No reality please, we're actuaries

1. Back-testing
2. Analysis of the results
3. Two methods to account for systemic risk

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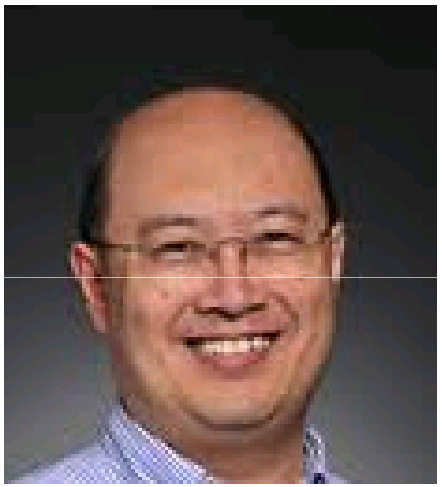

“No reality please, we’re ~~economists~~ actuaries”

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- CAS database of actuarial research enquiry (DARE):

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1. Back-testing: Create a distribution

DATA:

Homeowners
Company A
Net Paid Loss & ALAE
as of 12/2000

10 x 10

1. Back-testing: Create a distribution

DATA:	Homeowners Company A Net Paid Loss & ALAE as of 12/2000
MODEL:	ODP bootstrap of the paid chain-ladder method England and Verrall (2002) No tail factor (unpaid to 120 months)

10 x 10

1. Back-testing: Create a distribution

DATA:

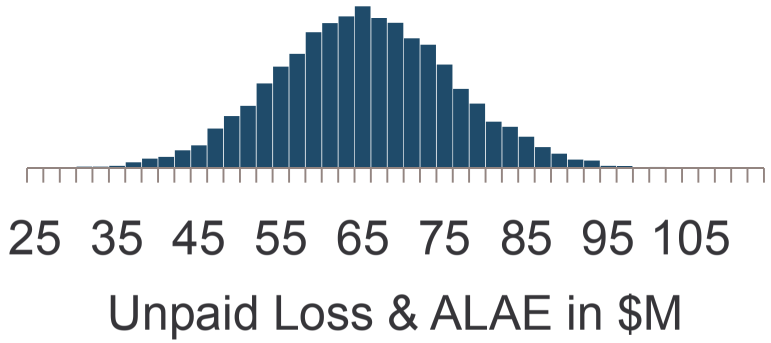
Homeowners
Company A
Net Paid Loss & ALAE
as of 12/2000

10 x 10

MODEL:

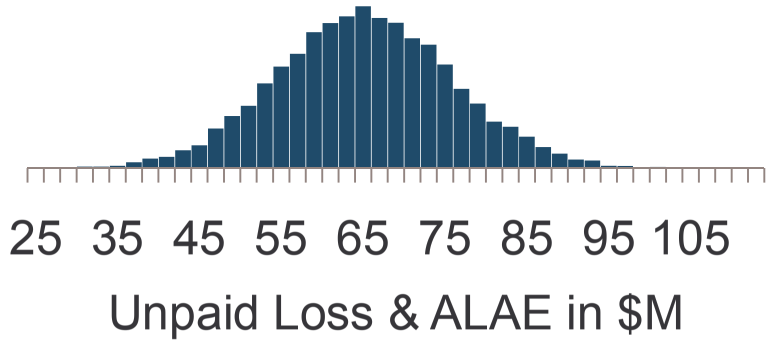
ODP bootstrap of the paid chain-ladder method
England and Verrall (2002)
No tail factor (unpaid to 120 months)

RESERVE DISTRIBUTION:
for all AYs



1. Back-testing: test the distribution

RESERVE DISTRIBUTION:
for all AYs



1. Back-testing: test the distribution

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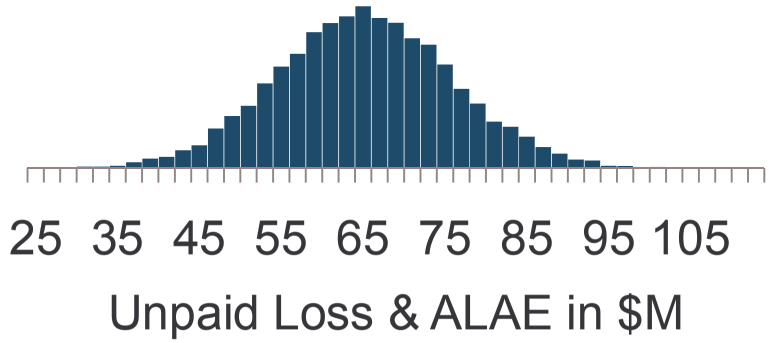
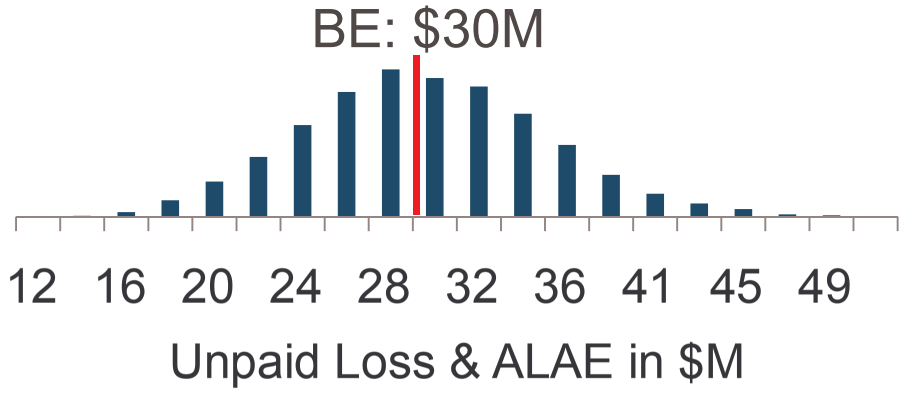


RESERVE DISTRIBUTION:
for AY 2000



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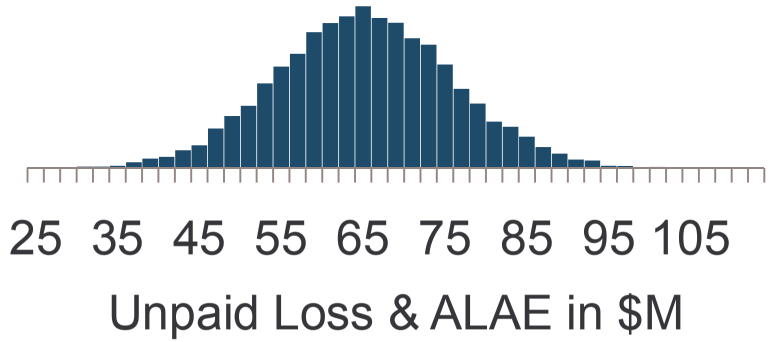
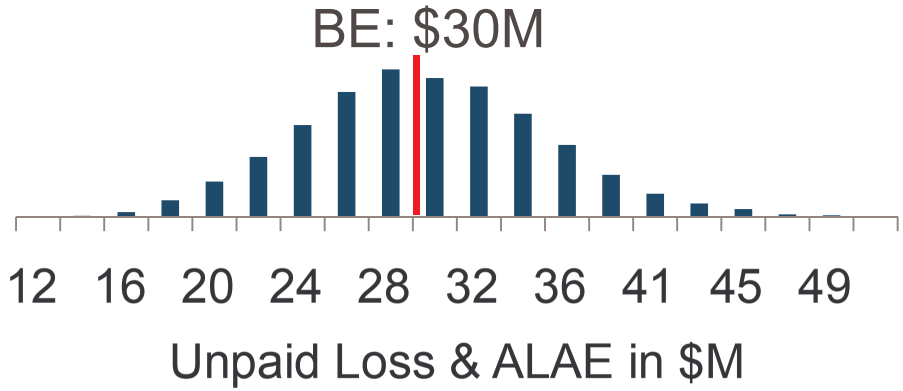


