GUY CARPENTER

How to estimate Risk Margins under IFRS

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GUY CARPENTER

1. Overview
2. Three methods to estimate Risk Margins
3. IFRS and Solvency II
4. Etc

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Overview of IASB's philosophy

Balance sheet at Market Value

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Overview of IASB's philosophy

Balance sheet at Market Value → Current Exit Value

Overview of IASB's philosophy

Balance sheet at Market Value

Current Exit Value

Overview of IASB's philosophy

Balance sheet at Market Value

Current Exit Value

Overview of IASB's philosophy

Balance sheet at Market Value → Current Exit Value → Current Fulfillment Value

Overview of IASB's philosophy

Balance sheet at Market Value

Current Exit Value

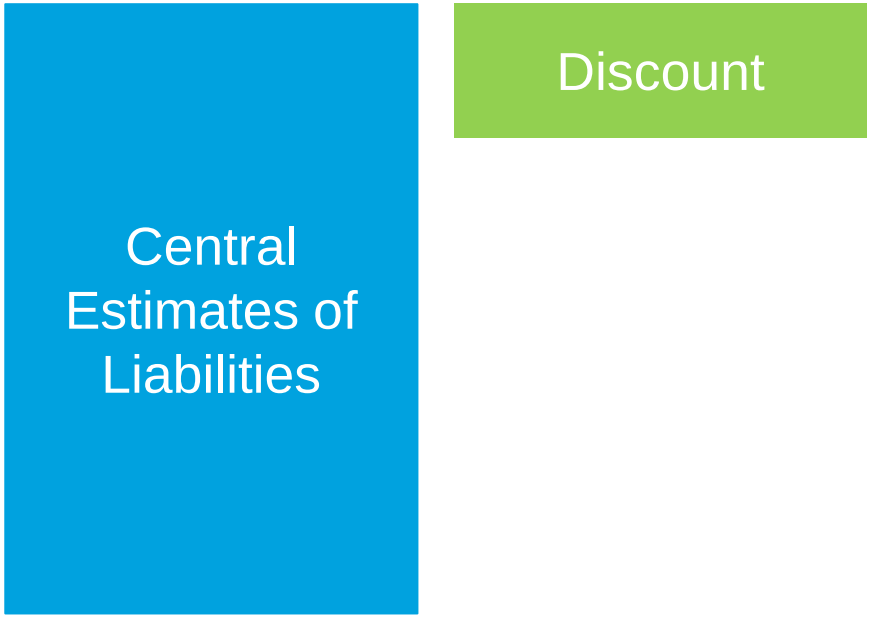
Current Fulfillment Value

Four Components of Current Fulfillment Value

Four Components of Current Fulfillment Value

Central Estimates of Liabilities

Four Components of Current Fulfillment Value



Four Components of Current Fulfillment Value

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Three methods to estimate Risk Margins

1. Cost of Capital
2. Confidence Level
3. Conditional Tail Expectation

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1. Cost of Capital
2. Confidence Level
3. Conditional Tail Expectation

Cost of Capital method

- Market value of liabilities?

Cost of Capital method

- Market value of liabilities?
- Market value of an asset

Selling you my General Liability book

Discounted reserves = $236 million

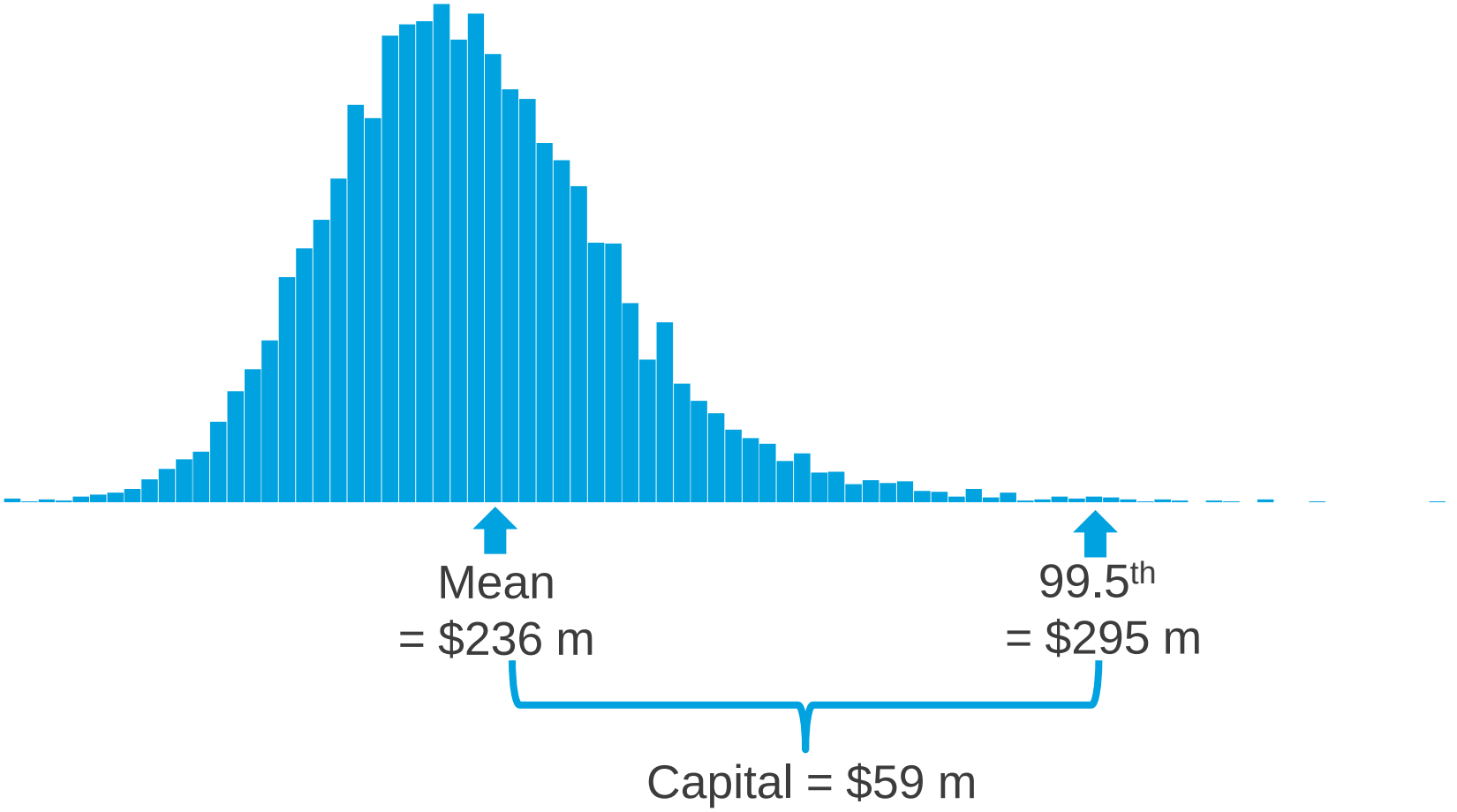
1st offer: $236 million

Selling you my General Liability book

Discounted reserves = $236 million

1st offer: $236 million  TOO LOW

How much capital?



