

30 March 2023

Opus Suite
Conference

SYDNEY

OPUS10 Model Robustness and Support for Analysis in Early Phases

Ahmed Hatem
Systecon AB

by Systecon
opus
suite

 **Systecon**

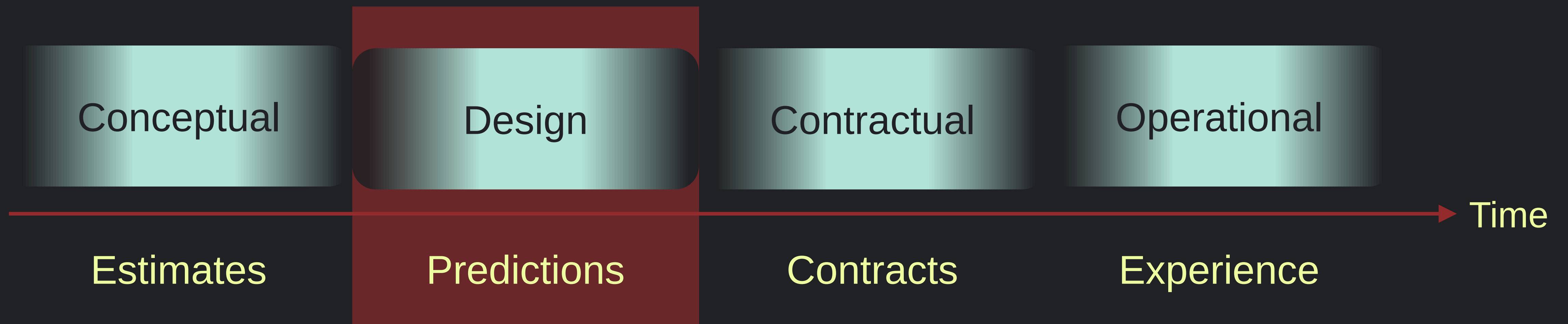
“Garbage in, garbage out”

Word of wisdom or just a bad excuse?



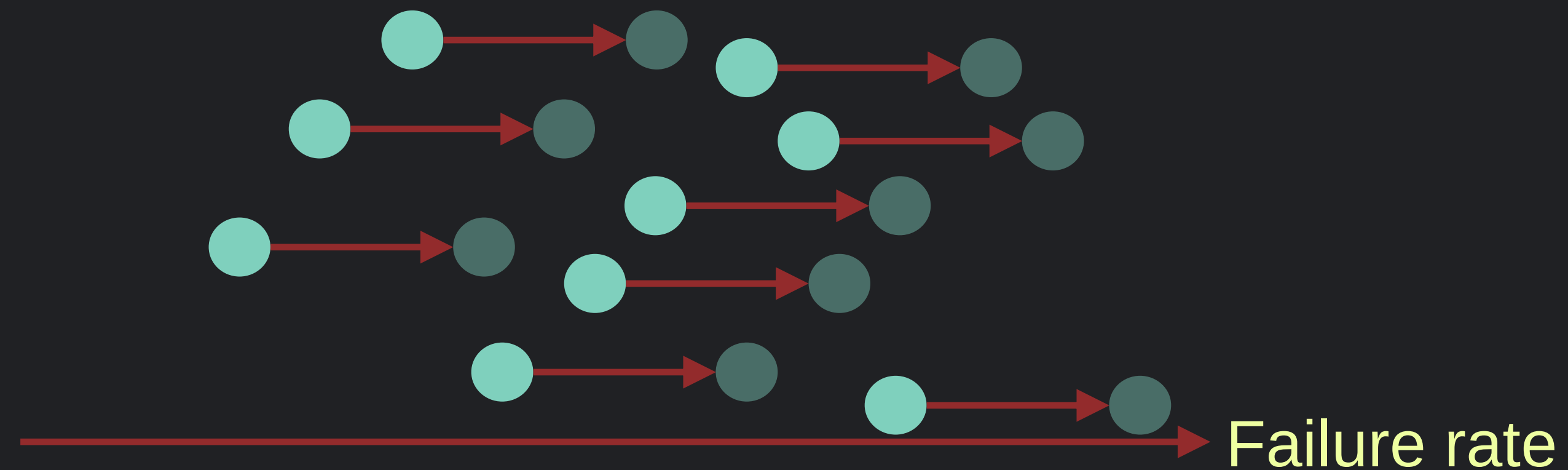
Data accuracy

Failure rates



Classic sensitivity analysis

"What if FRT increases by 20%?"



