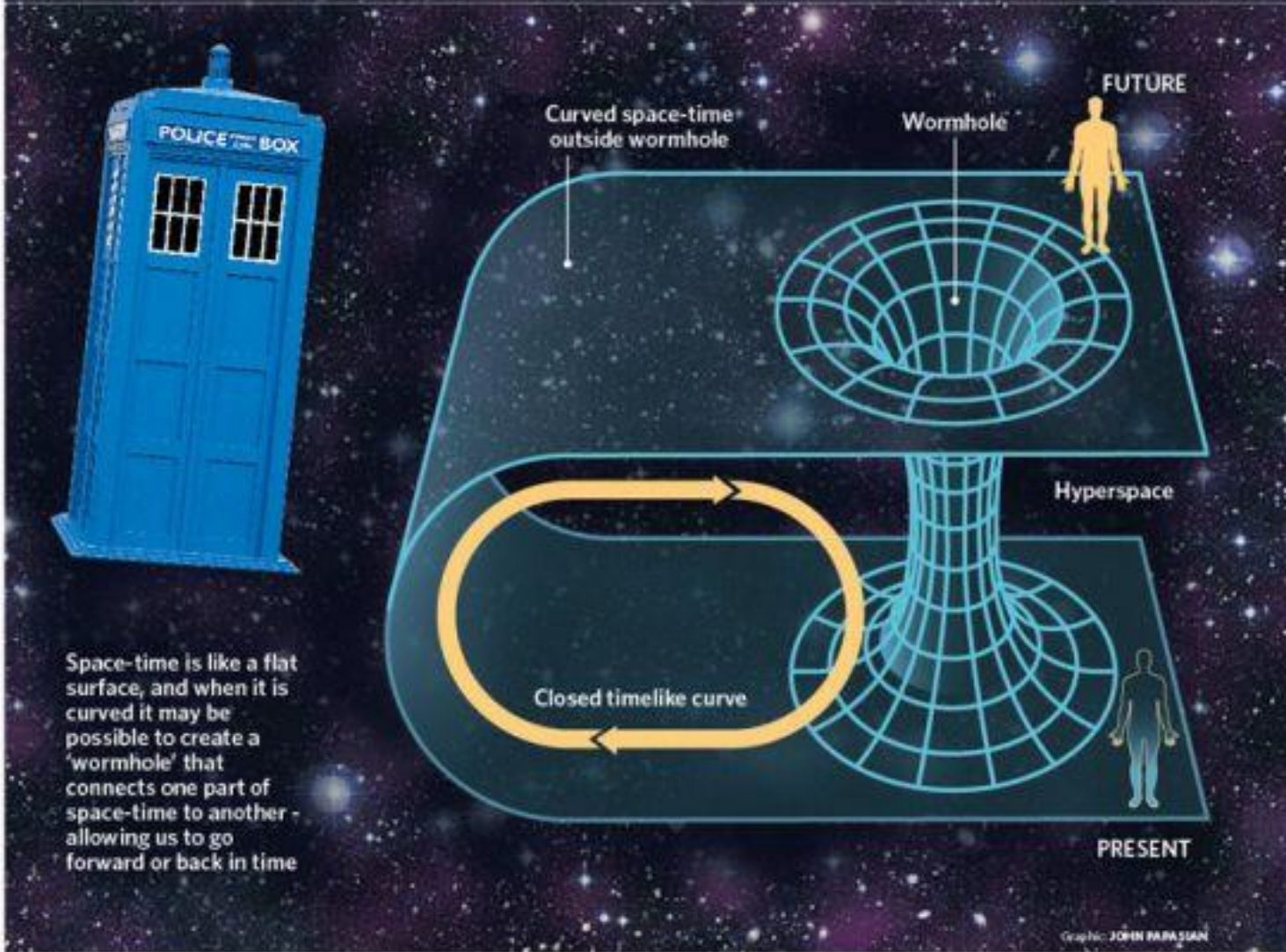


Is My Reserve Distribution too Narrow?

Jessica Leong, FIAA, FCAS, MAAA, AIA
CLRS September 2010

It's next year already

How time travelling would work



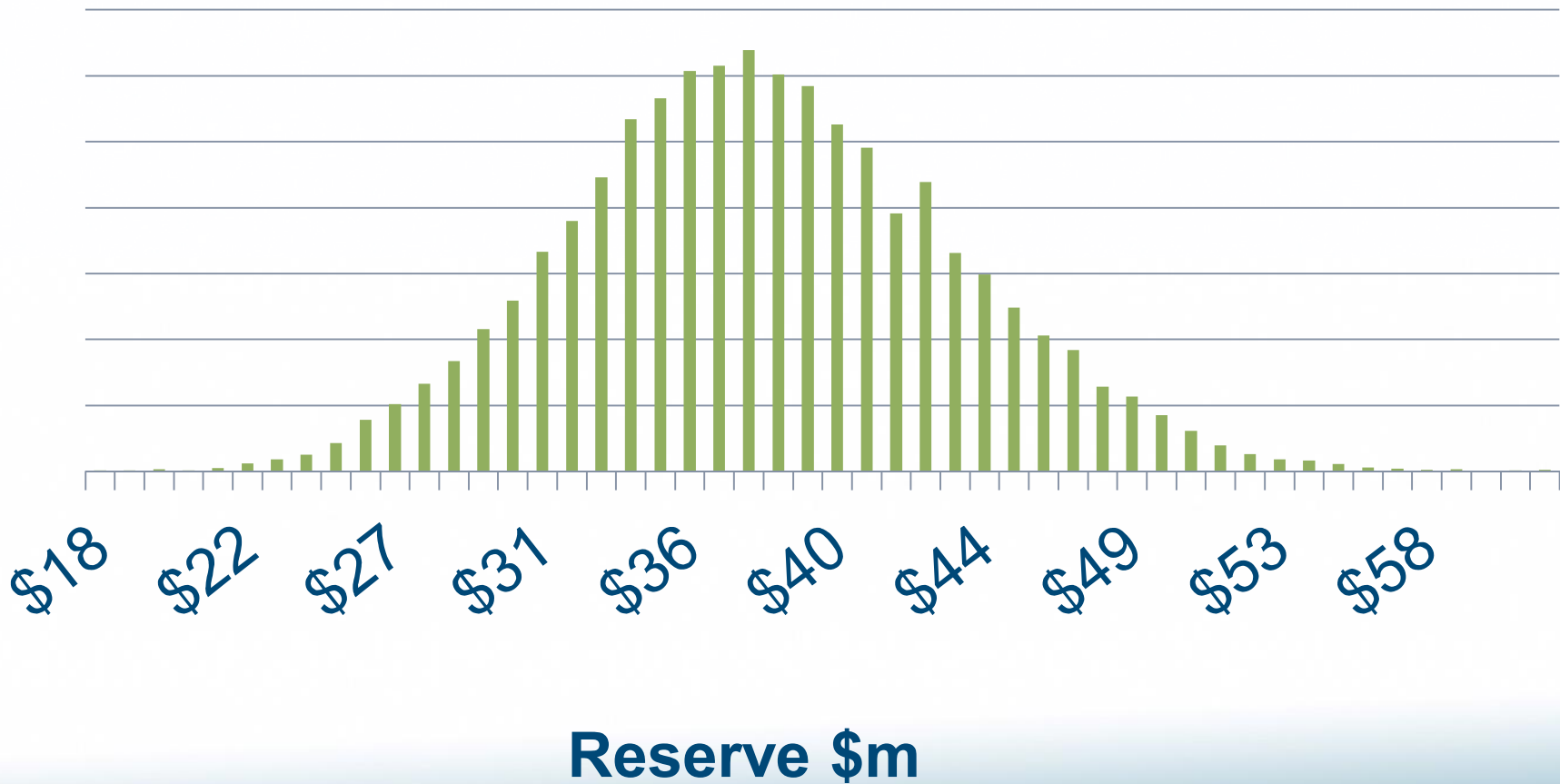
Space-time is like a flat surface, and when it is curved it may be possible to create a 'wormhole' that connects one part of space-time to another - allowing us to go forward or back in time

Source: New Scientist

Graphic: JOHN PARASIAN

Company A

Distribution of Homeowners Unpaid as of 12/2000



Company A Distribution of Homeowners Unpaid as of 12/2000



Is My Reserve Distribution too Narrow?

1. Are my reserve distributions realistic?

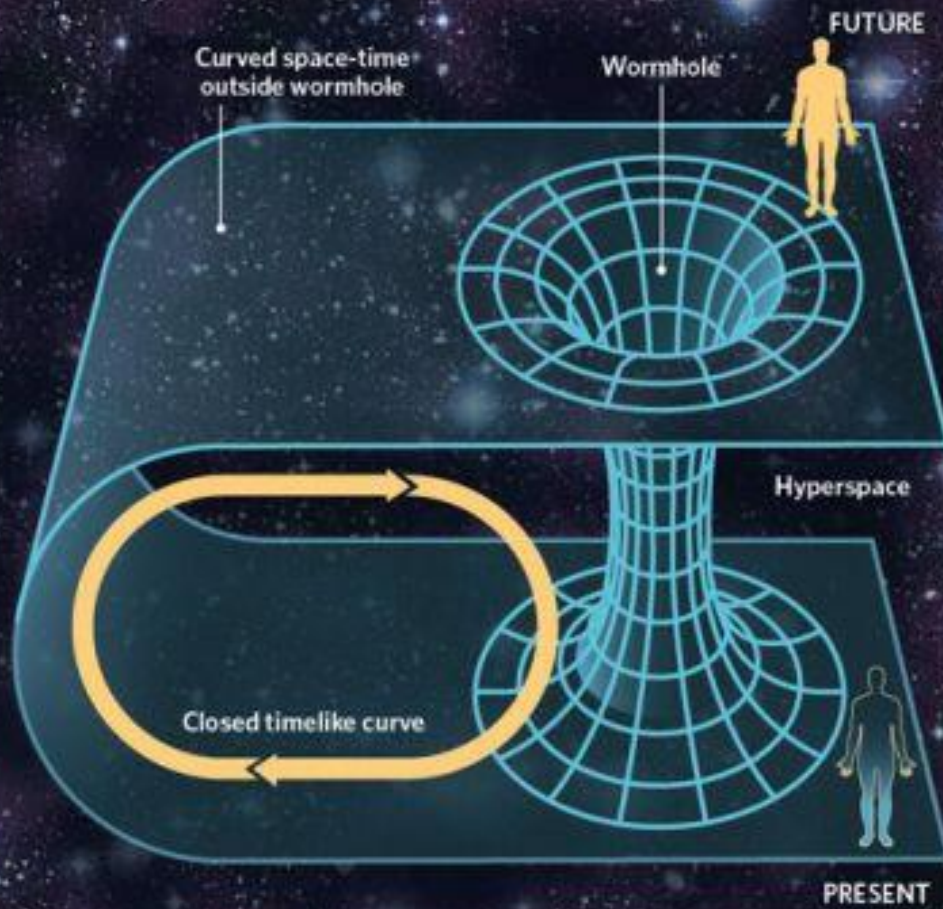


It's next year already

How time travelling would work



Space-time is like a flat surface, and when it is curved it may be possible to create a 'wormhole' that connects one part of space-time to another - allowing us to go forward or back in time

