



# Risk & Uncertainty (R&U) Benchmarking and Insights

**DAAG Conference**

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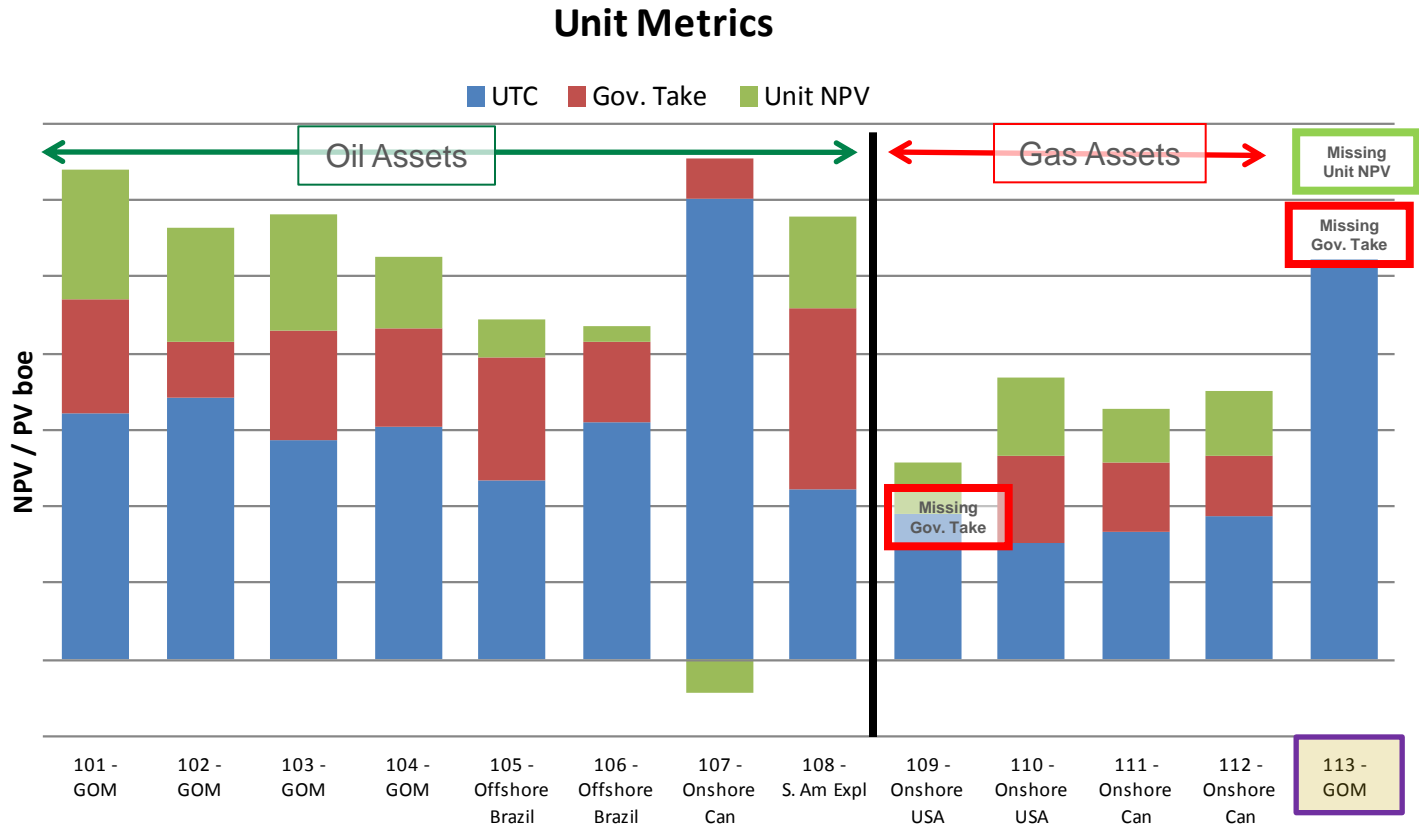
# R&U Benchmarking

