GUY CARPENTER

How to estimate Risk Margins under IFRS

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Lead Casualty Specialty Actuary

GUY CARPENTER

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

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Overview of IASB's philosophy

Balance sheet at Market Value

Overview of IASB's philosophy

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Balance sheet at Market 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

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

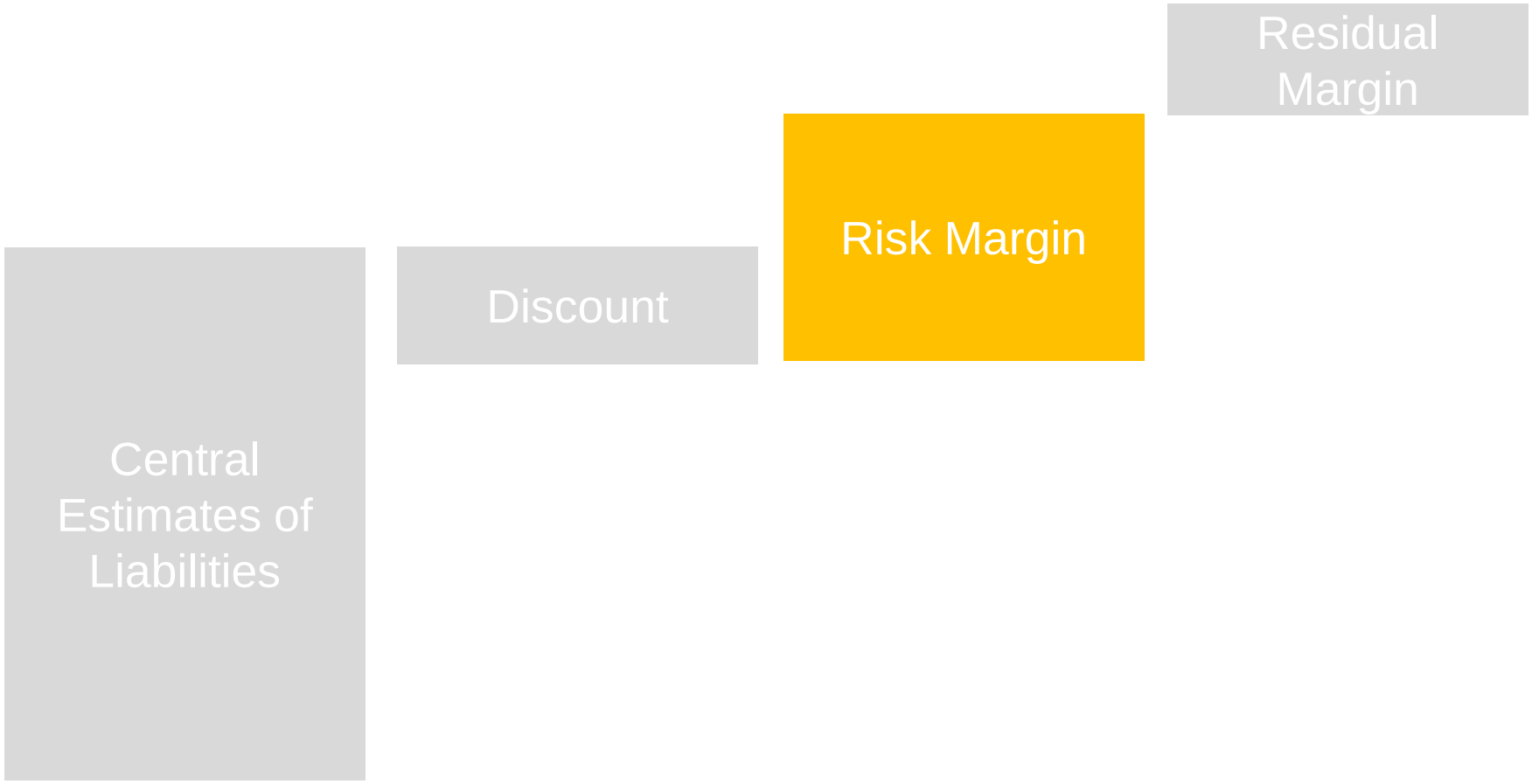
Central Estimates of Liabilities

Discount

Four Components of Current Fulfillment Value

Four Components of Current Fulfillment Value

Four Components of Current Fulfillment Value



GUY CARPENTER

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

Three methods to estimate Risk Margins

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

Three methods to estimate Risk Margins

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

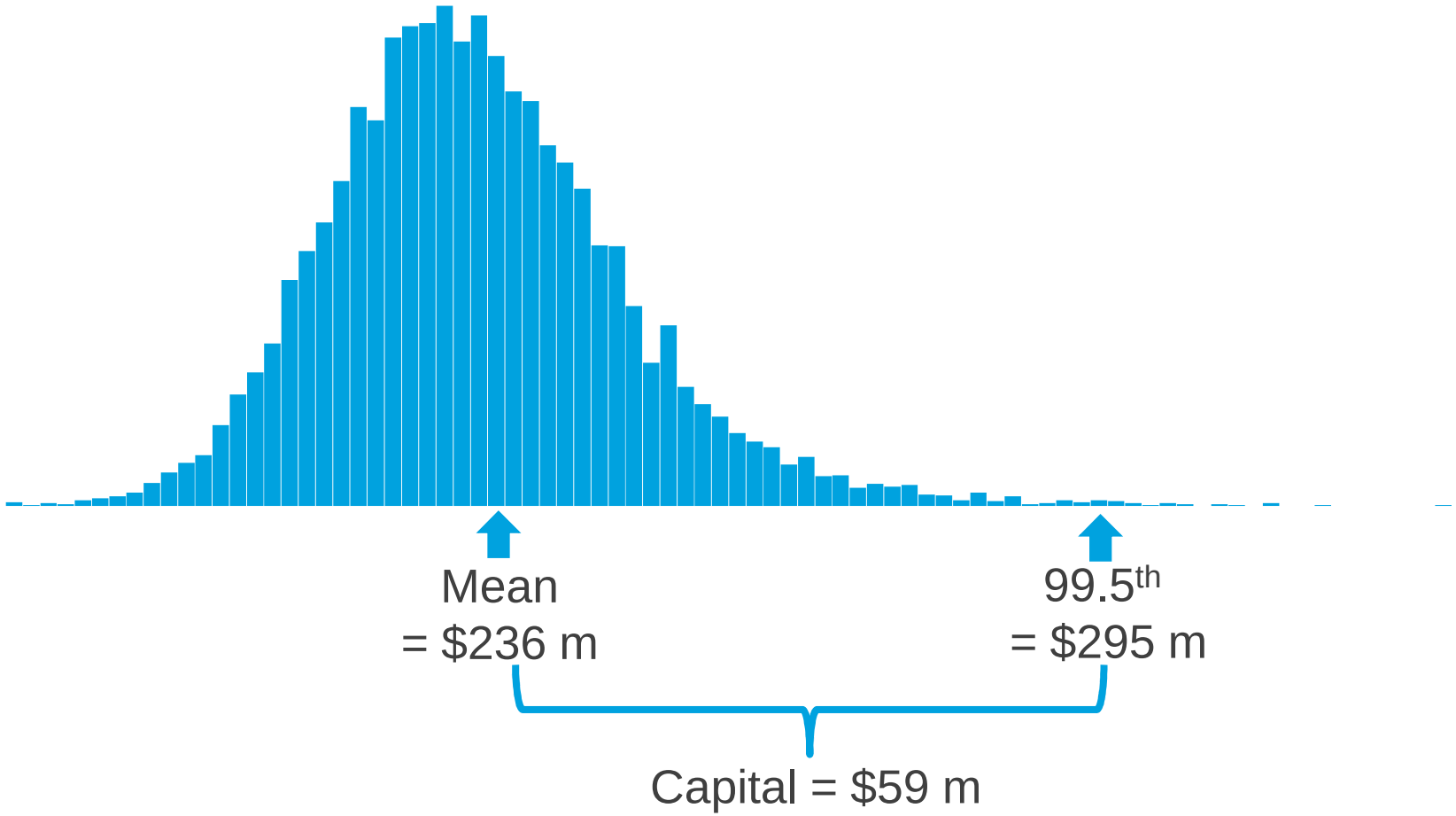
1st offer: $236 million

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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1st offer: $236 m → TOO LOW

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Selling you my General Liability book