Selling you my General Liability book

Discounted reserves = $236 million

1st offer: $236 m → TOO LOW

2nd offer: $236 m + $59 m

Selling you my General Liability book

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$236 m + ? = Market Value

Selling you my General Liability book

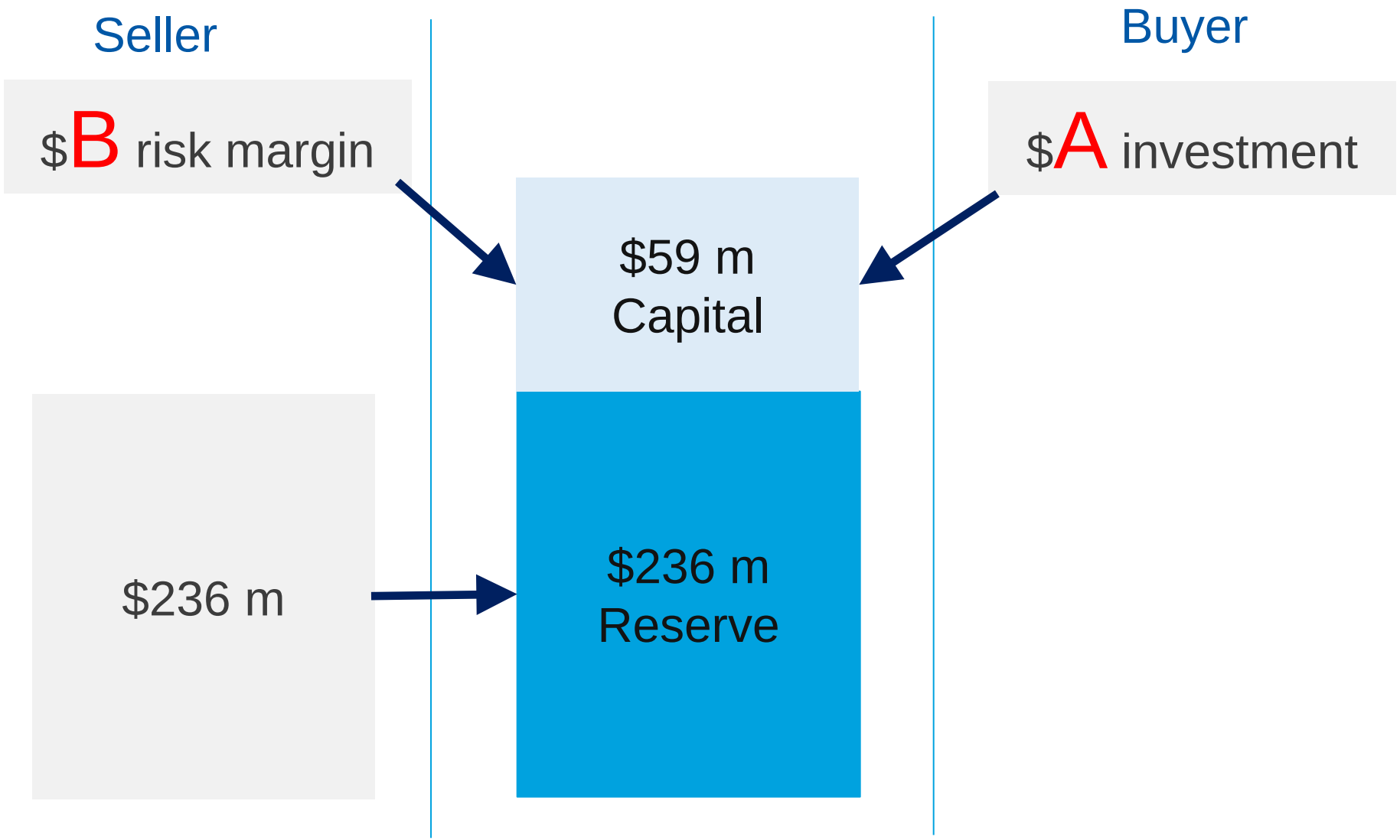
Discounted reserves = $236 million

1st offer: $236 m → TOO LOW

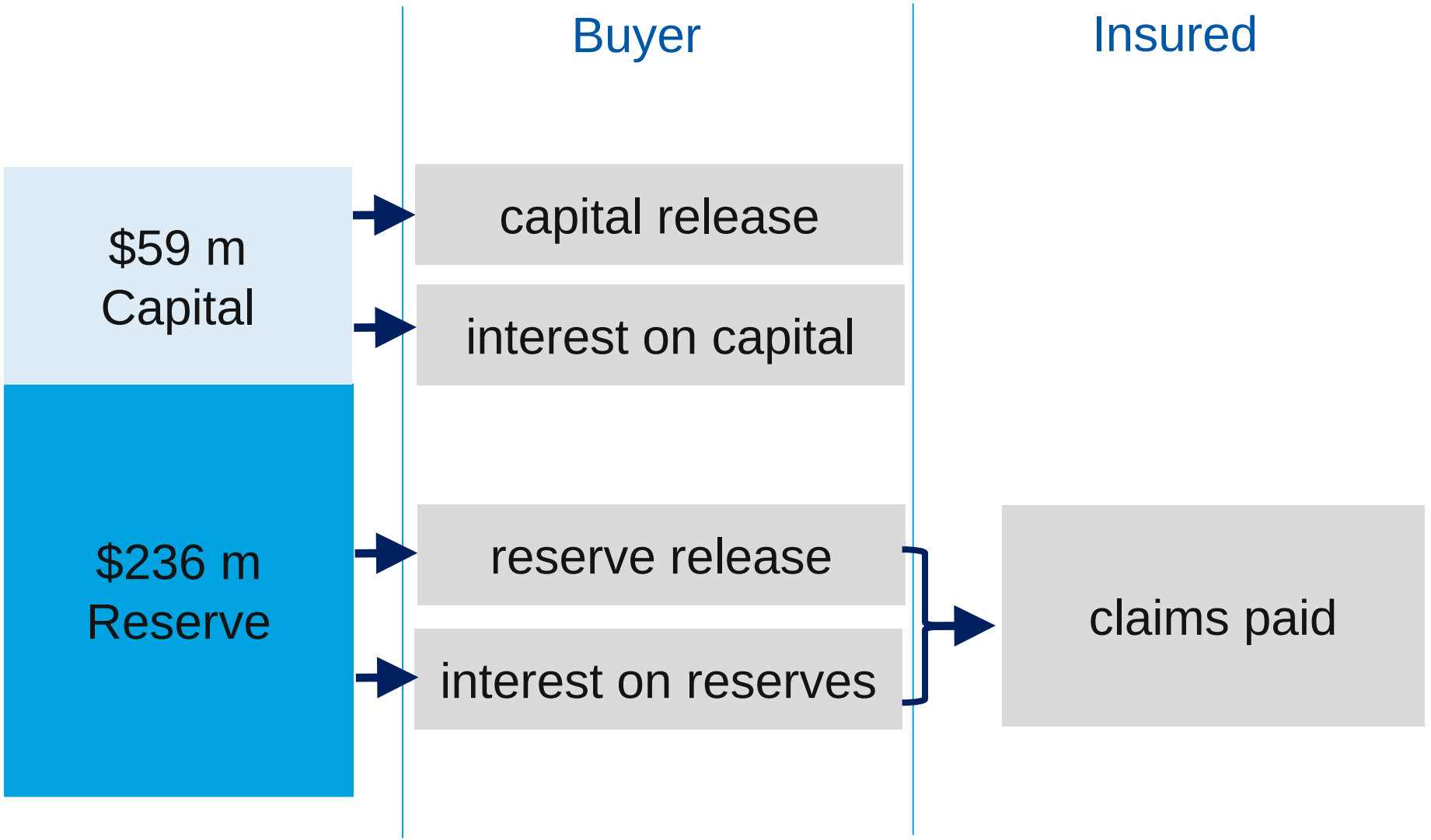
2nd offer: $236 m + $59 m → TOO HIGH

$236 m + Risk Margin = Market Value

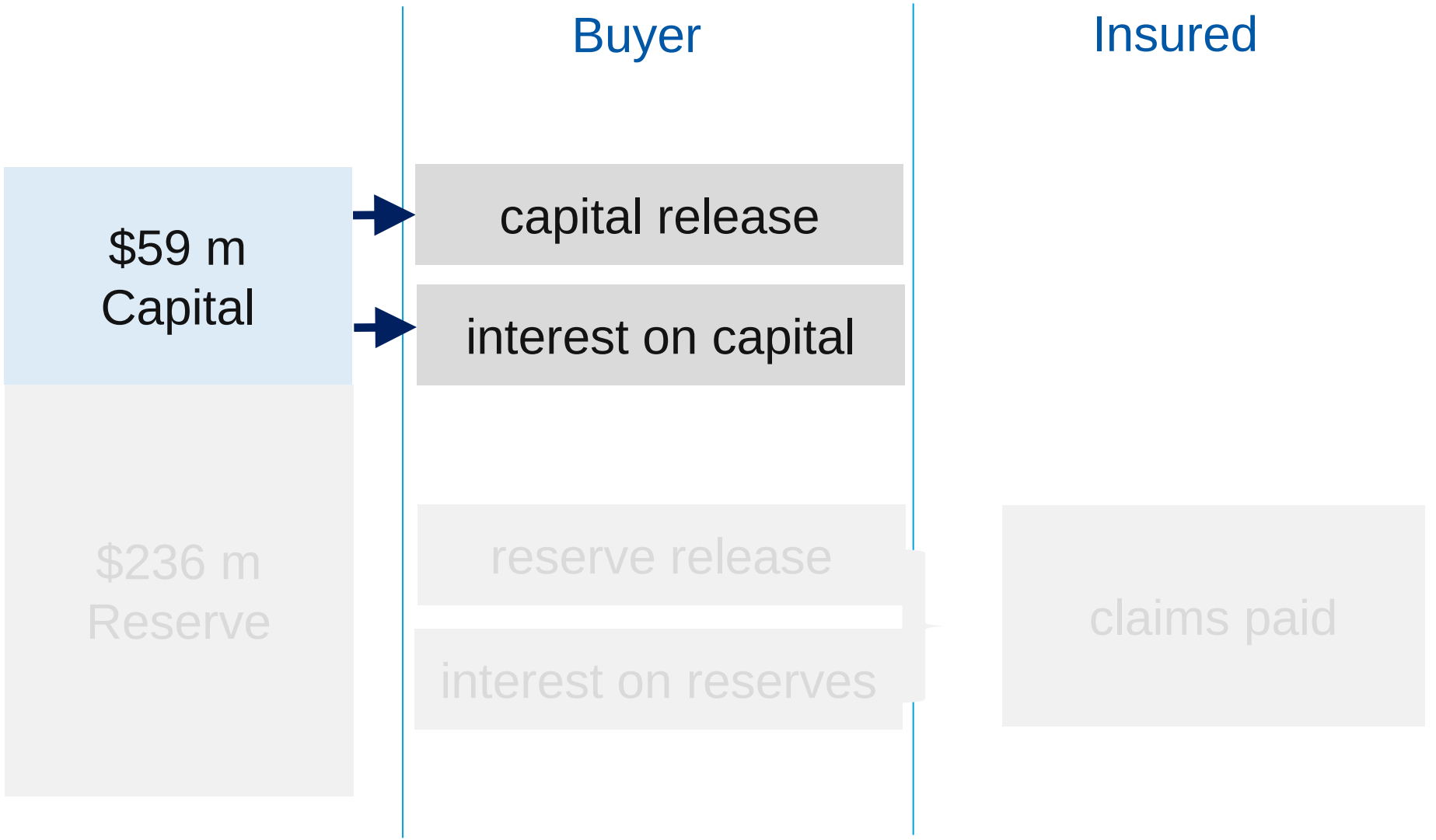
Transaction



Future Cash Flows



Future Cash Flows



Expected Future Net Cash Flow

Yr	Capital Release (1)	Interest on Capital (2)	Net Cash Flow (3) = (1) + (2)
1			
2			
…			
34			
35			

Expected Future Net Cash Flow

Yr	Capital Release	Interest on Capital	Net Cash Flow
	(1)	(2)	(3) = (1) + (2)
1	=Capital (0) – Capital (1)		
2			
…			
34			
35			

Expected Future Net Cash Flow

Yr	Capital Release	Interest on Capital	Net Cash Flow
	(1)	(2)	(3) = (1) + (2)
1	= $59.0	– Capital (1)	
2			
…			
34			
35			

Expected Future Net Cash Flow

Yr		Capital Release (1)		Interest on Capital (2)	Net Cash Flow (3) = (1) + (2)
1	=	$59.0	–	$52.3	
2					
…					
34					
35					

Expected Future Net Cash Flow

Yr	Capital Release	Interest on Capital	Net Cash Flow
	(1)	(2)	(3) = (1) + (2)
1	$6.7		
2			
…			
34			
35			

Expected Future Net Cash Flow

Yr	Capital Release	Interest on Capital	Net Cash Flow
	(1)	(2)	(3) = (1) + (2)
1	$6.7	=Capital (0) * rf	
2			
…			
34			
35			