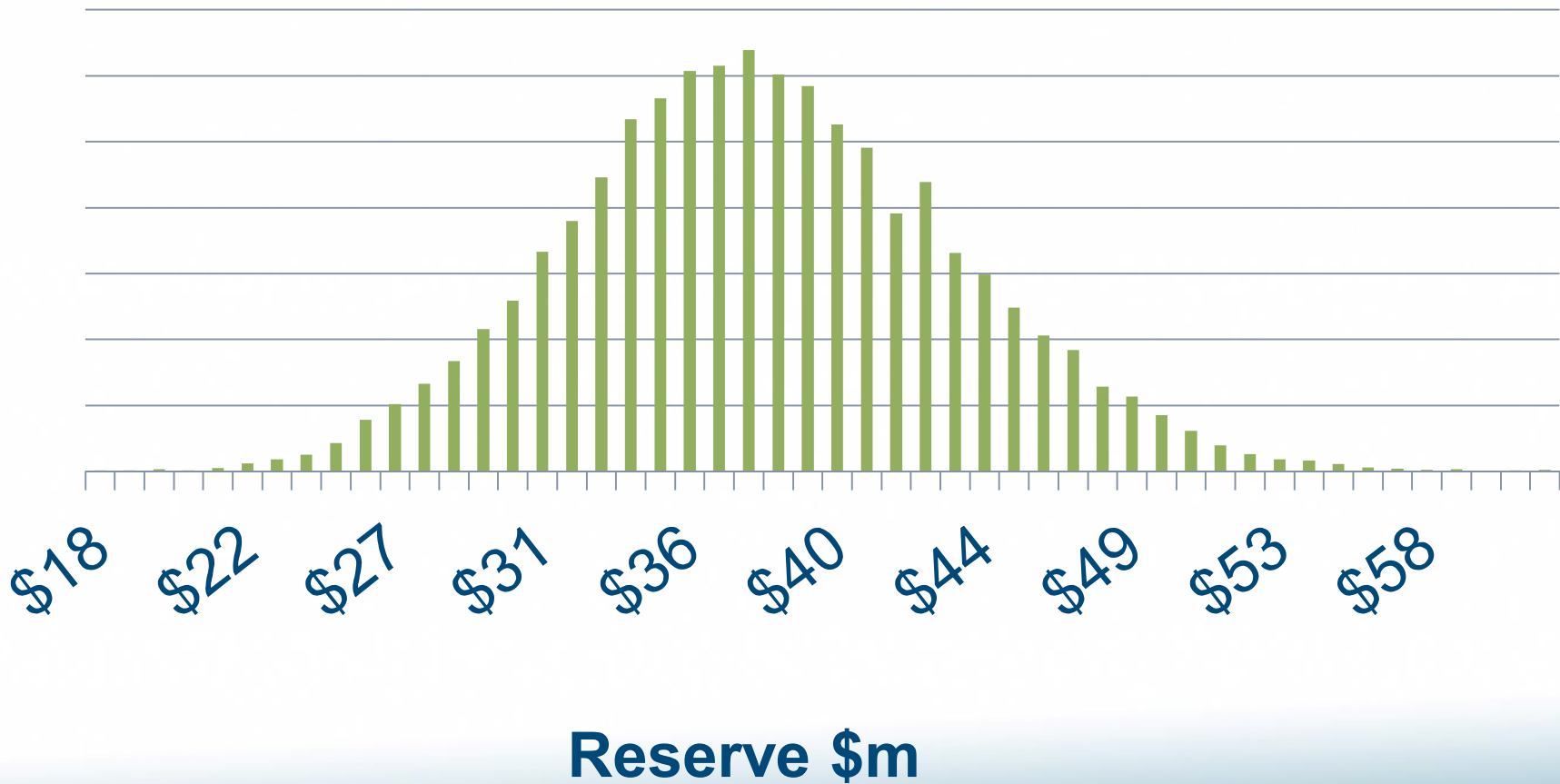


Graphic: JOHN PARASIAN

Source: New Scientist

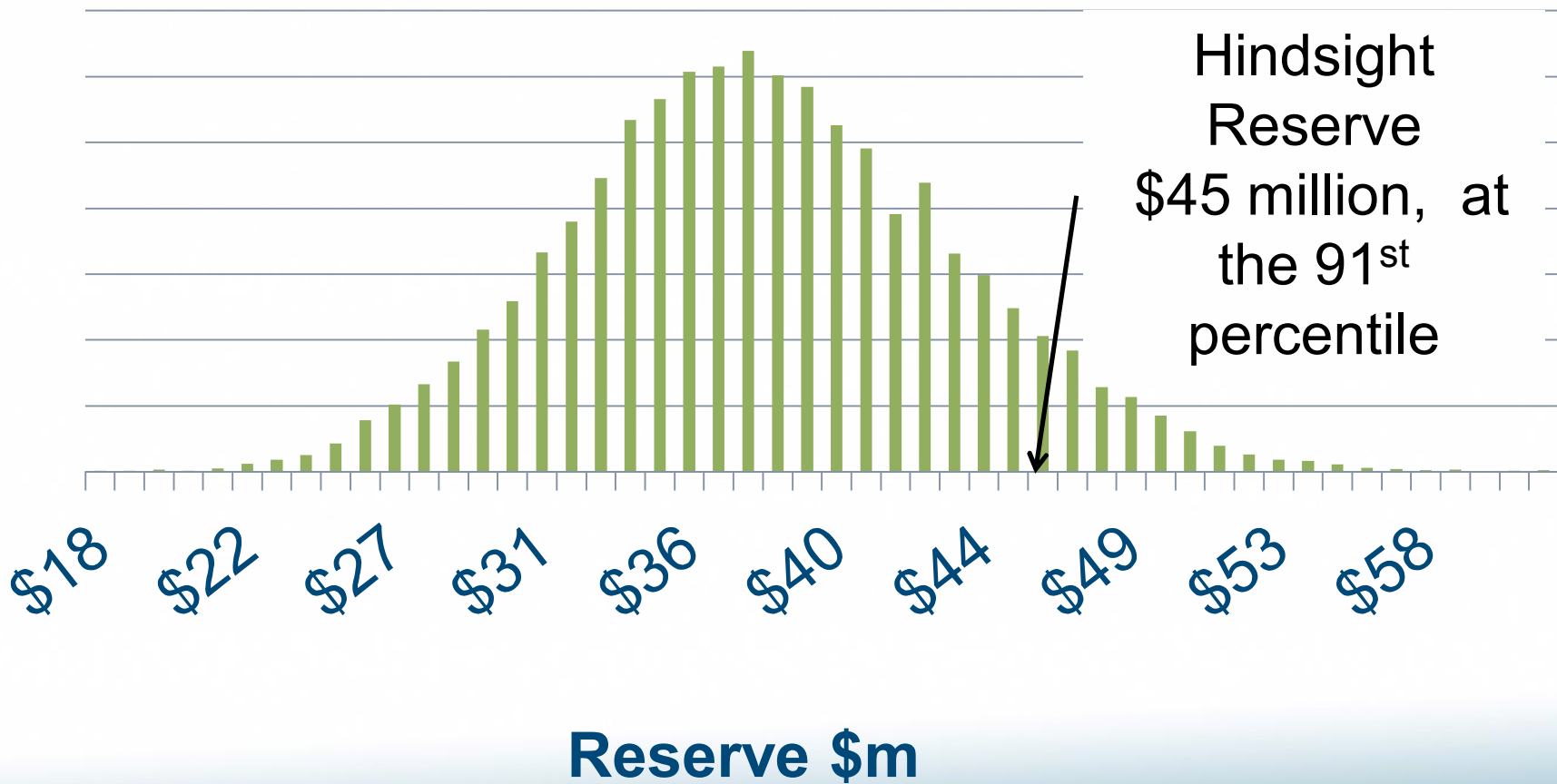
Company A

Distribution of Homeowners Unpaid as of 12/2000



Company A

Distribution of Homeowners Unpaid as of 12/2000

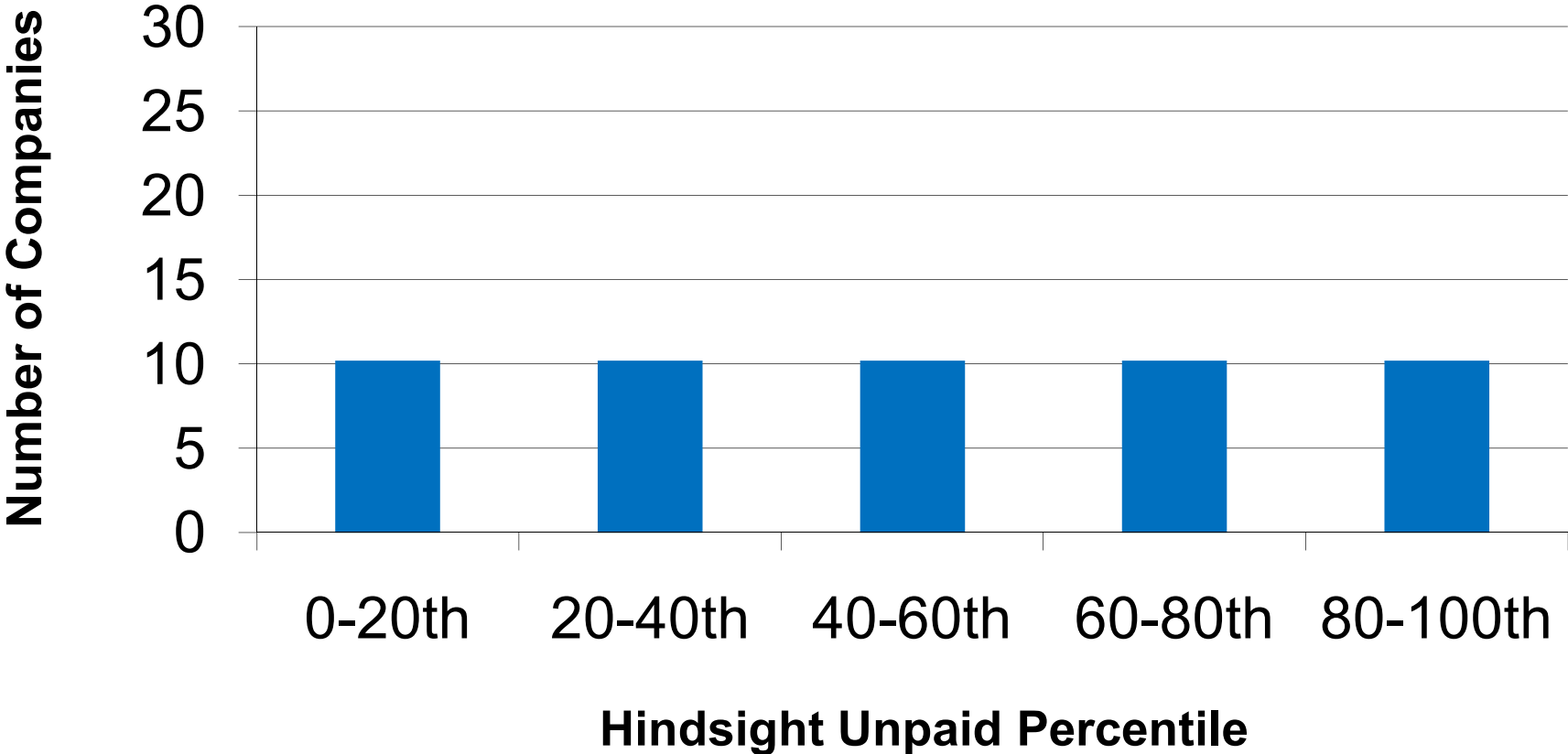


51 Companies

Hindsight Unpaid Percentile

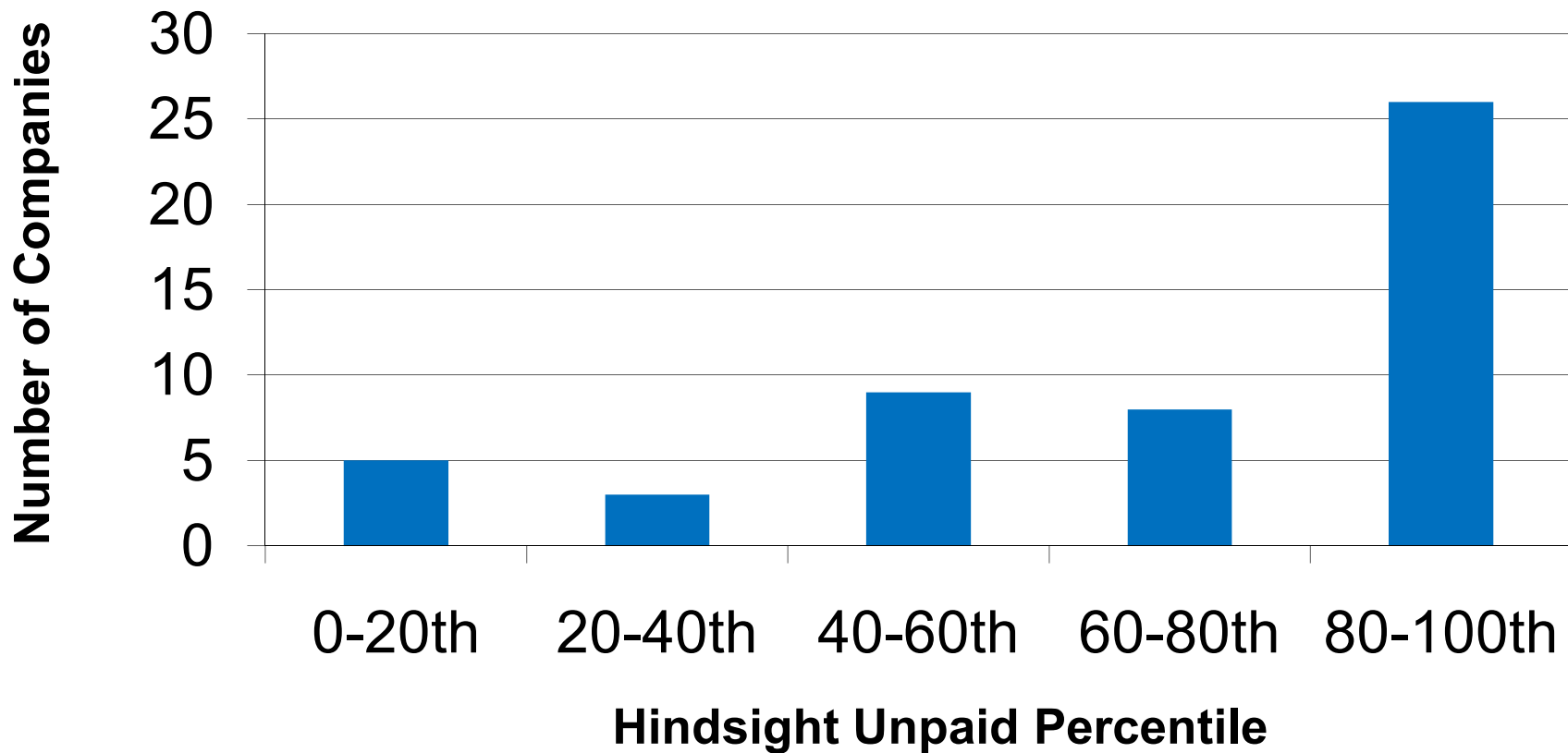
Company A	91%
Company B	51%
Company C	6%
....
....
Company AA	85%
Company AB	37%