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1st offer: $236 m → TOO LOW

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$236 m + ? = Market Value

Selling you my General Liability book

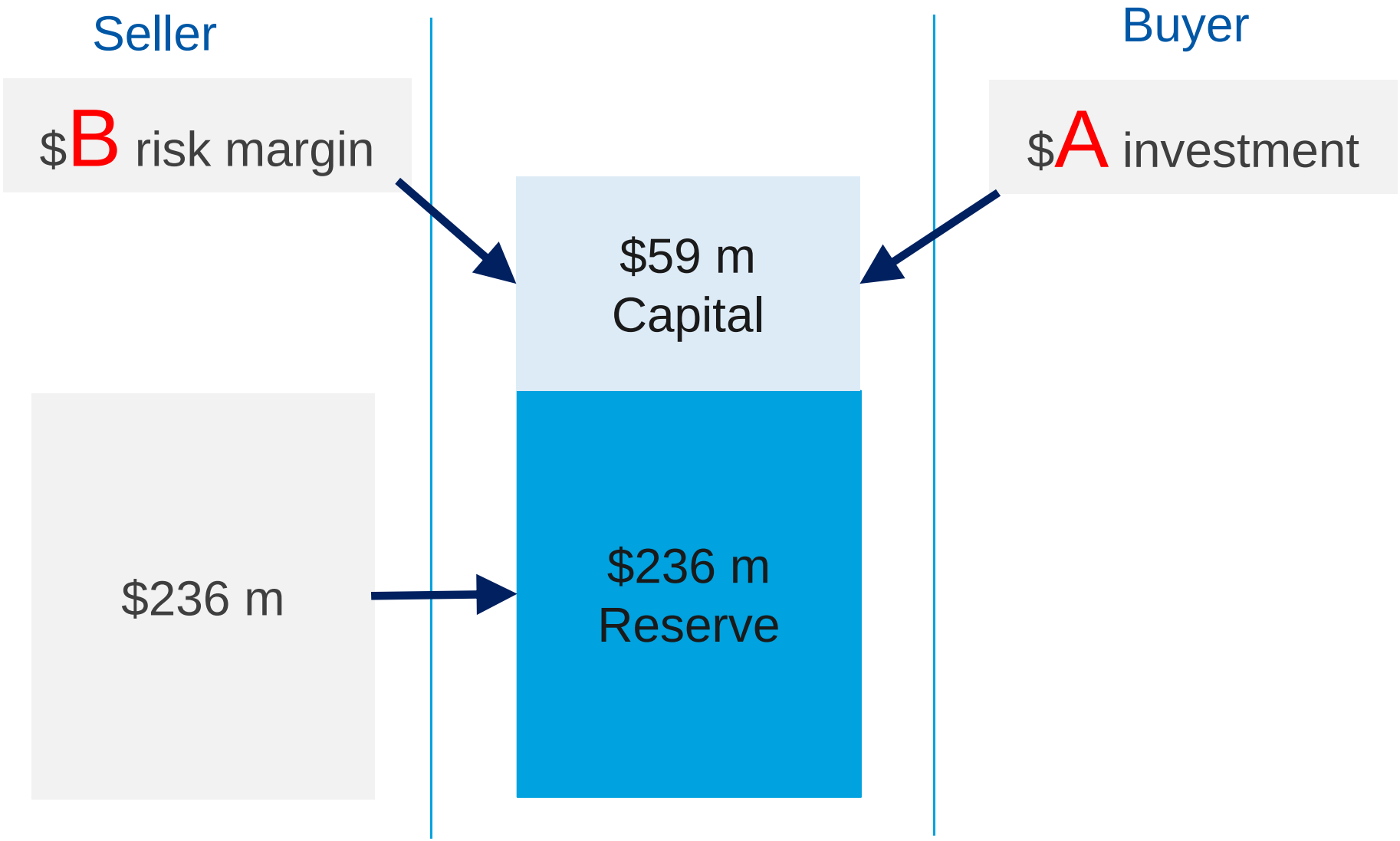
Discounted reserves = $236 million

1st offer: $236 m → TOO LOW

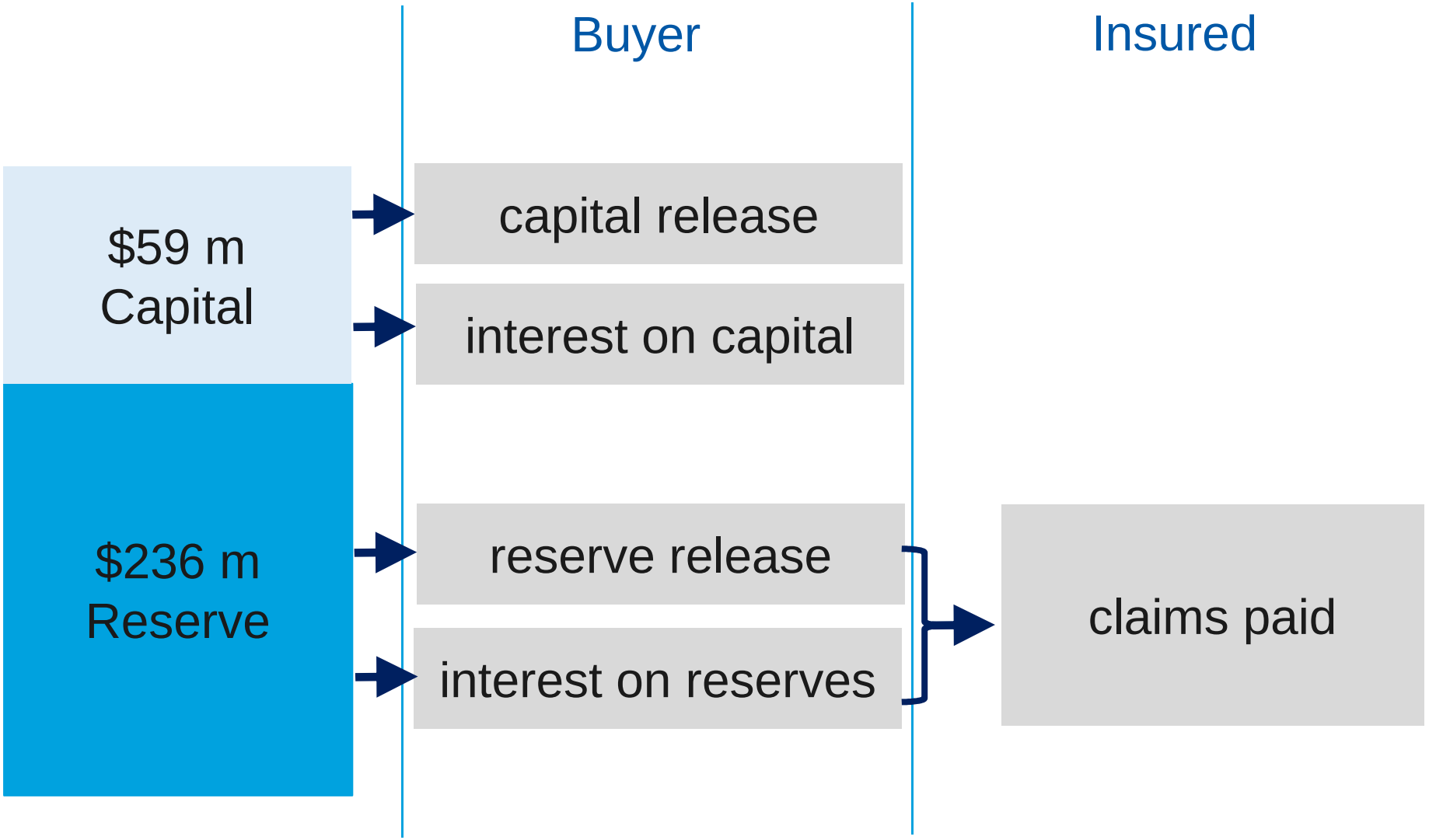
2nd offer: $236 m + $59 m → TOO HIGH

$236 m + Risk Margin = Market Value

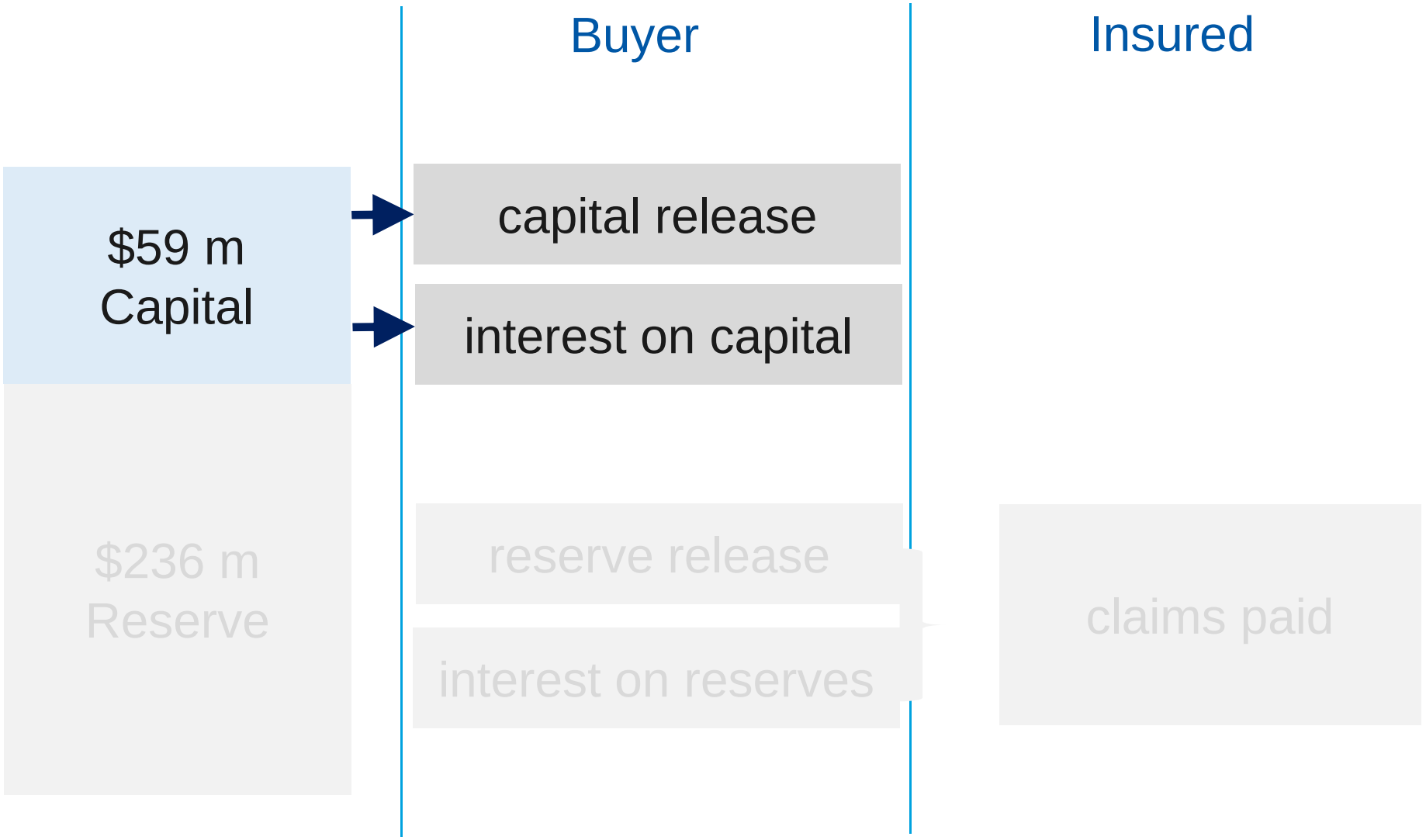
Transaction



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 (1)	Interest on Capital (2)	Net Cash Flow (3) = (1) + (2)
1	=Capital (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	– 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 (1)	Interest on Capital (2)	Net Cash Flow (3) = (1) + (2)
1	$6.7		
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	=Capital (0) * rf	
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	= $59 * 4%	
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	
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 (1)	Interest on Capital (2)	Net Cash Flow (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