Expected Future Net Cash Flow

Yr	Capital Release	Interest on Capital	Net Cash Flow
	(1)	(2)	(3) = (1) + (2)
1	$6.7	= $59 * 4%	
2			
…			
34			
35			

Expected Future Net Cash Flow

Yr	Capital Release	Interest on Capital	Net Cash Flow
	(1)	(2)	(3) = (1) + (2)
1	$6.7	$2.3	
2			
…			
34			
35			

Expected Future Net Cash Flow

Yr	Capital Release (1)	Interest on Capital (2)	Net Cash Flow (3) = (1) + (2)
1	$6.7	$2.3	$9.0
2			
…			
34			
35			

Expected Future Net Cash Flow

Yr	Capital Release	Interest on Capital	Net Cash Flow
	(1)	(2)	(3) = (1) + (2)
1	$6.7	$2.3	$9.0
2	$5.9	$2.1	$8.0
…			….
34			$0.3
35			$0.3

Expected Future Net Cash Flow

Yr	Capital Release (1)	Interest on Capital (2)	Net Cash Flow (3) = (1) + (2)
1	$6.7	$2.3	$9.0
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…			….
34			$0.3
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Expected Future Net Cash Flow

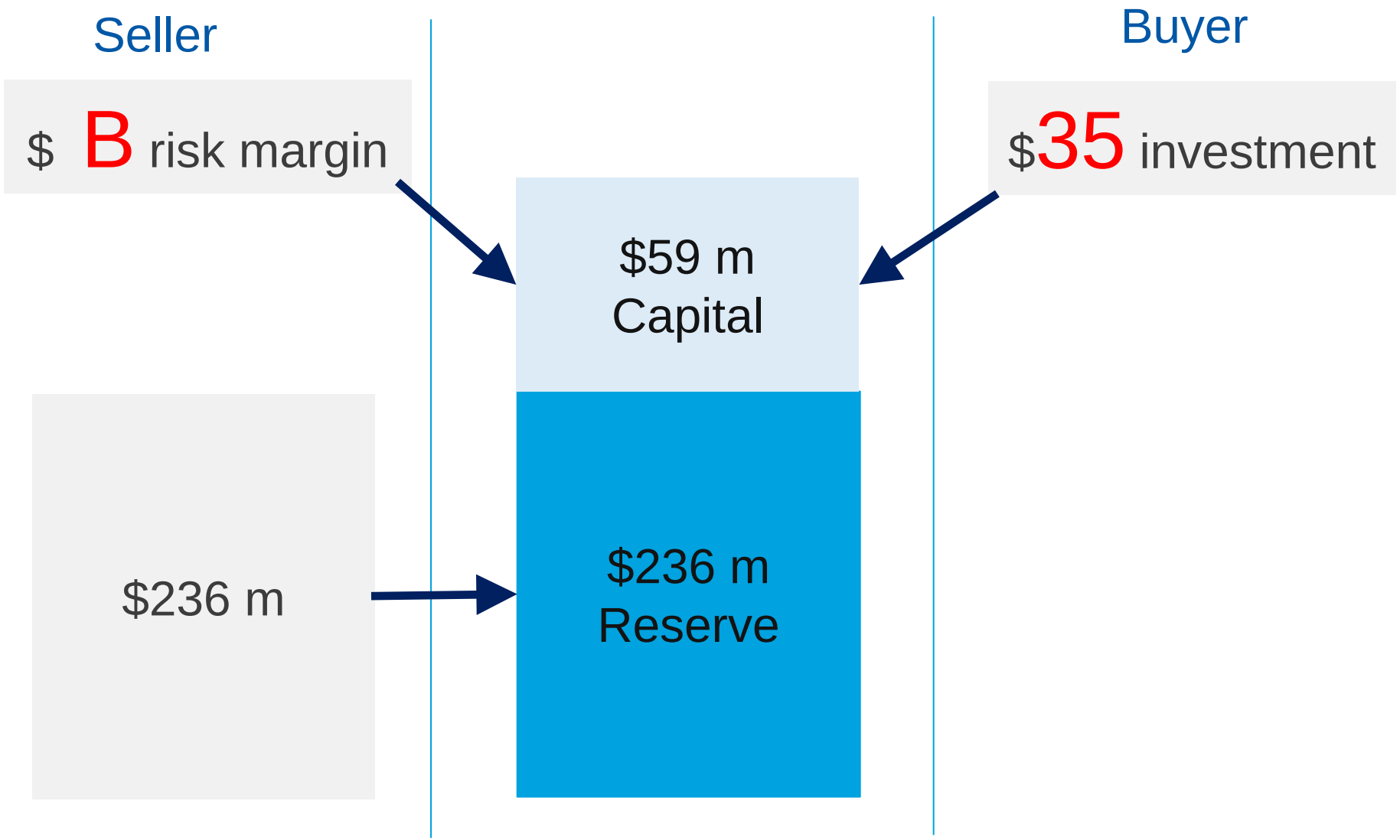
Yr	Capital Release	Interest on Capital	Net Cash Flow	Discounted Net Cash Flow
	(1)	(2)	(3) = (1) + (2)	(4)
1	$6.7	$2.3	$9.0	=$9.0 * 1.10^-1
2	$5.9	$2.1	$8.0	=$8.0 * 1.10^-2
…			….	
34			$0.3	=$0.3 * 1.10^-34
35			$0.3	=$0.3 * 1.10^-35

Expected Future Net Cash Flow

Yr	Capital Release (1)	Interest on Capital (2)	Net Cash Flow (3) = (1) + (2)	Discounted Net Cash Flow (4)
1	$6.7	$2.3	$9.0	=$9.0 * 1.10^-1
2	$5.9	$2.1	$8.0	=$8.0 * 1.10^-2
…			….	
34			$0.3	=$0.3 * 1.10^-34
35			$0.3	=$0.3 * 1.10^-35

= $35.0 m

Transaction



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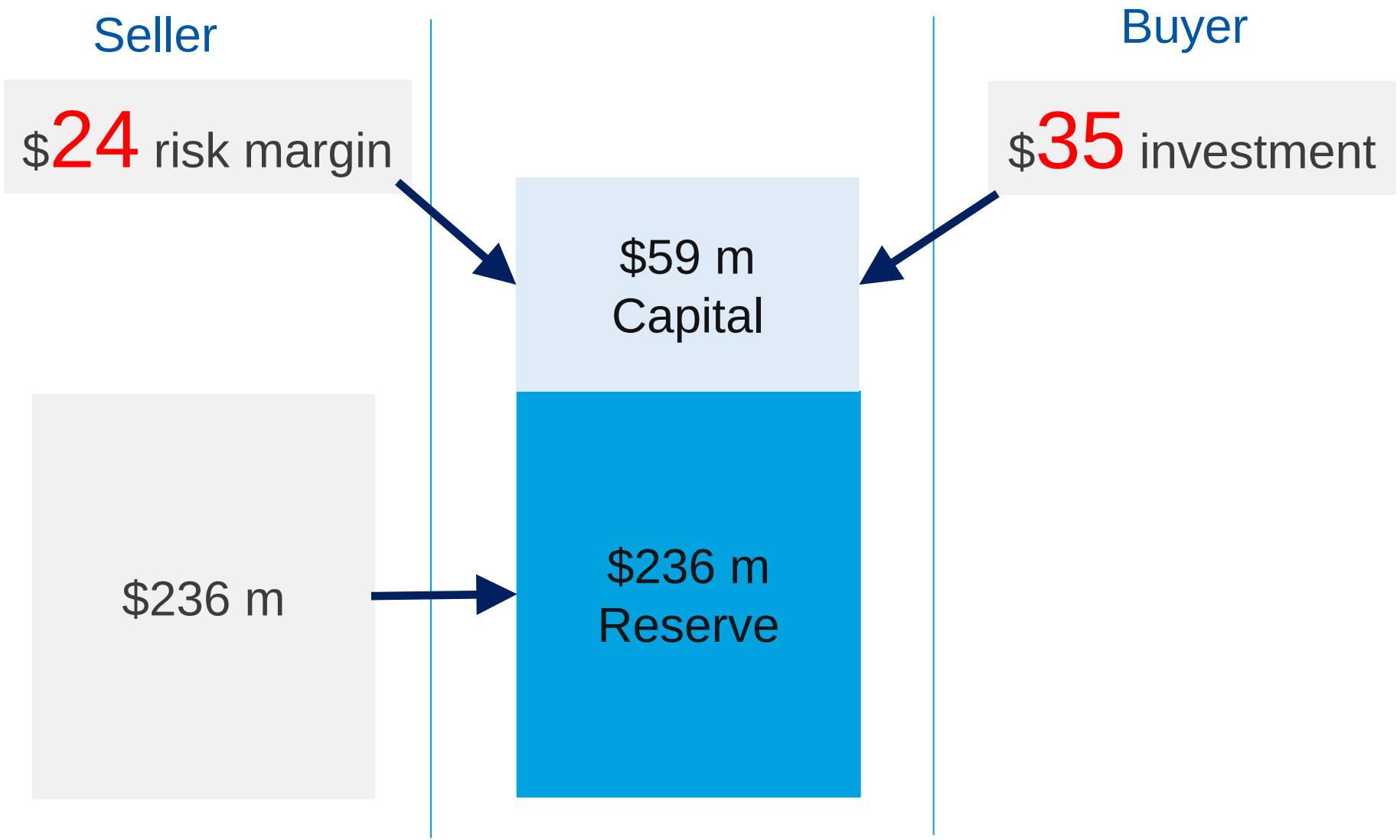

Selling you my General Liability book

Discounted reserves = $236 million

1st offer: $236 m → TOO LOW

2nd offer: $236 m + $59 m → TOO HIGH

3rd offer: $236 m + $24 m

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1st offer: $236 m → TOO LOW

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3rd offer: $236 m + $24 m → JUST RIGHT

Equation

$$Risk\ Margin = Capital_0 - What\ you\ will\ invest$$

Equation

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$$Risk\ Margin = Capital_0 - \sum \frac{What\ you\ get}{(1 + CoC)}$$