## What is R&U Benchmark?

- Risk & Uncertainty Benchmarking is a data repository for an individual Projects R&U data.
- It is limited in the number of Assets and in the metrics tracked
- We track Major Projects and Major Milestones
- The Objective of the Benchmark activity is to perform Risk and Uncertainty for project comparisons

# R&U Benchmarking

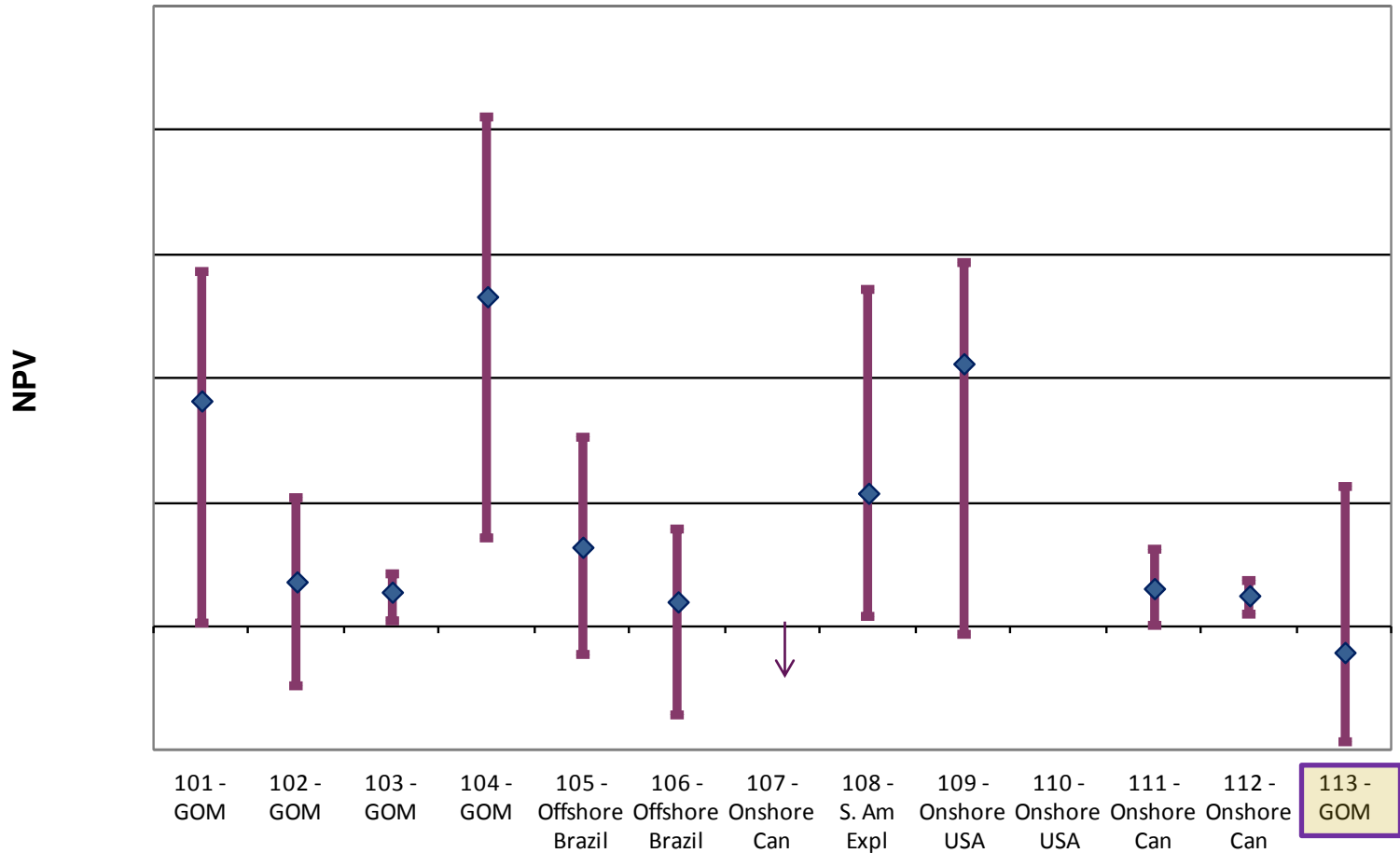
## Unit Metrics



# R&U Benchmarking

## NPV Range

NPV  
P90, Base & P10



# R&U Benchmarking

## NPV Upside / Downside

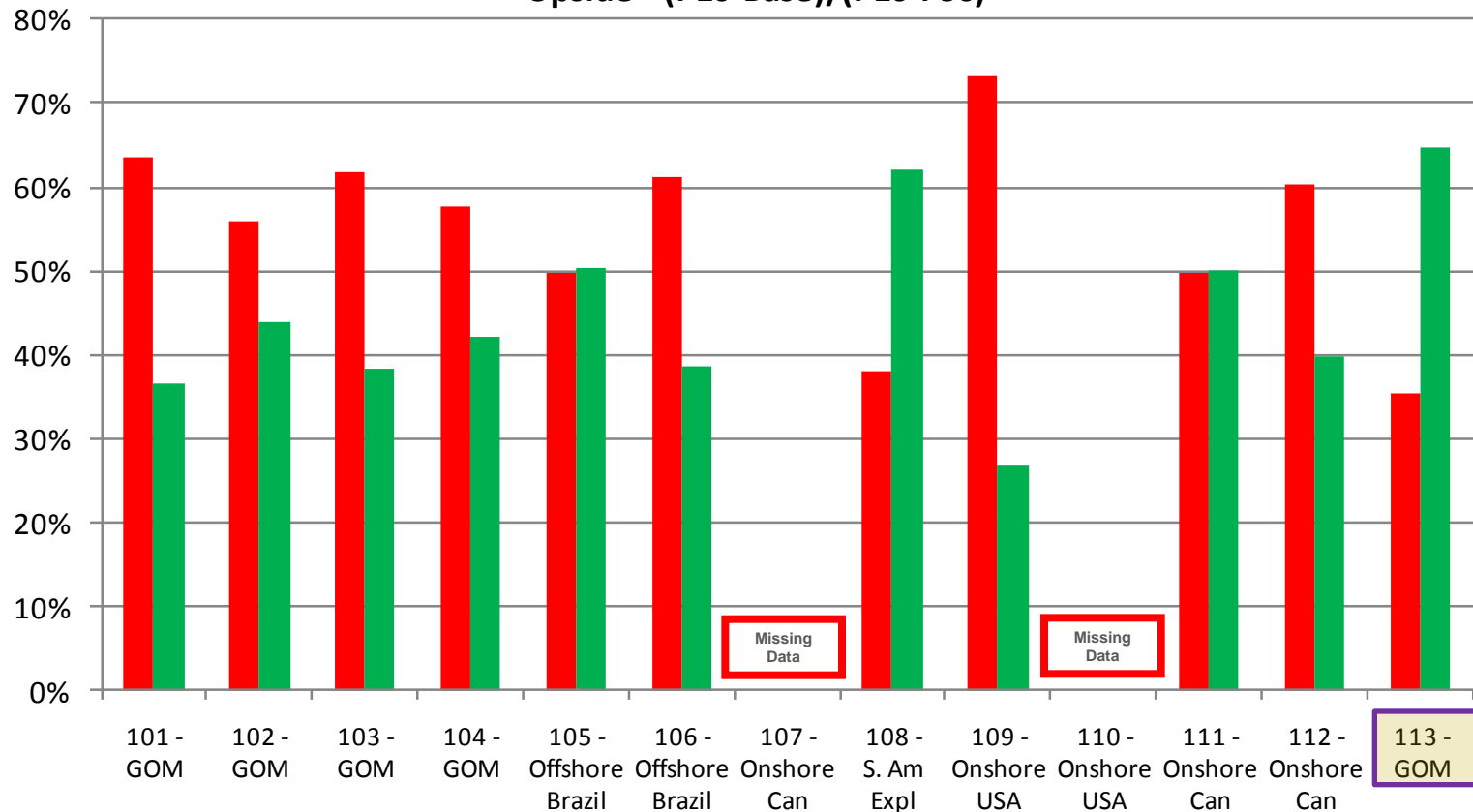
### NPV - Upside/Downside

$$\text{Downside} = (\text{Base} - \text{P90}) / (\text{P10} - \text{P90})$$

$$\text{Upside} = (\text{P10} - \text{Base}) / (\text{P10} - \text{P90})$$

■ Downside