Ideal Histogram of the Hindsight Unpaid Percentile



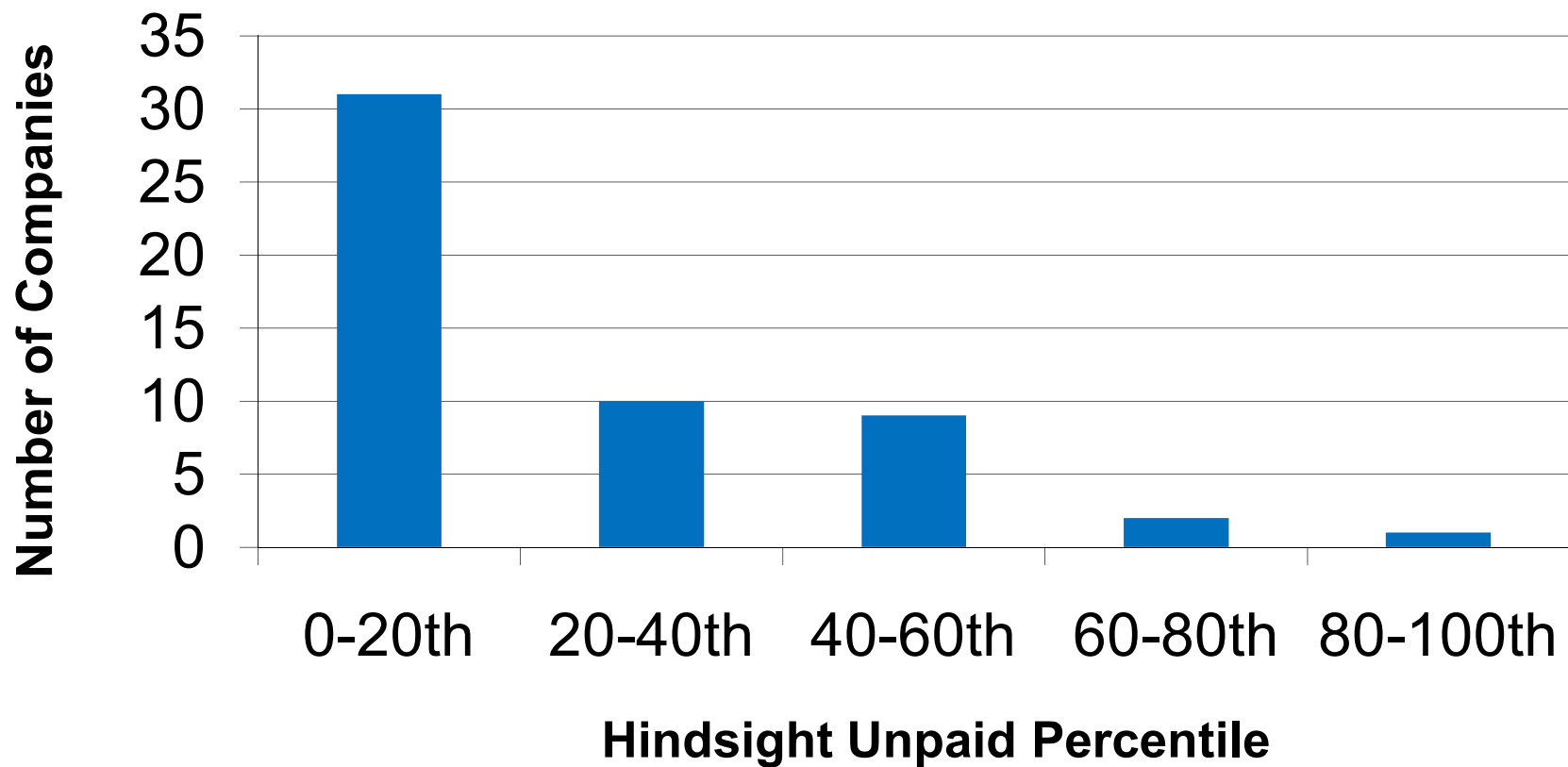
Homeowners as of 12/2000

Histogram of the Hindsight Unpaid Percentile



Homeowners as of 12/1996

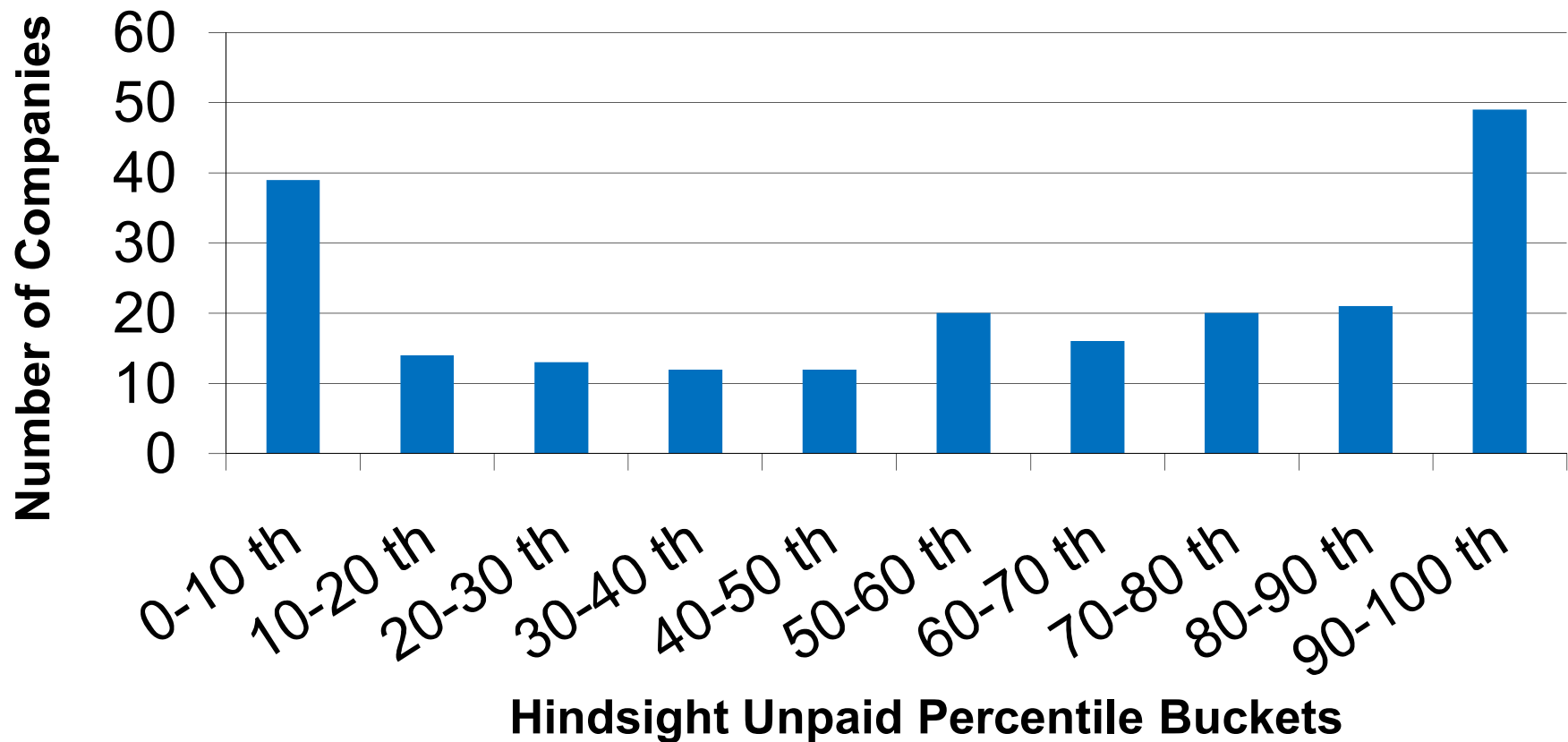
Histogram of the Hindsight Unpaid Percentile



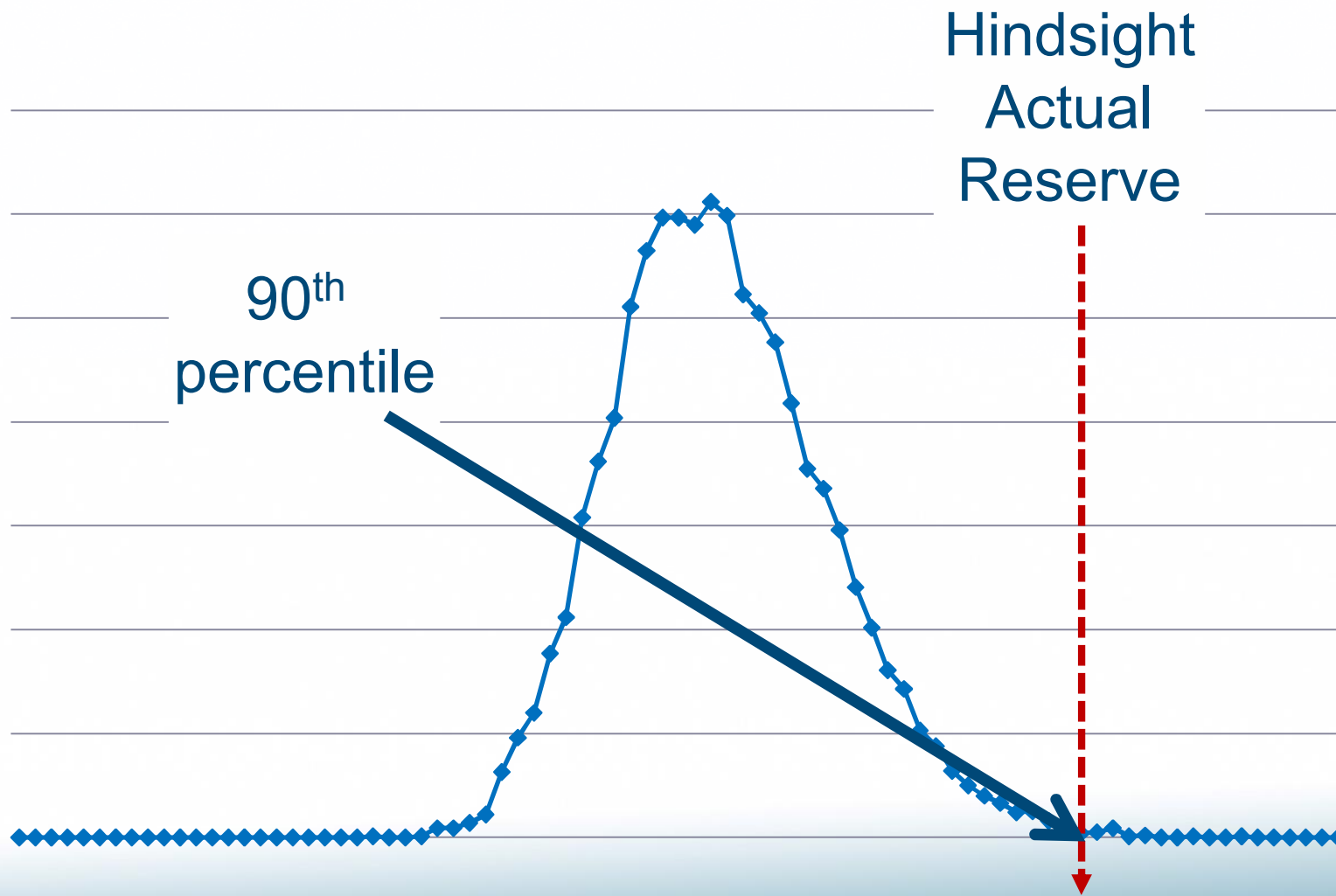
Homeowners

AY 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003

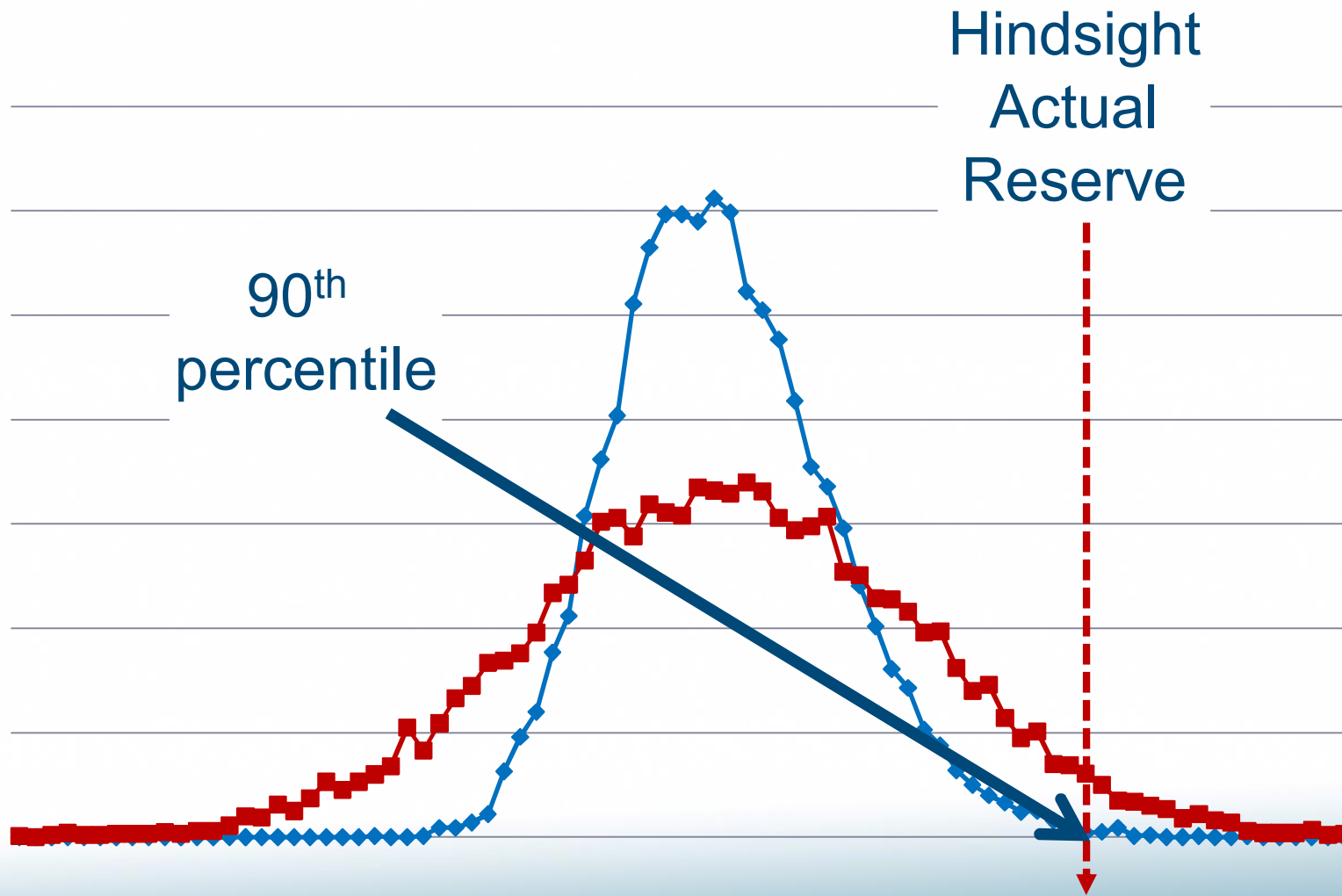
Histogram of the Hindsight Unpaid Percentile