Classic sensitivity analysis

Example scenario

Technical system

- 32 items
- Multiple indenture levels
- Repair and discard

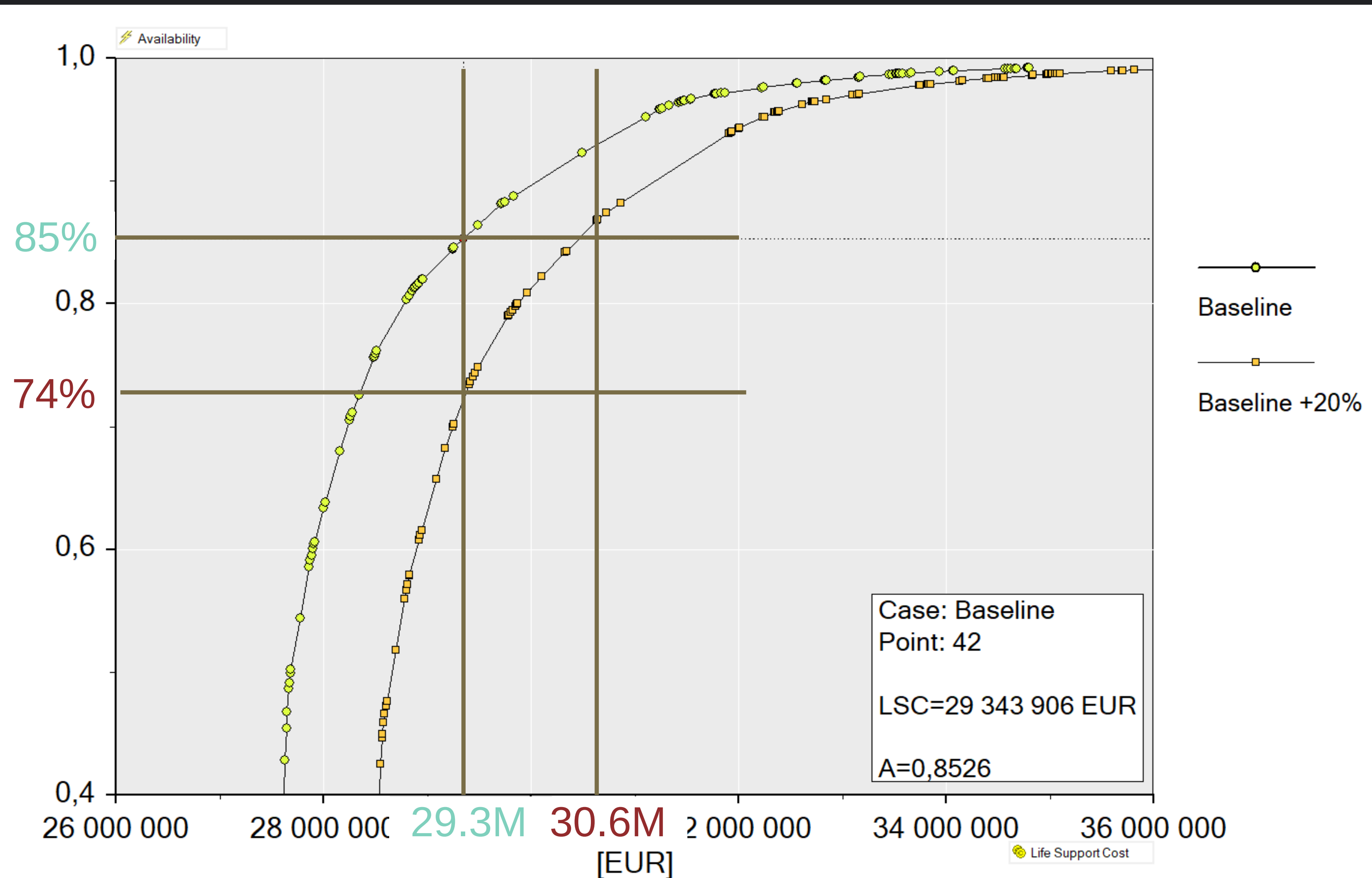
Logistic support

- Multiple repair levels
- 3 storage locations
- Transportation routes

System operation

- 4 operating bases
- 24 systems in operations
- 525 operating hours/year

Classic sensitivity analysis



Extended sensitivity analysis

"What if FRT is uncertain by 20%?"