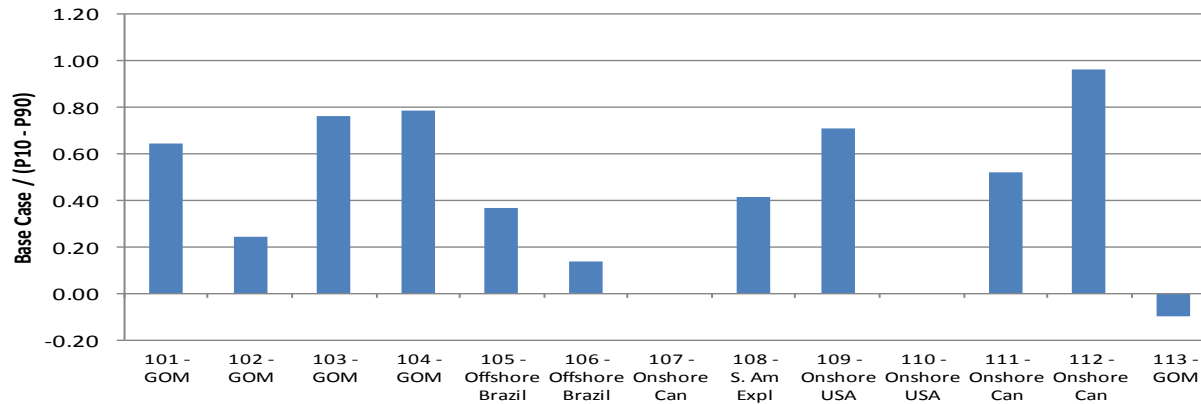
■ Upside



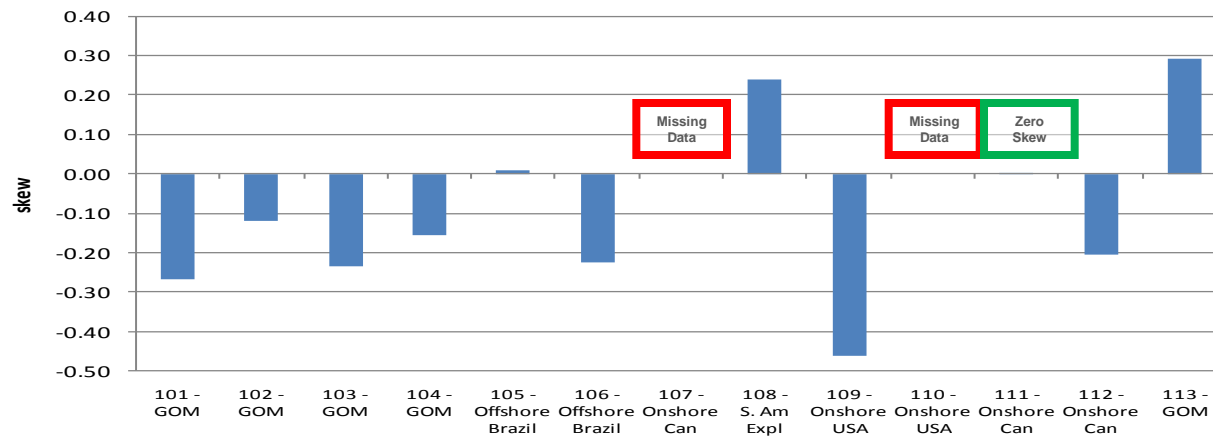
# R&U Benchmarking

## Dispersion and Skew

**NPV Uncertainty**  
Base / (P10 - P90)



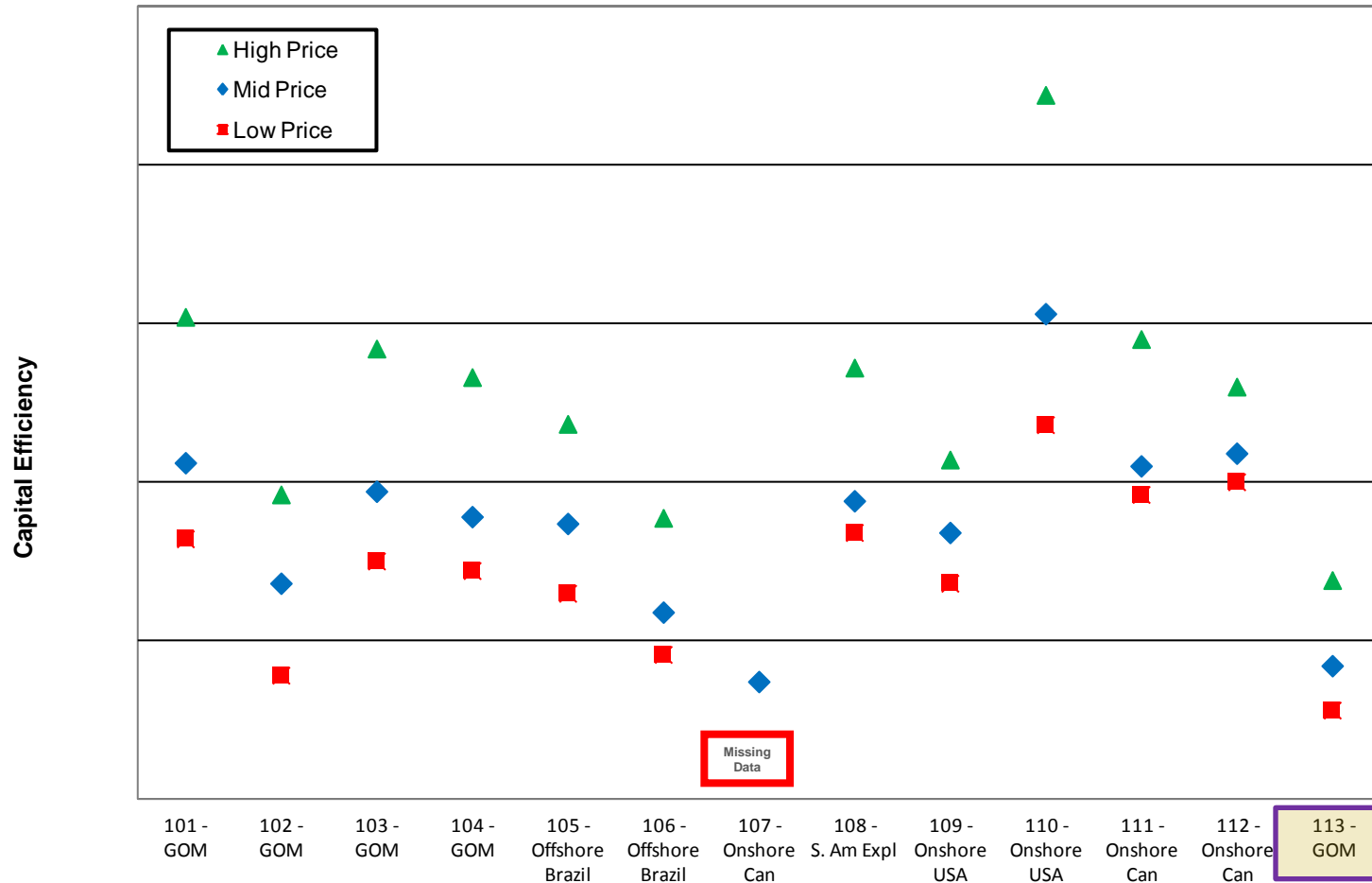
**Skew of NPV**  
(P10 - 2\*Base+P90)/(P10-P90)