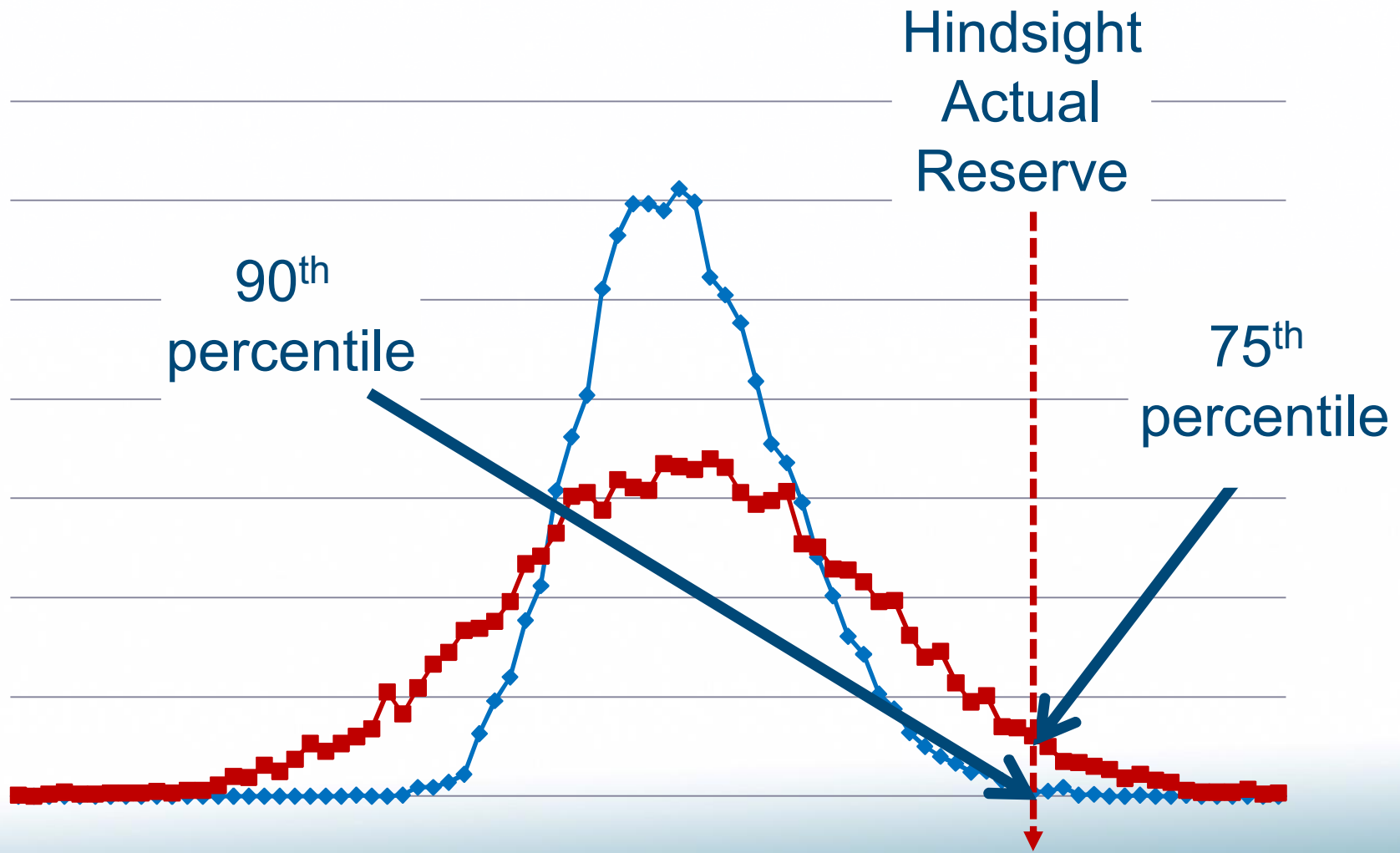
Bootstrap vs Wider Distribution



Bootstrap vs Wider Distribution



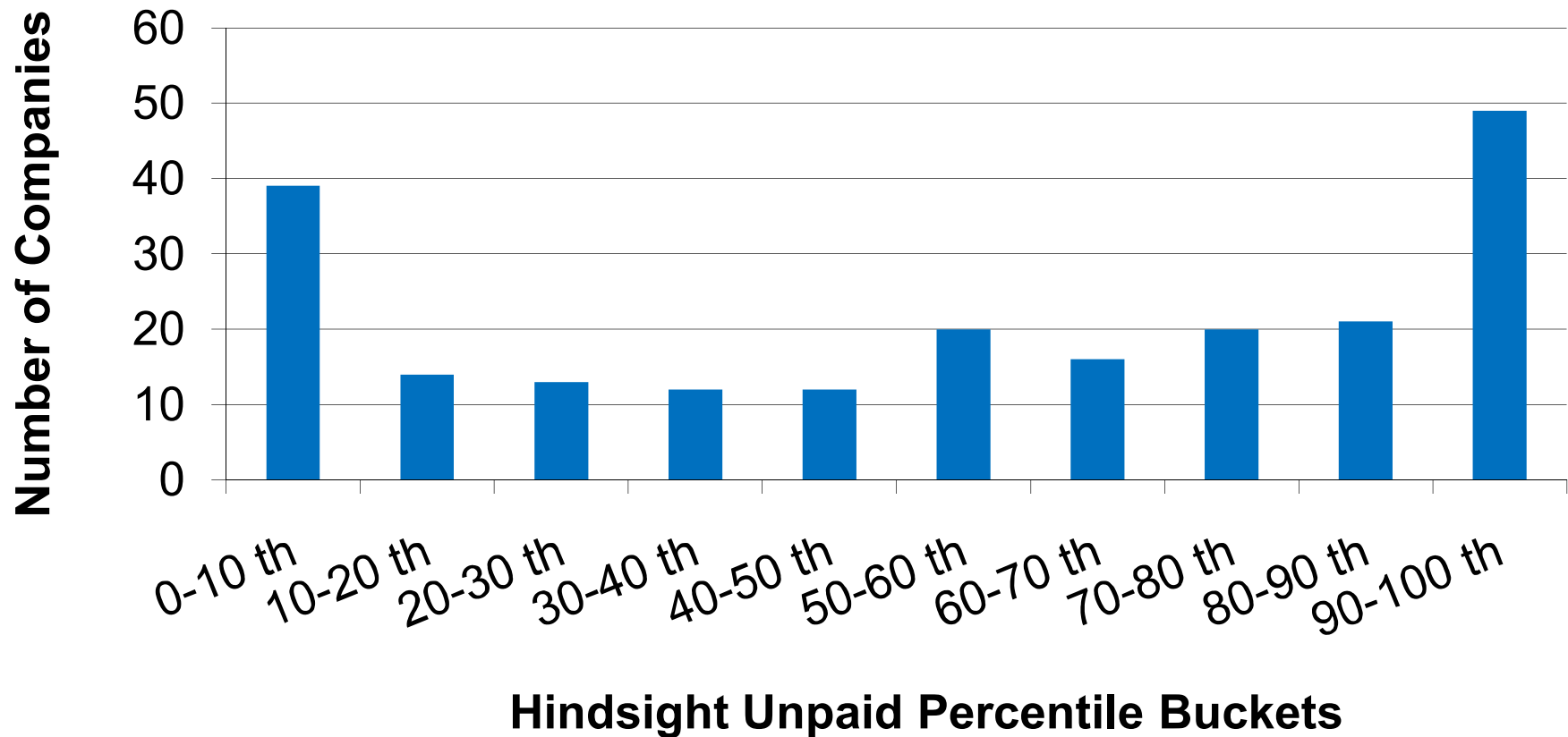
Bootstrap vs Wider Distribution



Homeowners

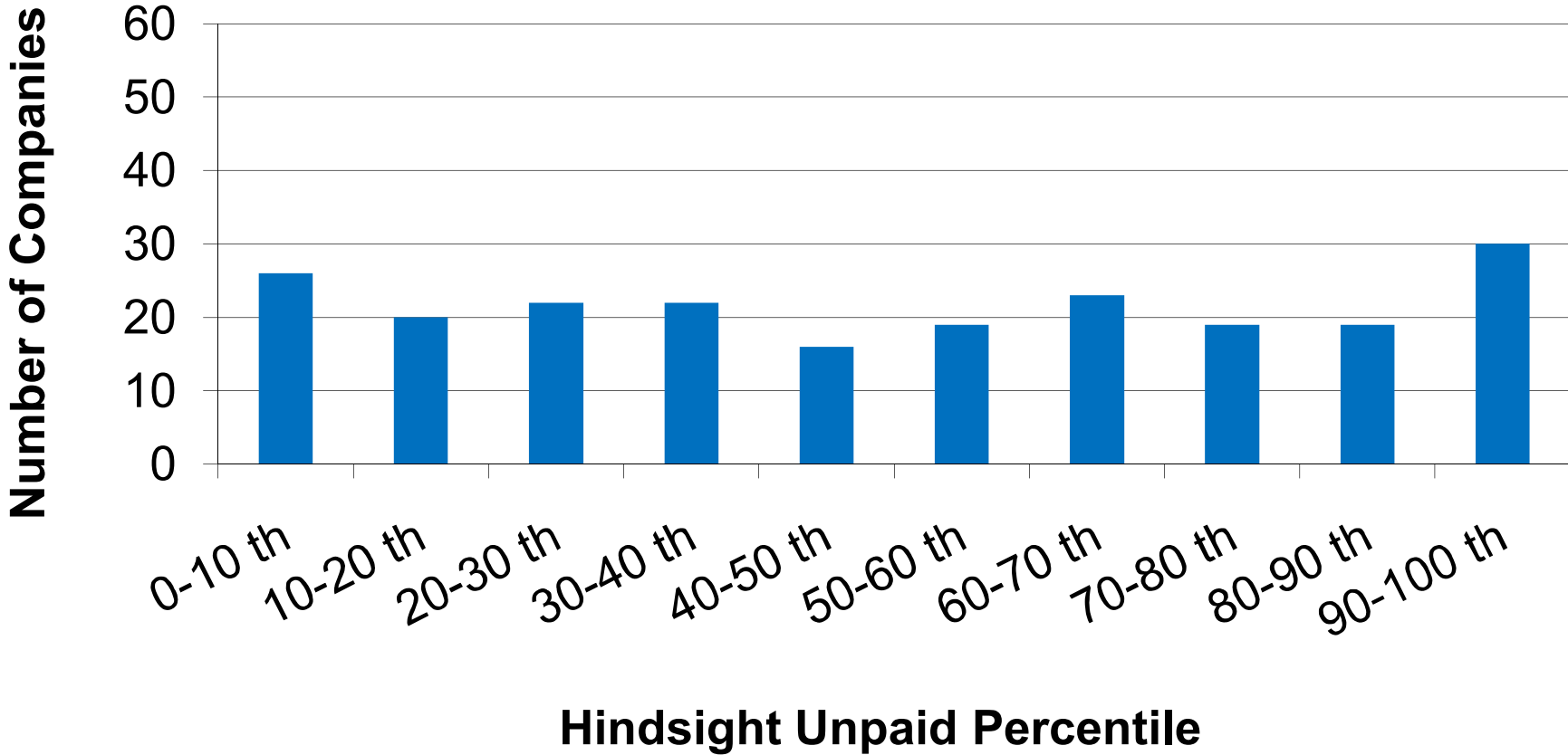
AY 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003

Histogram of the Hindsight Unpaid Percentile



Homeowners AY 1996-2003

Histogram of the Hindsight Unpaid Percentile



Is My Reserve Distribution too Narrow?