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$$Risk\ Margin = Capital_0 - \sum \frac{What\ you\ get}{(1 + CoC)}$$

$$Risk\ Margin = Capital_0 - \sum_{t=0}^{n} \frac{(Capital_t - Capital_{t-1}) + Capital_t \times r_f}{(1 + CoC)^t}$$

Equation

Cost of Capital:

$$Risk\ Margin = Capital_0 - \sum_{t=0}^{n} \frac{(Capital_t - Capital_{t-1}) + Capital_t \times r_f}{(1 + CoC)^t}$$

Simple Example

n = 1, Capital(0) = $100, Capital(1) = $0, rf = 4%, CoC = 10%

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$$Risk\ Margin = Capital_0 - \sum_{t=0}^{n} \frac{(Capital_t - Capital_{t-1}) + Capital_t \times r_f}{(1 + CoC)^t}$$

$$Risk\ Margin = \$100 - \frac{(\$100 - \$0) + \$100 \times 4\%}{(1 + 10\%)}$$

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$$Risk\ Margin = \$100 - \frac{(\$100 - \$0) + \$100 \times 4\%}{(1 + 10\%)}$$

$$Risk\ Margin = \$100 - \frac{\$104}{1.10}$$

Simple Example

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$$Risk\ Margin = \$100 - \$94.54$$

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$$Risk\ Margin = \$100 - \$94.54$$

$$Risk\ Margin = \$5.45$$

Another Cost of Capital Method

1. Calculate capital required at each year-end
2. Multiply by the cost of capital less the risk-free rate
3. Discount at the cost of capital and sum

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$$Risk\ Margin = \sum_{t=0}^{n} \frac{Capital_t(CoC - r_f)}{(1 + CoC)^t}$$

Risk Margin Methods:

Cost of Capital:

$$Risk\ Margin = Capital_0 - \sum_{t=0}^{n} \frac{(Capital_t - Capital_{t-1}) + Capital_t \times r_f}{(1 + CoC)^t}$$

Another Cost of Capital:

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$$= \frac{\$100 \times (10\% - 4\%)}{1.10}$$

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$$= \$5.45$$

Risk Margin Methods:

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- Another Cost of Capital:

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Three methods to estimate Risk Margins

1. Cost of Capital
2. Confidence Level
3. Conditional Tail Expectation

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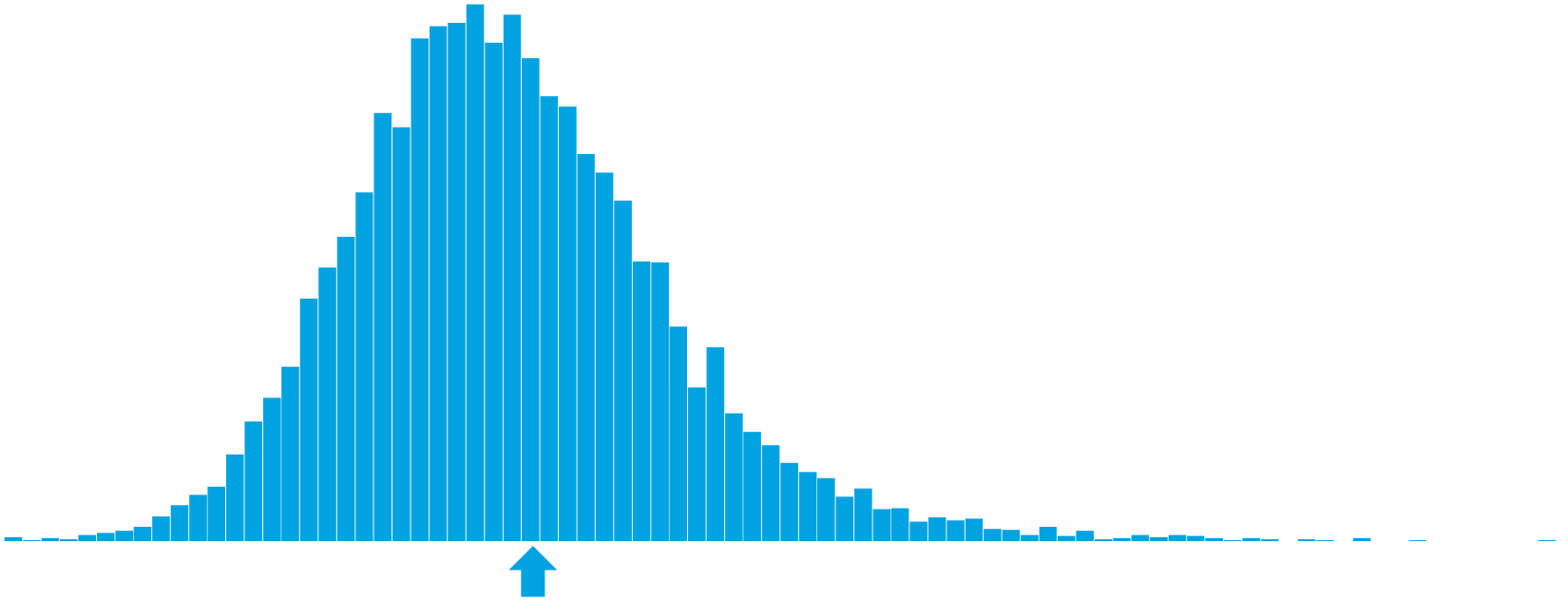
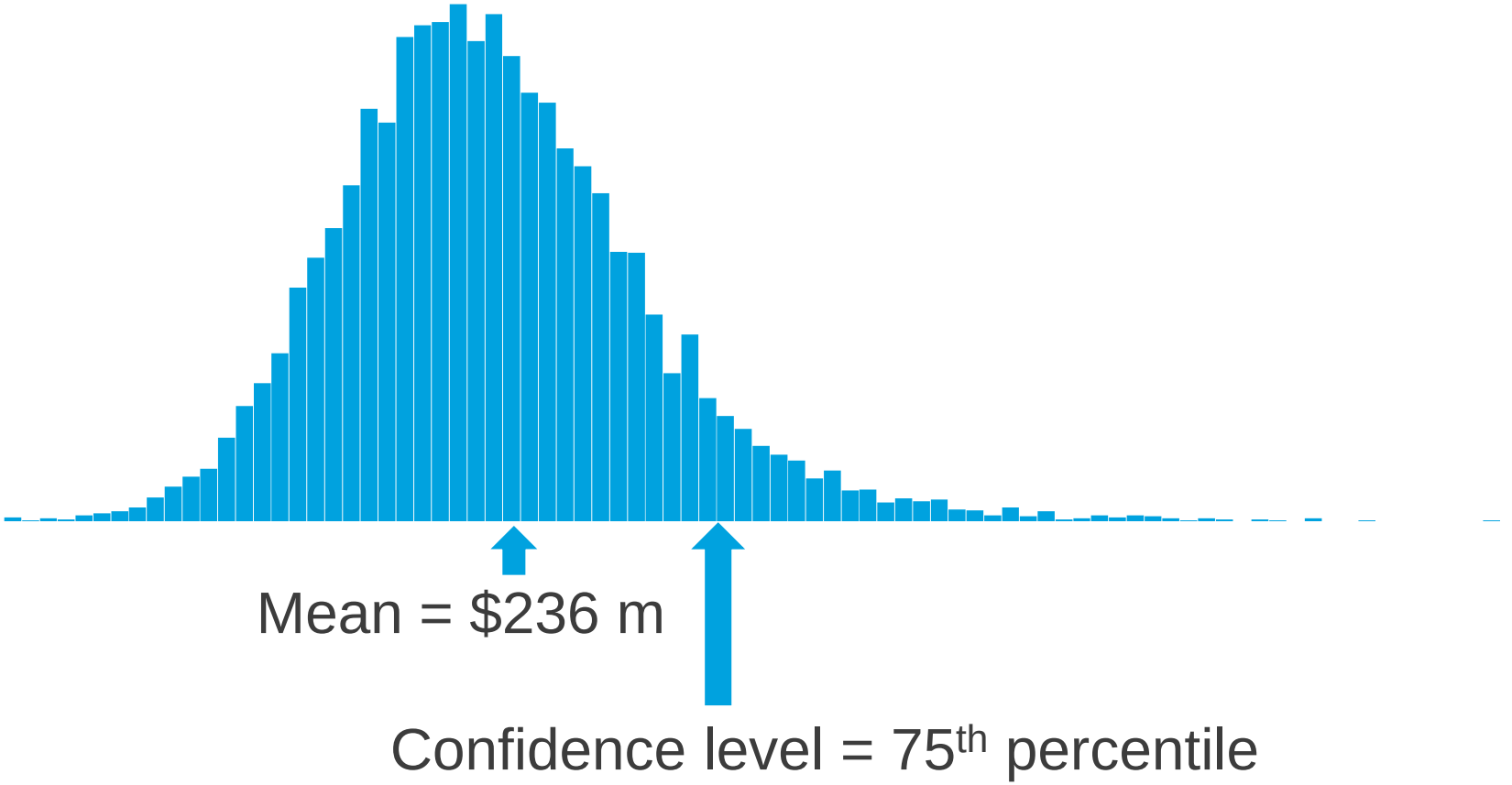
2. Confidence Level