# R&U Benchmarking

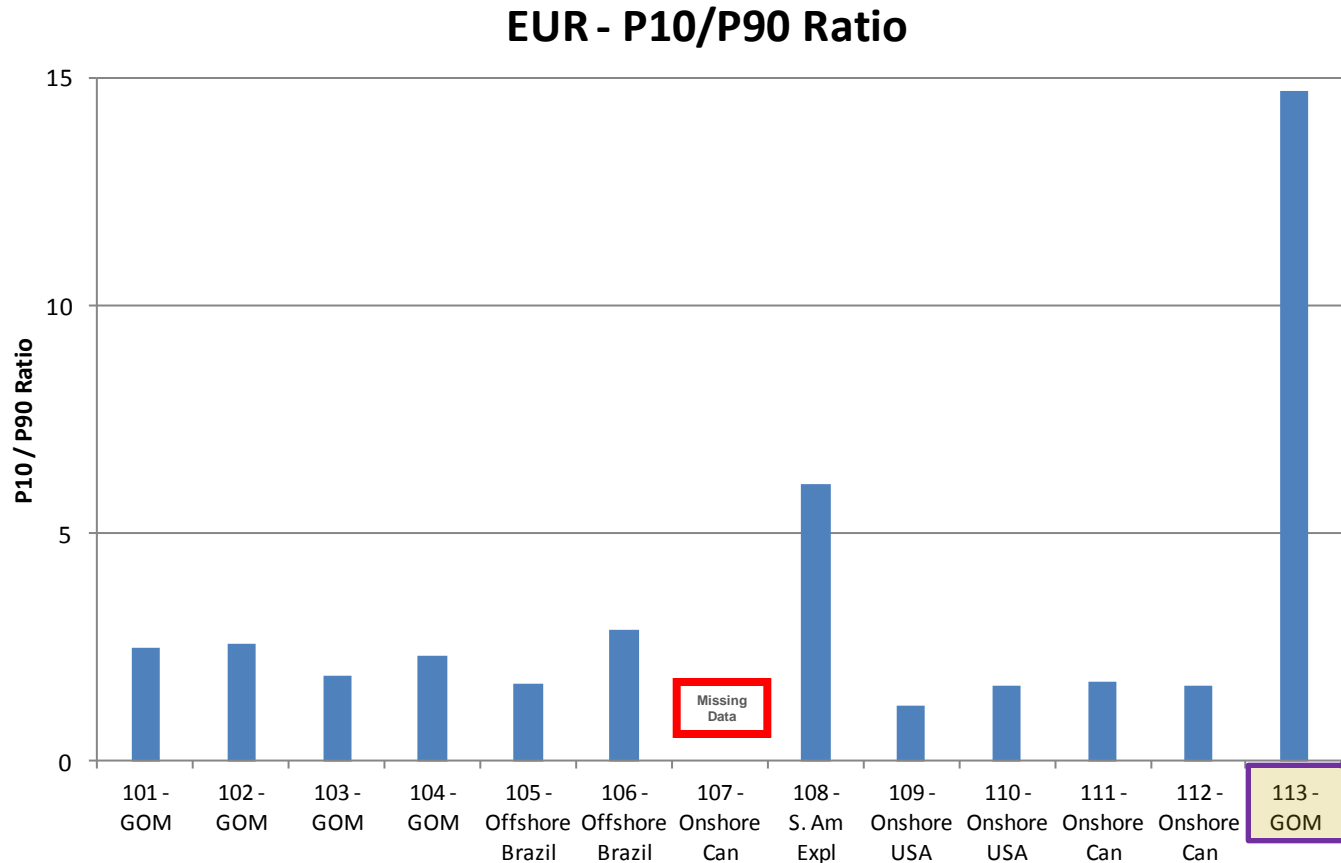
## Effect of Price on Capital Efficiency