1. Are my reserve distributions realistic?
2. Why are my reserve distributions not realistic?



IAAust Paper

Insurance liability risk split into two:

- independent risk
- systemic risk

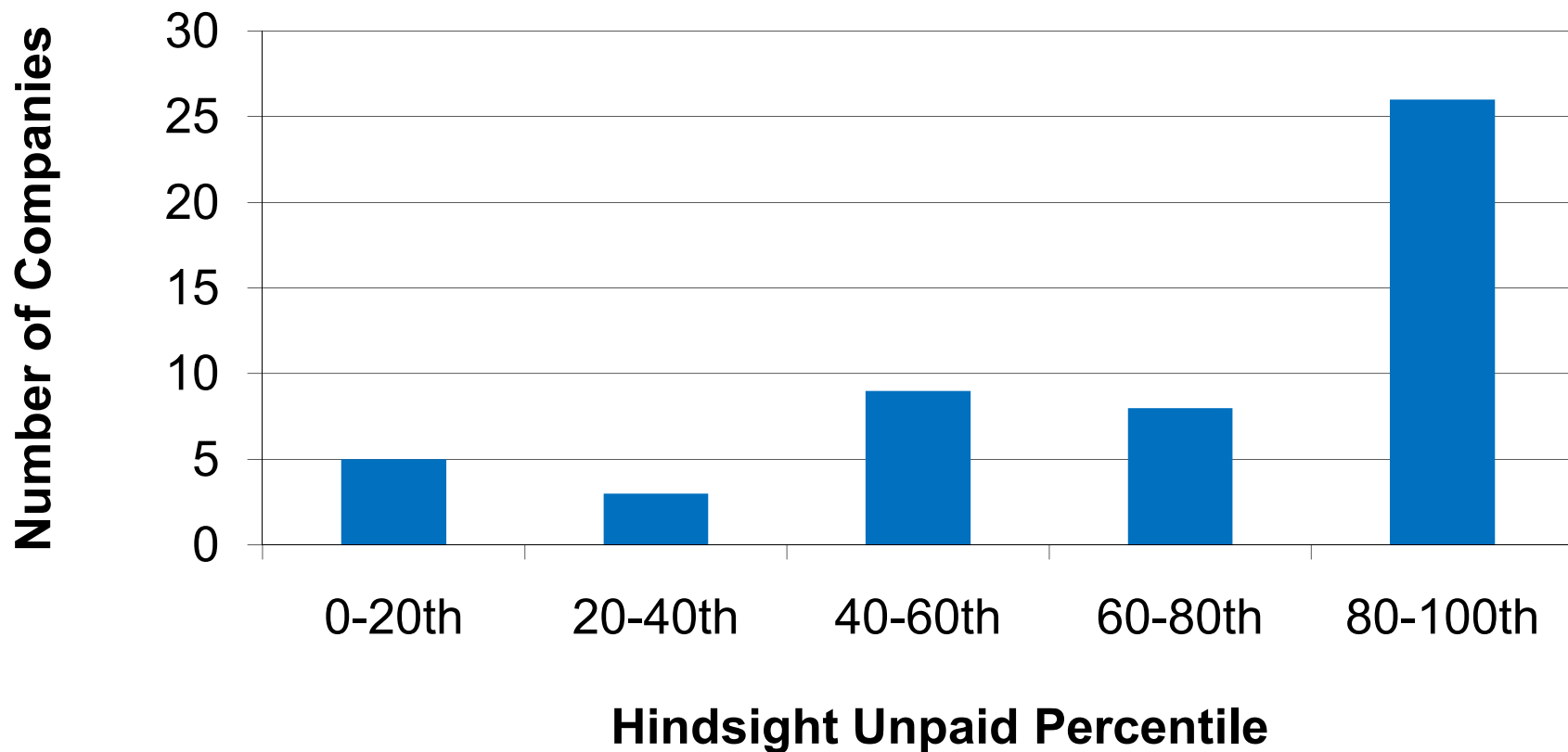
IAAust Paper

Models only cover independent risk

- fits away past systemic episodes
- if not fit away, is outcome suitable?

Homeowners as of 12/2000

Histogram of the Hindsight Unpaid Percentile



Remove systemic risk

- Multiply by 1.12
- Average $\left[\frac{\text{hindsight actual reserve}}{\text{mean reserve}} \right]$
- Correct for industry-wide under-reserving