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1	$6.7	$2.3	$9.0
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…			….
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Expected Future Net Cash Flow

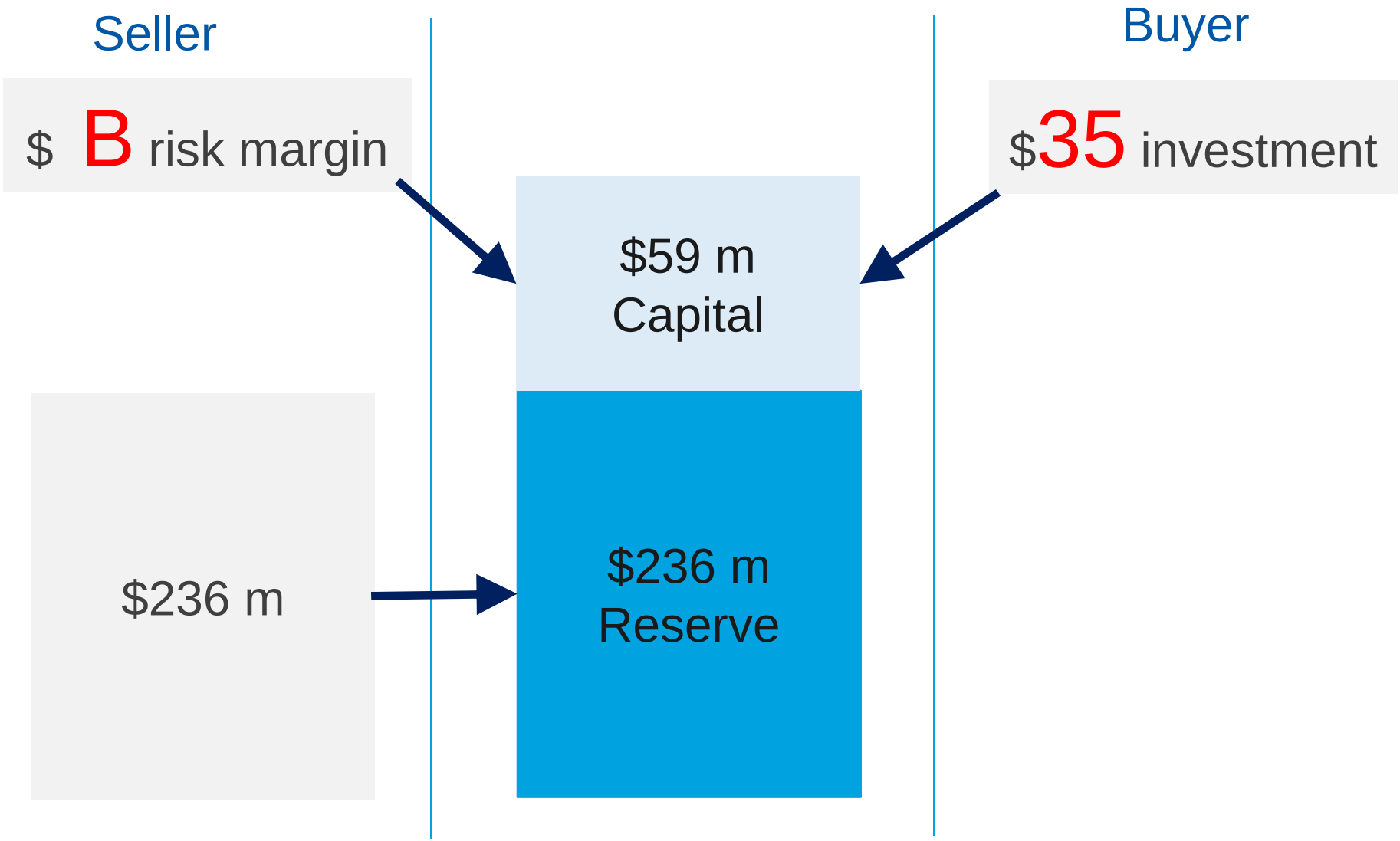
Yr	Capital Release (1)	Interest on Capital (2)	Net Cash Flow (3) = (1) + (2)	Discounted Net Cash Flow (4)
1	$6.7	$2.3	$9.0	=$9.0 * 1.10^-1
2	$5.9	$2.1	$8.0	=$8.0 * 1.10^-2
…			….	
34			$0.3	=$0.3 * 1.10^-34
35			$0.3	=$0.3 * 1.10^-35

Expected Future Net Cash Flow

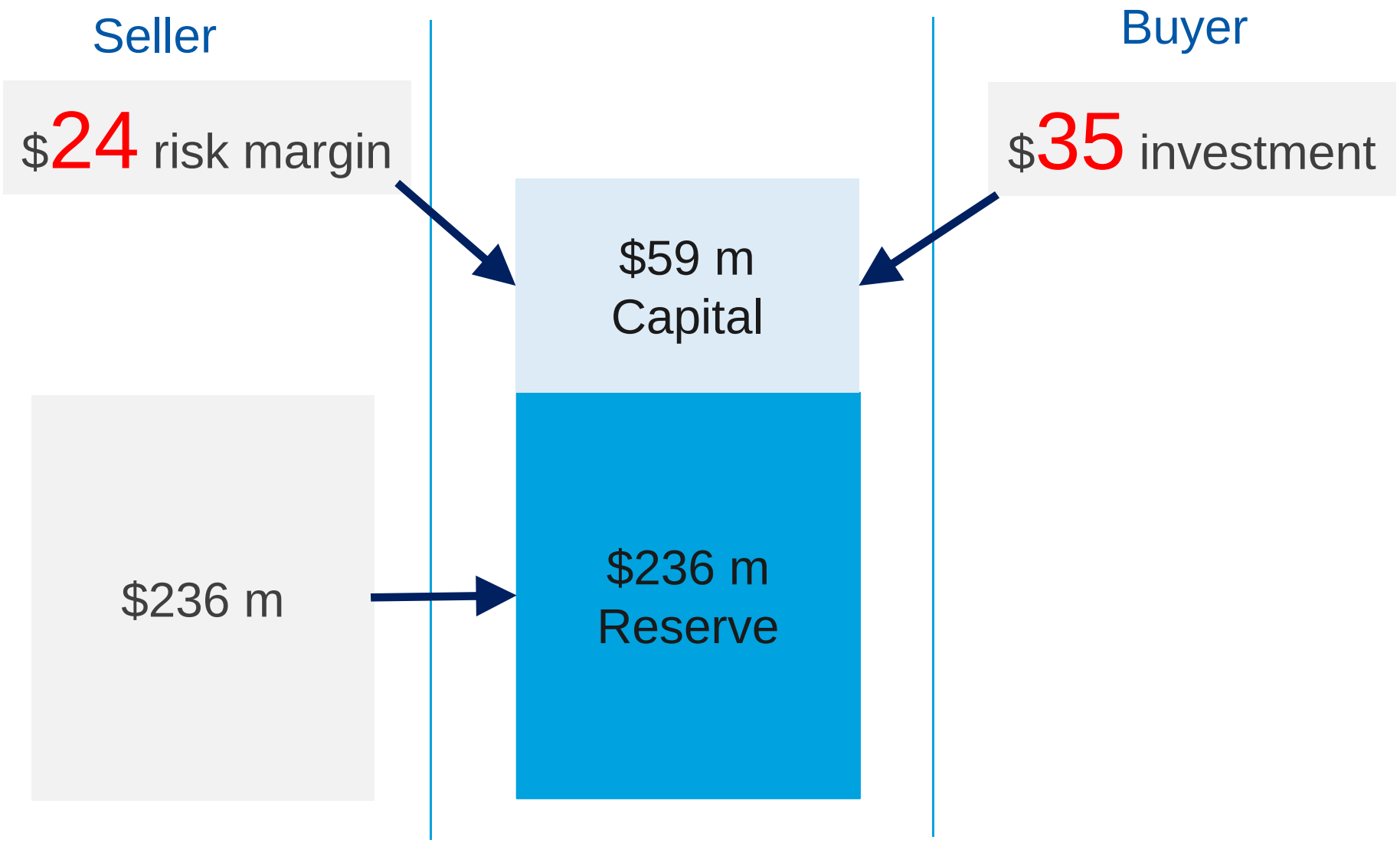
Yr	Capital Release (1)	Interest on Capital (2)	Net Cash Flow (3) = (1) + (2)	Discounted Net Cash Flow (4)
1	$6.7	$2.3	$9.0	=$9.0 * 1.10^-1
2	$5.9	$2.1	$8.0	=$8.0 * 1.10^-2
…			….	
34			$0.3	=$0.3 * 1.10^-34
35			$0.3	=$0.3 * 1.10^-35

= $35.0 m

Transaction



Transaction



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

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 → JUST RIGHT

Equation

$$\underset{\$24}{Risk\ Margin} = \underset{\$59}{Capital_0} - \underset{\$35}{What\ you\ will\ invest}$$

Equation

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

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

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

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

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

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$$Risk\ Margin = \$5.45$$

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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1. Calculate capital required at each year-end
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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:

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

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Simple Example – Another Cost of Capital Method

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Simple Example – Another Cost of Capital Method