Benchmark Data  
Capital Efficiency - Price Sensitivity



# R&U Benchmarking

EUR Range – P10 Volume divided by the P90 Volume



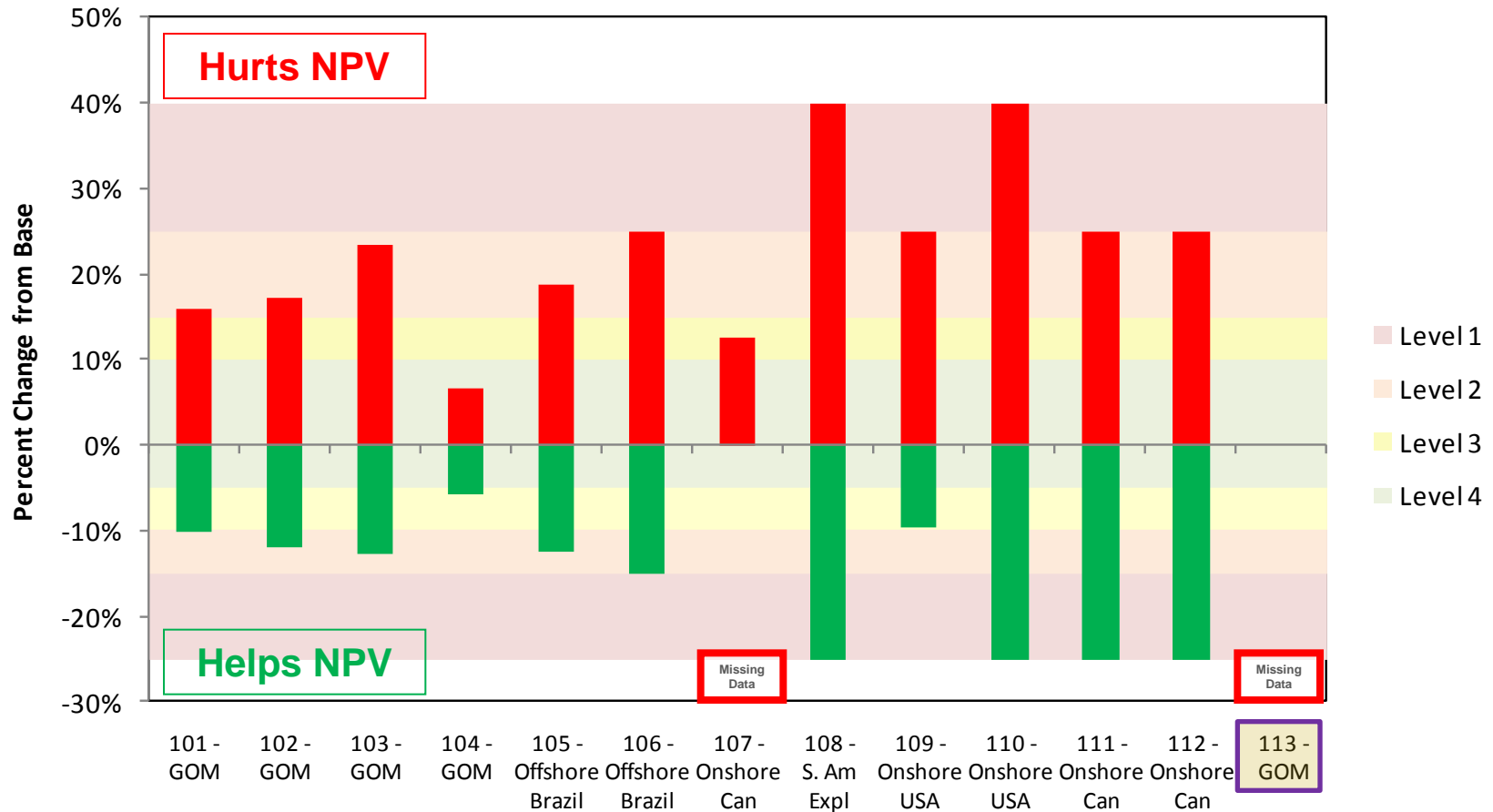
Rose & Associates' classification of P10/P90 Ratios



