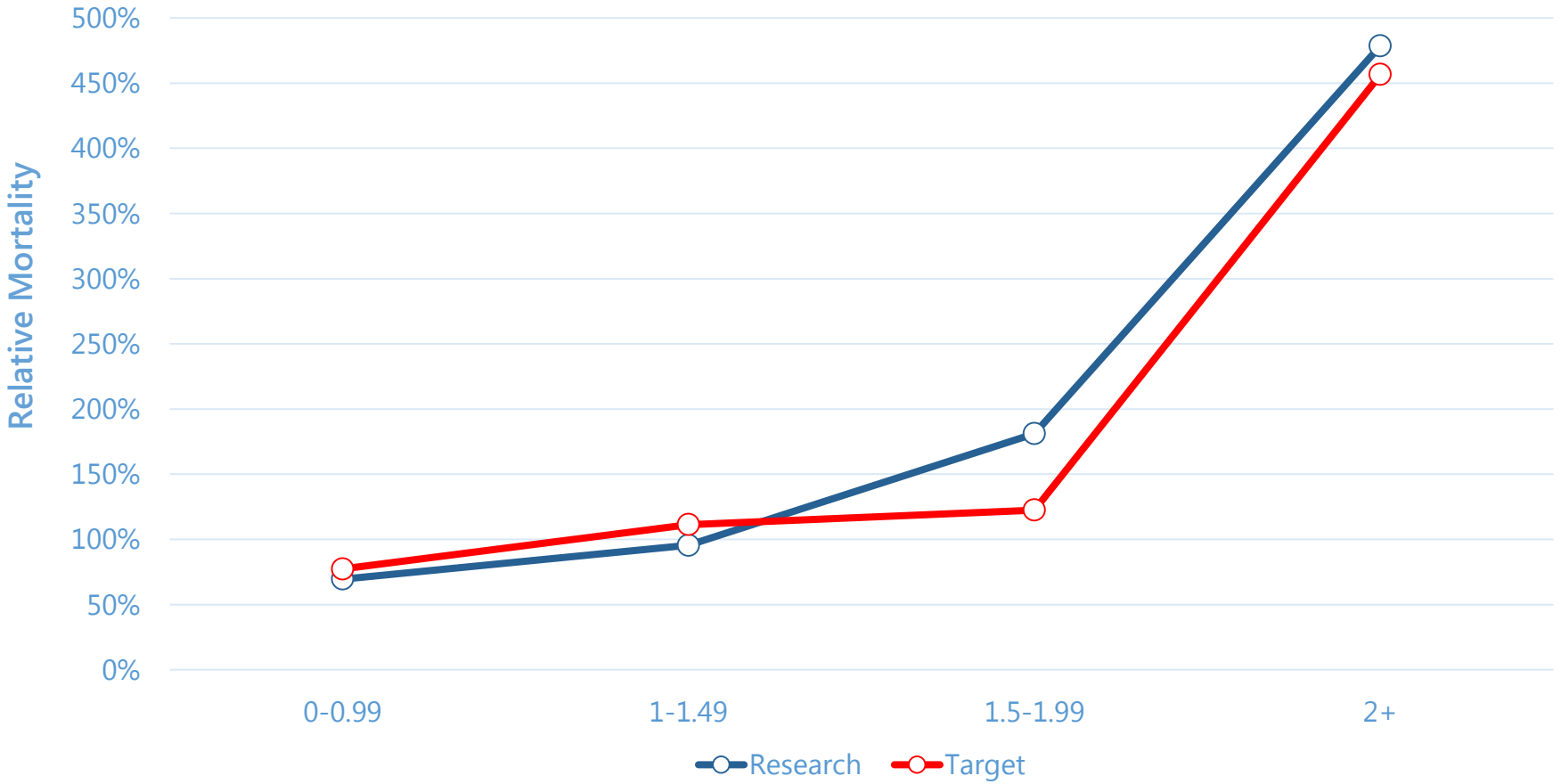
Compare two scores:

- Complement each other?