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

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

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$$= \$5.45$$

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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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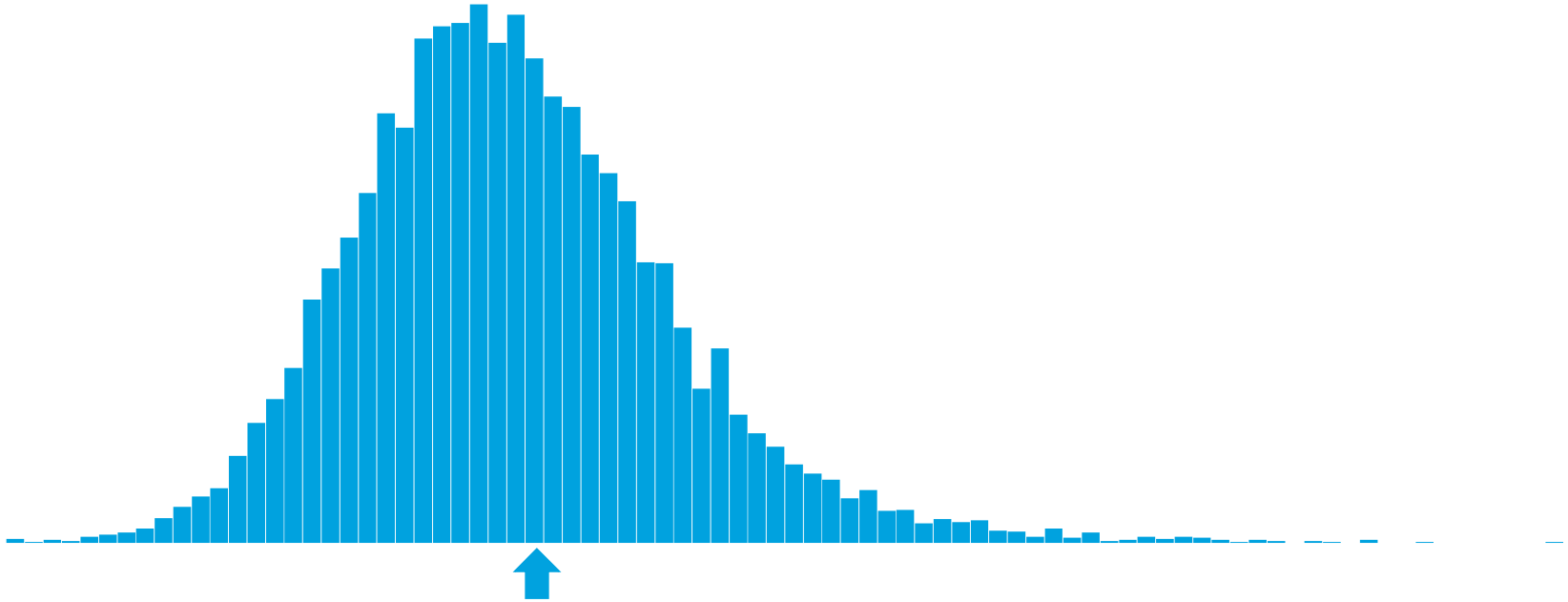
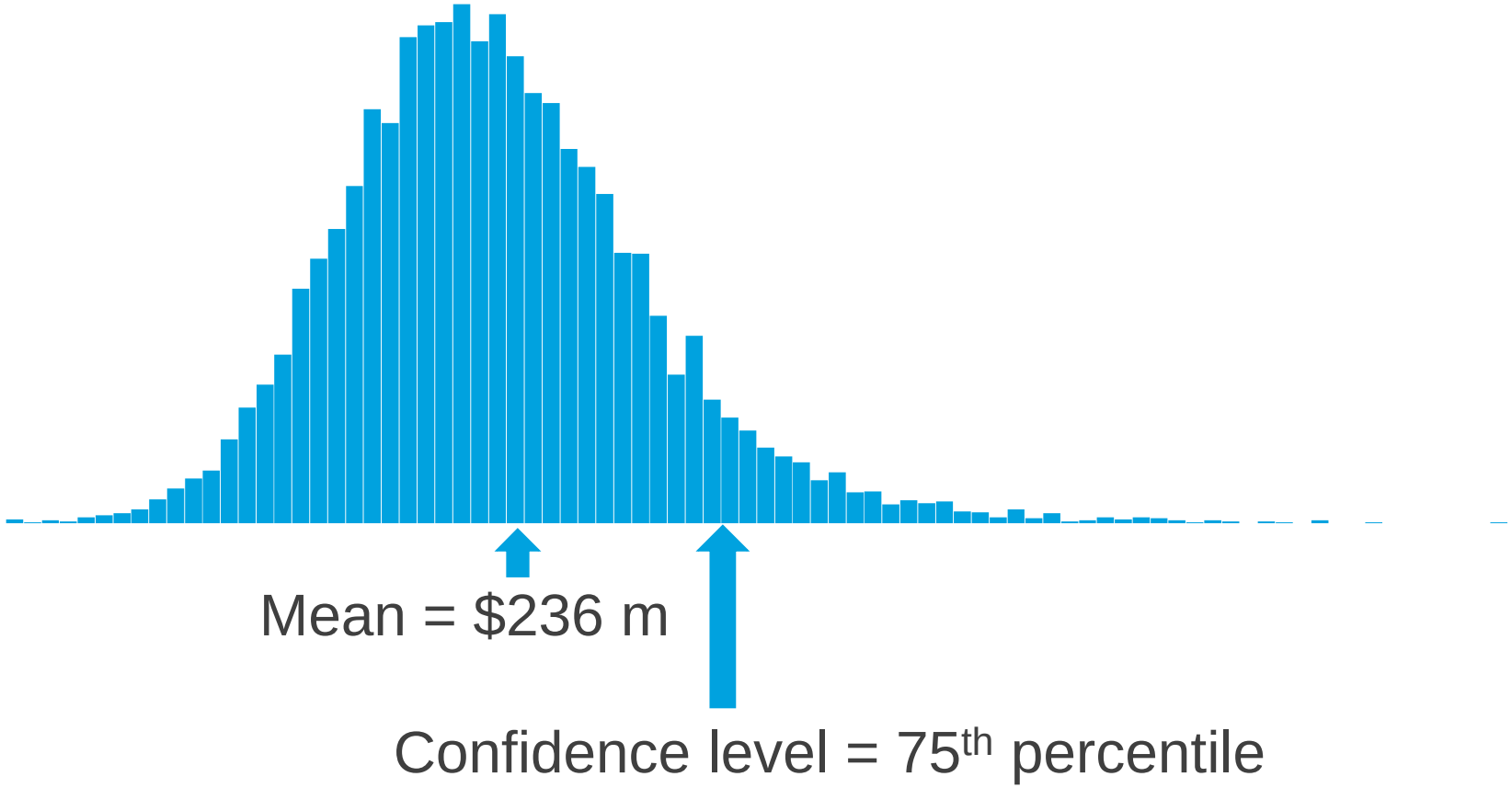
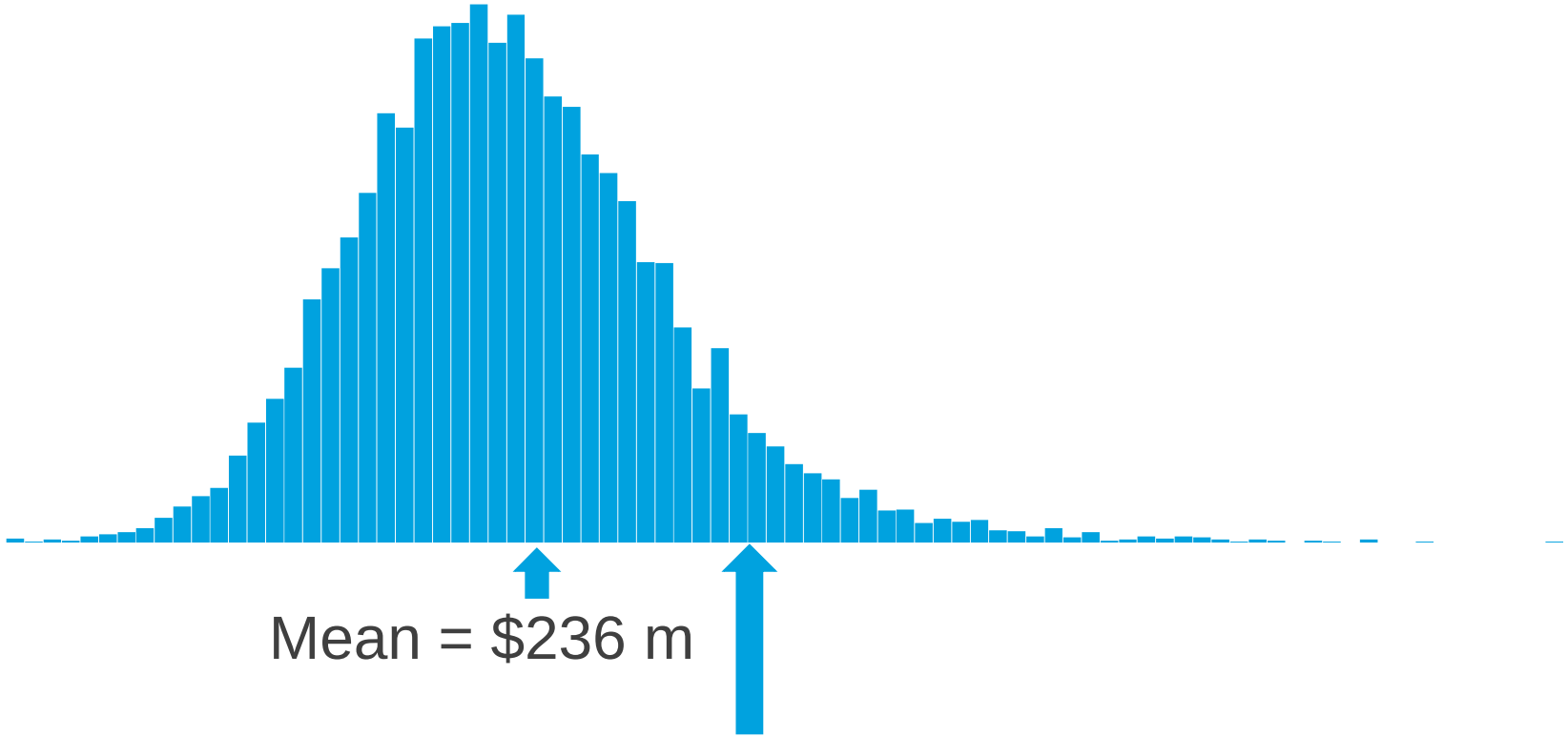
2. Confidence Level