# R&U Benchmarking

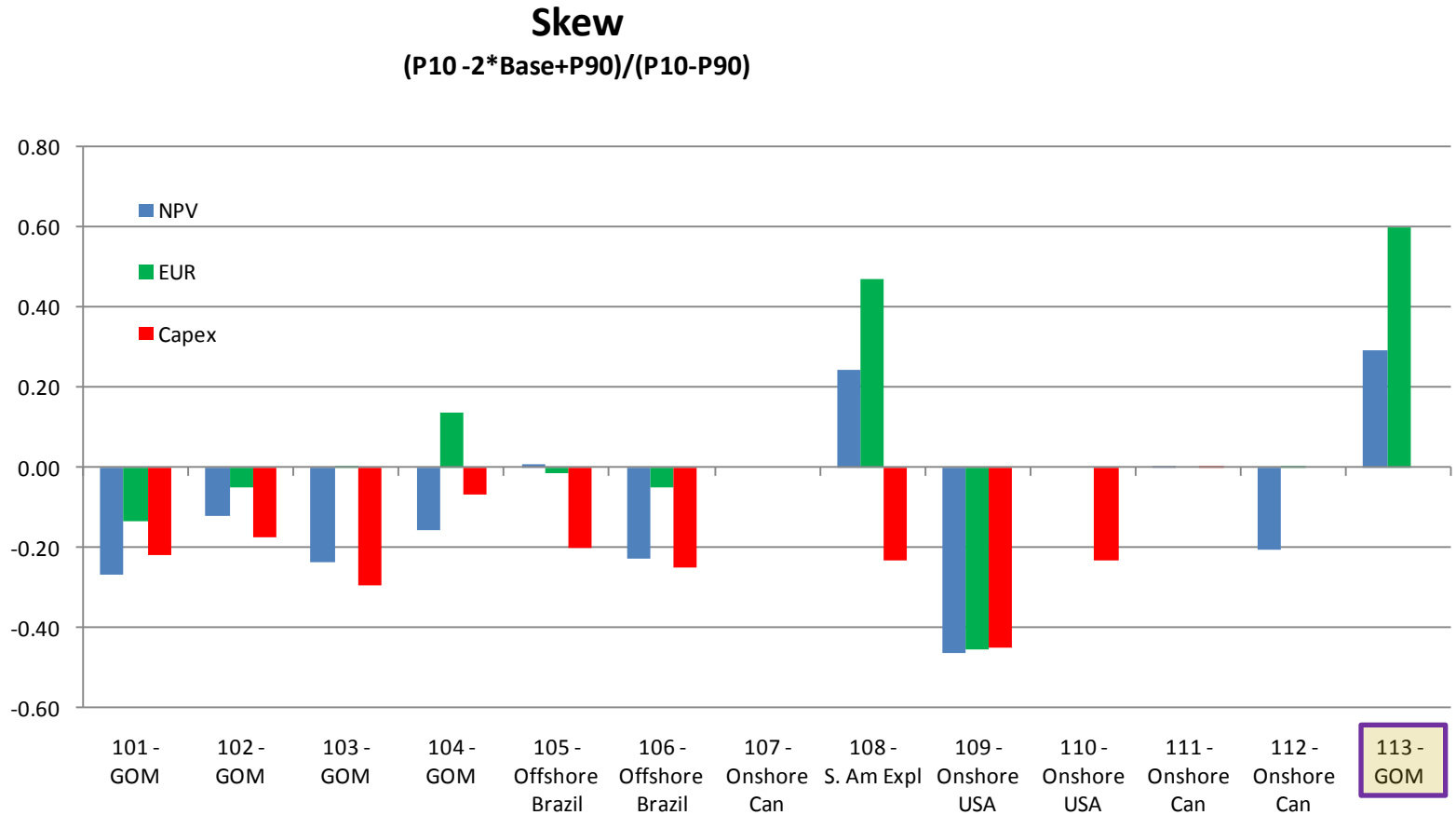
## Capital Range Classification

### Capital Range Comparison with Levels 1-4



# R&U Benchmarking

## Skew Comparison



**Note:** The majority of the above development projects have EUR's that are negatively skewed. This is contrary to our preconceived notion that volume distributions are lognormal

# R&U Benchmarking

## Summary & Key Points

1. We have assembled a set of charts that allows insightful comparison of an asset against benchmark assets.
2. We need more benchmark assets
  - We should be careful about drawing broad conclusions with so few data points
3. The Skew or Upside/Downside is an important metric
  - Negative Skews can lead to NPV and VIR value erosion
  - The benchmark development projects have EUR ranges that are negatively skewed.
  - Capital should always negatively skewed
4. Displayed asset data against standards where available:
  - Costing levels