Milliman's Risk Score in Research Population



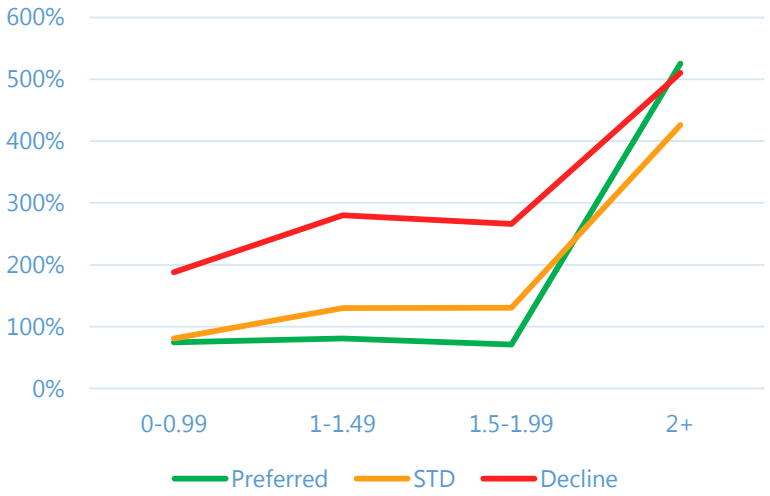
Milliman Risk Score and Mortality: Research vs. Target Population



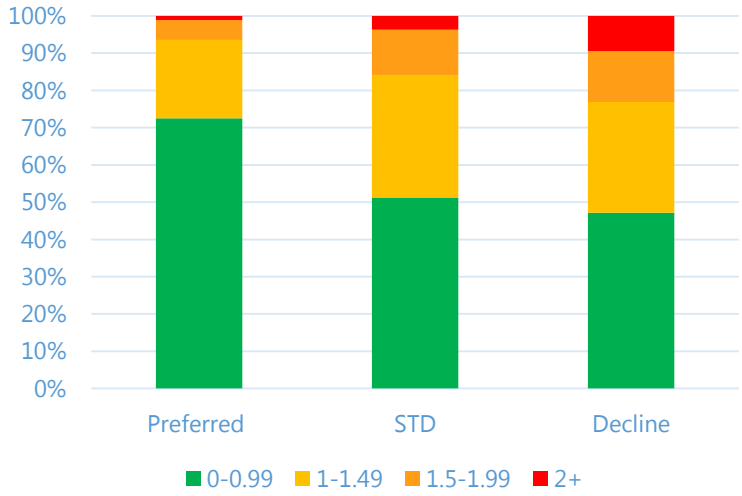
Source: Milliman Study, 2016

Milliman Score's Association with Full Underwriting

Independence of FU



Correlation with FU



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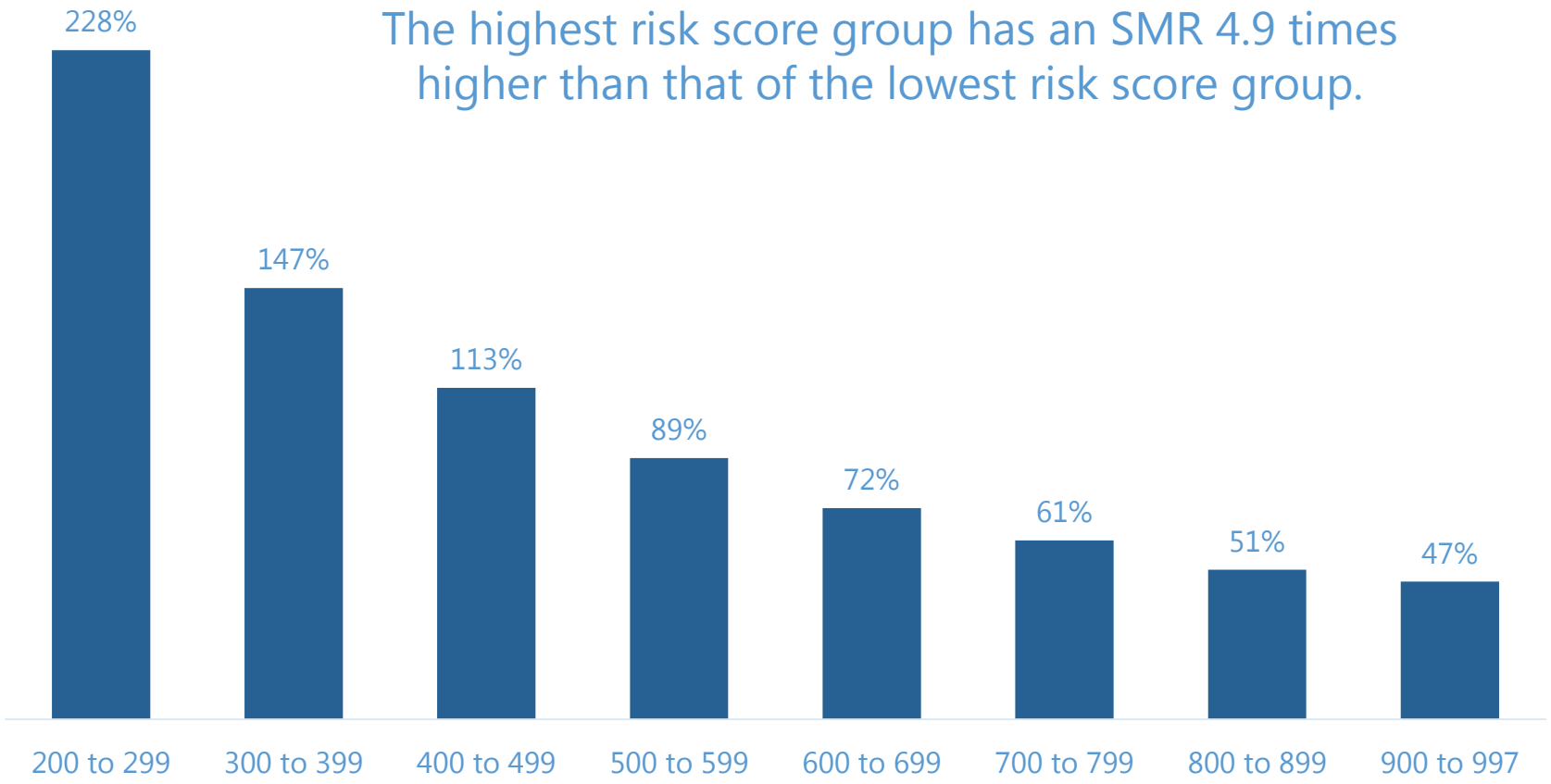
Risk Classifier® Score Predicts Mortality in Research Population