2. Confidence Level



2. Confidence Level



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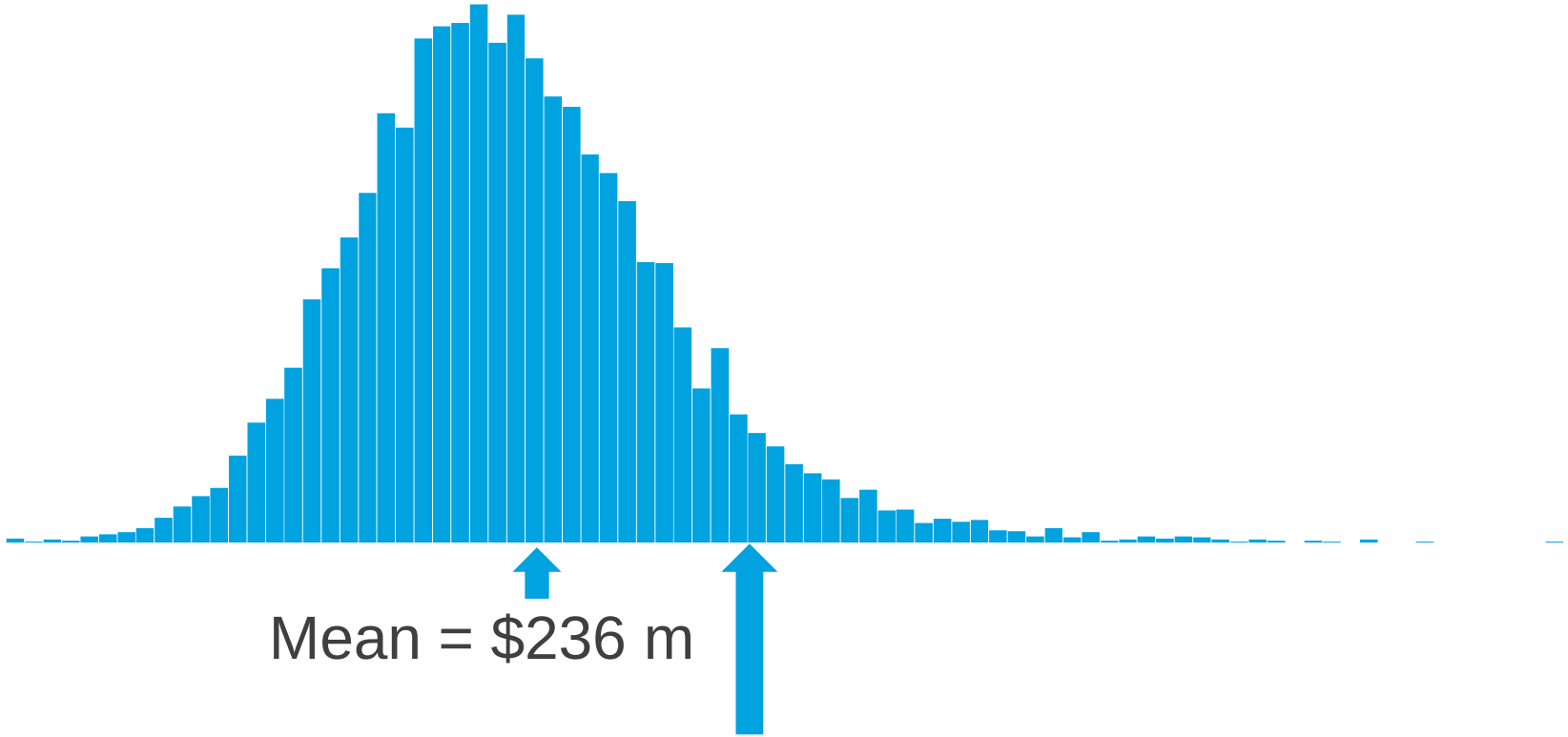

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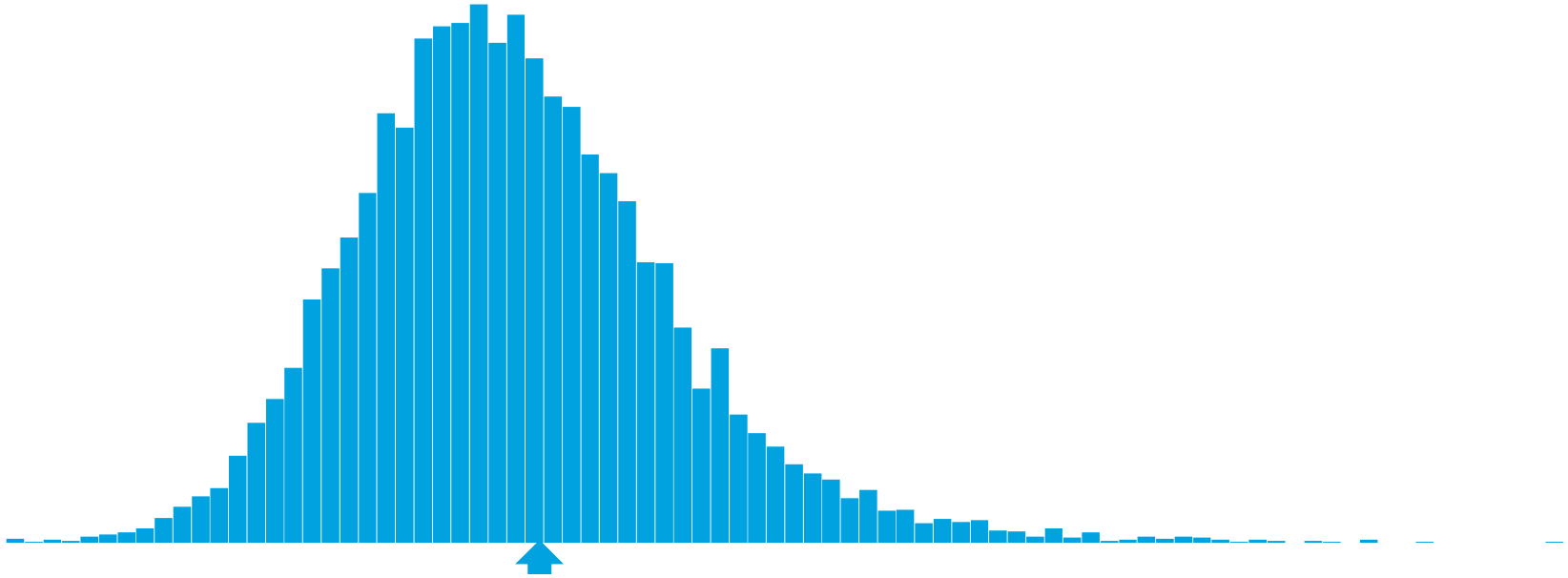
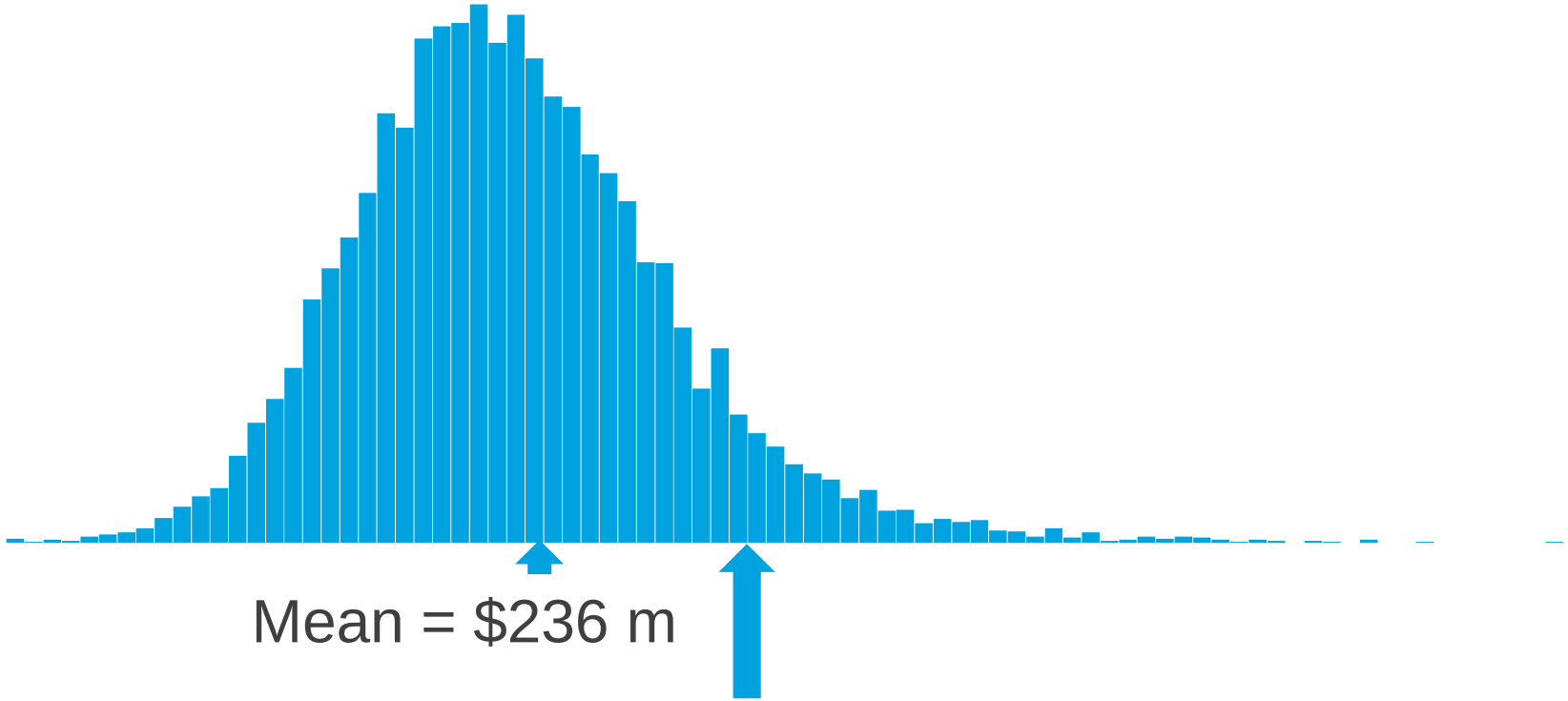