2. Confidence Level



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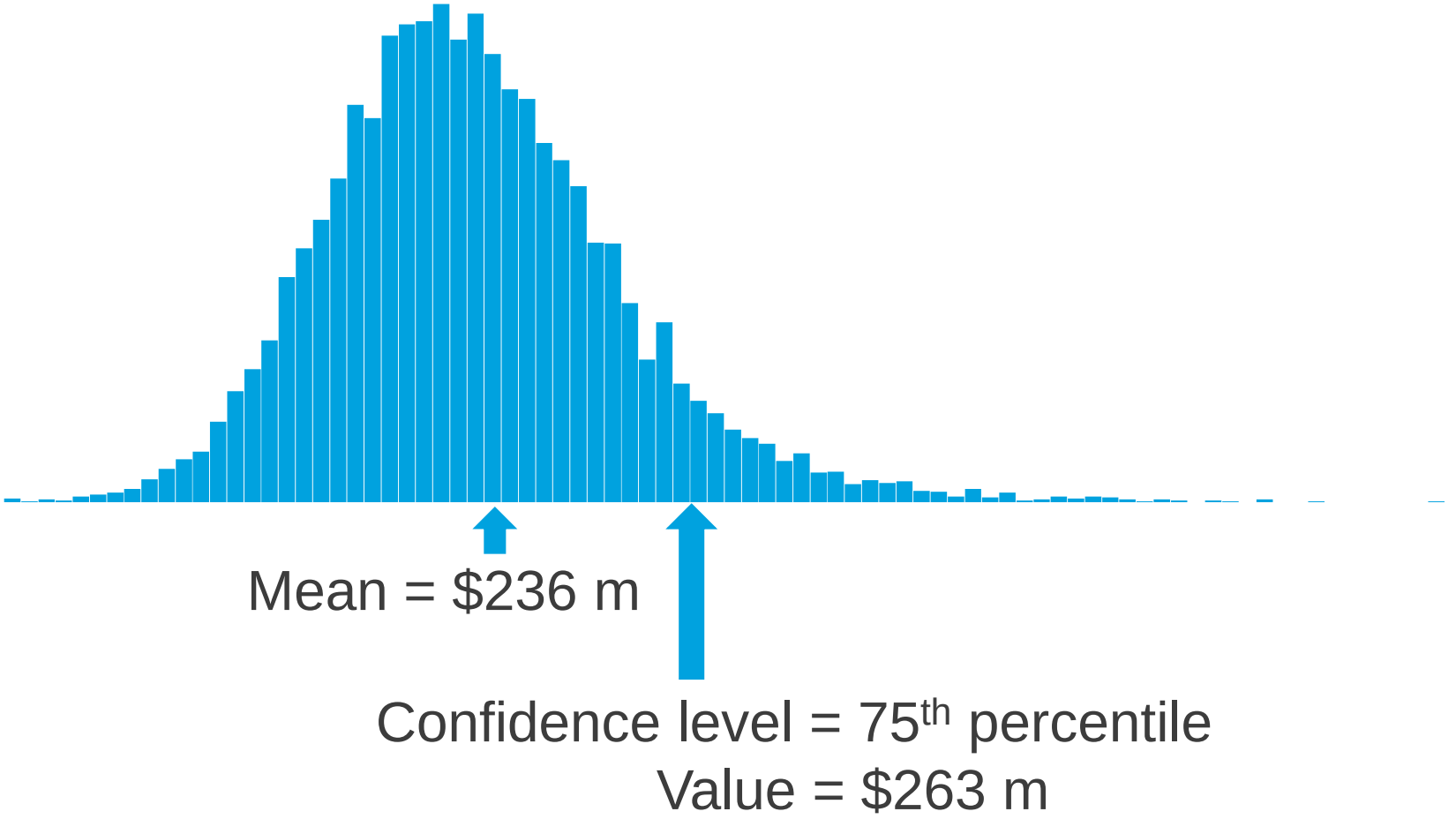

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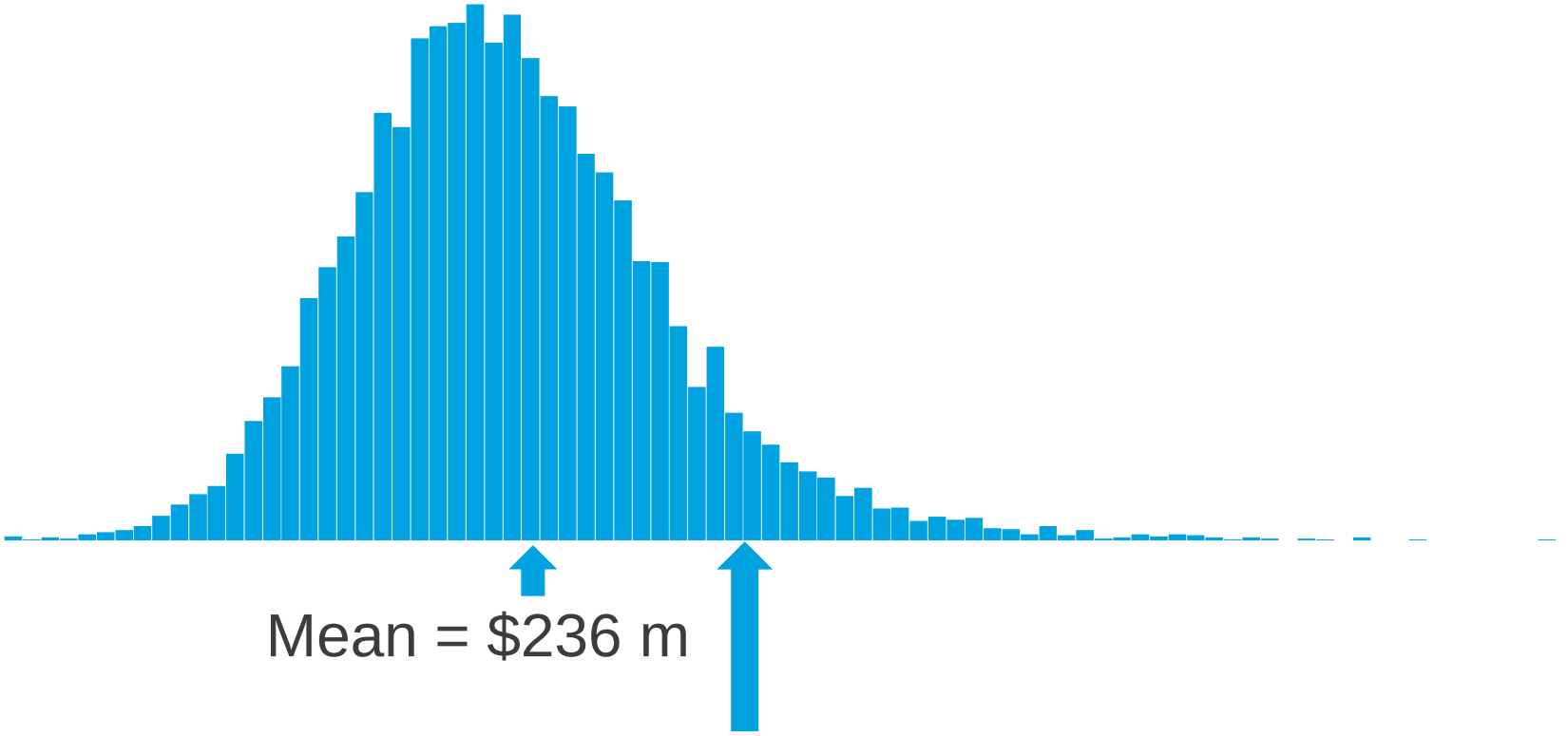

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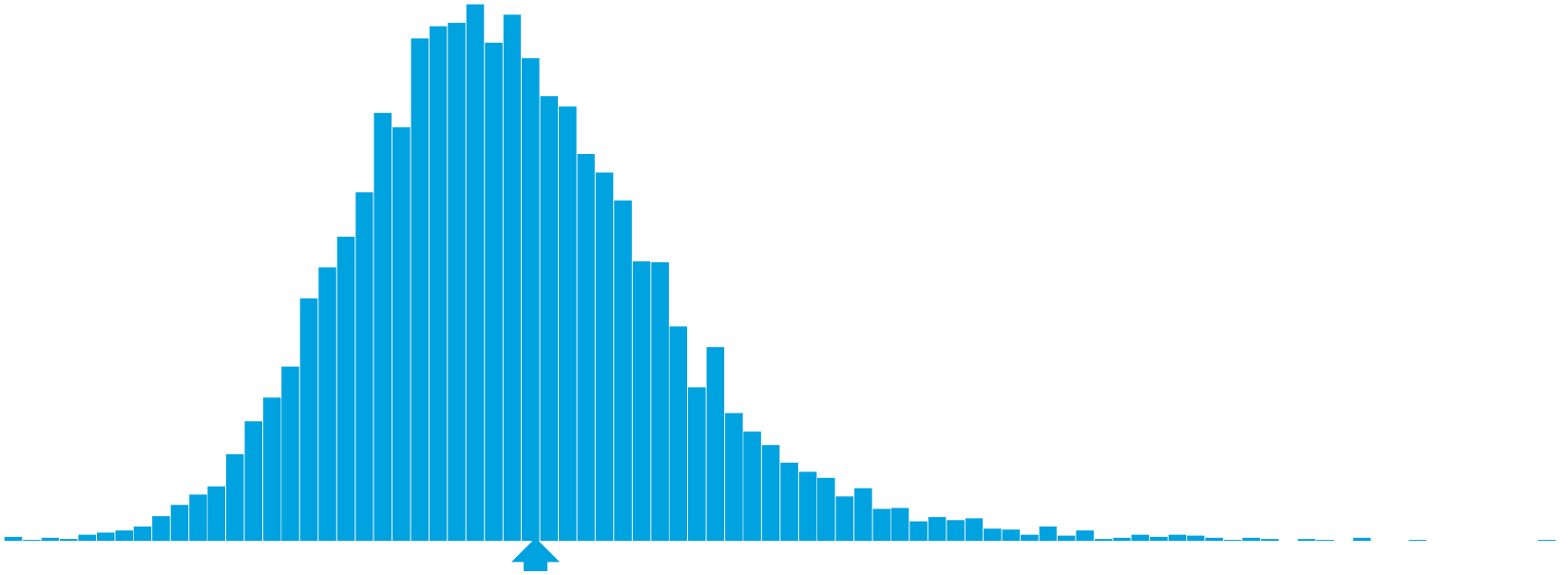
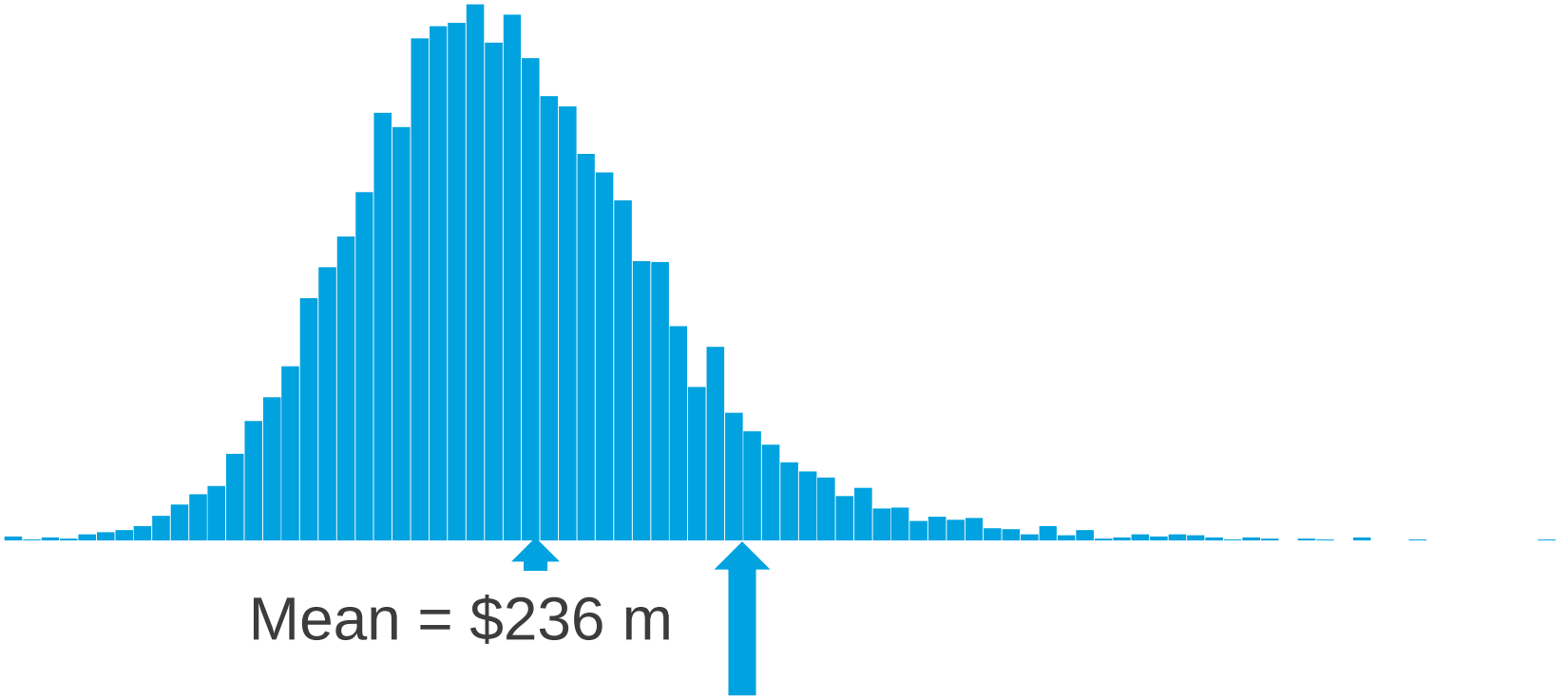