RESERVE DISTRIBUTION:
for AY 2000

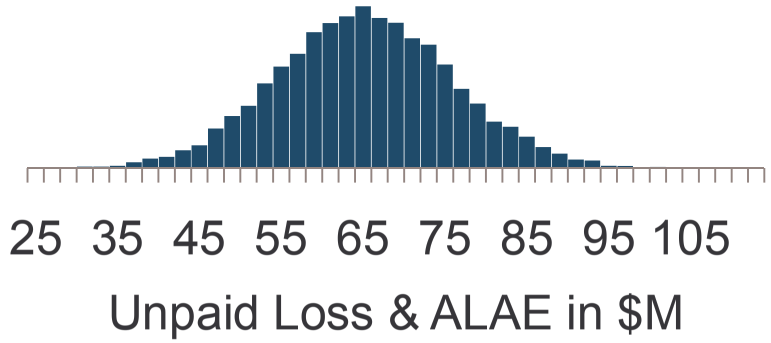


HINDSIGHT RESERVE

= $59M paid at 120 months
less $14M paid at 12 months

1. Back-testing: test the distribution

RESERVE DISTRIBUTION:
for all AYs



RESERVE DISTRIBUTION:
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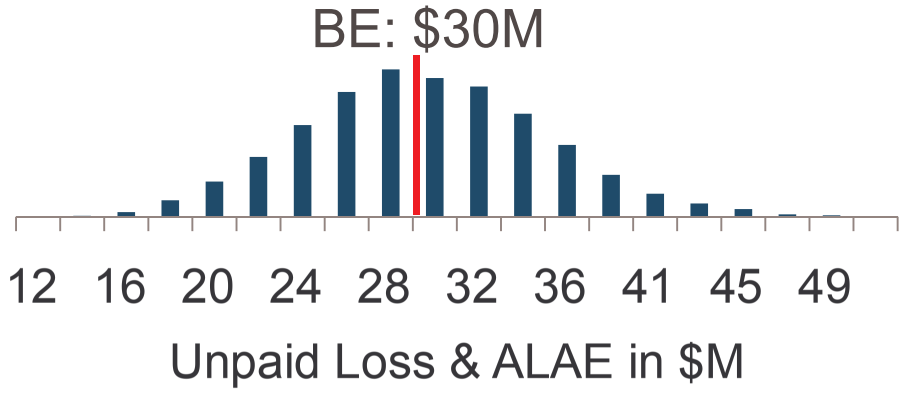
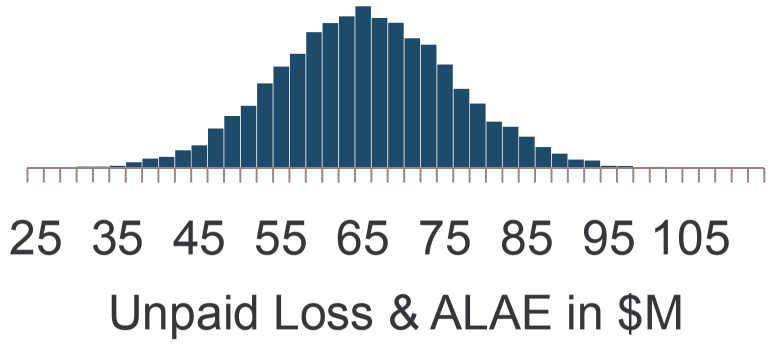


HINDSIGHT RESERVE = $38M

1. Back-testing: test the distribution

RESERVE DISTRIBUTION:
for all AYs



RESERVE DISTRIBUTION:
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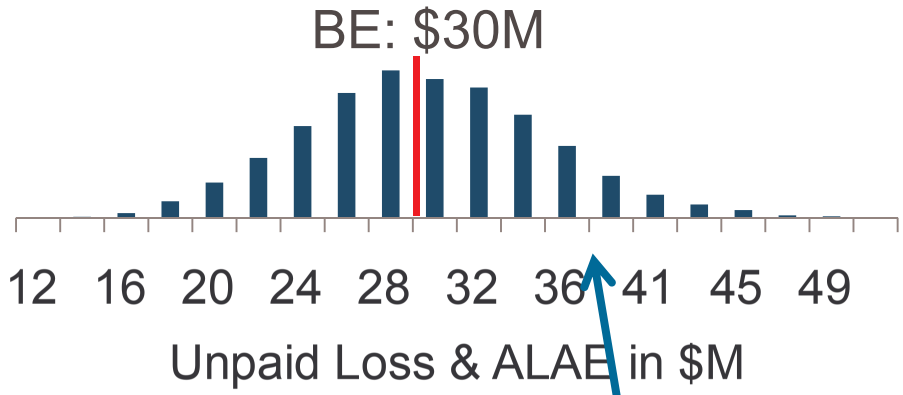