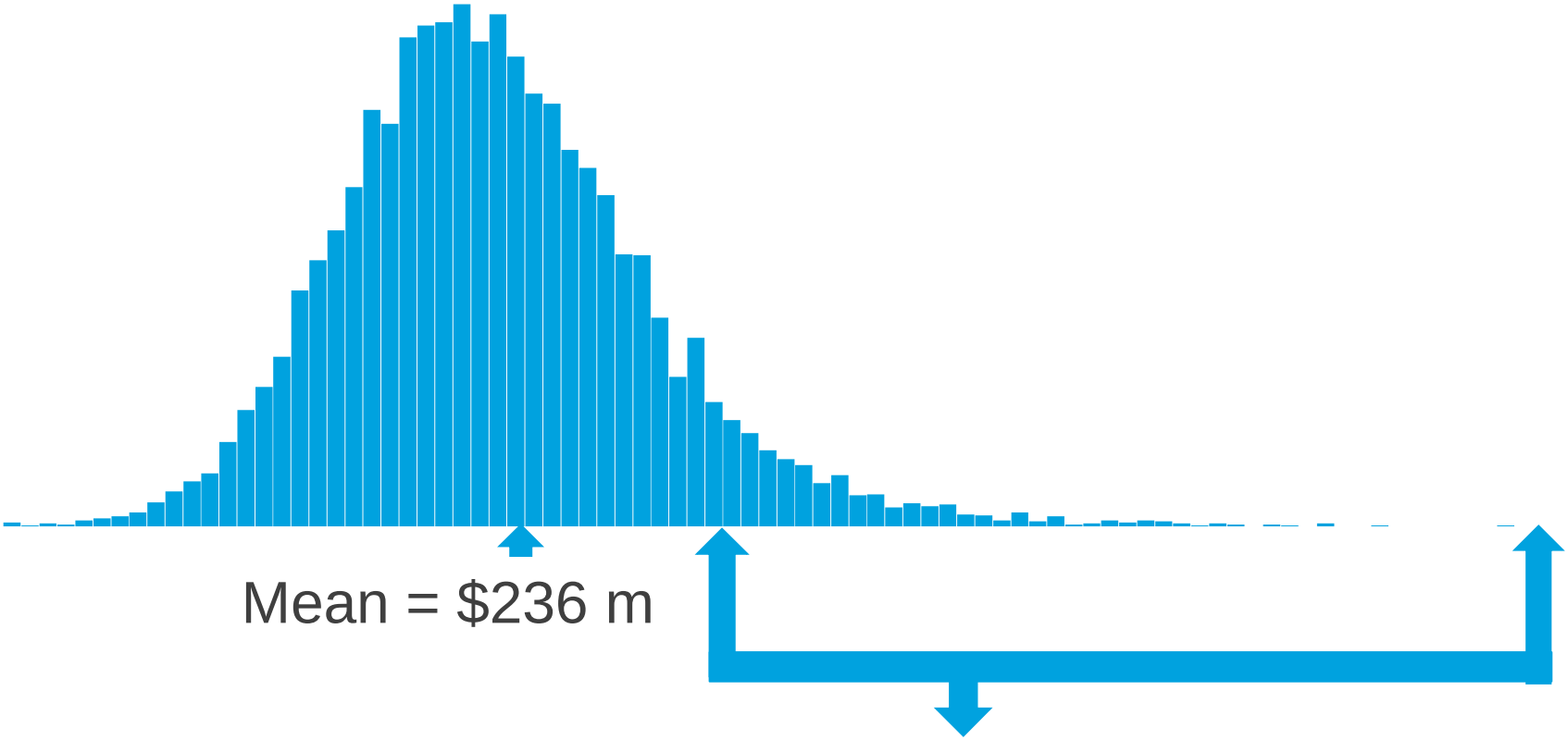
Mean = $236 m

3. Conditional Tail Expectation



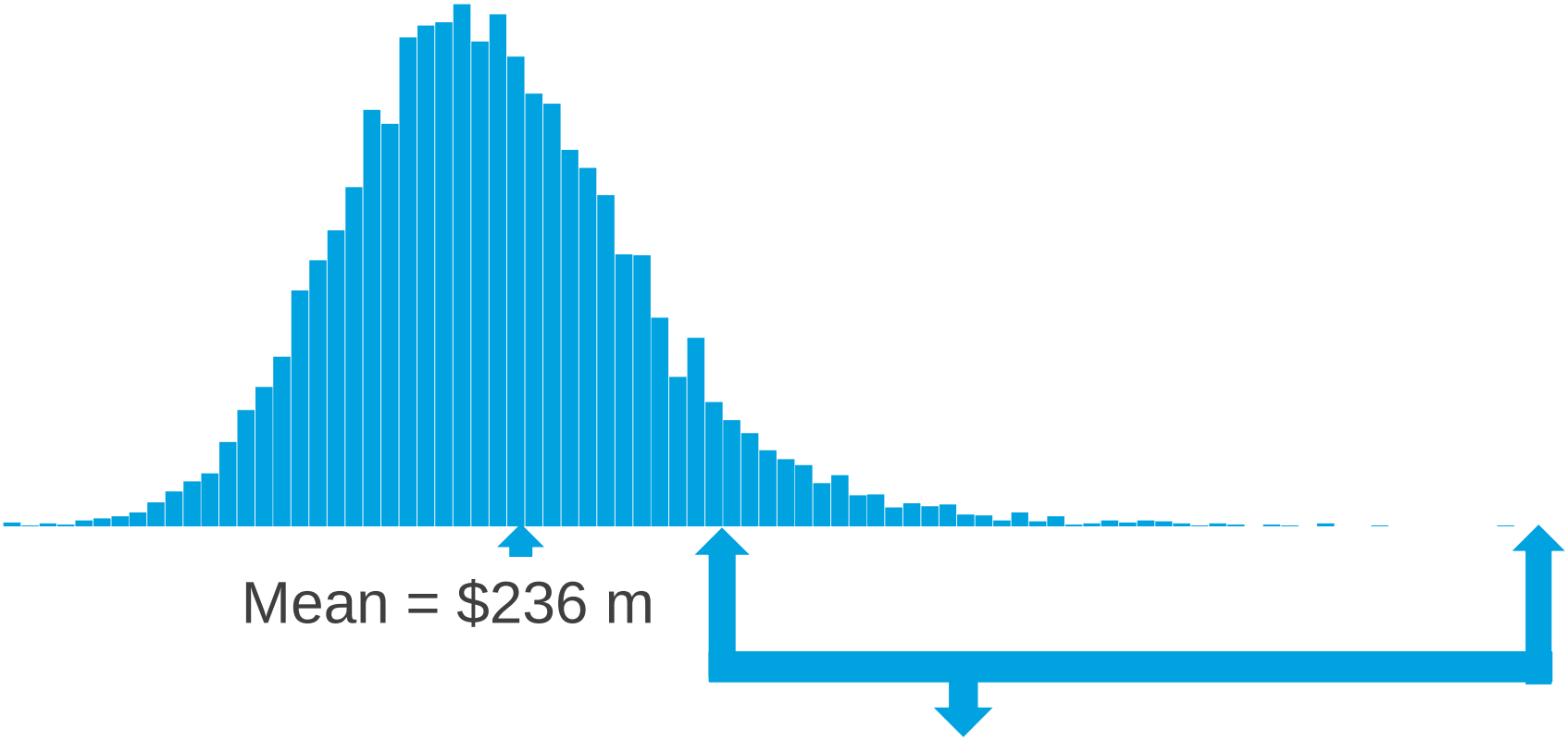
Confidence Level = 75th percentile

3. Conditional Tail Expectation



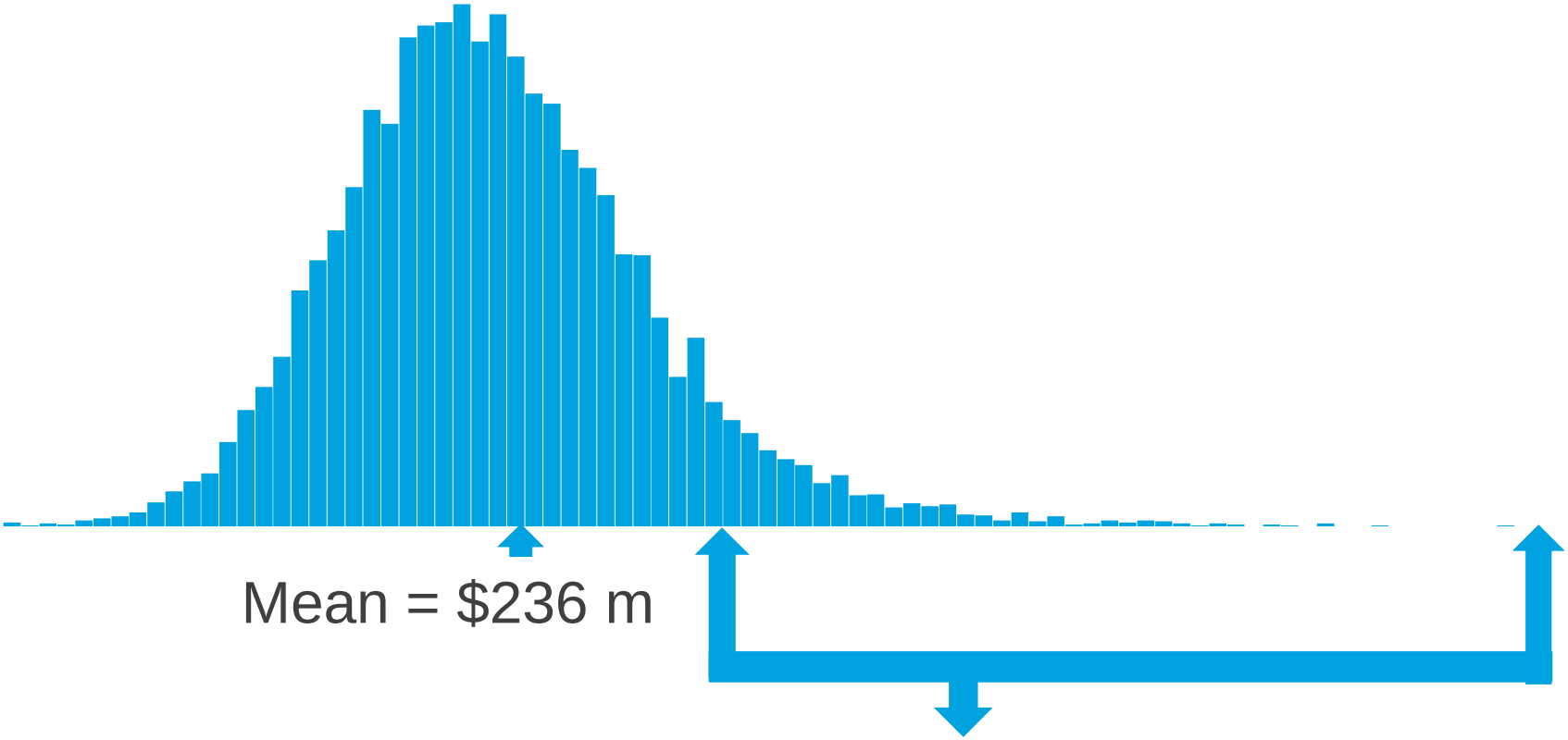
Conditional Tail Expectation = Average above the 75th percentile