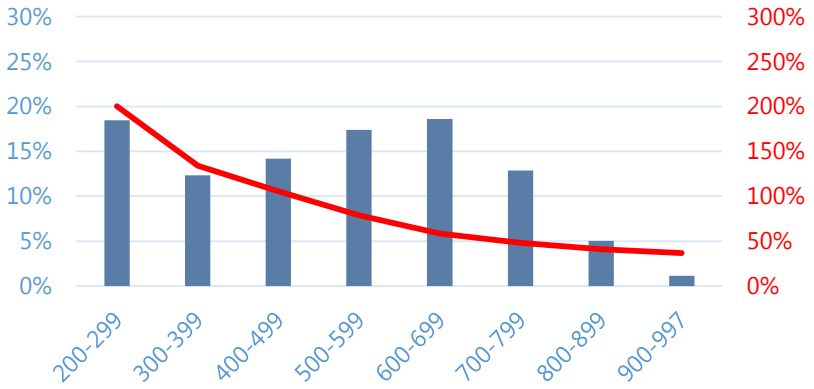


Age 18-89

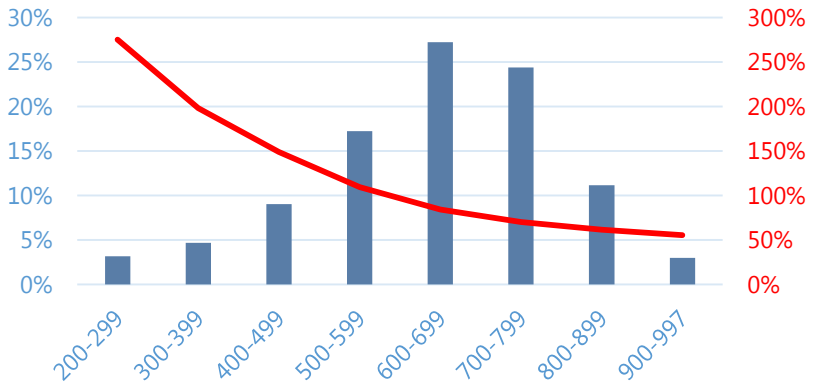
Expected deaths from the 2008 Primary VBT. SMR calculated as A/E divided by overall population A/E.