HINDSIGHT RESERVE = $38M at the 91st percentile

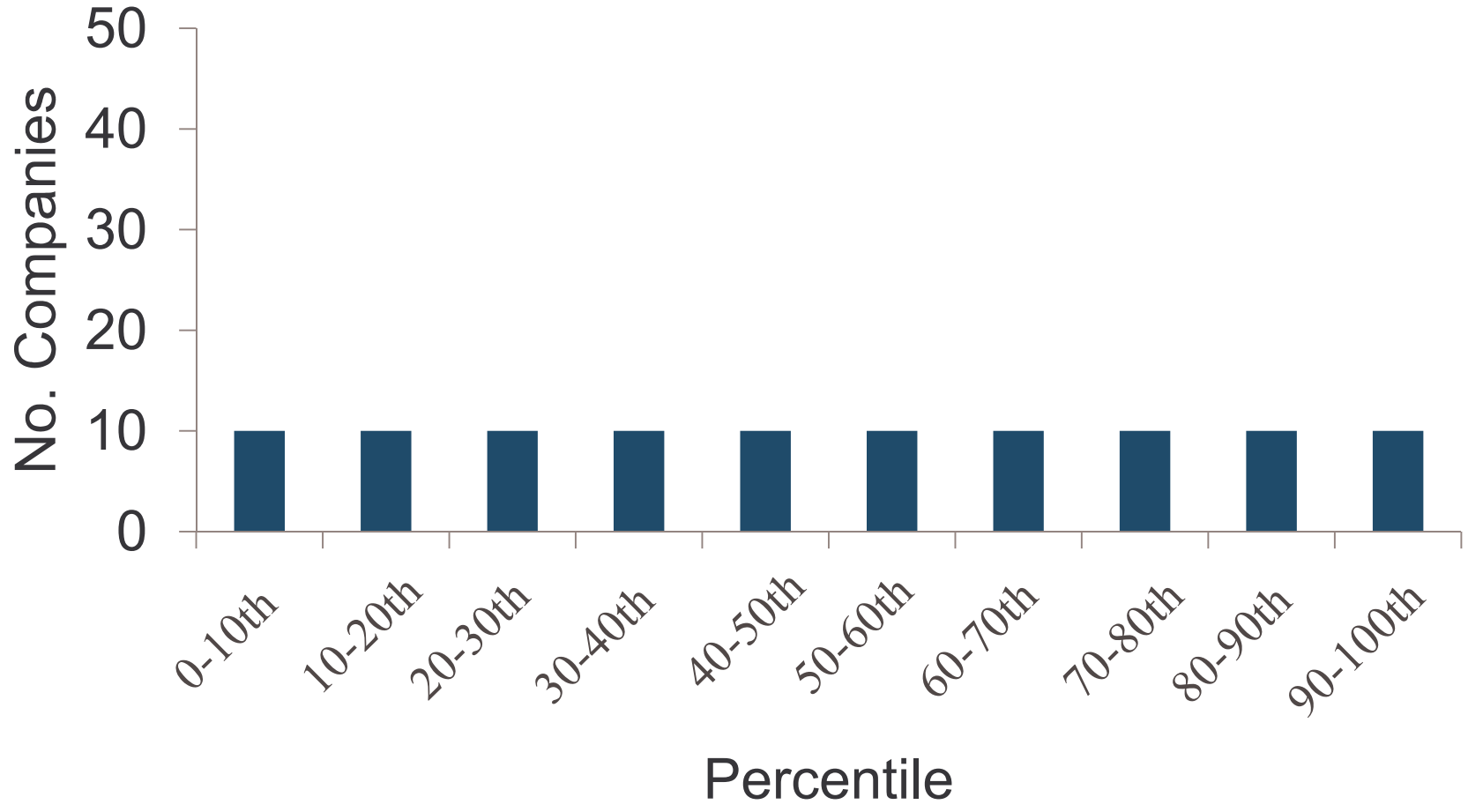
1. Back-testing: results

Company	Percentile
Company A	91%

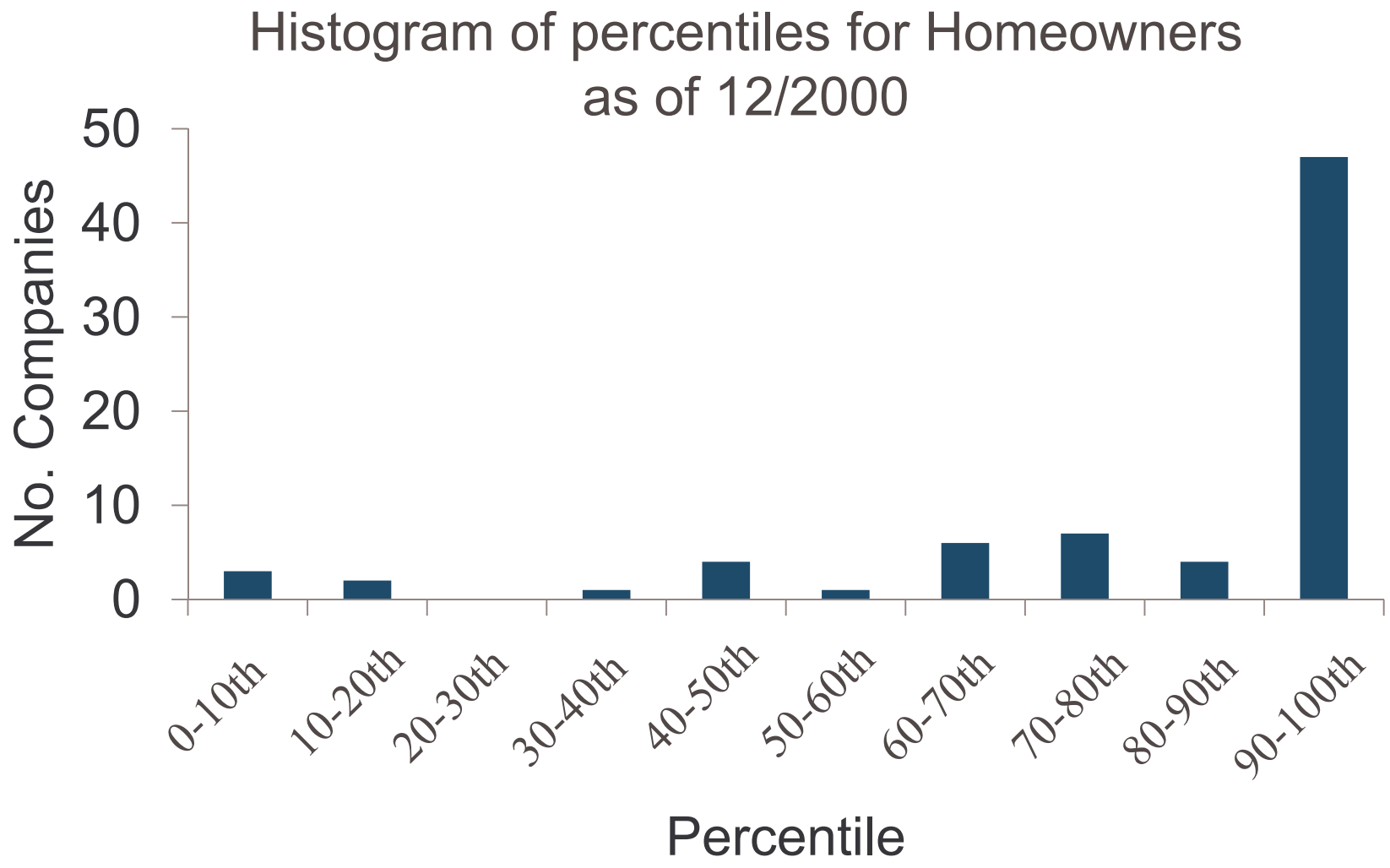
1. Back-testing: results

Company	Percentile
Company A	91%
Company B	55%
Company C	88%
Company D	92%
Company E	39%
Company F	75%
Company G	67%
…	…

1. Back-testing: ideal histogram of percentiles



1. Back-testing: Actual histogram of percentiles



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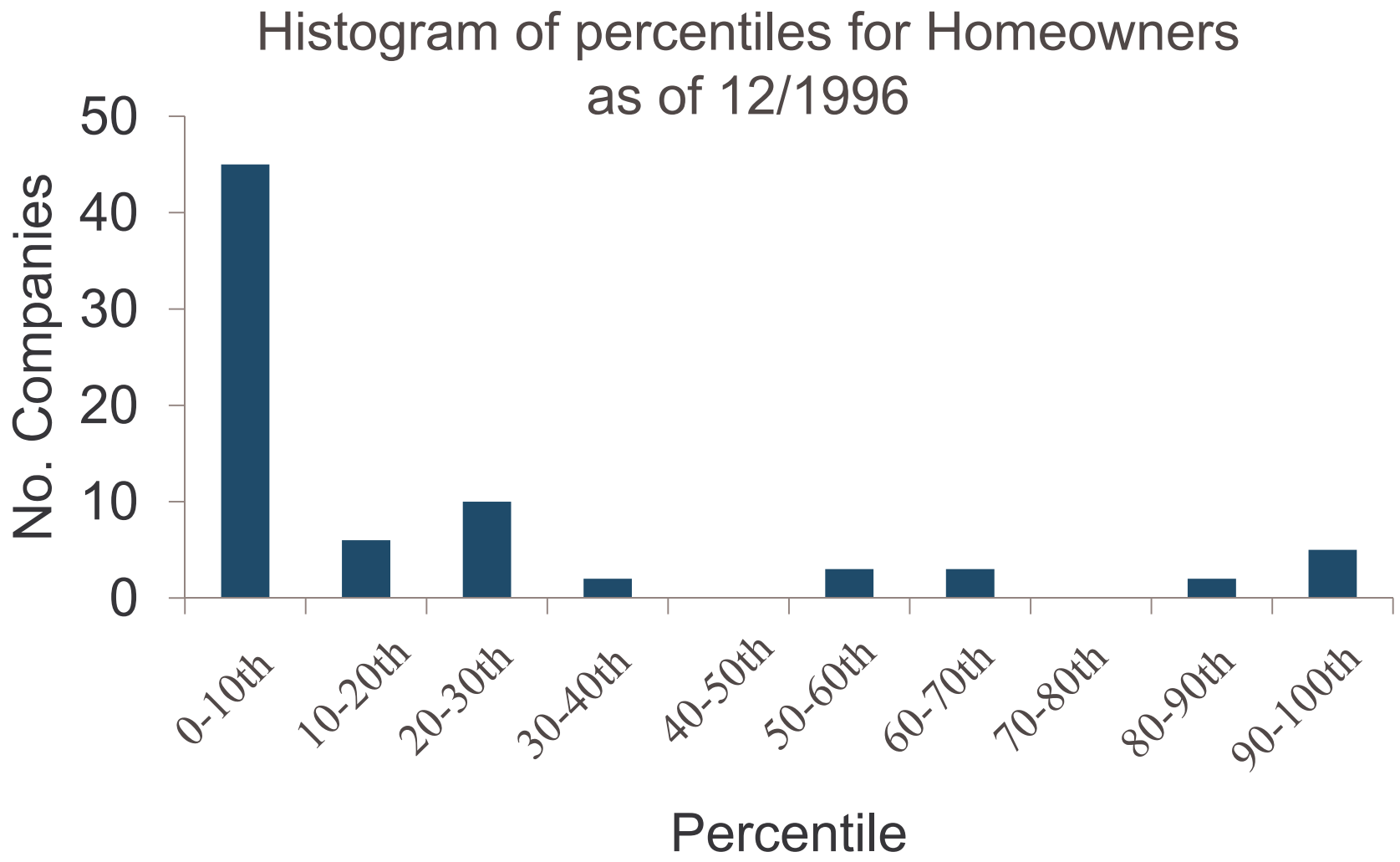