3. Conditional Tail Expectation



Conditional Tail Expectation = Average above the 75th percentile
Value = $319 m

3. Conditional Tail Expectation

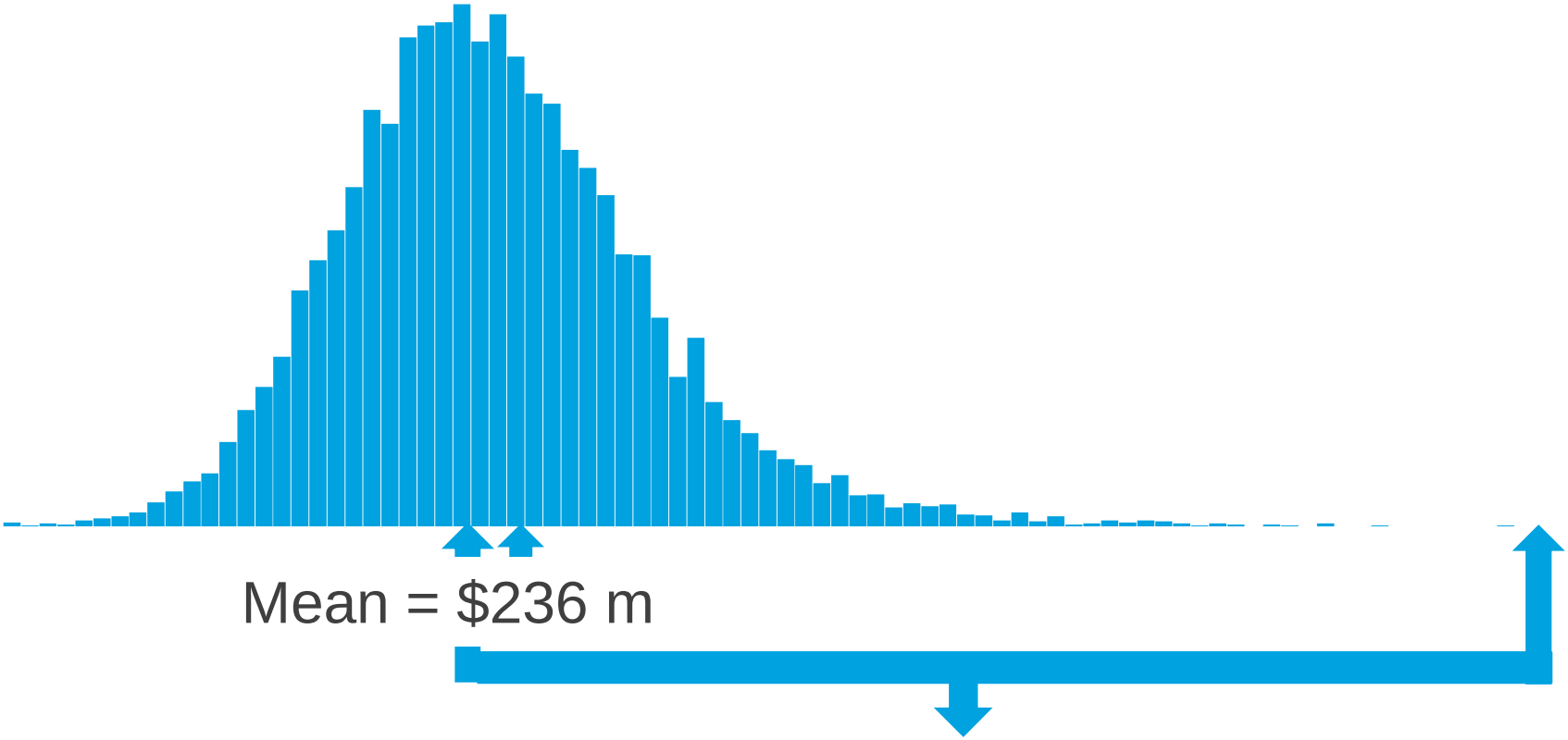


Conditional Tail Expectation = Average above the 75th percentile

Value = $319 m

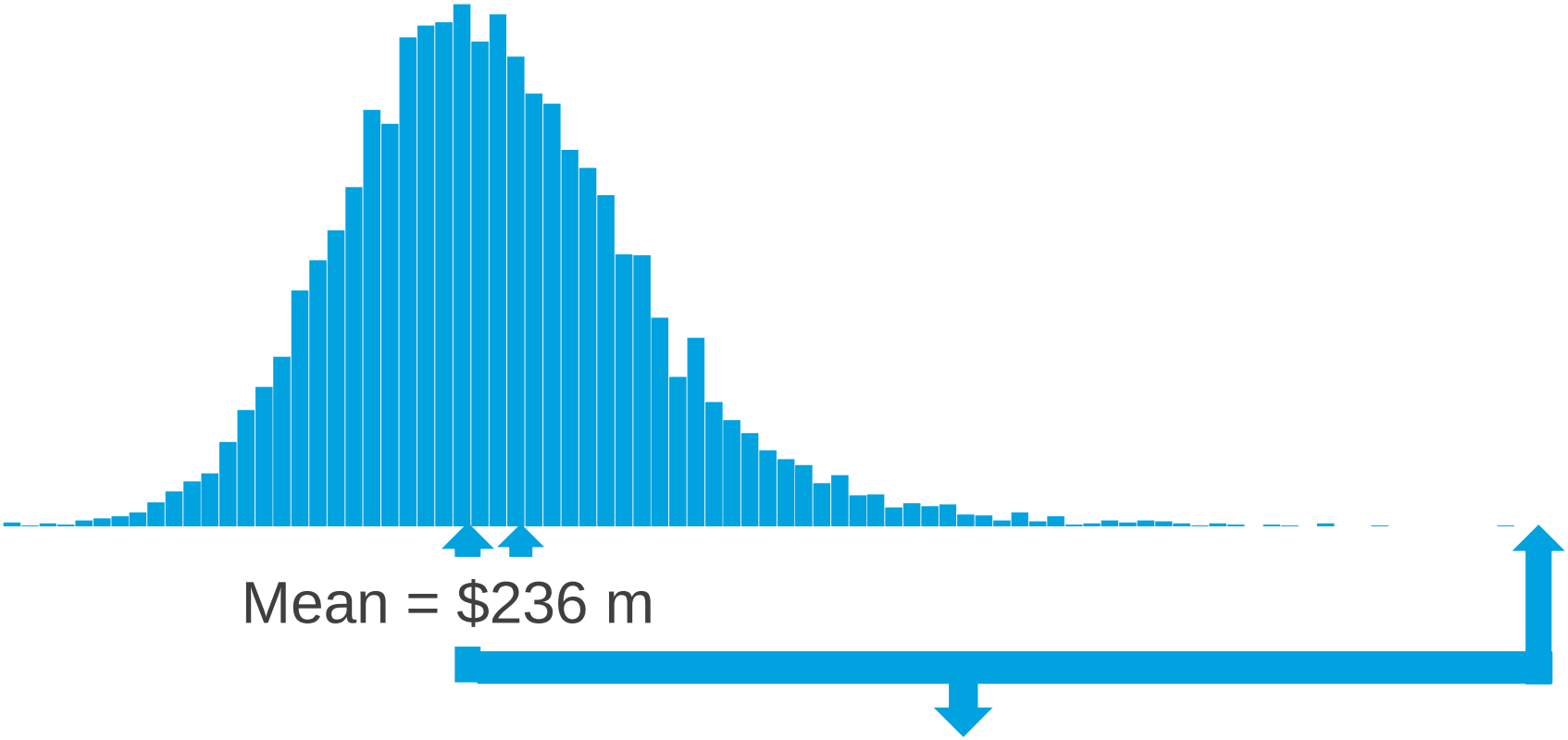
Risk Margin = $83 m

3. Conditional Tail Expectation



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

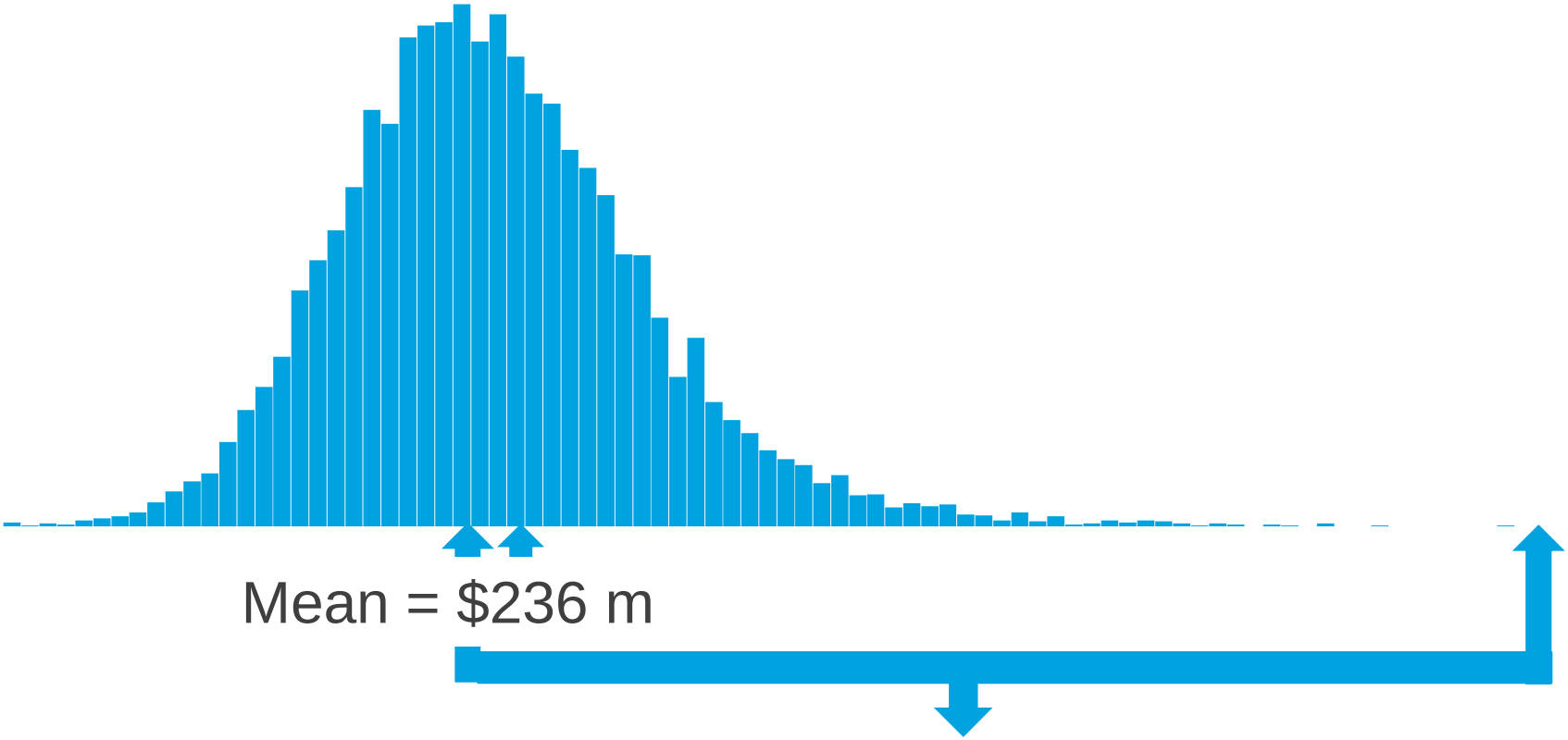
3. Conditional Tail Expectation



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	Market value?				
Cost of Capital	$24	Yes				
Confidence Level	$27	No				
Conditional Tail Expectation	$49	No				

Which method is right for me?

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

Which method is right for me?

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

Which method is right for me?

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

Which method is right for me?

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

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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

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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%

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

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

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$$Risk\ Margin = \frac{(\$100 - Risk\ Margin)(10\% - 4\%)}{1.04}$$