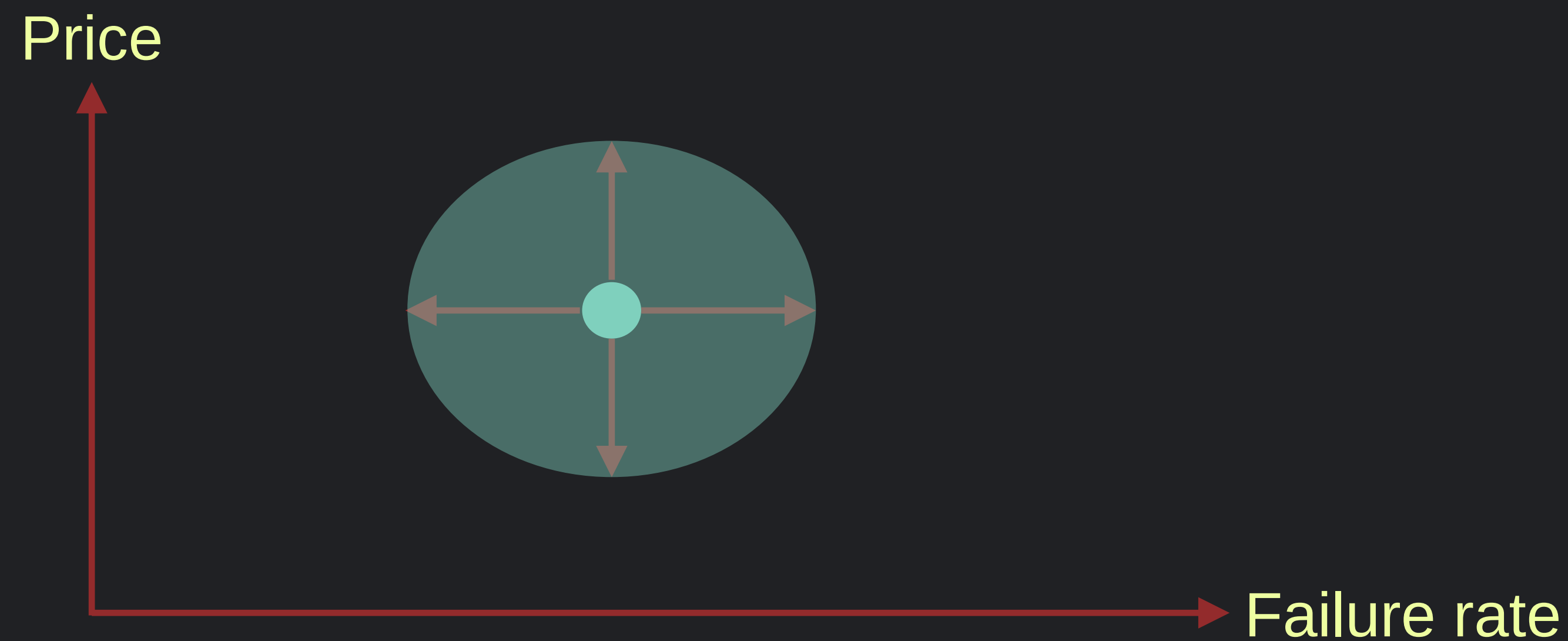


—————→ Failure rate

Extended sensitivity analysis

"What if FRT is uncertain by 20%?"

"What if the item price is uncertain by 20%?"



Extended sensitivity analysis

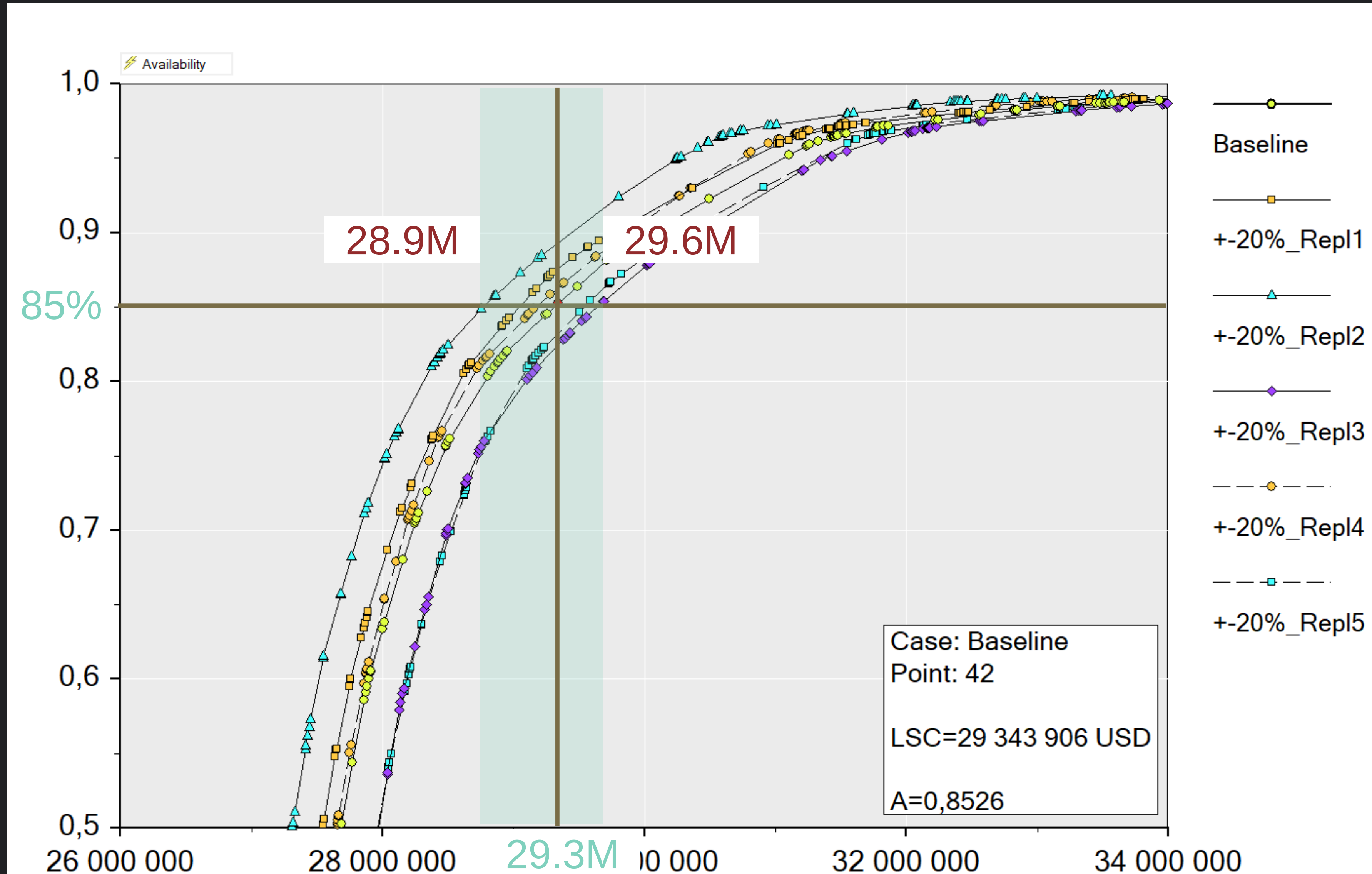
"What if FRT is uncertain by 20%?"