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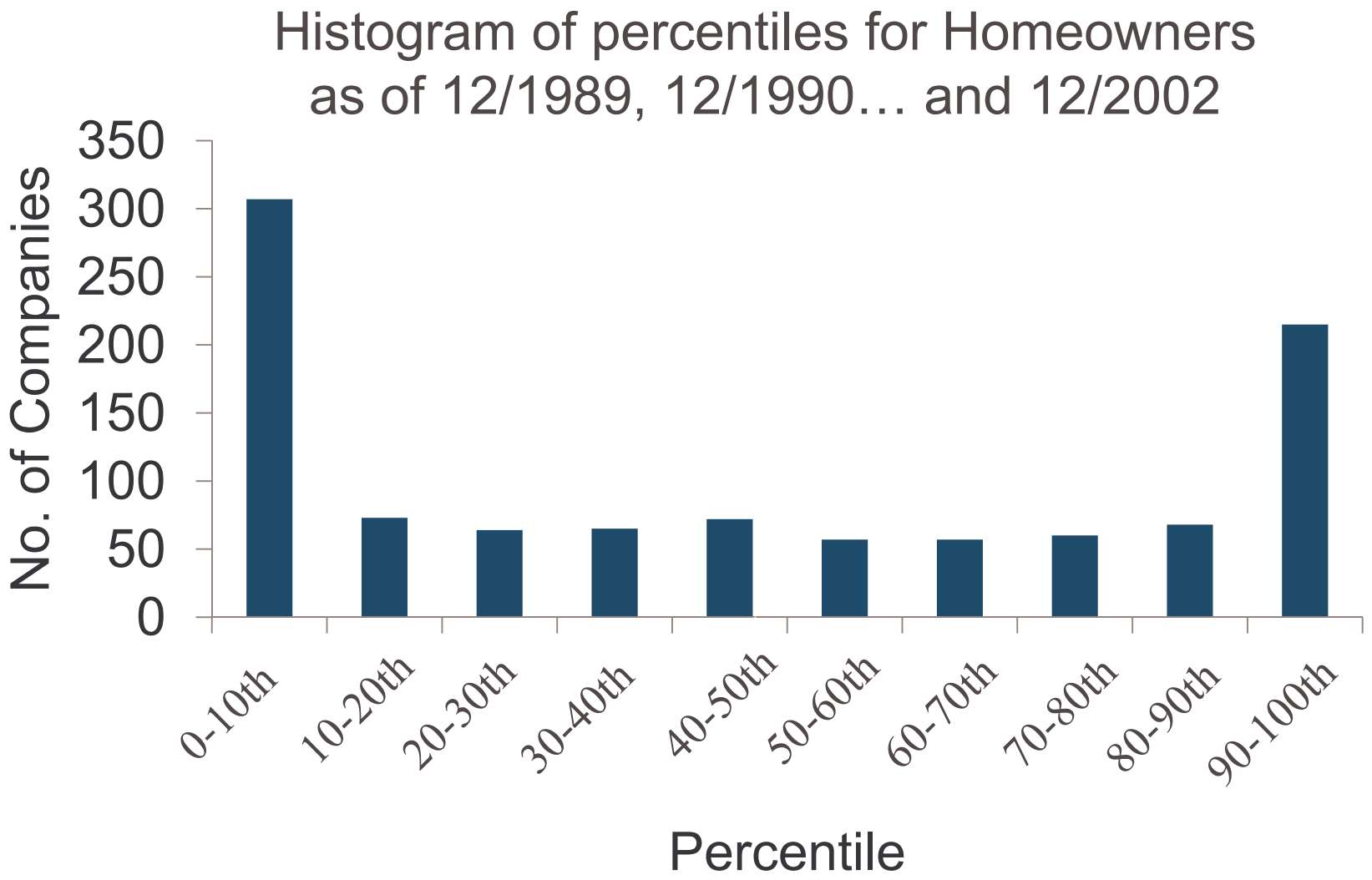
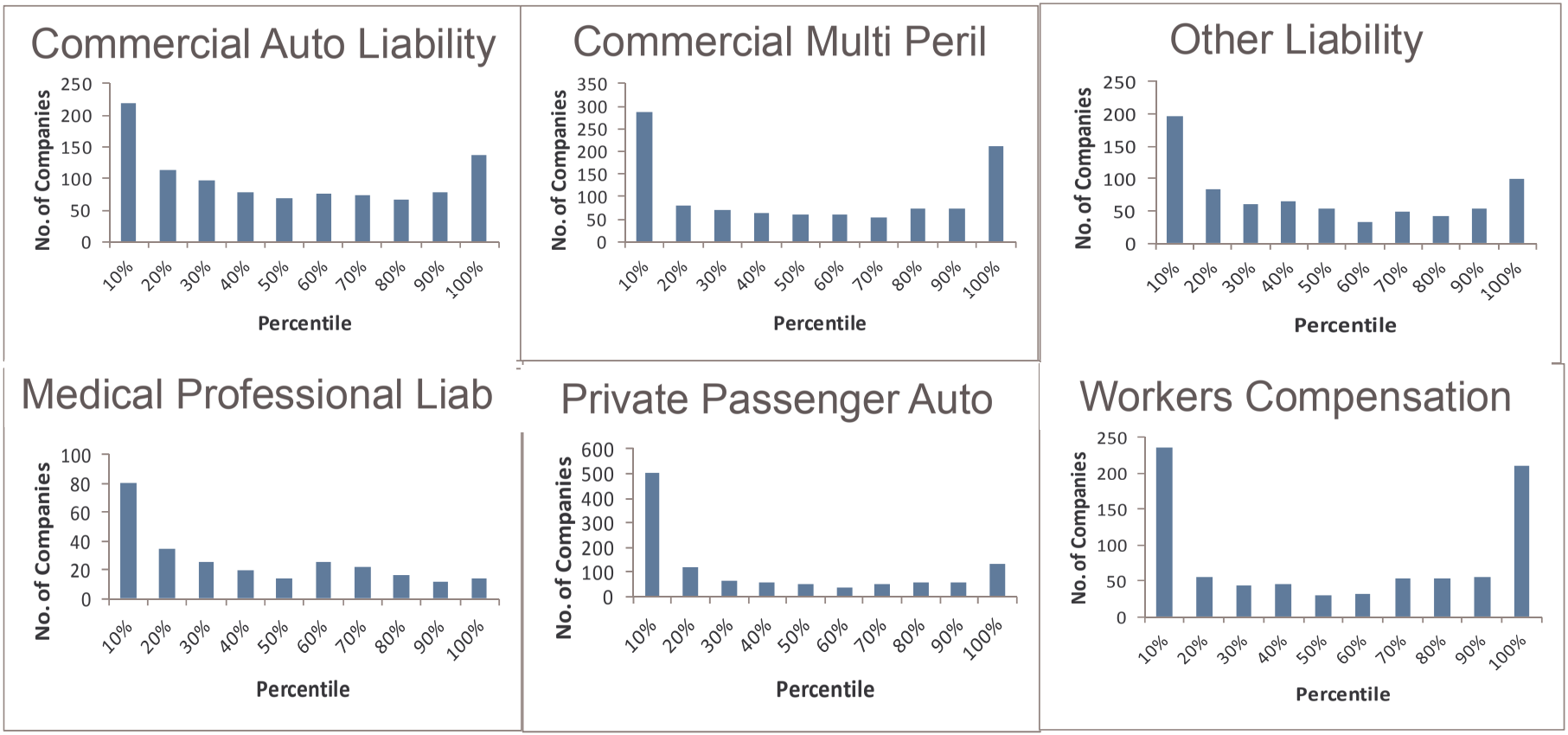


1. Back-testing: histogram of percentiles by line



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Why are we seeing these results?

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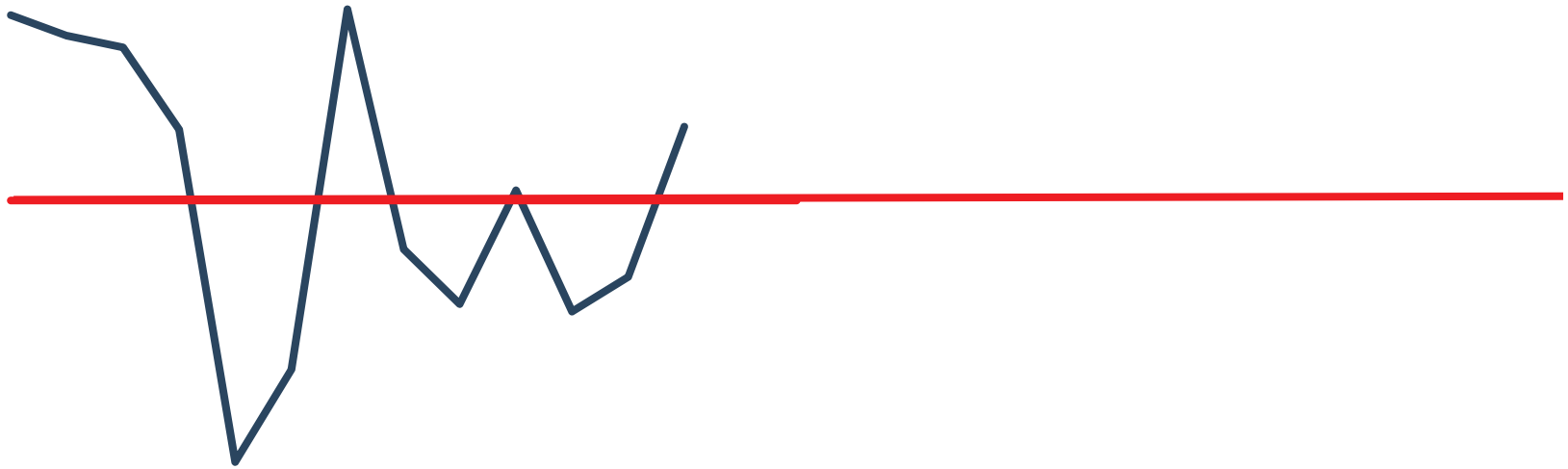
- In an Institute of Actuaries of Australia: “A Framework for Assessing Risk Margins,” the sources of uncertainty into two parts:.

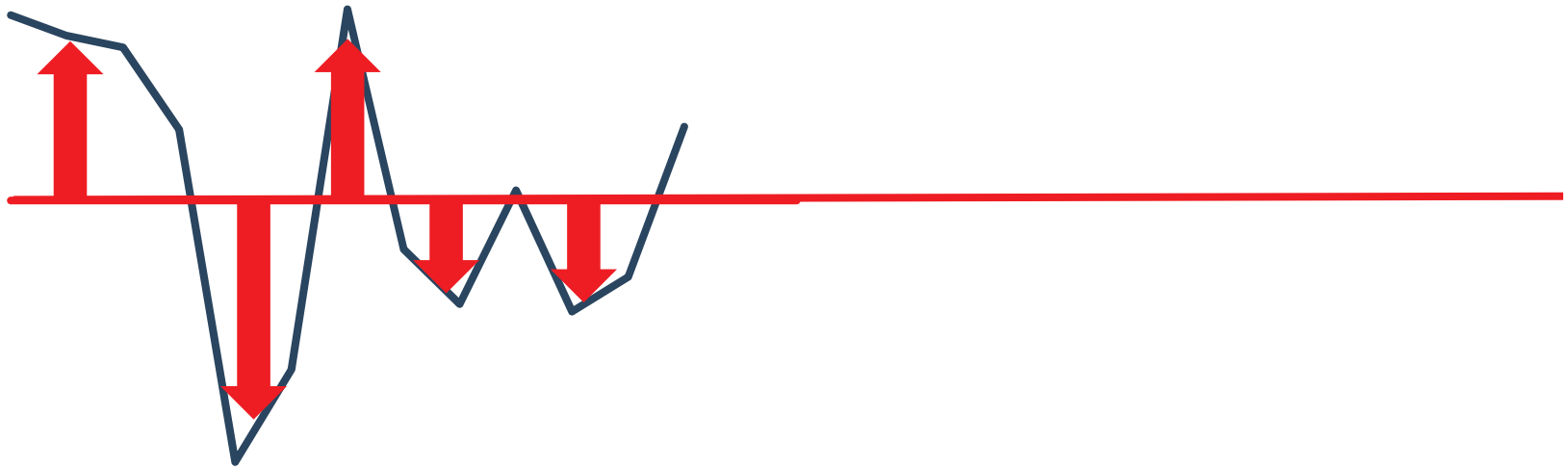
Why are we seeing these results?