Simple Example – Solvency II Method

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

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

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

$$Risk\ Margin = \frac{(\$100 - Risk\ Margin)(10\% - 4\%)}{1.04}$$

$$Risk\ Margin \times \frac{1.04}{0.06} + Risk\ Margin = \$100$$

Simple Example – Solvency II Method

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

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

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

$$Risk\ Margin = \frac{(\$100 - Risk\ Margin)(10\% - 4\%)}{1.04}$$

$$Risk\ Margin \times \frac{1.04}{0.06} + Risk\ Margin = \$100$$

$$Risk\ Margin = \$5.45$$

Solvency II Method

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Cost of Capital:

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

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- SCR measures risk over a one-year time horizon
- IFRS: ultimate time horizon may be more suitable
  - *fulfillment* value

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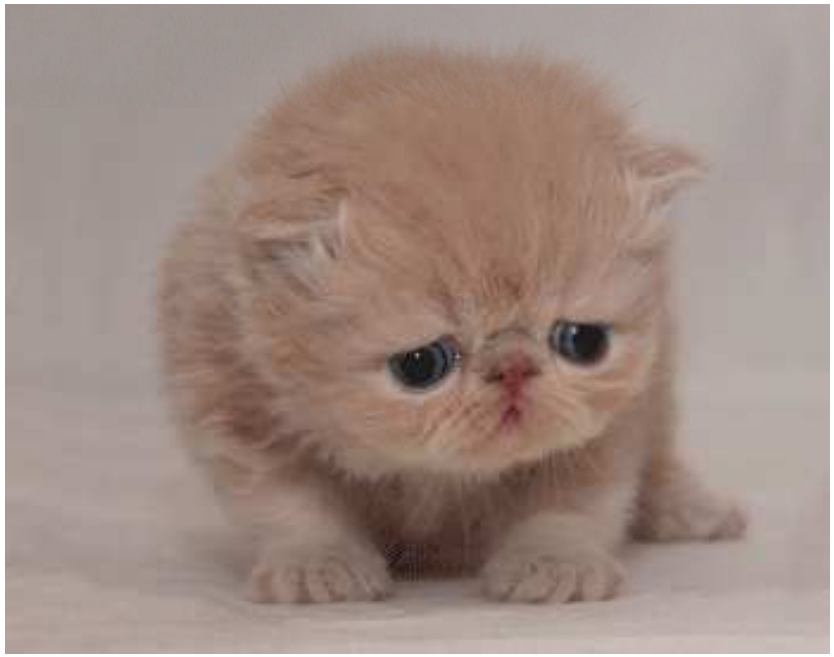
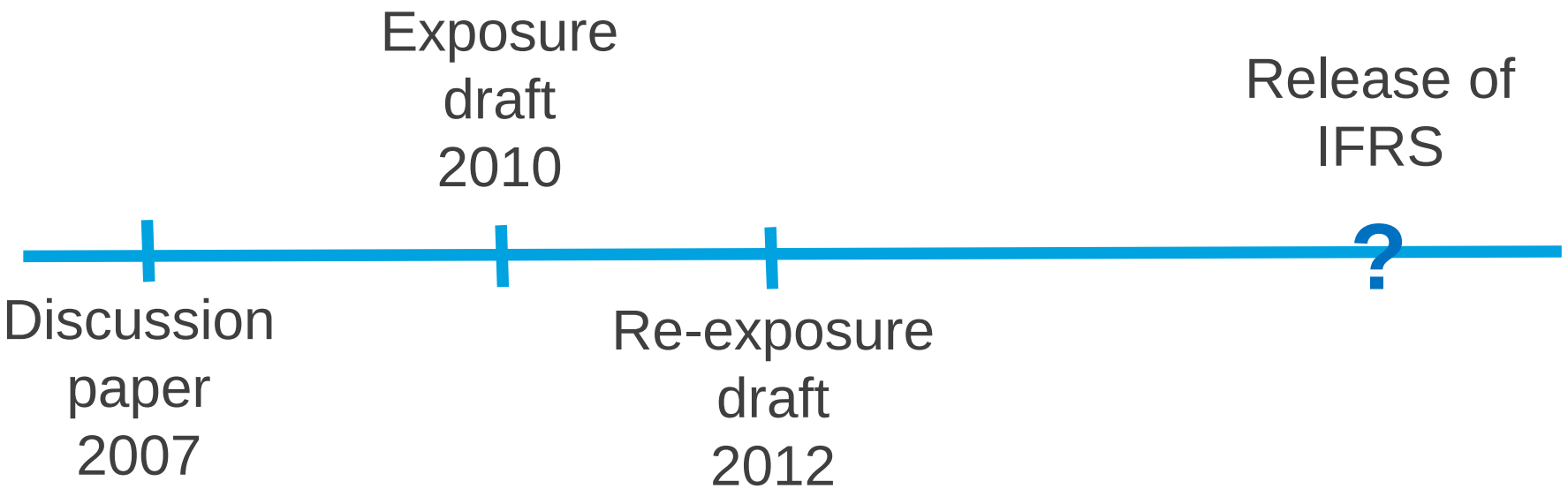


GUY CARPENTER

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

Timeline


Exposure draft 2010
Release of IFRS
?
Discussion paper 2007
Re-exposure draft 2012

Timeline

– “Proposed convergence of FASB and IASB in Fair Value Accounting”

Top Ten Casualty Actuarial Stories in 2003

Re-exposure draft in 2012