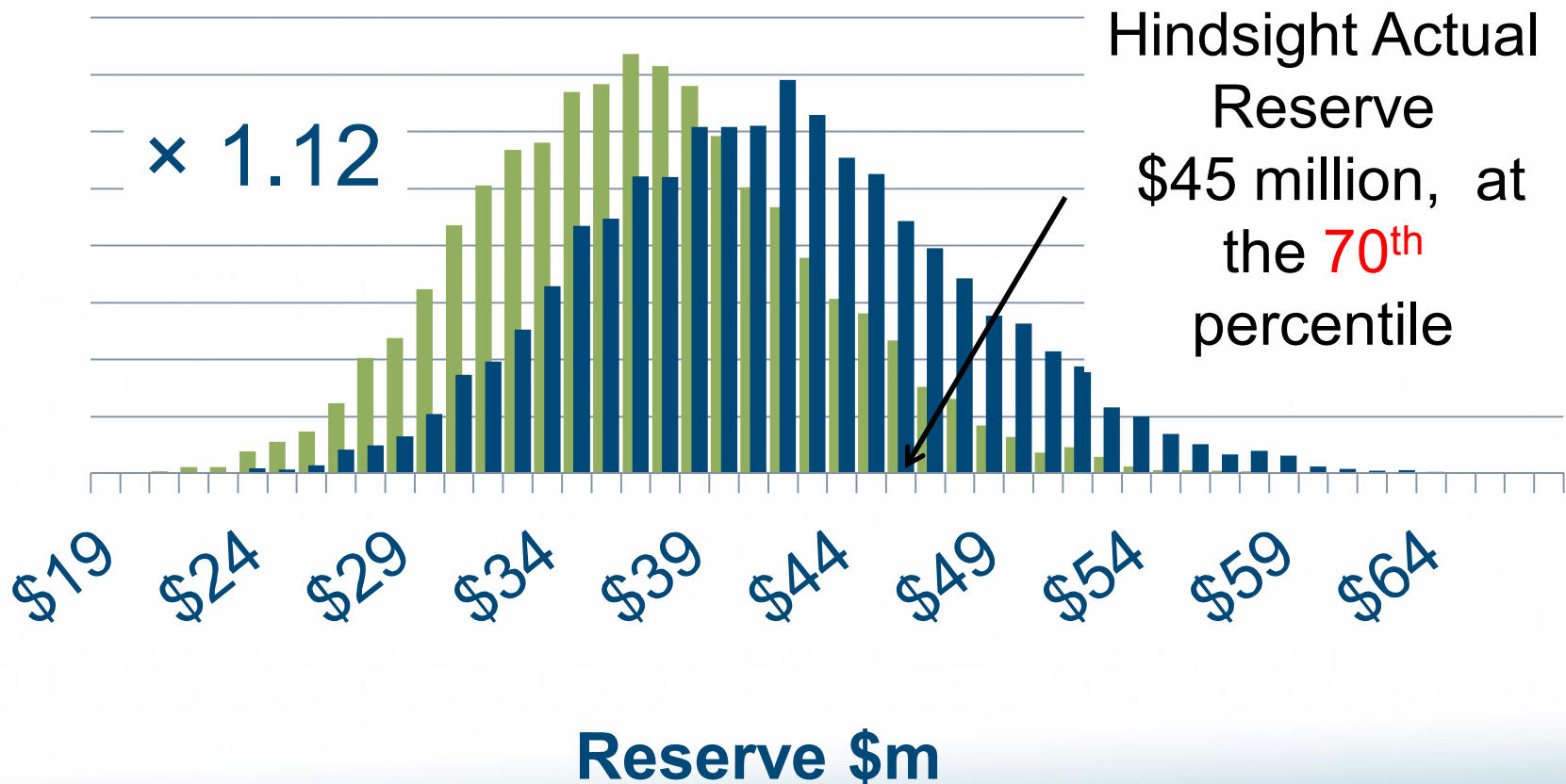
Company A

Distribution of Homeowners Unpaid as of 12/2000



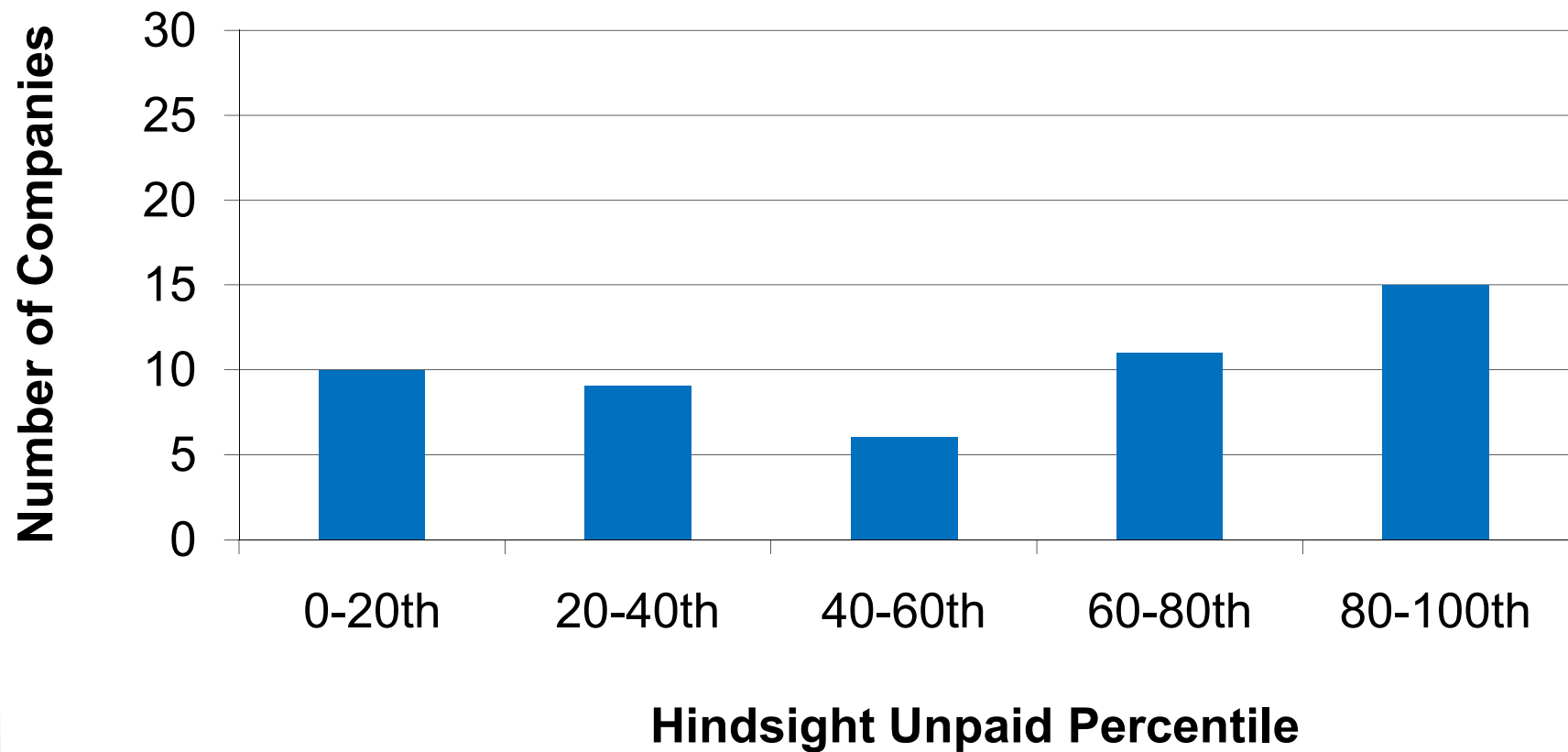
Company A

Distribution of Homeowners Unpaid as of 12/2000



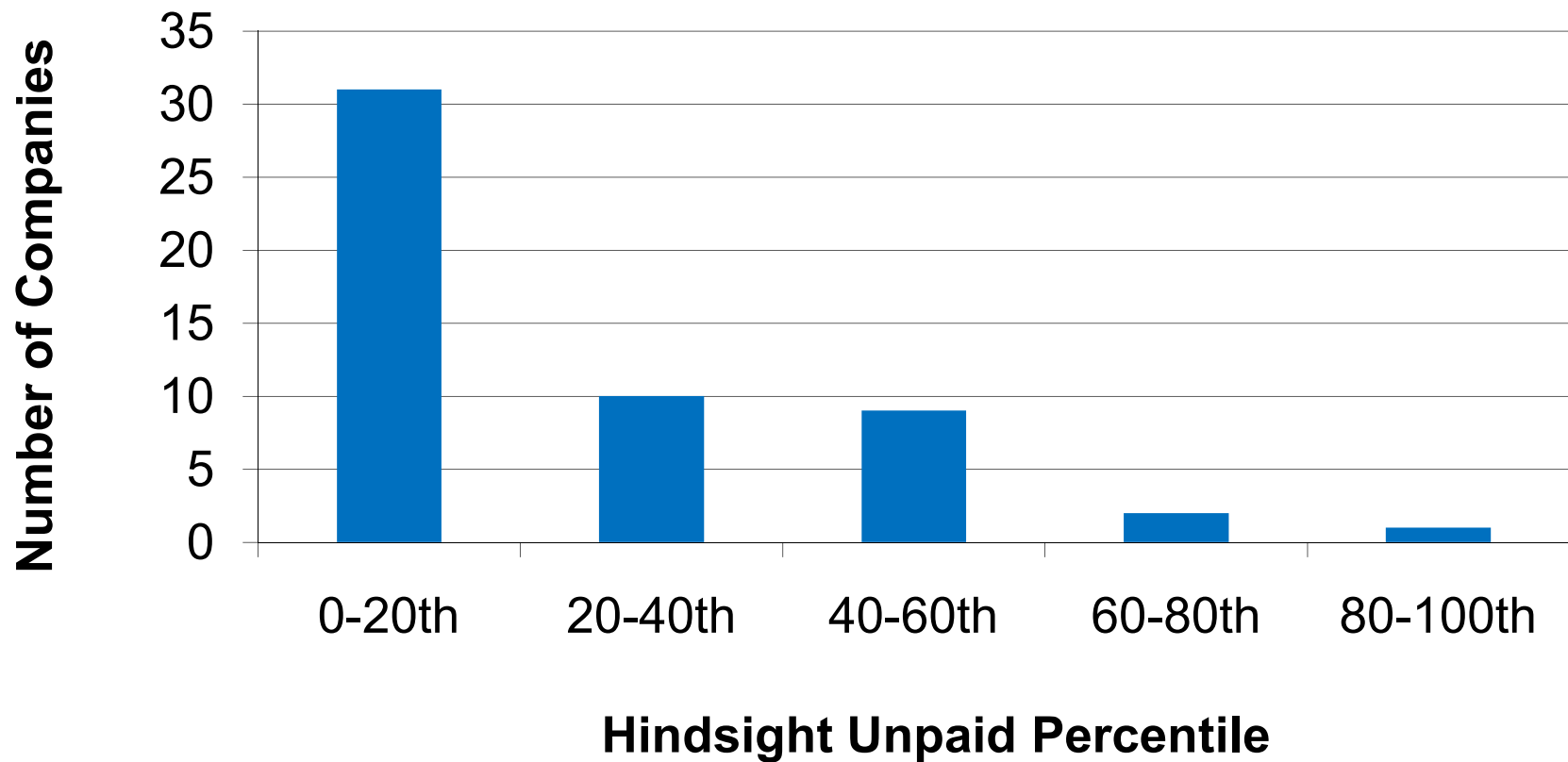
Homeowners as of 12/2000

Scaled Histogram of the Hindsight Unpaid Percentile



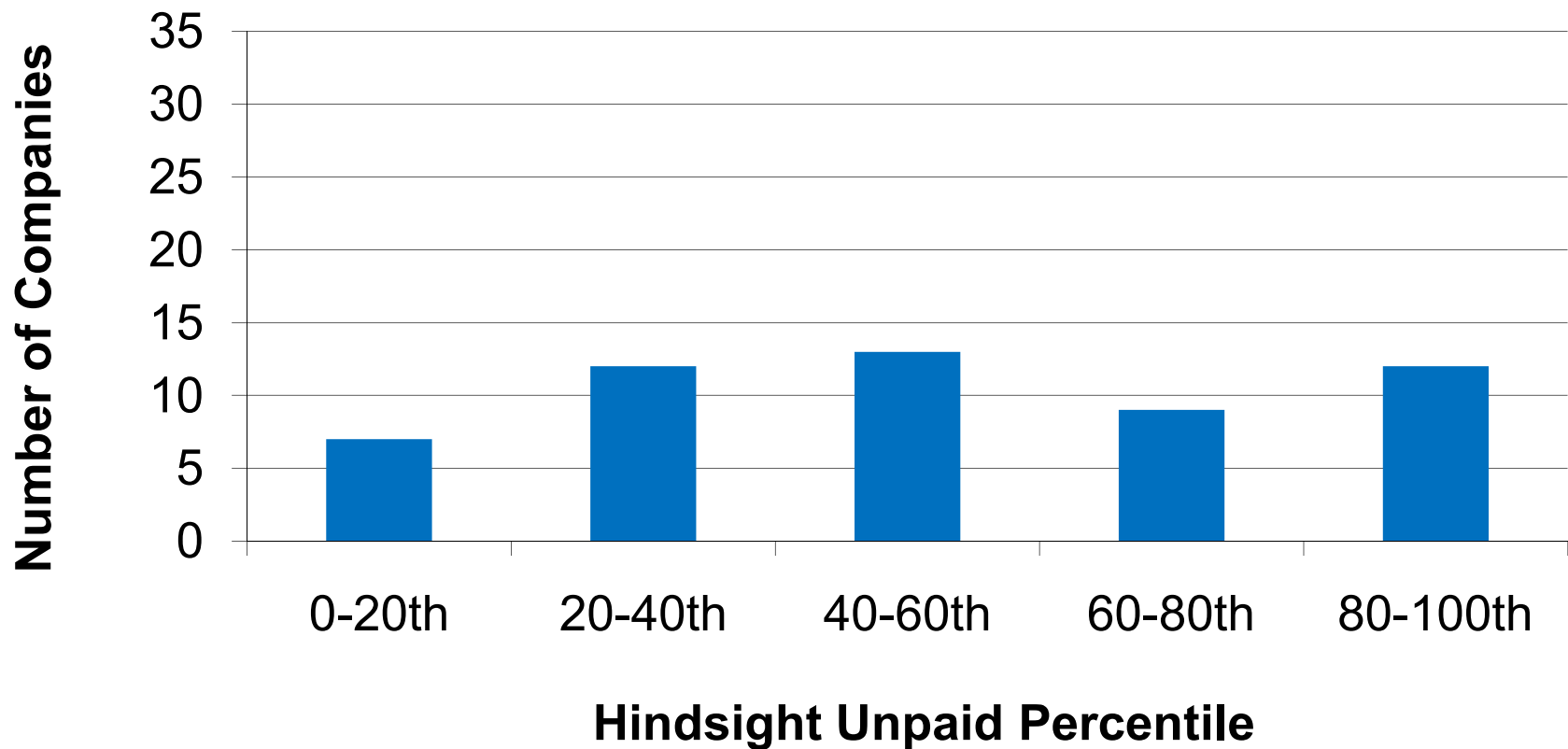
Homeowners as of 12/1996

Histogram of the Hindsight Unpaid Percentile



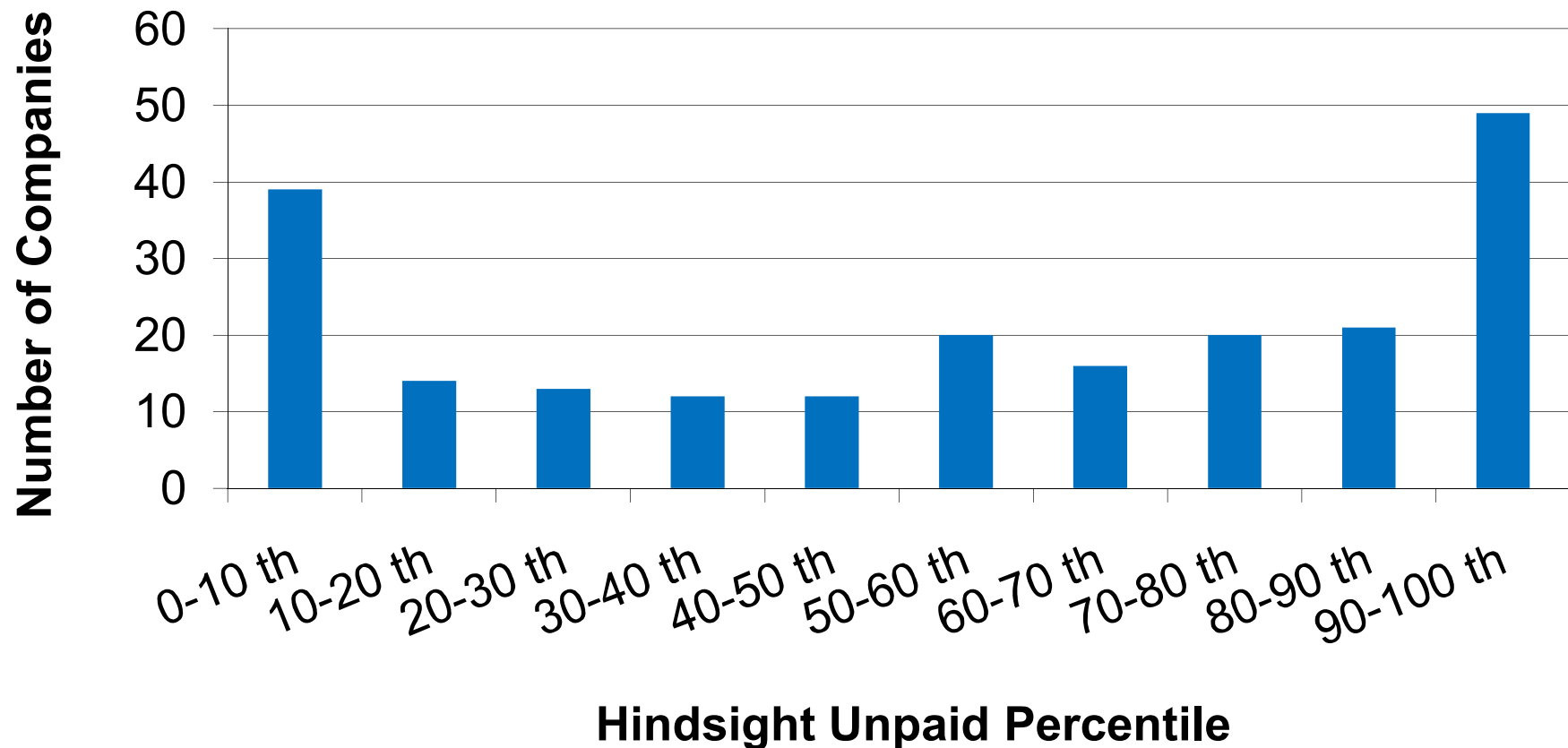
Homeowners as of 12/1996

Scaled Histogram of the Hindsight Unpaid Percentile



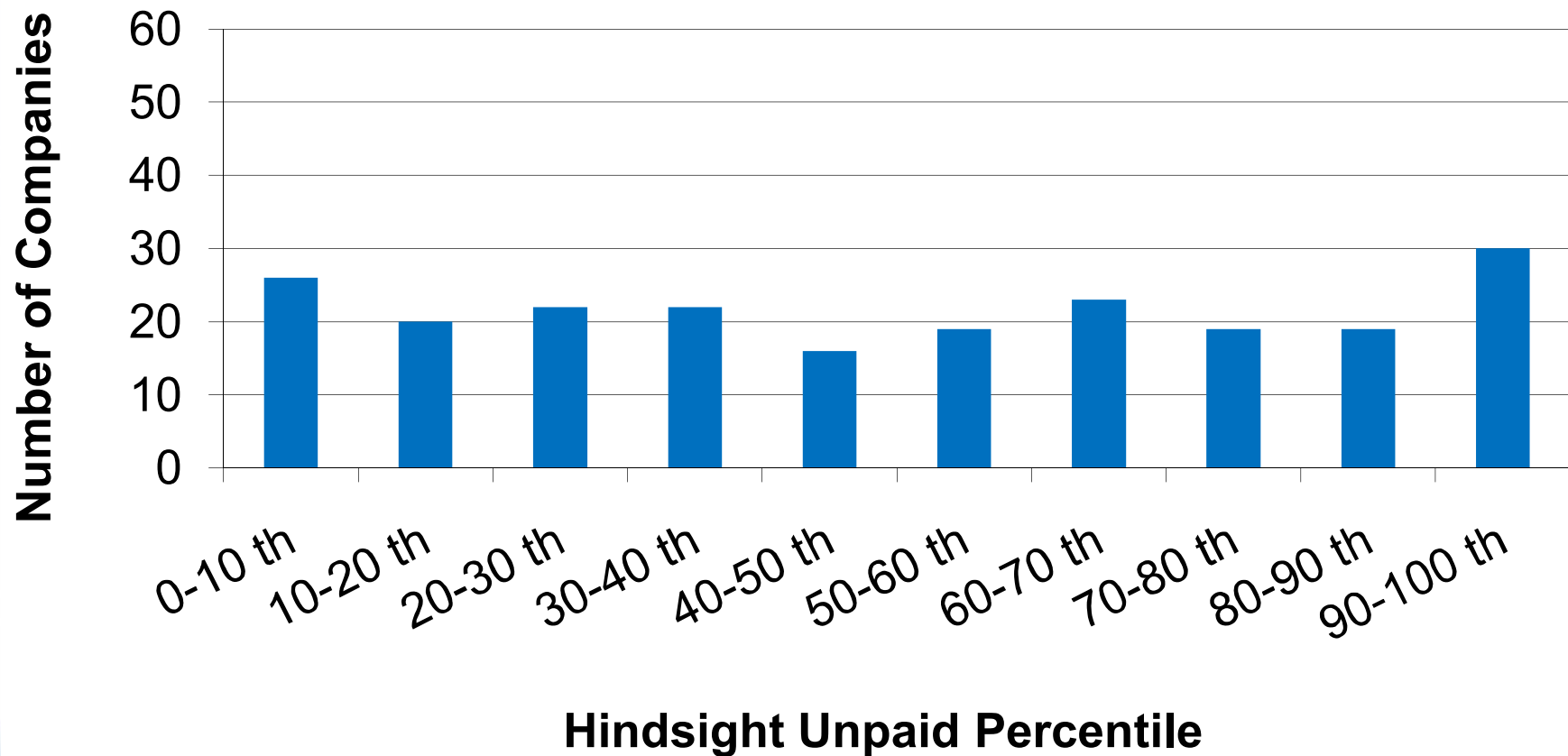
Homeowners AY 1996-2003

Histogram of the Hindsight Unpaid Percentile



Homeowners – Adjusted by Actual AY 1996-2003

Histogram of the Hindsight Unpaid Percentile



Is My Reserve Distribution too Narrow?