- In an Institute of Actuaries of Australia: “A Framework for Assessing Risk Margins,” the sources of uncertainty into two parts:.
  - Independent risk
  - Systemic risk

How the bootstrap model works



How the bootstrap model works



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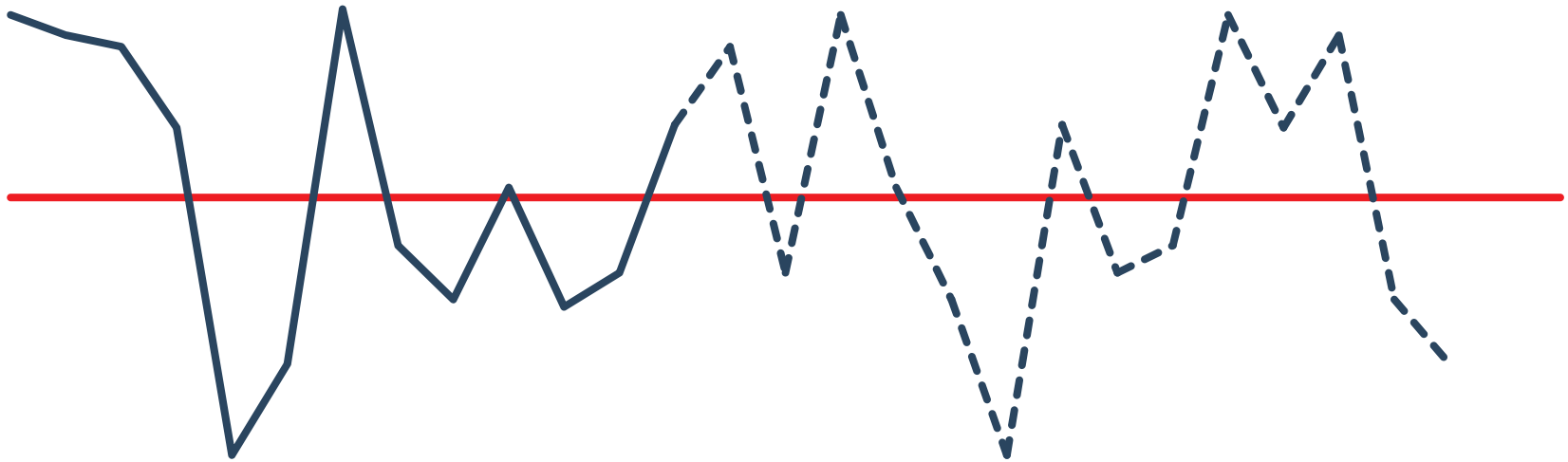

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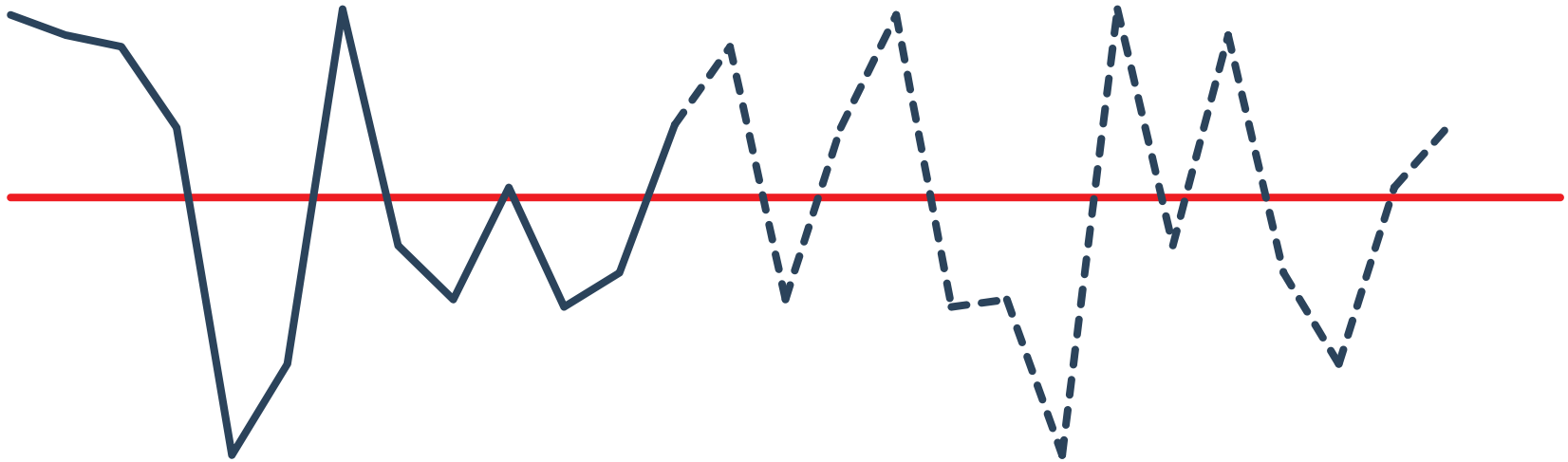

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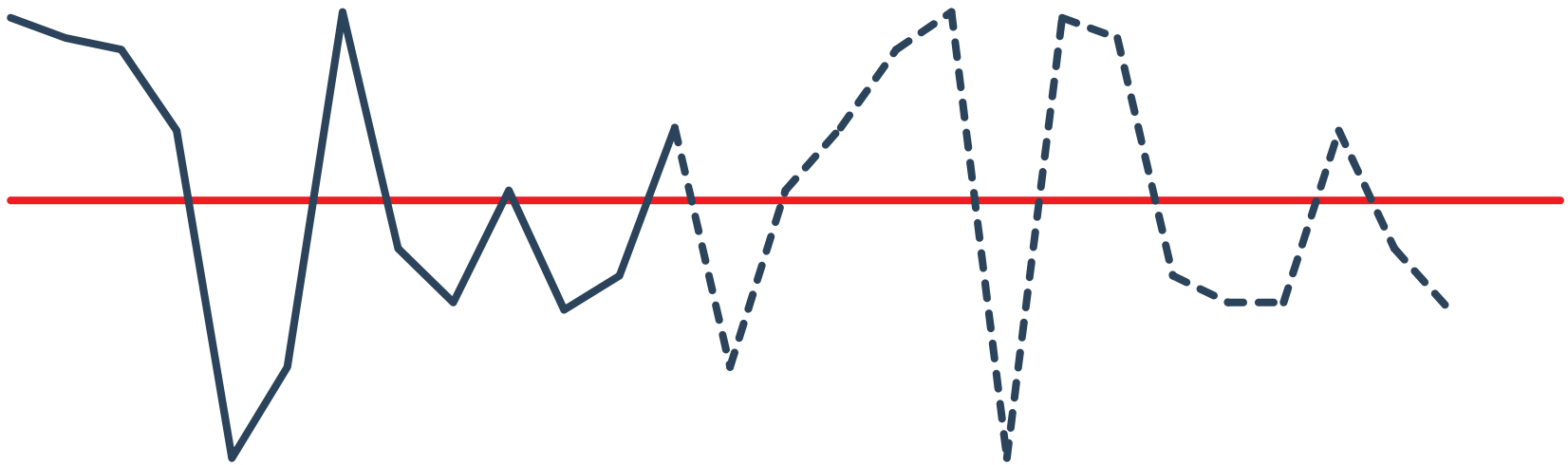
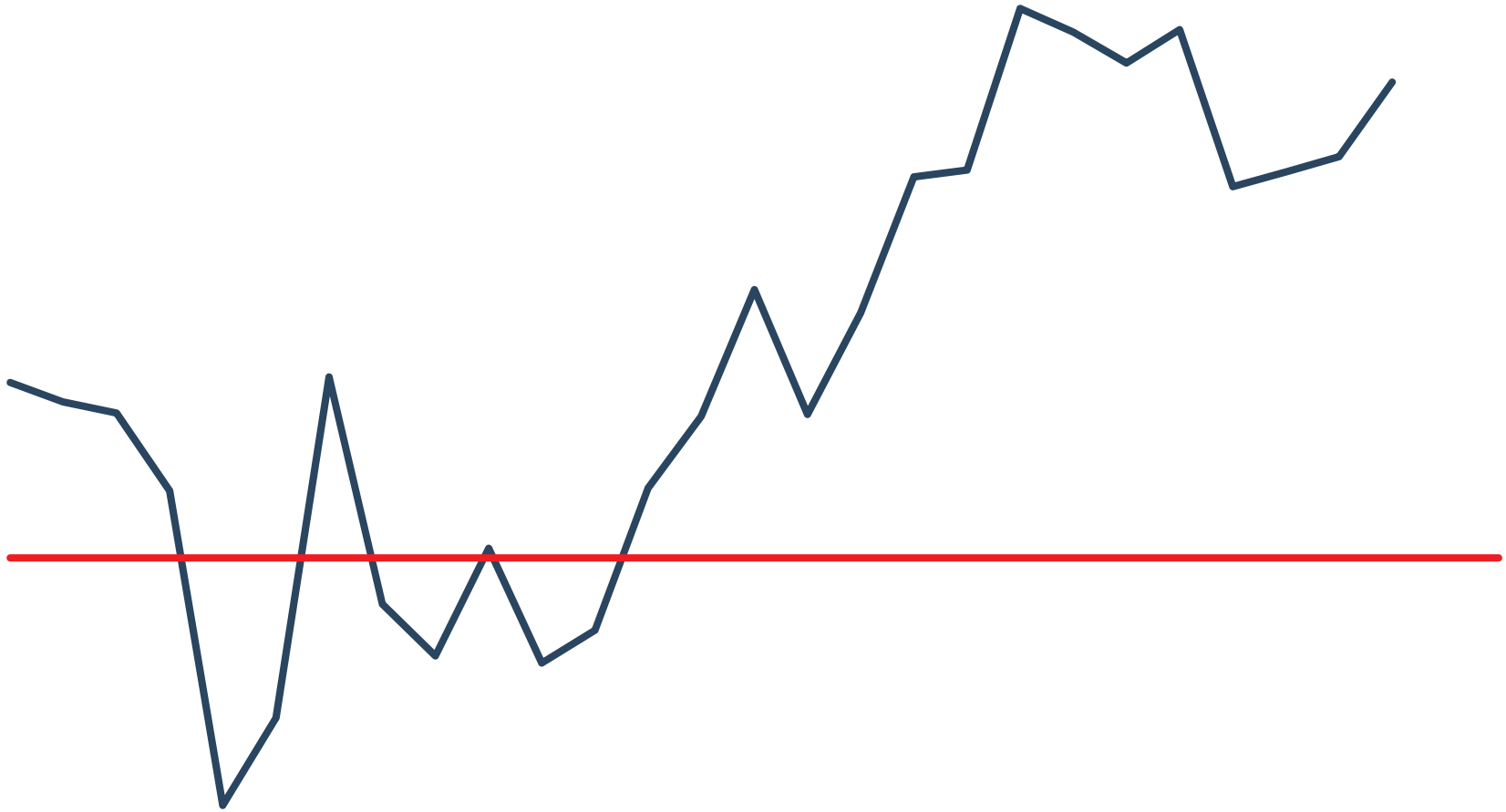