"What if the item price is uncertain by 20%?"

APPROACH:

1. Draw random numbers
2. Calculate results
3. Repeat...

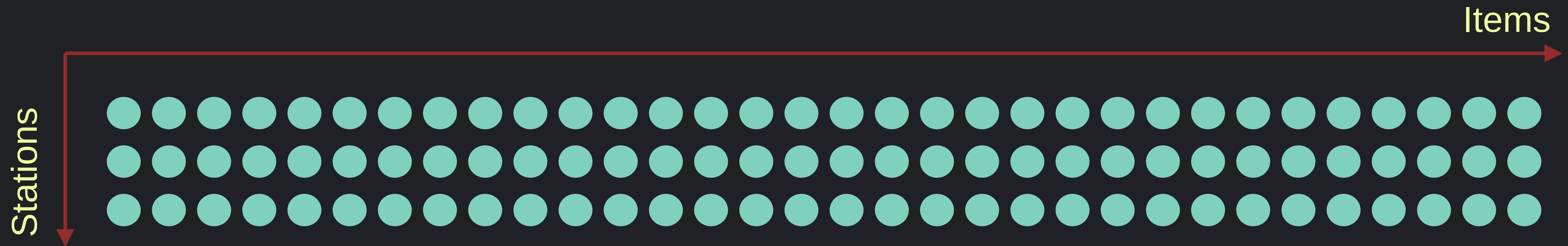
Extended sensitivity analysis



Extended sensitivity analysis

Compare stock levels

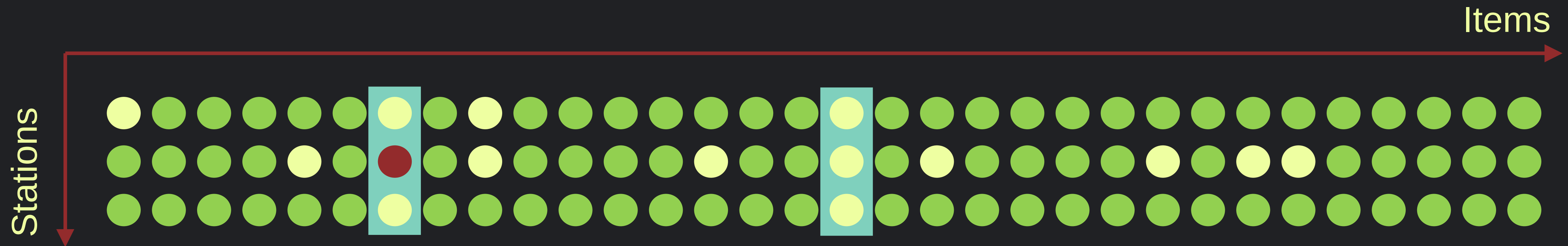
- Diff = 0
- Diff = 1
- Diff = 2



Extended sensitivity analysis

Compare stock levels

- Diff = 0
- Diff = 1
- Diff = 2



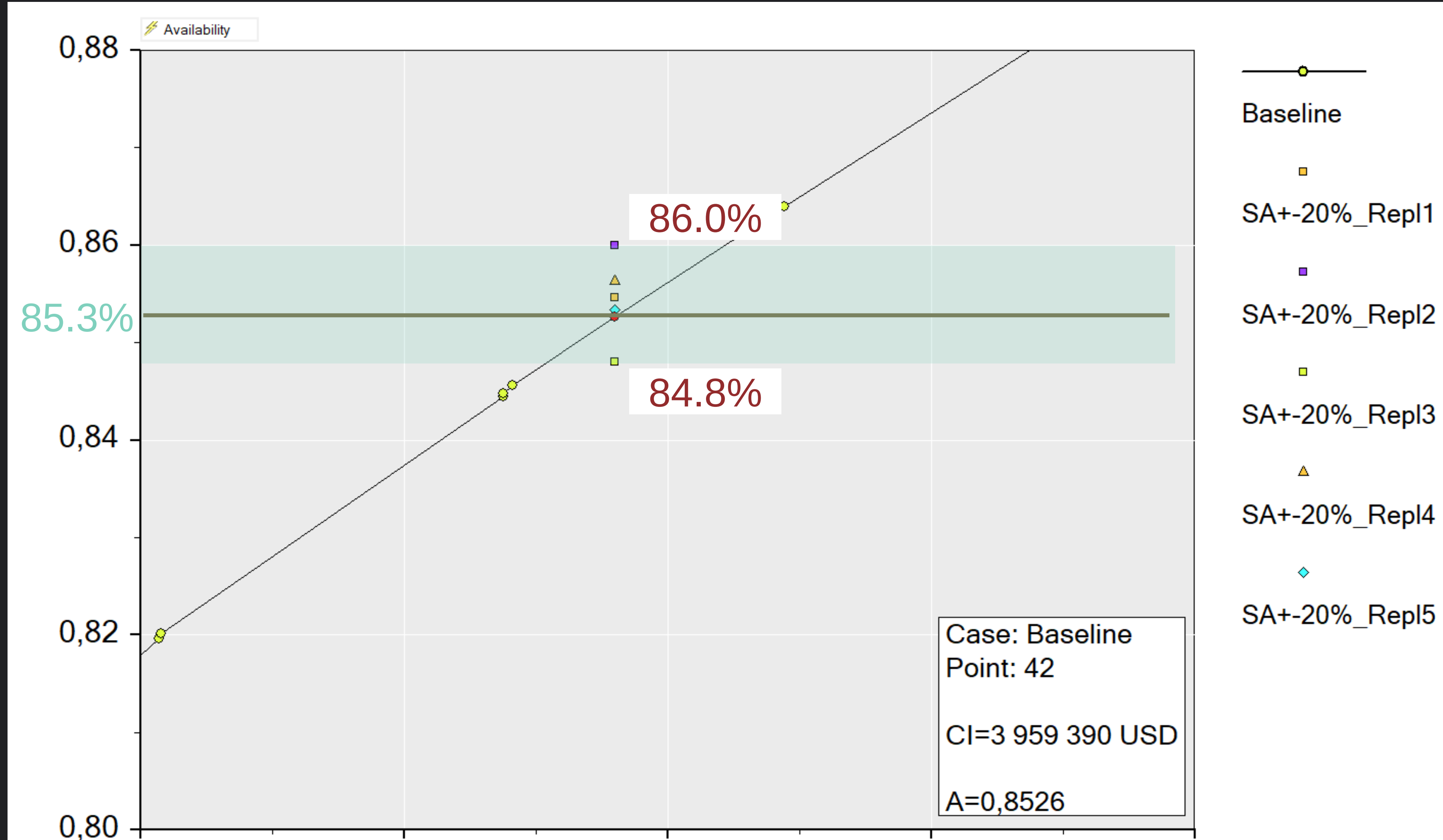
Extended sensitivity analysis

Impact of early decisions

APPROACH:

1. Stock invested according to baseline predictions
2. Analyze invested stock with random failure rates

Extended sensitivity analysis

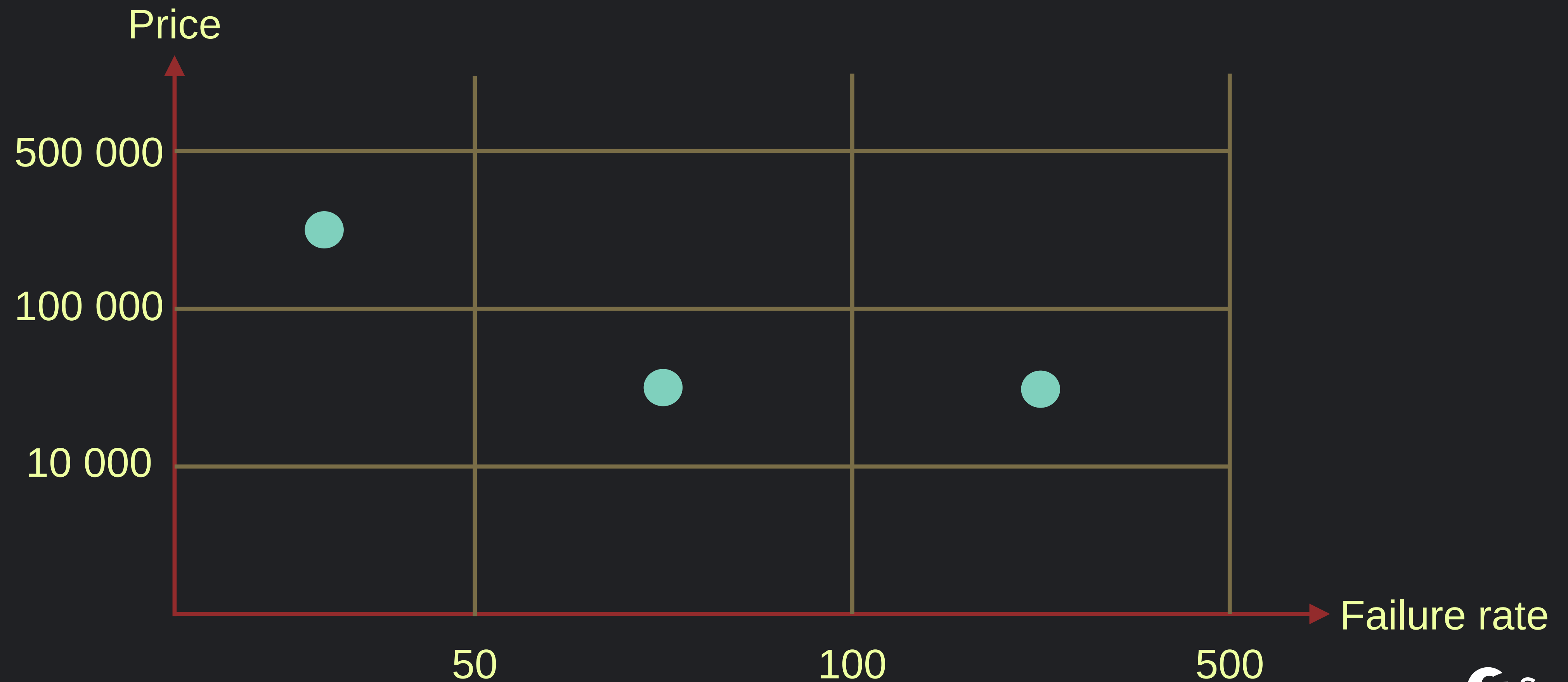


Data accuracy



Sensitivity analysis of estimates

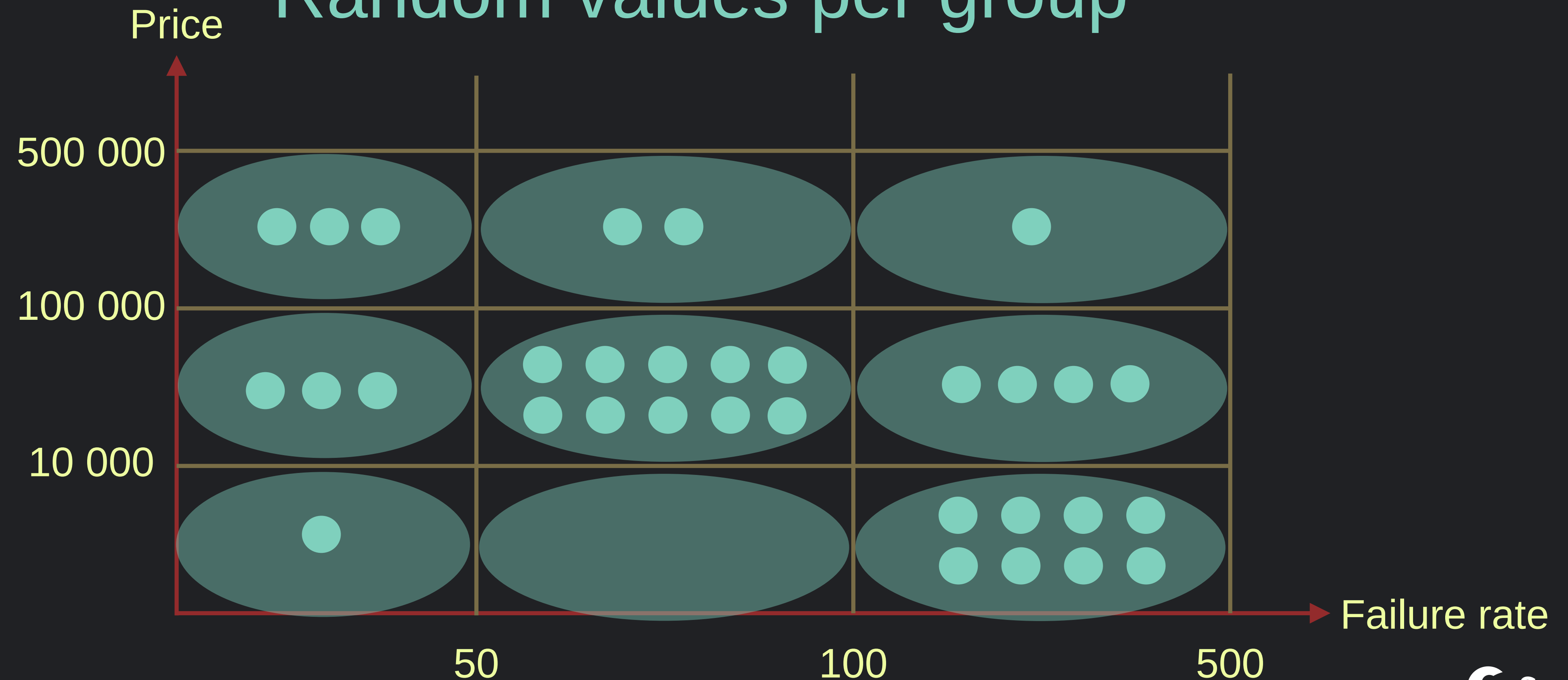