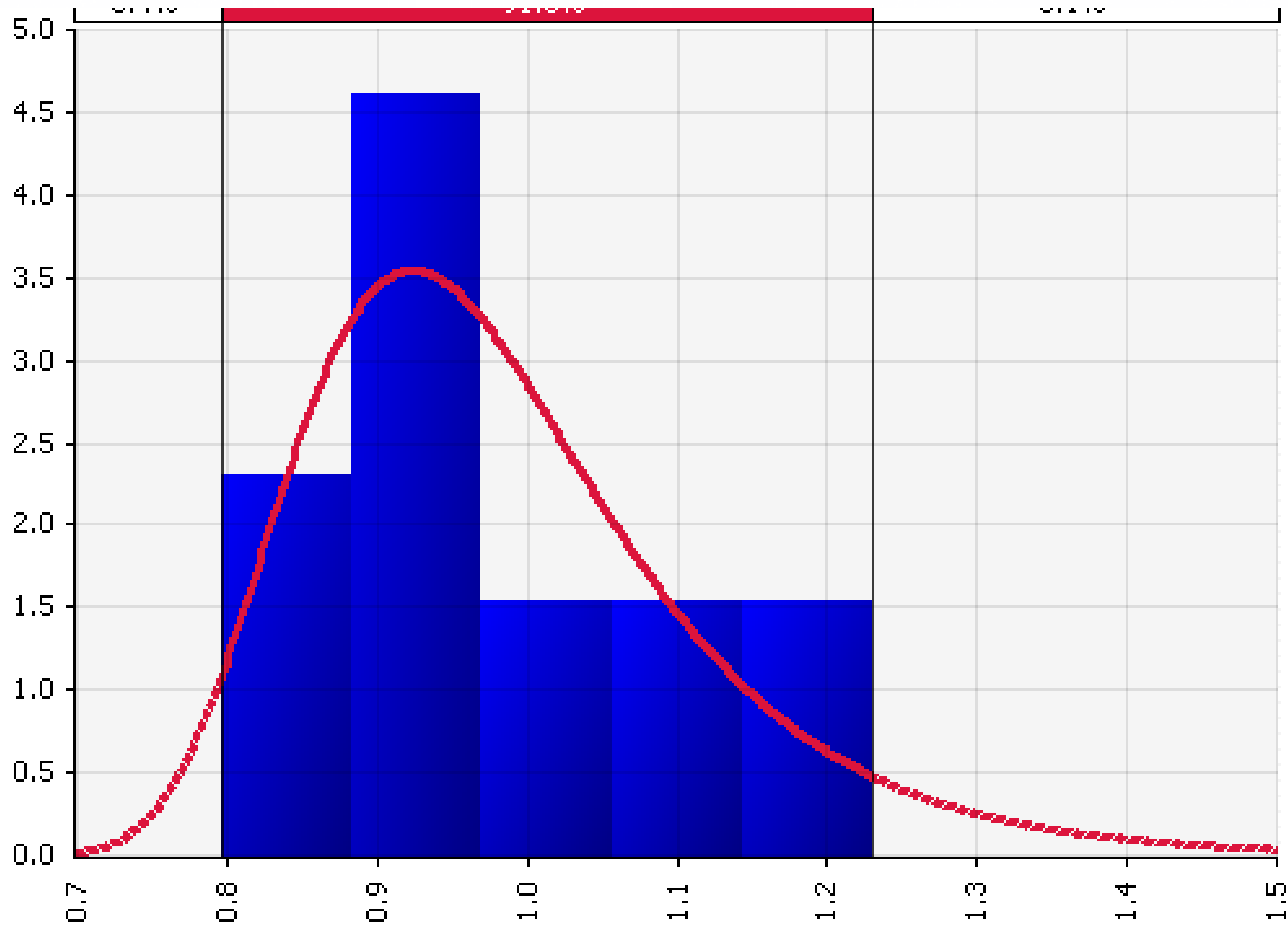
1. Are my reserve distributions realistic?
2. Why are my reserve distributions not realistic?
3. How to I make my reserve distribution realistic?