…systemic risk!



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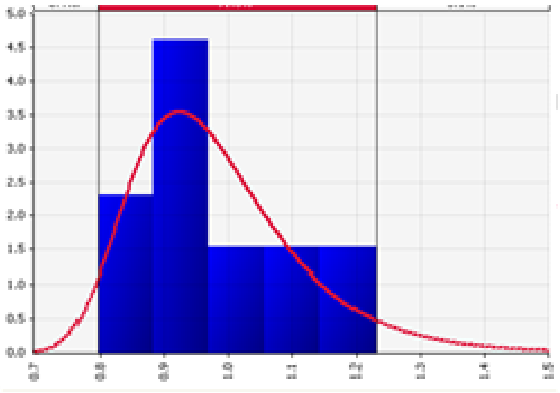
3. Two methods to account for systemic risk

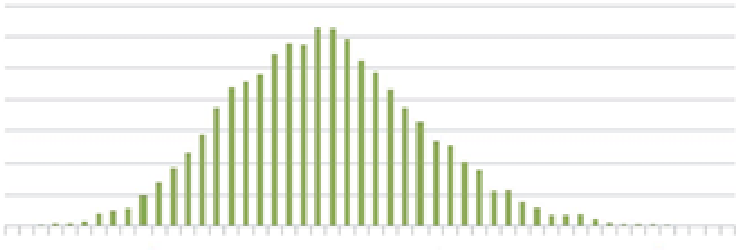
a) The systemic risk distribution method

b) Wang transform adjustment

The systemic risk distribution method

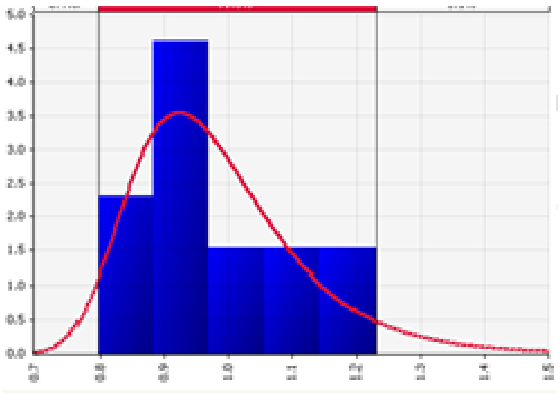


Systemic Risk Distribution



Independent Risk Distribution

The systemic risk distribution method



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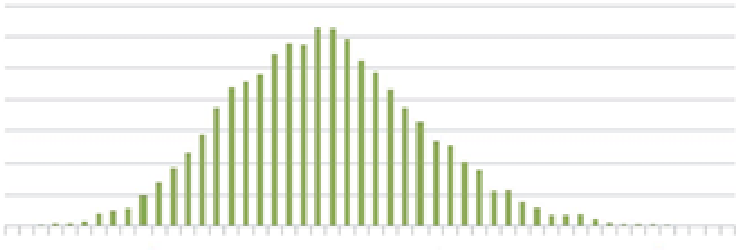
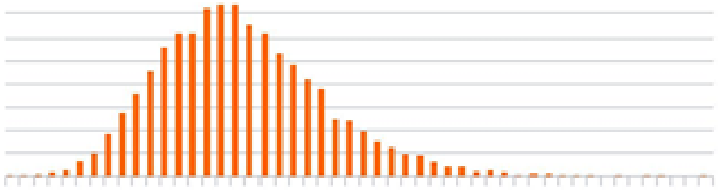


Independent Risk Distribution

×



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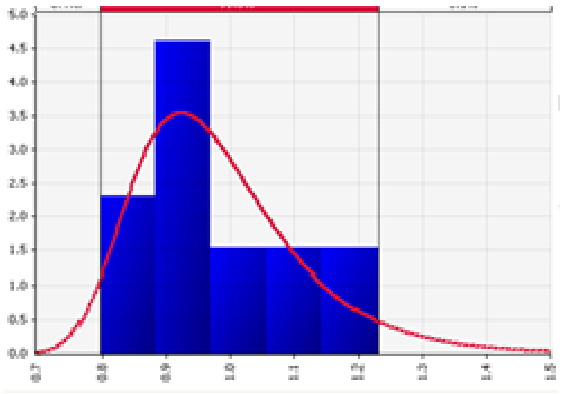
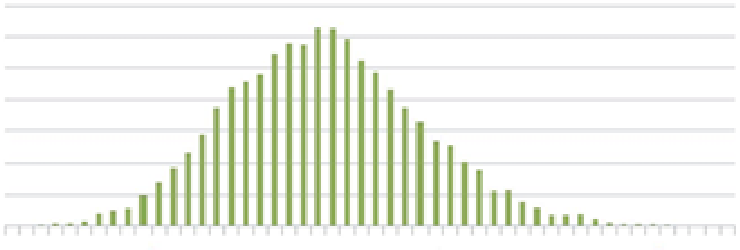
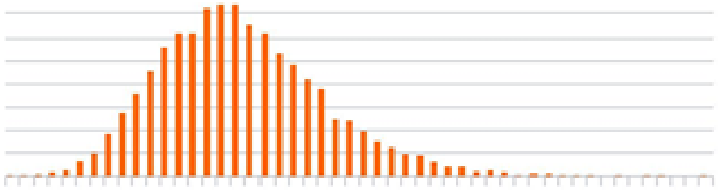