Matrix grouping



Sensitivity analysis of estimates

Matrix grouping

Random values per group



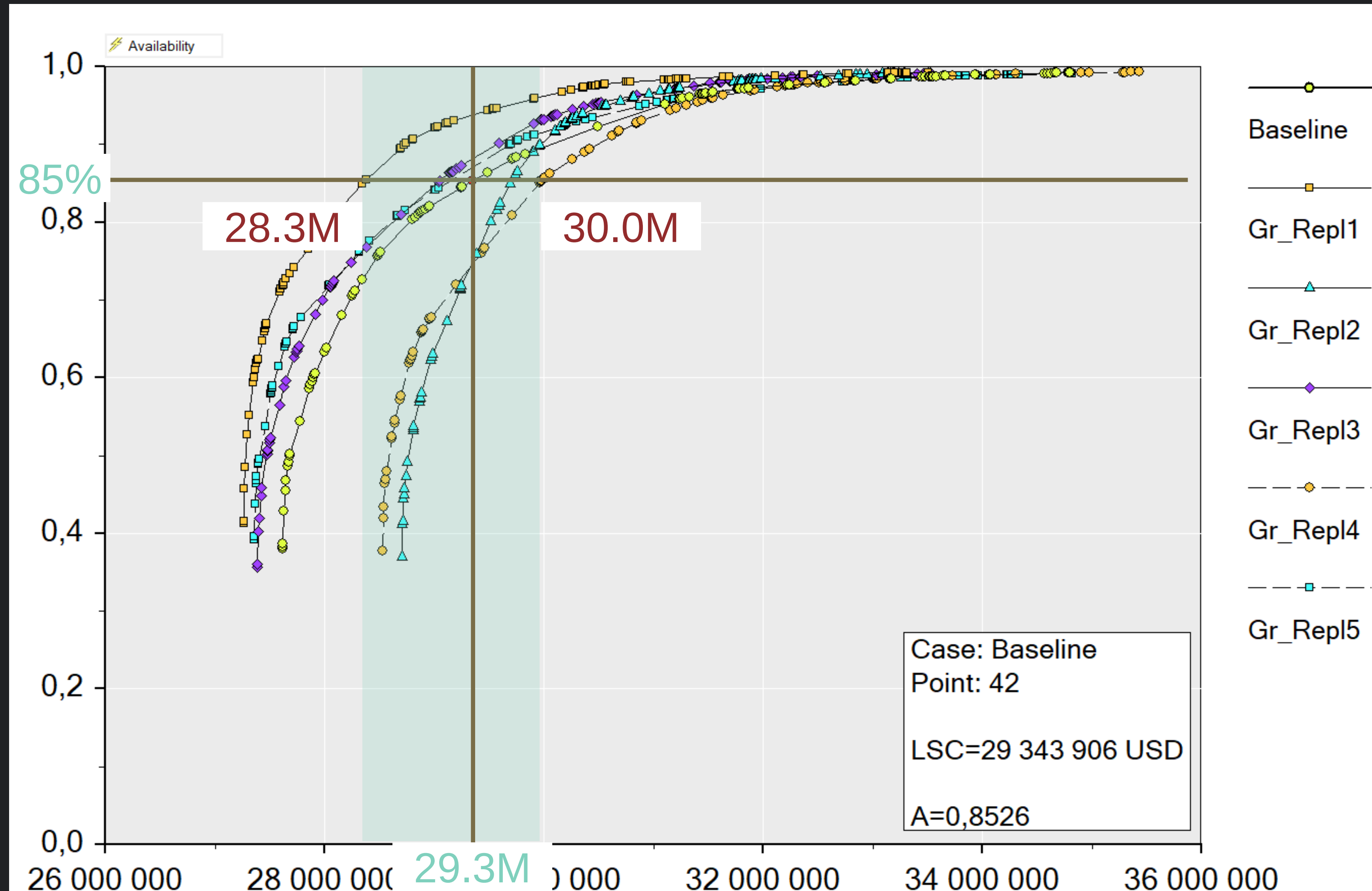
Sensitivity analysis of estimates

Matrix grouping

APPROACH:

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3. Repeat...