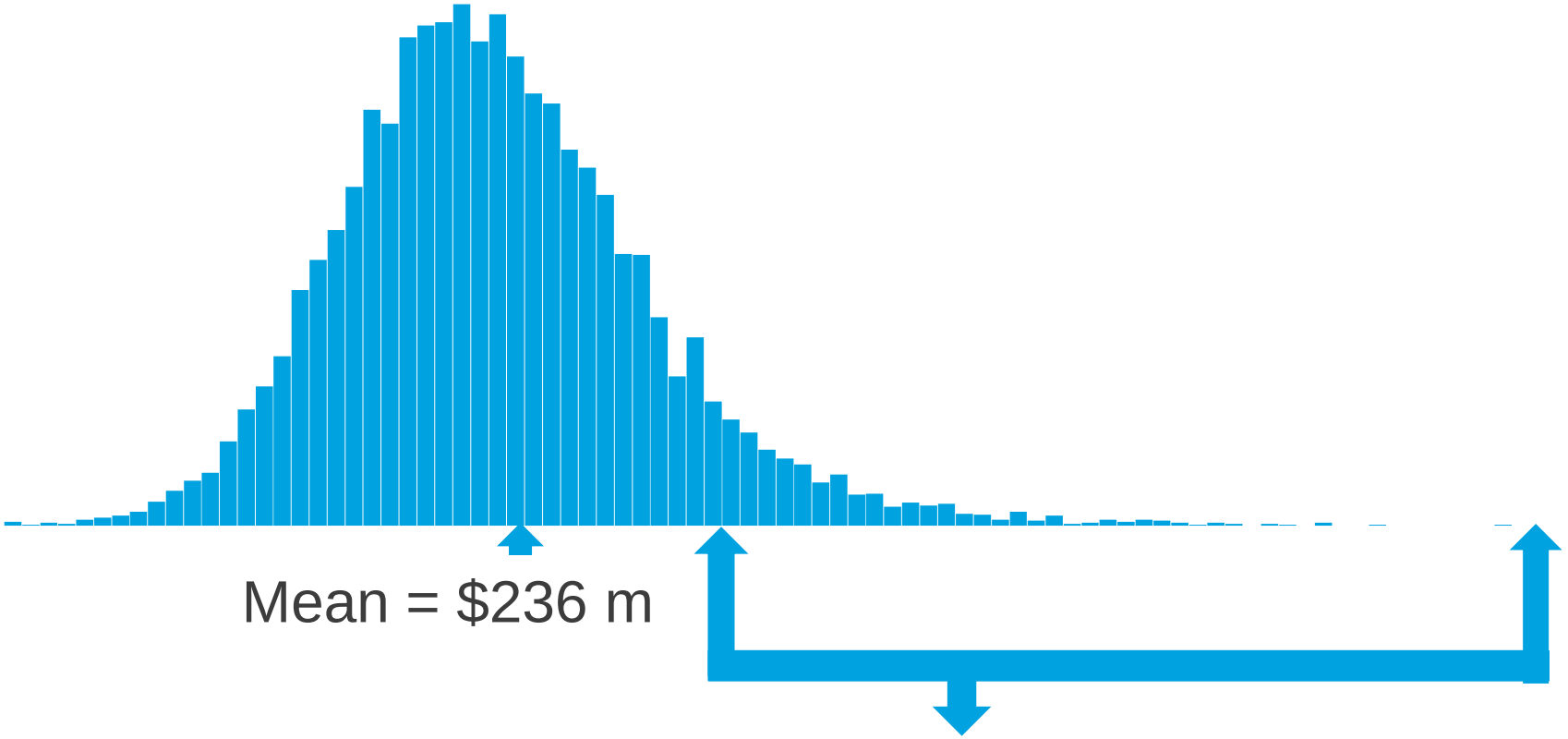
Mean = $236 m

3. Conditional Tail Expectation



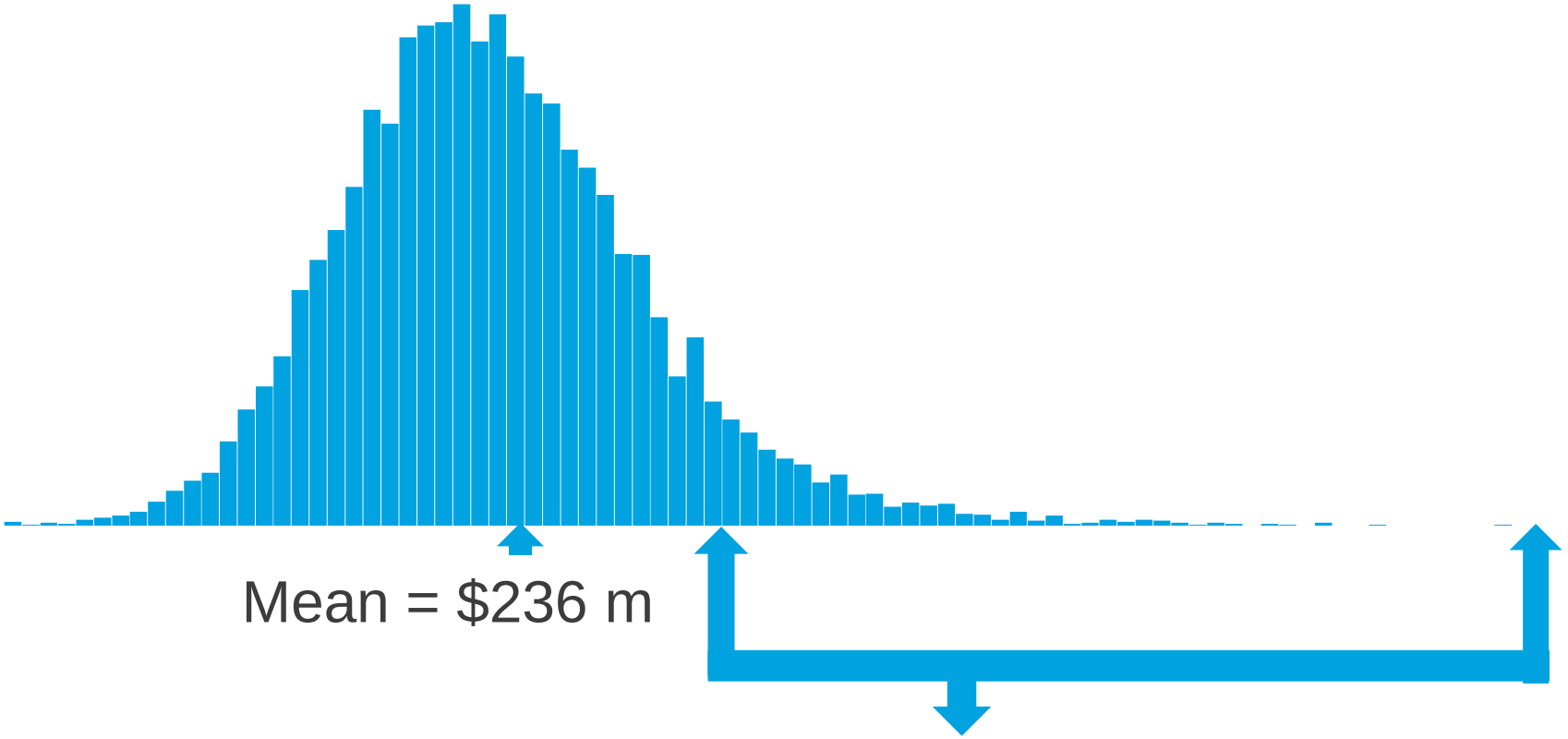
Confidence Level = 75th percentile

3. Conditional Tail Expectation



Conditional Tail Expectation = Average above the 75th percentile

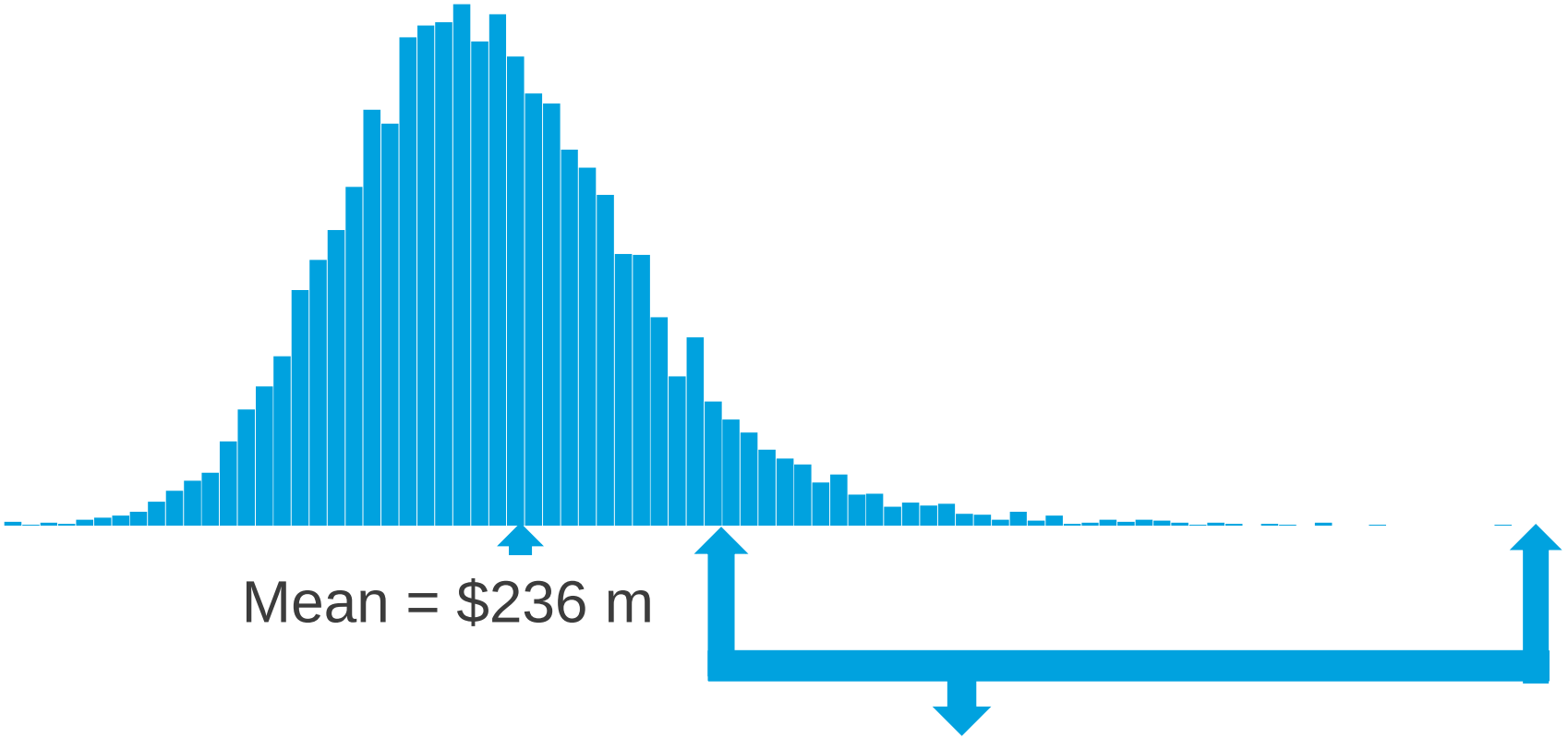
3. Conditional Tail Expectation



Conditional Tail Expectation = Average above the 75th percentile

Value = $319 m

3. Conditional Tail Expectation

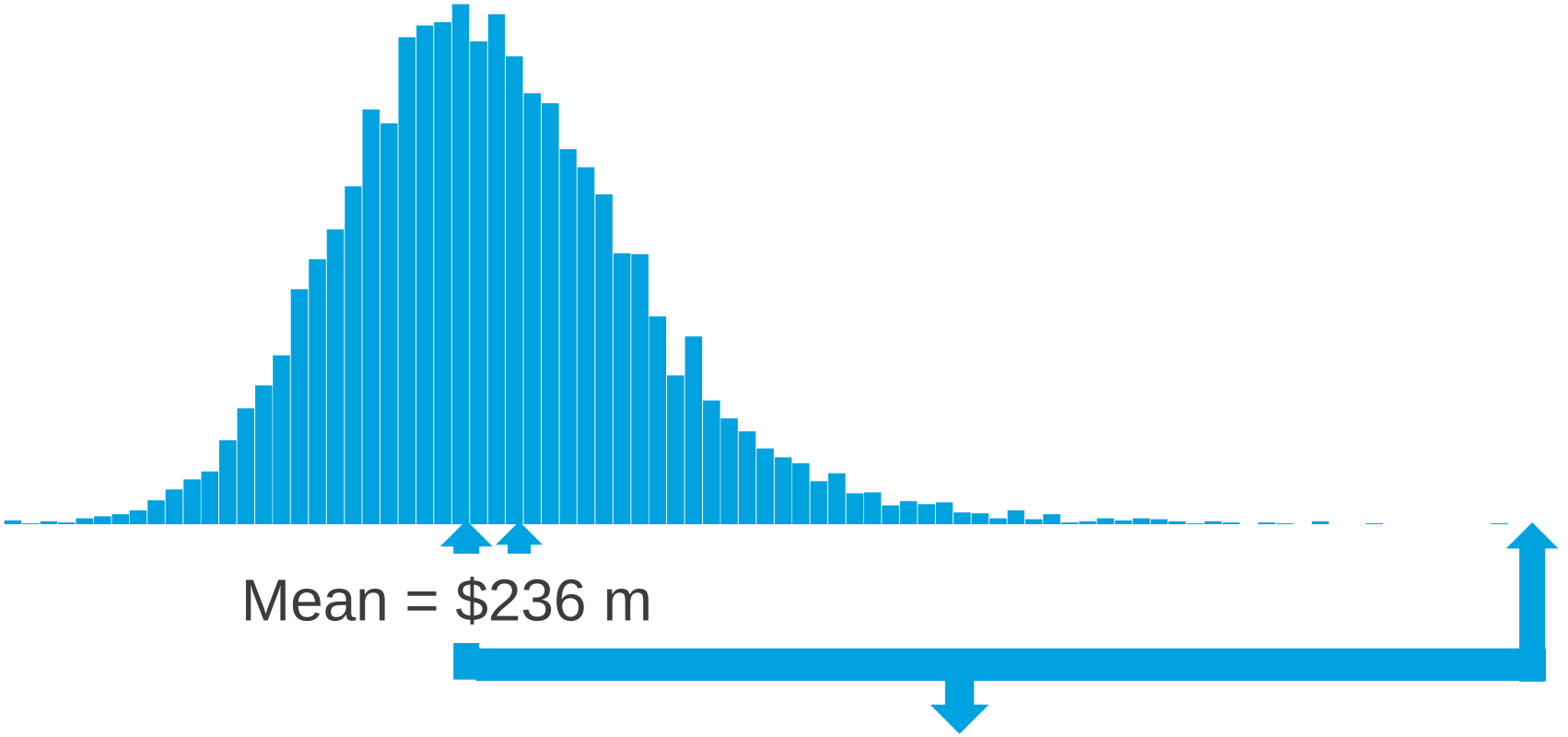


Conditional Tail Expectation = Average above the 75th percentile

Value = $319 m

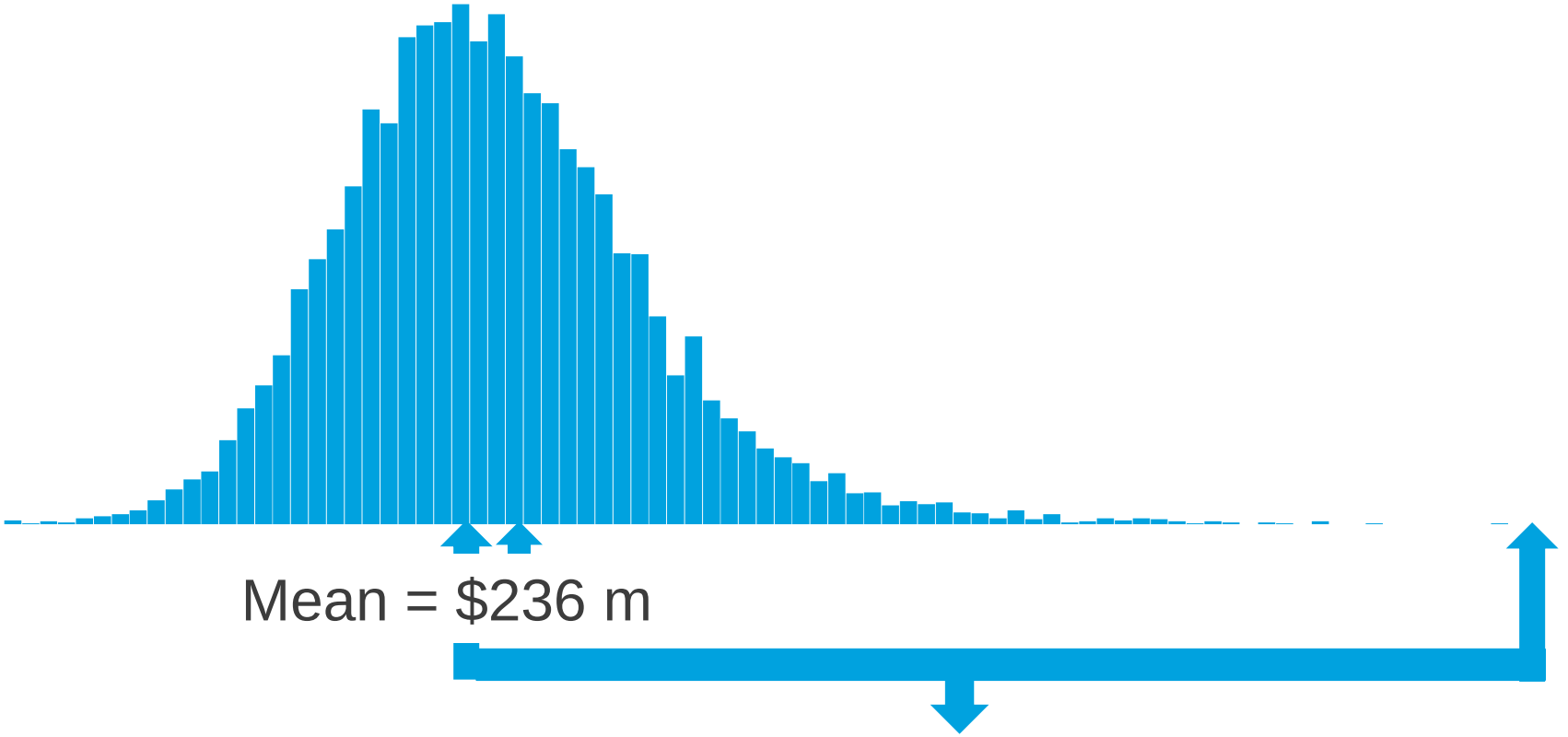
Risk Margin = $83 m

3. Conditional Tail Expectation



Conditional Tail Expectation = Average above the **50th** percentile

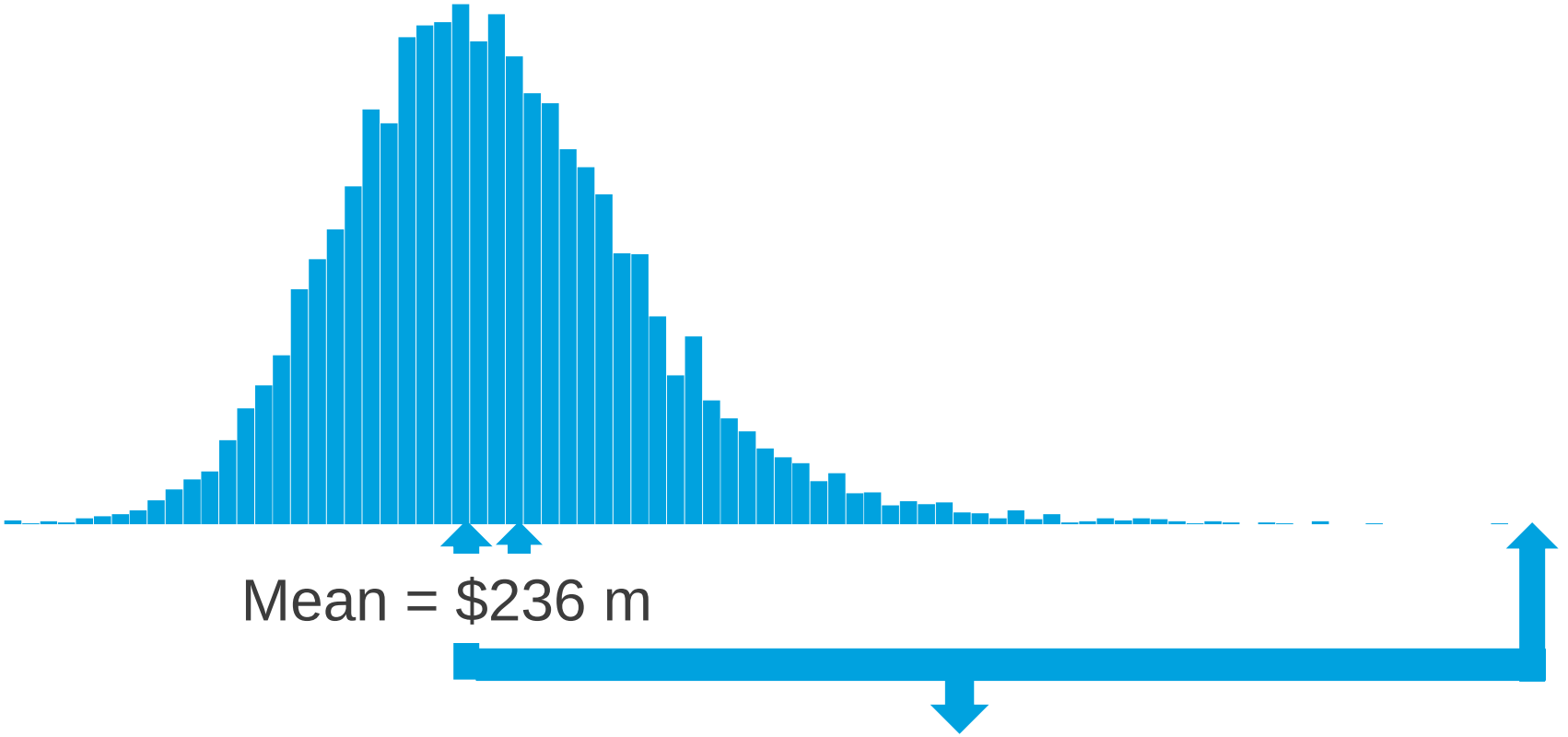
3. Conditional Tail Expectation



Conditional Tail Expectation = Average above the **50th** percentile

Value = $285 m

3. Conditional Tail Expectation



Conditional Tail Expectation = Average above the **50th** percentile

Value = $285 m

Risk Margin = $49 m

Which method is right for me?

Methods						
Cost of Capital						
Confidence Level						
Conditional Tail Expectation						

Which method is right for me?

Methods	Risk Margin					
Cost of Capital	$24					
Confidence Level	$27					
Conditional Tail Expectation	$49					

Which method is right for me?

Methods	Risk Margin	Hard?				
Cost of Capital	$24	Hard				
Confidence Level	$27	Easy				
Conditional Tail Expectation	$49	Med				

Which method is right for me?

Methods	Risk Margin	Hard?	Market value?			