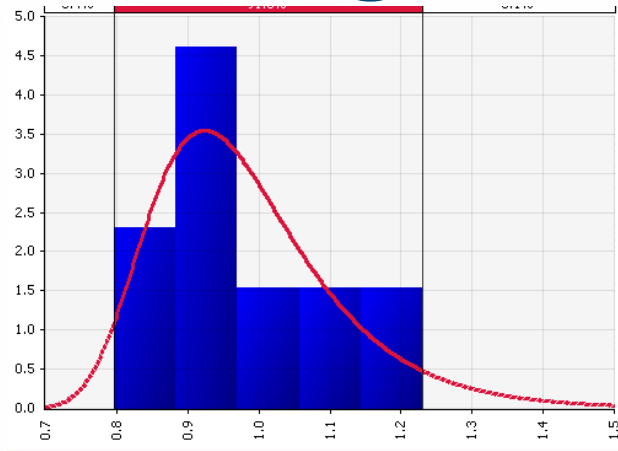
Possible solution

- Systemic factor 1.12 for 12/2000
- Systemic factor 0.80 for 12/1996

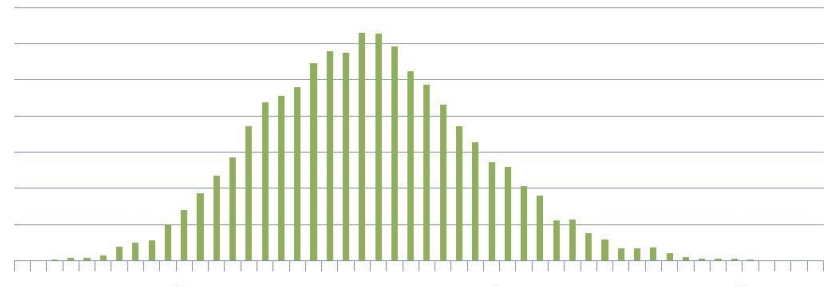
Systemic Risk Distribution



Combining Distributions

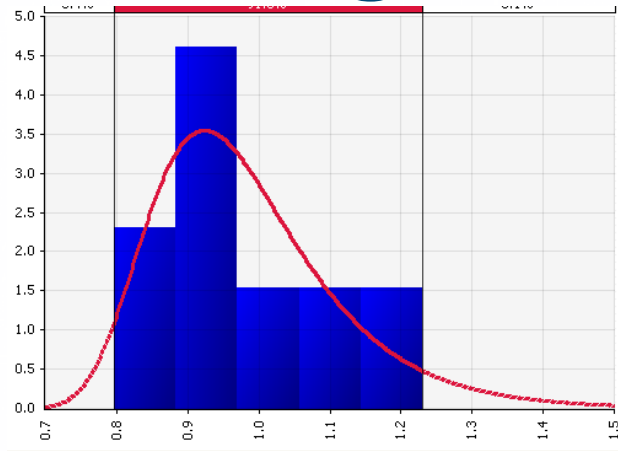


Systemic Risk Distribution



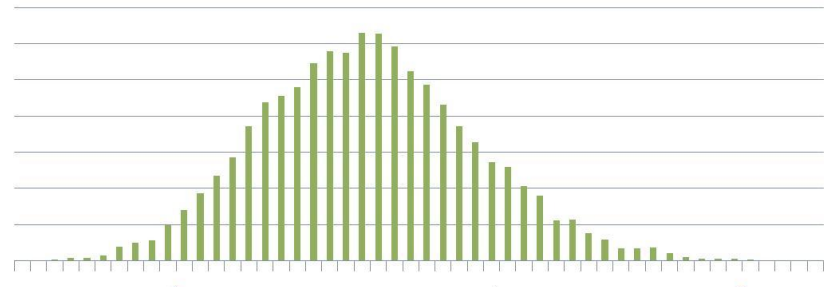
Independent Risk Distribution

Combining Distributions



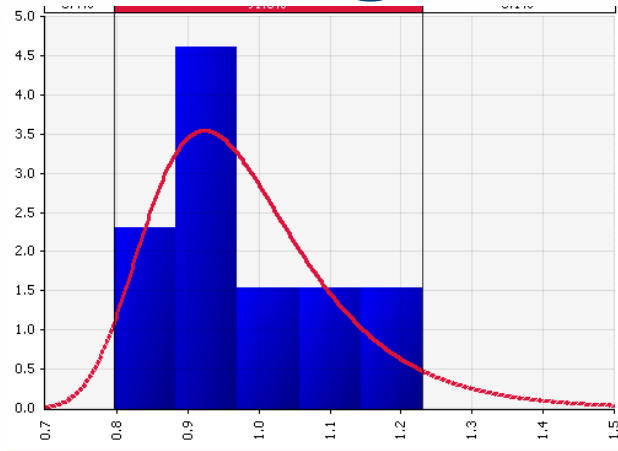
Systemic Risk Distribution

1.13



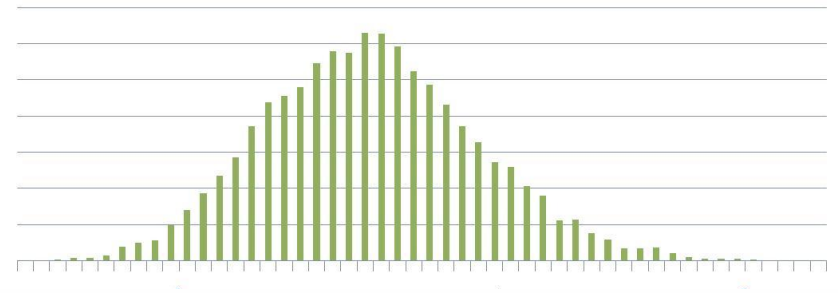
Independent Risk Distribution

Combining Distributions



Systemic Risk Distribution

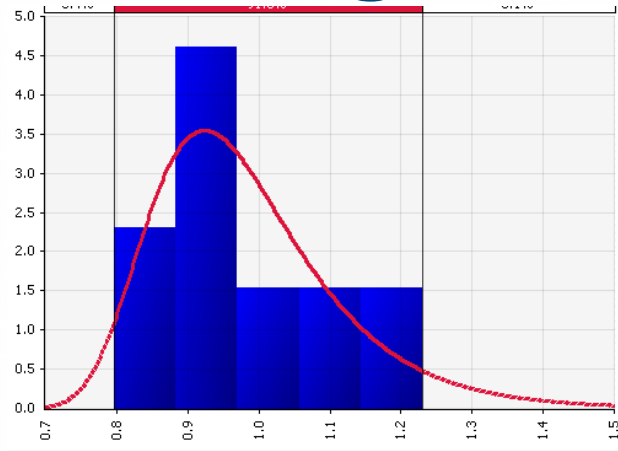
1.13



Independent Risk Distribution

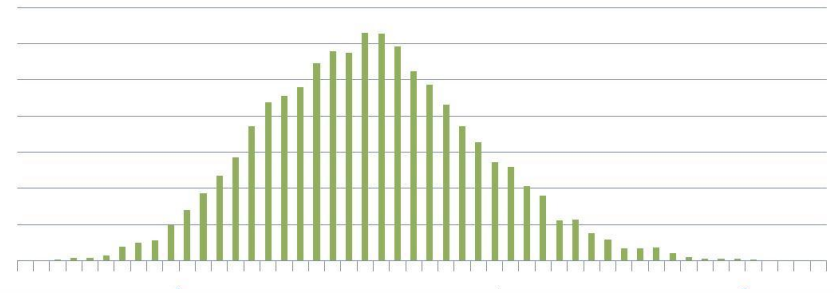
\$32 million

Combining Distributions



Systemic Risk Distribution

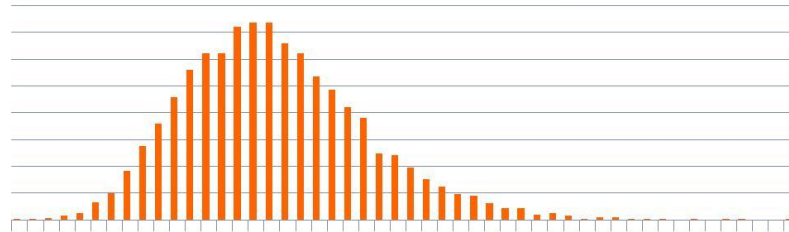
1.13



Independent Risk Distribution

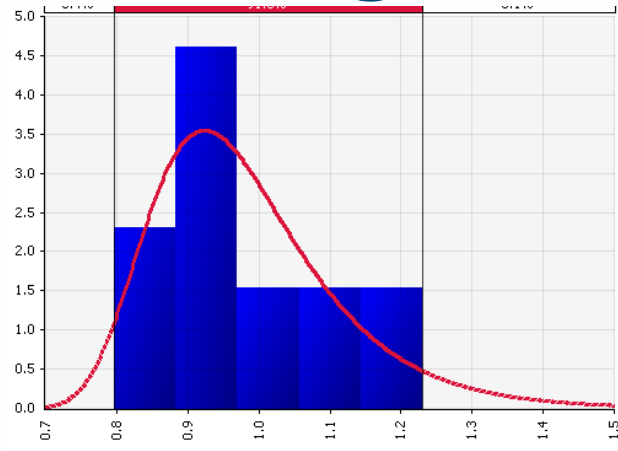
\$32 million

×



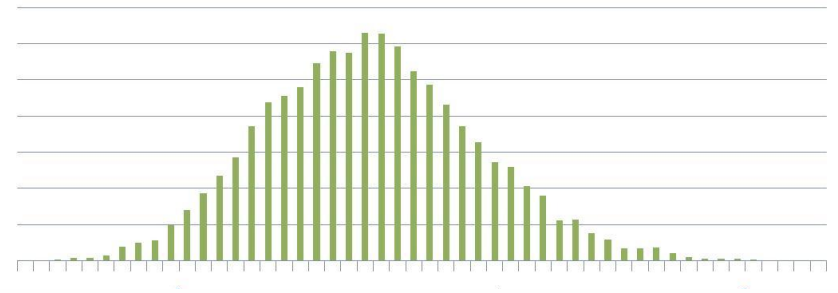
\$36 million

Combining Distributions



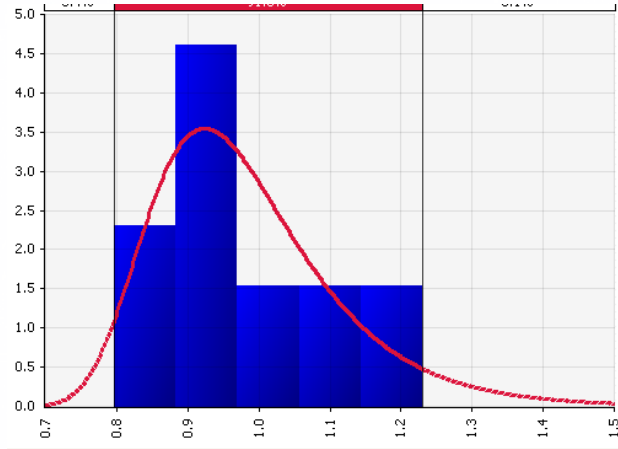
Systemic Risk Distribution

0.92



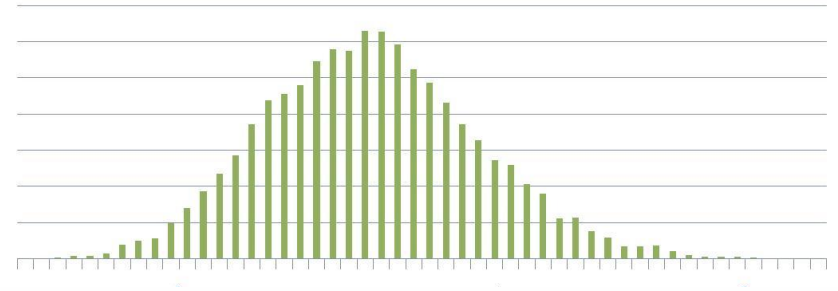
Independent Risk Distribution

Combining Distributions



Systemic Risk Distribution

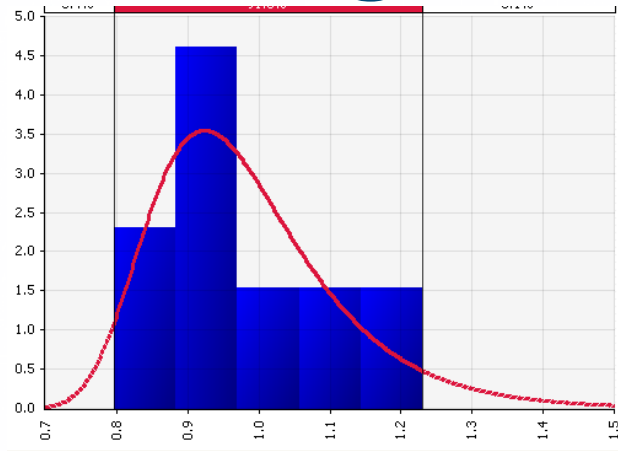
0.92



Independent Risk Distribution

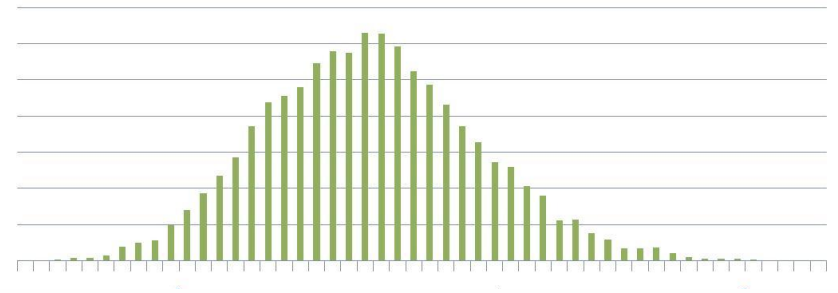
\$44 million

Combining Distributions



Systemic Risk Distribution

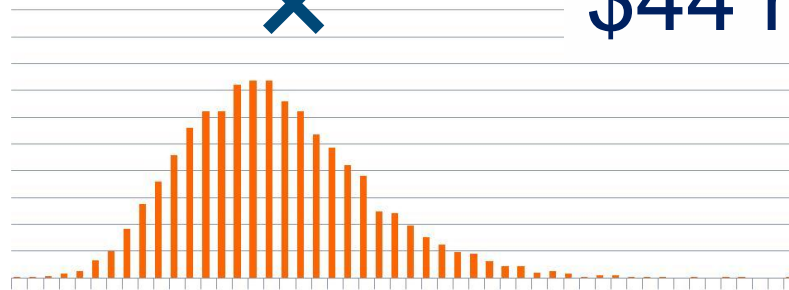
0.92



Independent Risk Distribution

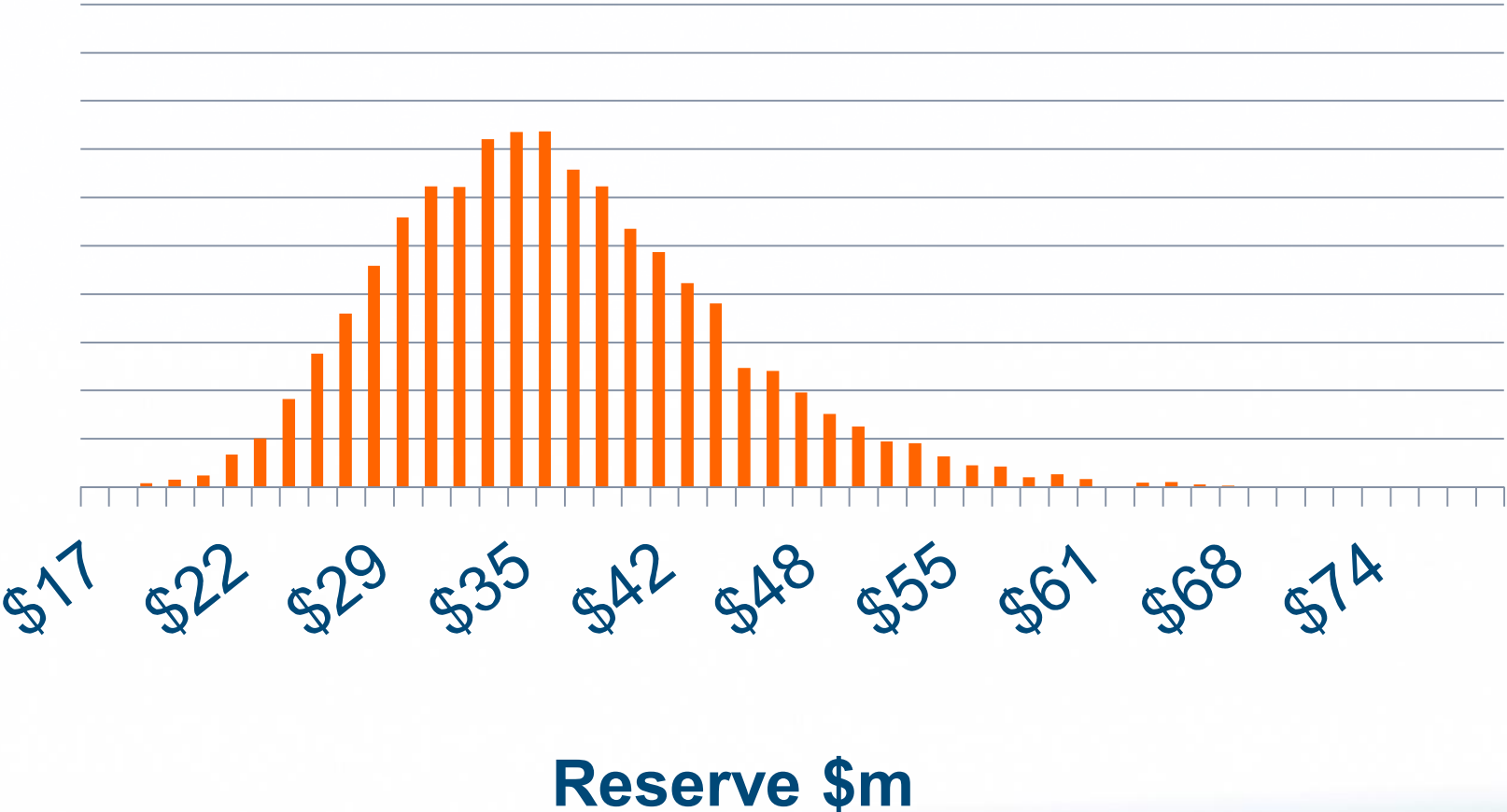
\$44 million

×

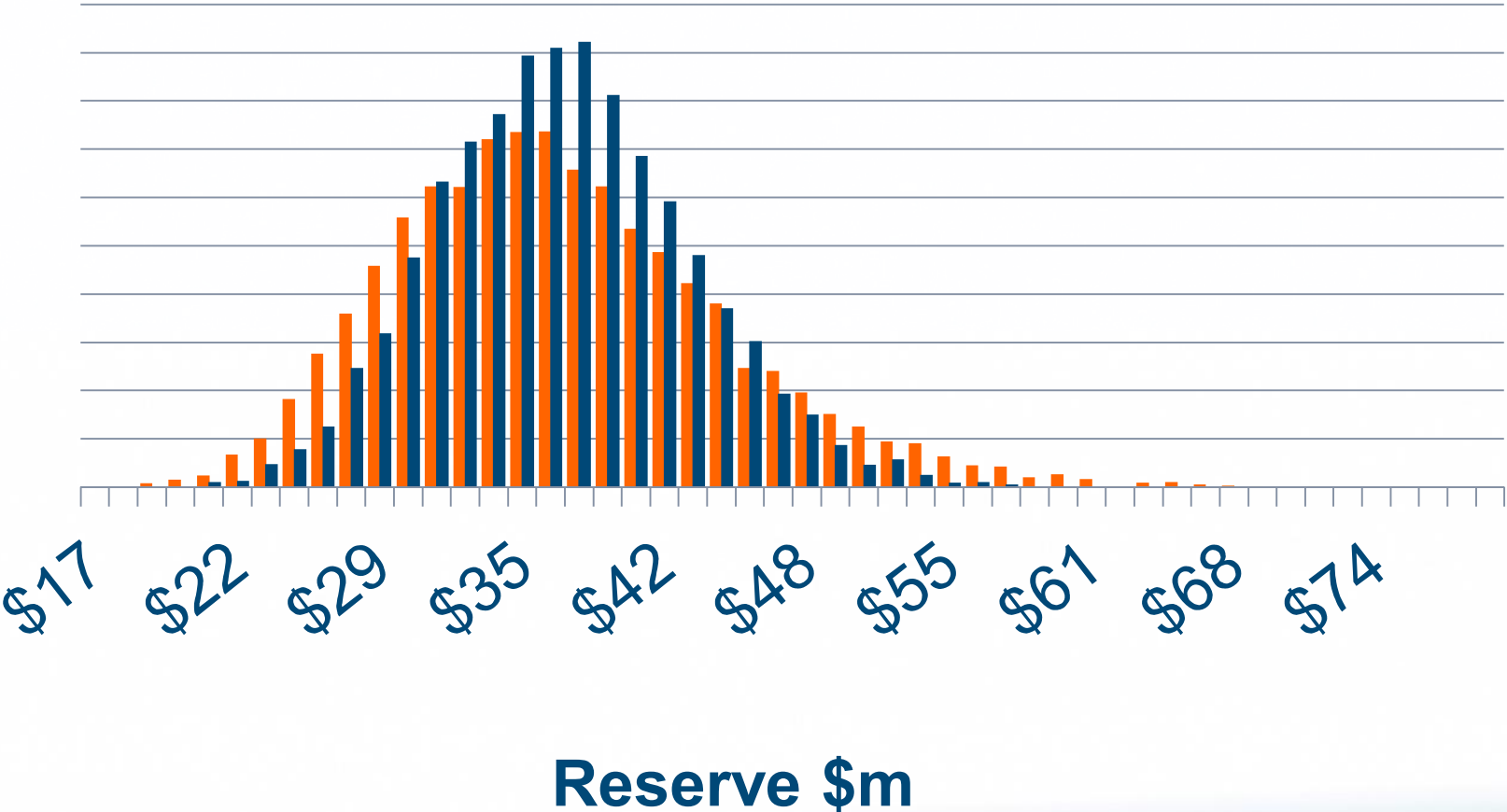


\$40 million

Total Risk Distribution



Total Risk Distribution



Is My Reserve Distribution too Narrow?

1. Are my reserve distributions realistic?
2. Why are my reserve distributions not realistic?
3. How to I make my reserve distribution realistic?





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Consulting Actuary

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