Risk Classifier Predicts Mortality in Research/Target Population

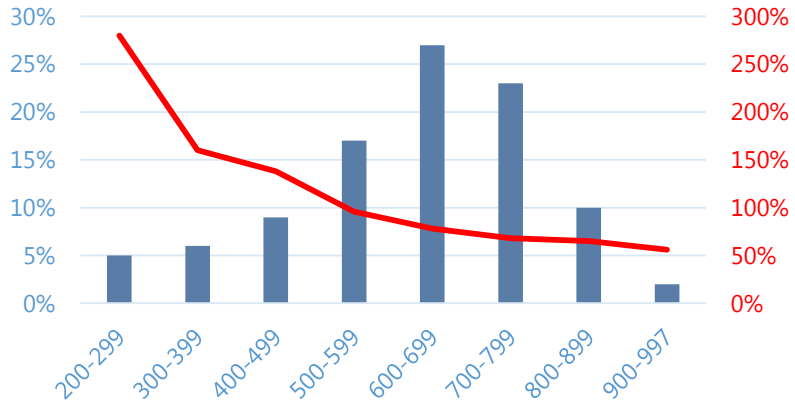
Research Population
(N=6.5M, age 20-59)



Subset of Research Population
(SES=high, N=2M, age 20-59)



Target Population*



SES is defined by income, education, mortgage payment etc.