Cost of Capital	$24	Hard	Yes			
Confidence Level	$27	Easy	No			
Conditional Tail Expectation	$49	Med	No			

Which method is right for me?

Methods	Risk Margin	Hard?	Market value?	Skew?		
Cost of Capital	$24	Hard	Yes	Yes		
Confidence Level	$27	Easy	No	No		
Conditional Tail Expectation	$49	Med	No	Yes		

Which method is right for me?

Methods	Risk Margin	Hard?	Market value?	Skew?	Time?	
Cost of Capital	$24	Hard	Yes	Yes	Yes	
Confidence Level	$27	Easy	No	No	No	
Conditional Tail Expectation	$49	Med	No	Yes	No	

Which method is right for me?

Methods	Risk Margin	Hard?	Market value?	Skew?	Time?	Compare btwn?
Cost of Capital	$24	Hard	Yes	Yes	Yes	Hard
Confidence Level	$27	Easy	No	No	No	Hard
Conditional Tail Expectation	$49	Med	No	Yes	No	Hard

Inputs

Method	Reserve Distribution	Discount Rate	Cost of Capital	Capital Level	Percentile
Cost of Capital					
Confidence Level					
Conditional Tail Expectation					

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Solvency II Method

Solvency II:

1. Calculate SCR at each year-end
2. Multiply by the Cost of Capital less the risk-free rate
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Solvency II Method

Solvency II:

1. Calculate **SCR** at each year-end
2. Multiply by the Cost of Capital less the risk-free rate
3. Discount at the **risk-free** rate and sum

Cost of Capital:

1. Calculate **capital** at each year-end
2. Multiply by the Cost of Capital less the risk-free rate
3. Discount at the **cost of capital** and sum

Solvency II Method

Solvency II:

$$Risk\ Margin = \sum_{t=0}^{n} \frac{SCR_t(CoC - r_f)}{(1 + r_f)^t}$$