Systemic Risk Distribution

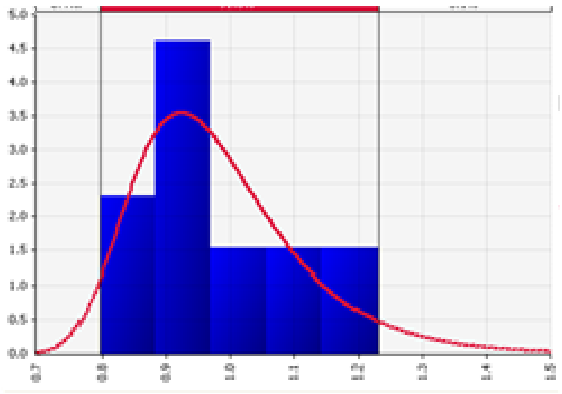


Independent Risk Distribution

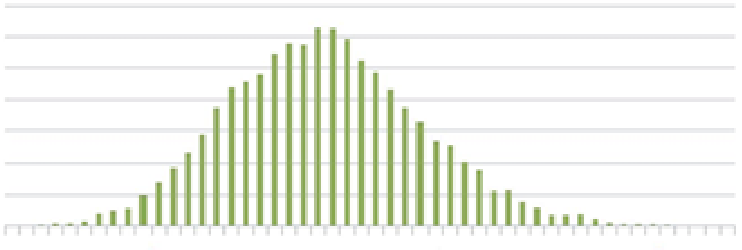
1.13 ×



The systemic risk distribution method

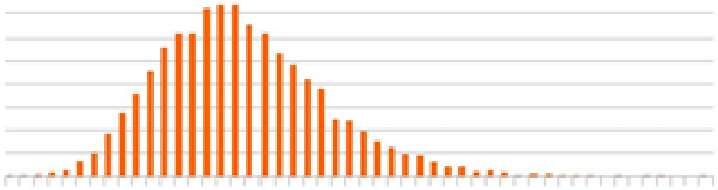


Systemic Risk Distribution

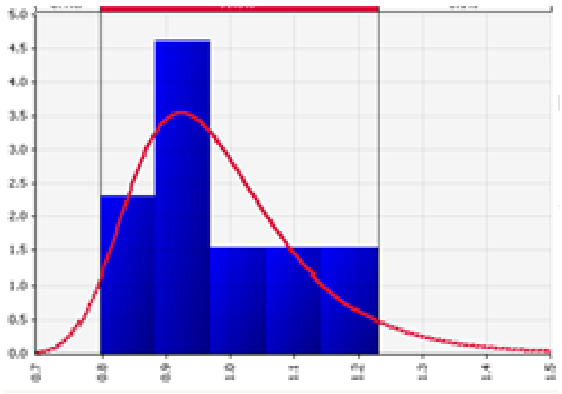


Independent Risk Distribution

1.13 × $32 million



The systemic risk distribution method



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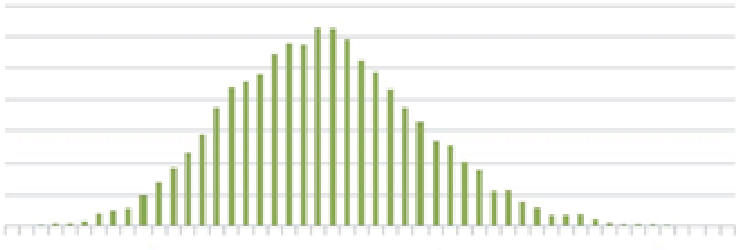

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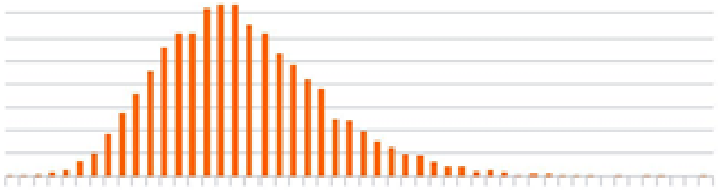
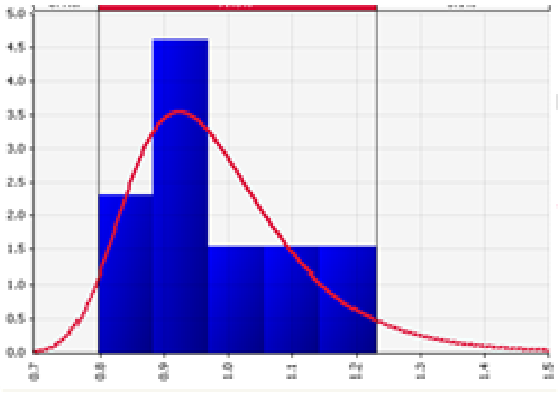
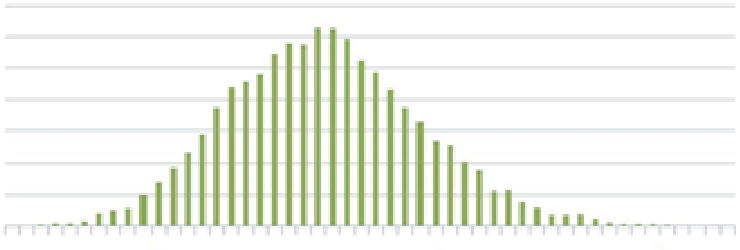


$36 million

The systemic risk distribution method

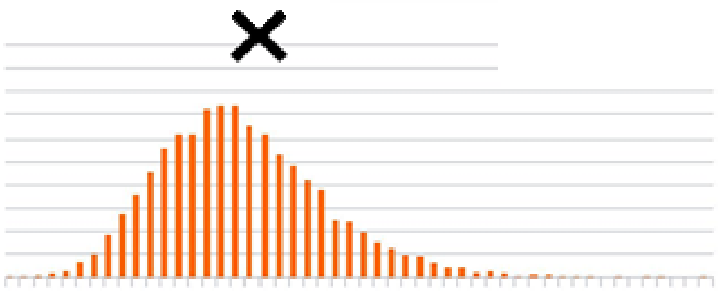


Systemic Risk Distribution

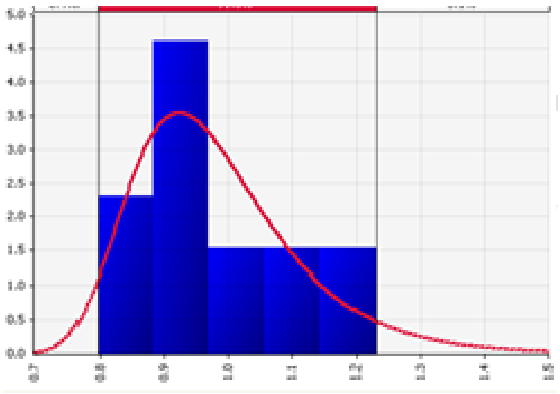


Independent Risk Distribution

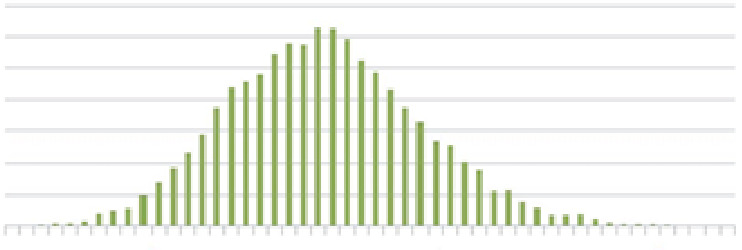
0.95 ×



The systemic risk distribution method



Systemic Risk Distribution



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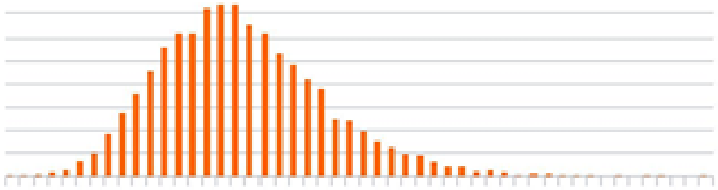

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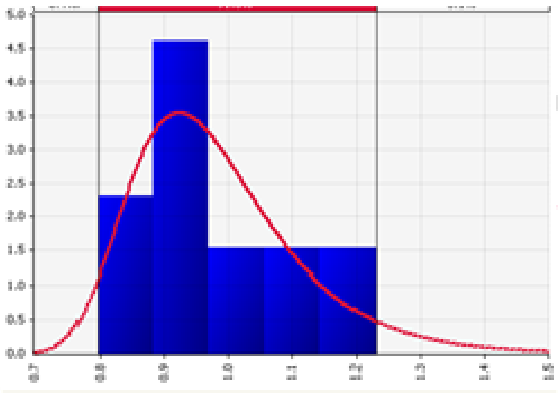

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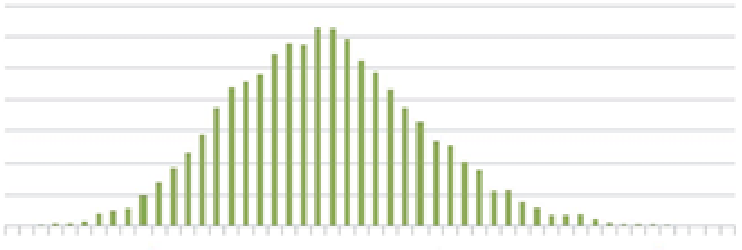

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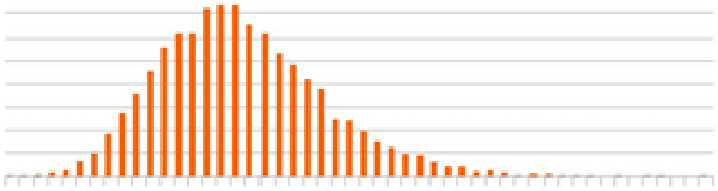
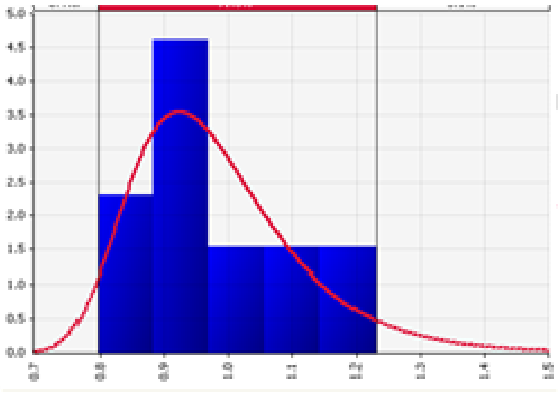