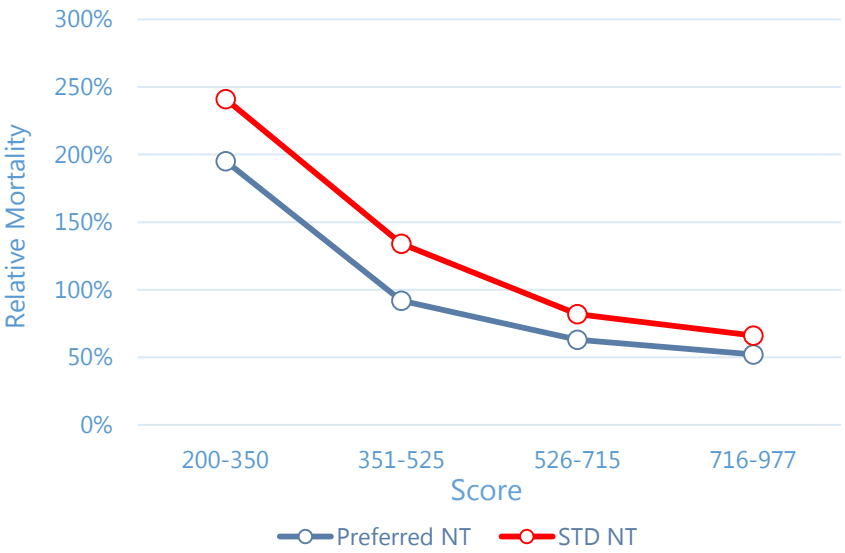
Distribution

Mortality SMR

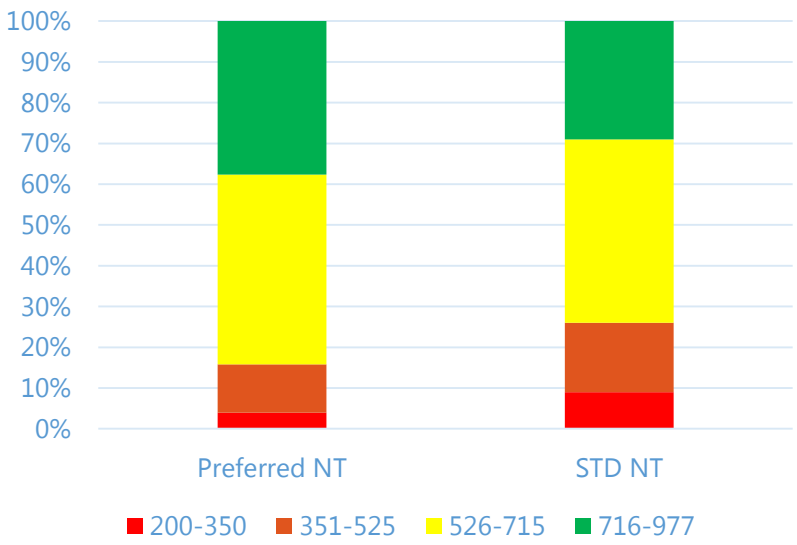
** Source: LexisNexis study, 2016.*

Risk Classifier Score's Association with Full Underwriting

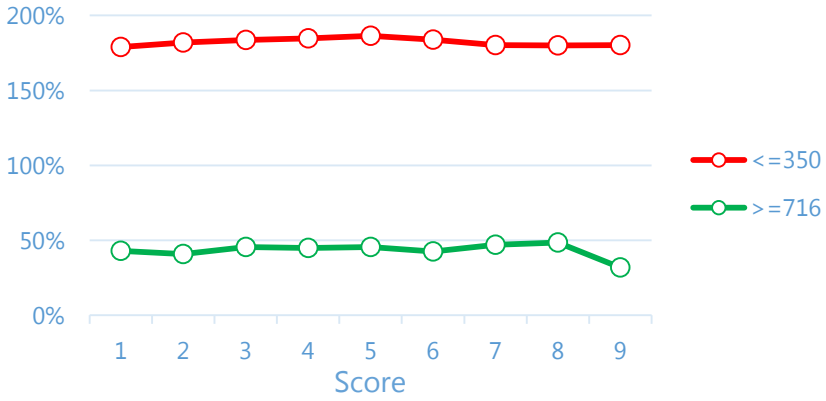
Independence of FU



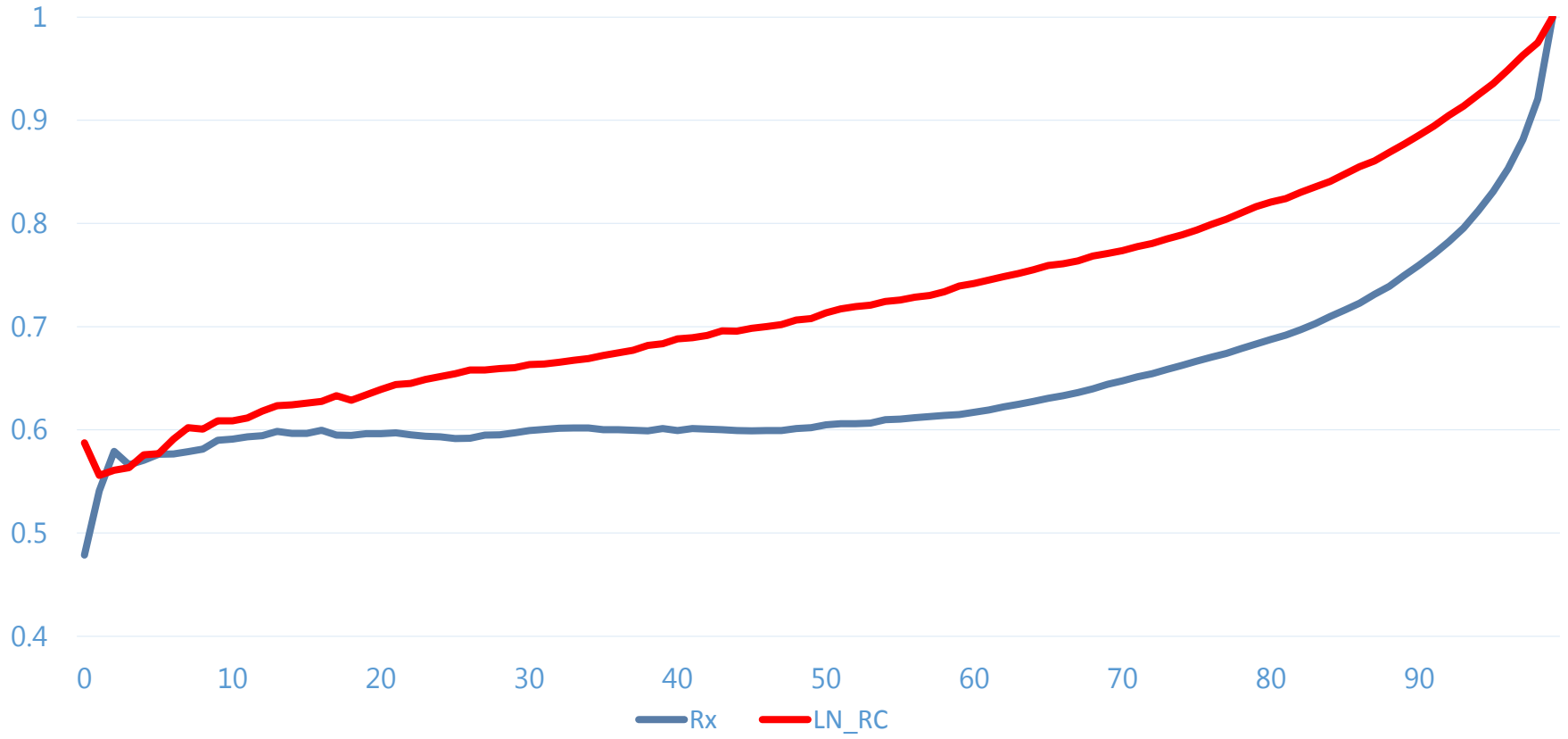
Correlation with FU



Mortality Differentiation by Duration Years



Performance Variations Makes The Two Scores Complement Each Other



Scores percentile in risk ascending order vs. cumulative mortality

Thank you

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