Sensitivity analysis of estimates



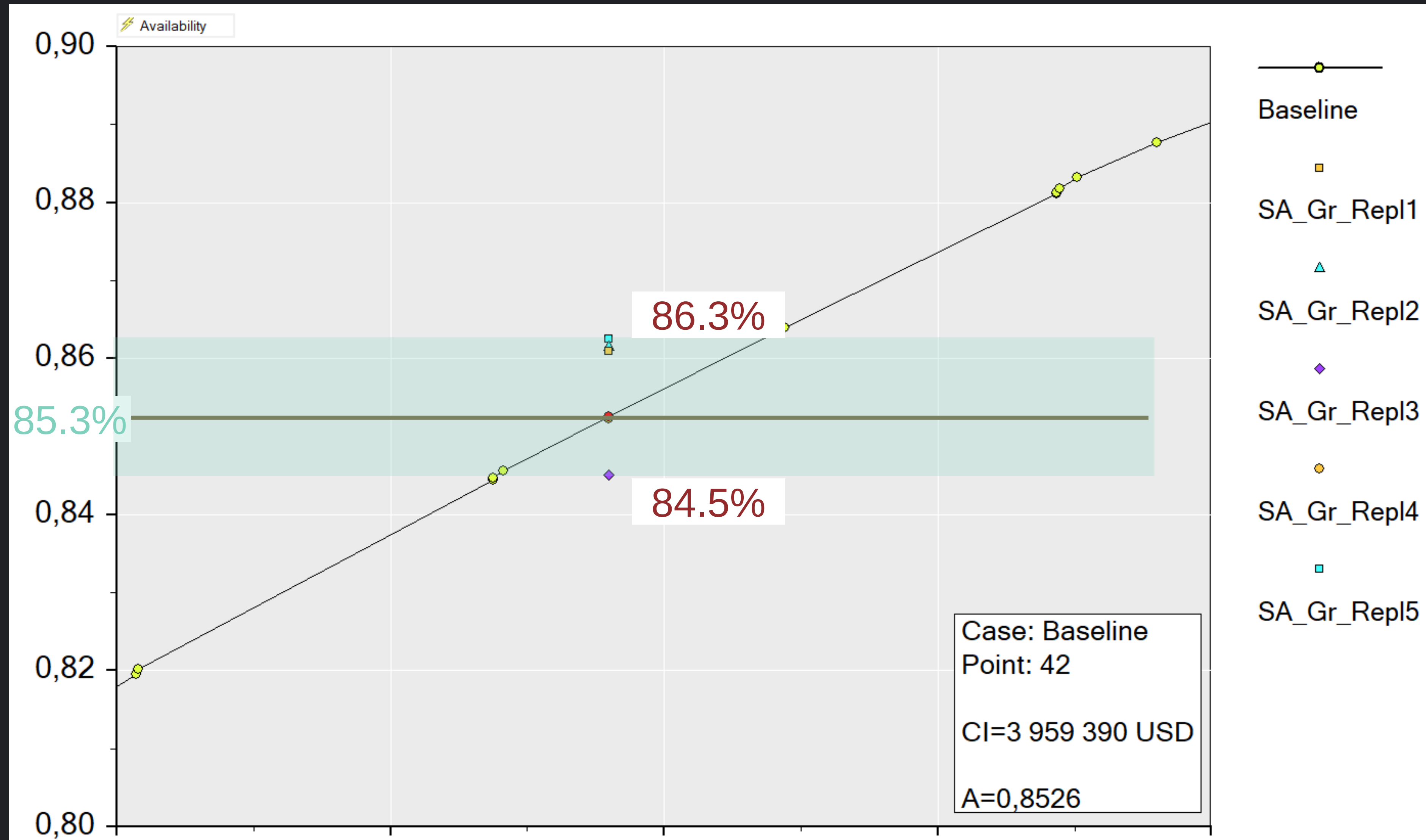
Sensitivity analysis of estimates

Impact of early decisions

APPROACH:

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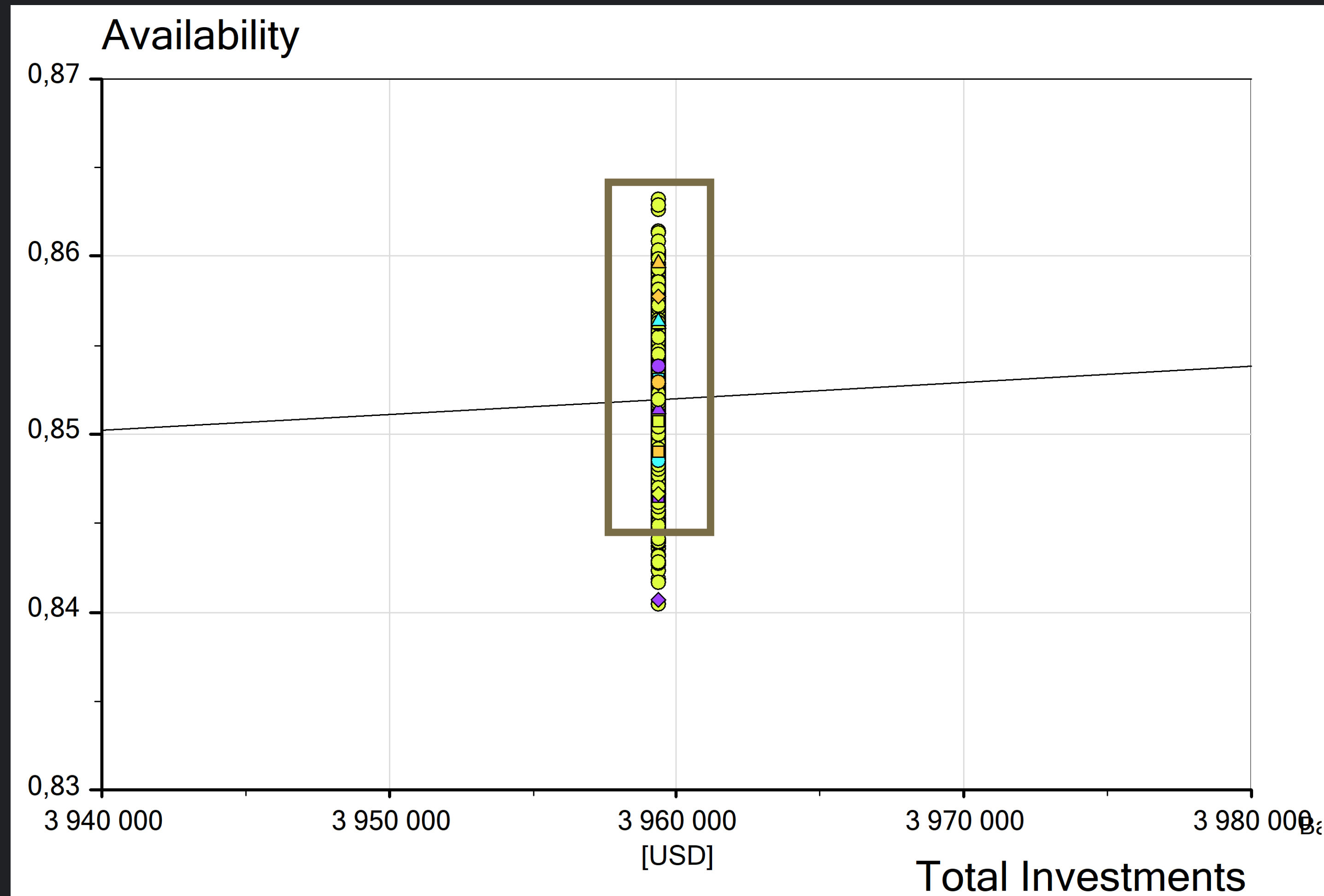
Sensitivity analysis of estimates



Not convinced?

5 replications are not enough:
- What about 1 000?

Not convinced?



**90% probability that
additional investment
 $5\% \leq$ of initial stock
investment**

Conclusions

- Results are surprisingly robust
- High value of early decision support
- Definitely better than "a finger in the air"

“Garbage in, garbage out”

A word of wisdom or just a bad excuse?

Just a bad excuse!



Thank you.