Cost of Capital:

$$Risk\ Margin = \sum_{t=0}^{n} \frac{Capital_t(CoC - r_f)}{(1 + CoC)^t}$$

Simple Example – Solvency II Method

n = 1, Capital(0) = $100, Capital(1) = $0, rf = 4%, CoC = 10%

$$Risk\ Margin = \sum_{t=0}^{n} \frac{SCR_t(CoC - r_f)}{(1 + r_f)^t}$$

Simple Example – Solvency II Method

n = 1, Capital(0) = $100, Capital(1) = $0, rf = 4%, CoC = 10%

$$Risk\ Margin = \sum_{t=0}^{n} \frac{SCR_t(CoC - r_f)}{(1 + r_f)^t}$$

$$RM = \frac{(\$100 - RM) \times (10\% - 4\%)}{1.04}$$

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$$RM = \frac{(\$100 - RM) \times (10\% - 4\%)}{1.04}$$

$$RM \times \frac{1.04}{0.06} + RM = \$100$$

Simple Example – Solvency II Method

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$$Risk\ Margin = \sum_{t=0}^{n} \frac{SCR_t(CoC - r_f)}{(1 + r_f)^t}$$

$$RM = \frac{(\$100 - RM) \times (10\% - 4\%)}{1.04}$$

$$RM \times \frac{1.04}{0.06} + RM = \$100$$

$$RM = \$5.45$$

Solvency II Method

Solvency II:

$$Risk\ Margin = \sum_{t=0}^{n} \frac{SCR_t(CoC - r_f)}{(1 + r_f)^t}$$

Cost of Capital:

$$Risk\ Margin = \sum_{t=0}^{n} \frac{Capital_t(CoC - r_f)}{(1 + CoC)^t}$$

Solvency II Method

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- SCR measures risk over a one-year time horizon
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Things you might not know

- No benefit from diversification between “portfolios”
- Pre-claims liabilities

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Timeline

Re-exposure draft in 2012

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Release of IFRS ?????