$28 million

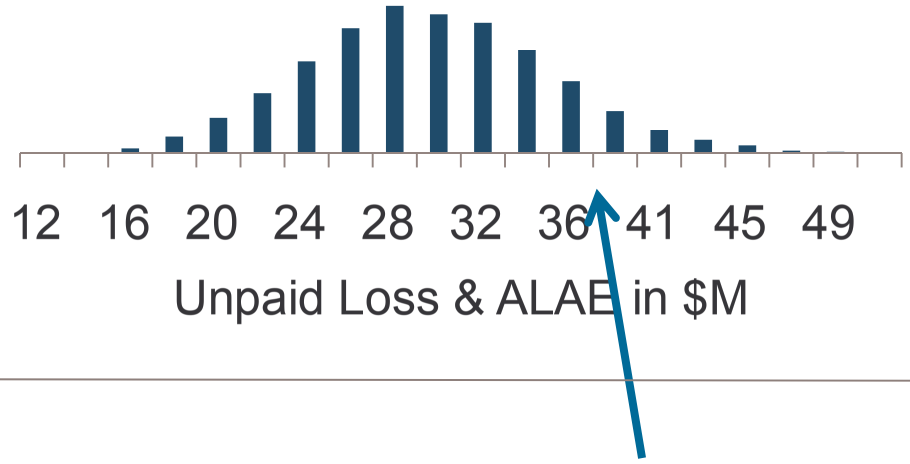
The systemic risk distribution method



Systemic Risk Distribution

Deriving the Systemic Risk Distribution

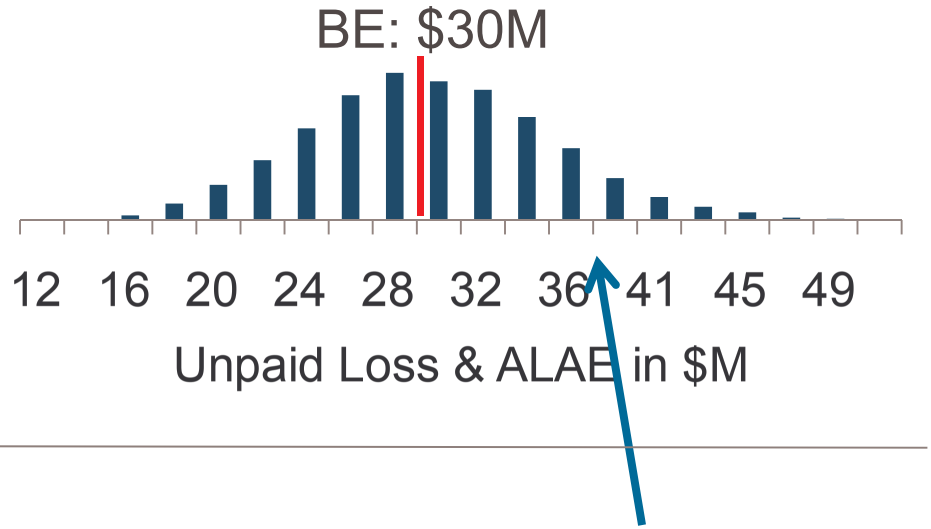
RESERVE DISTRIBUTION:
for AY 2000



HINDSIGHT RESERVE = $38M at the 91st percentile

Deriving the Systemic Risk Distribution

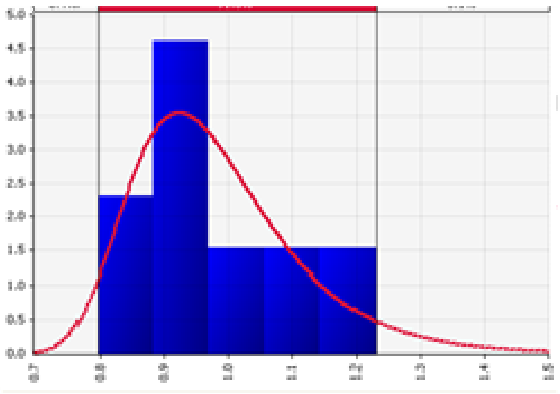
RESERVE DISTRIBUTION:
for AY 2000



HINDSIGHT RESERVE = $38M at the 91st percentile

SYSTEMIC RISK FACTOR = $38M / $30M
= 1.27

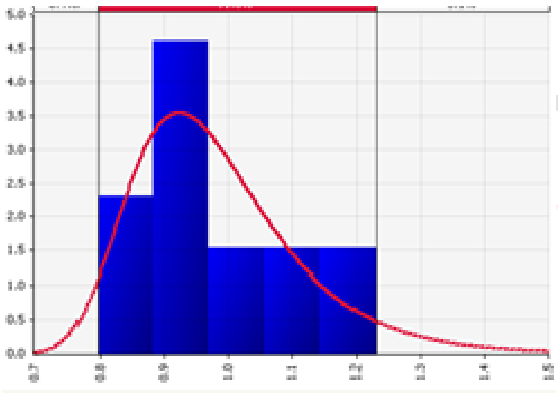
The systemic risk distribution method



Systemic Risk Distribution

Company	Systemic Risk Factor
Company A	1.27

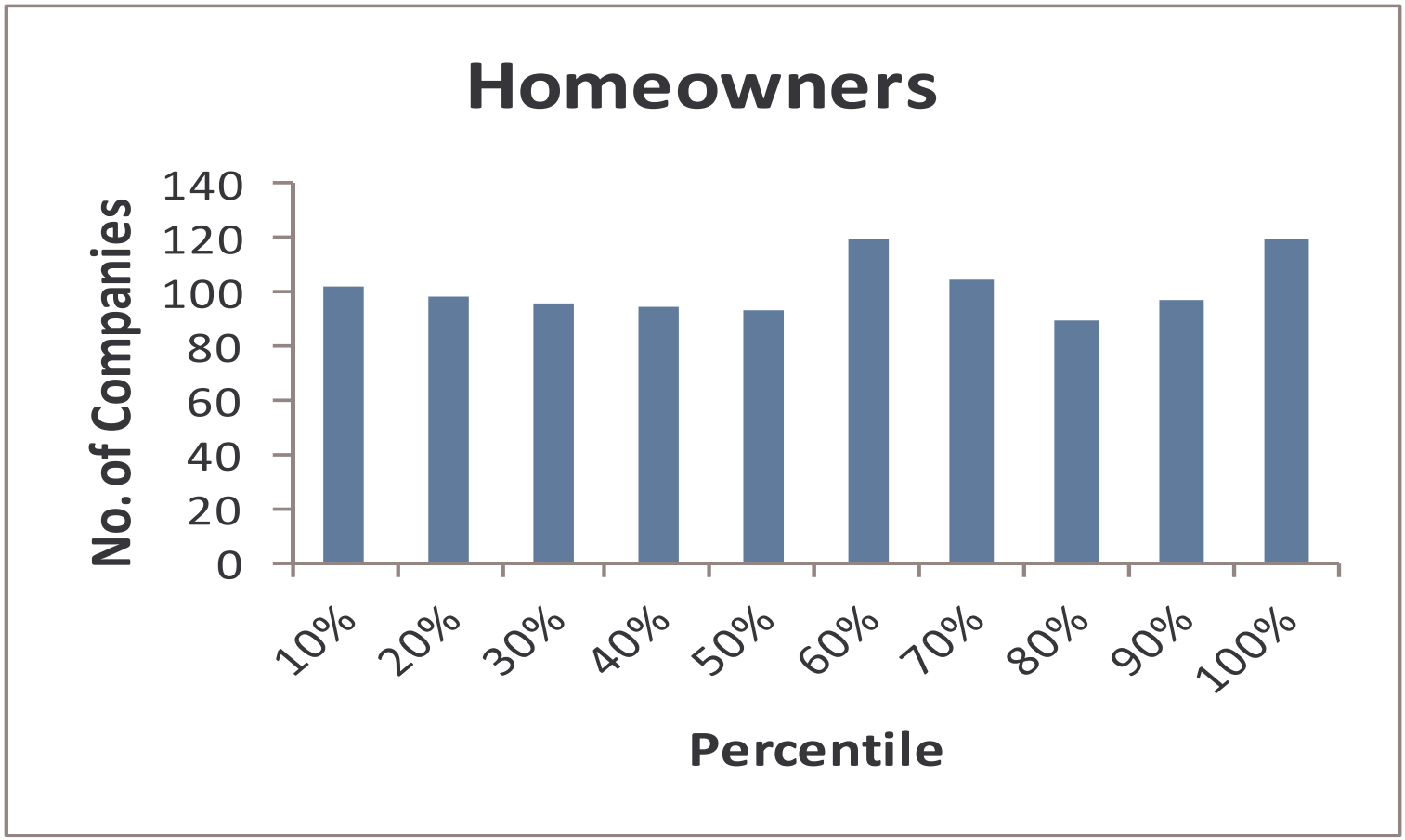
The systemic risk distribution method



Systemic Risk Distribution

Company	Systemic Risk Factor
Company A	1.27
Company B	1.15
Company C	0.86
Company D	0.92
Company E	1.08
Company F	1.35
Company G	1.22
…	…

The systemic risk distribution method



3. Two methods to account for systemic risk

a) The systemic risk distribution method

b) Wang transform adjustment