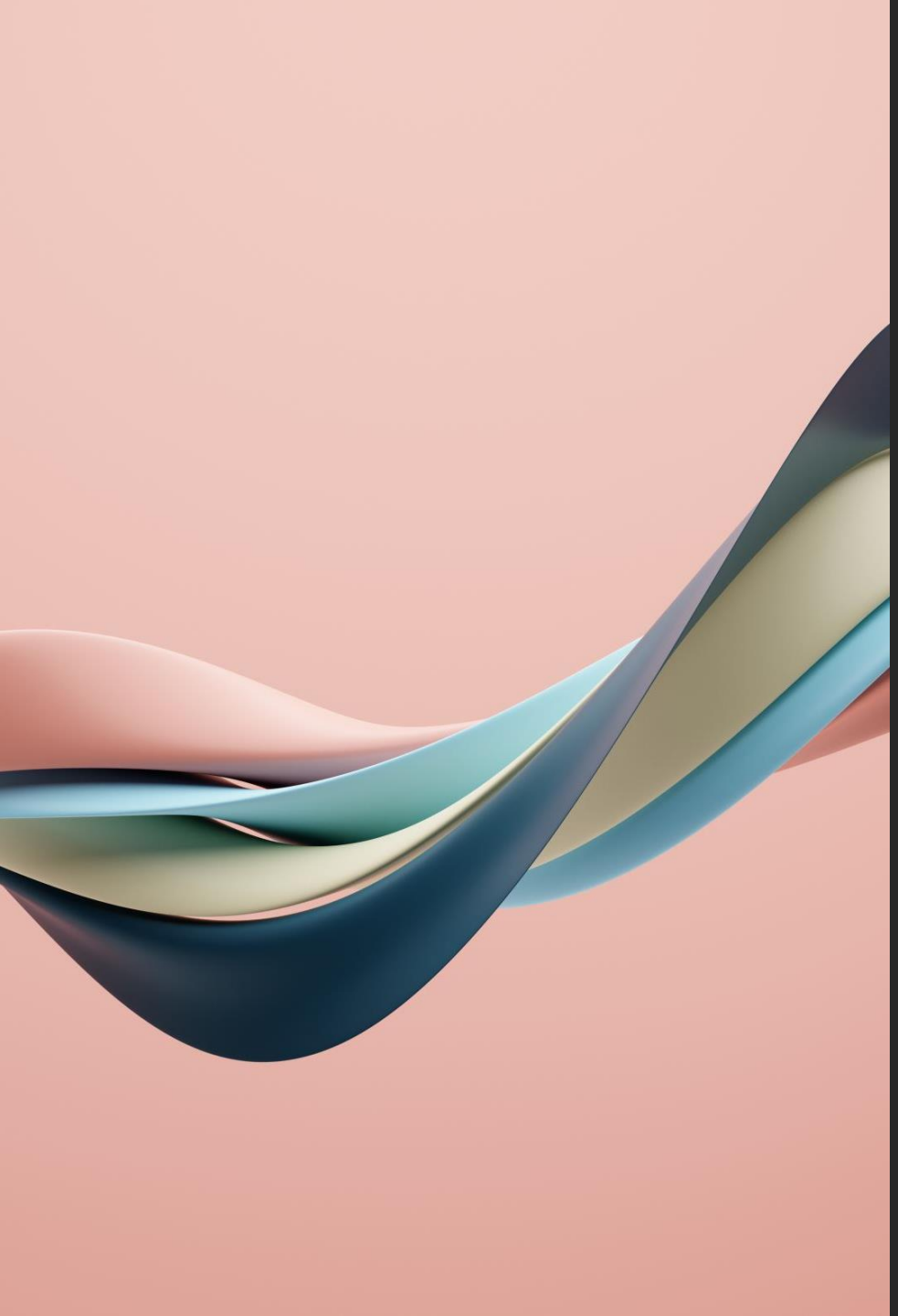


Island Energy “chancified”!

(Inspired from CEE 227 – Global Project Finance)

Presented by Hemanth Hariharan

Project Overview

- Undersea power transmission cable project (750 MW, HVDC)
- Current status: Completed initial design work and environmental review, negotiated PPAs

Traditional case - deterministic

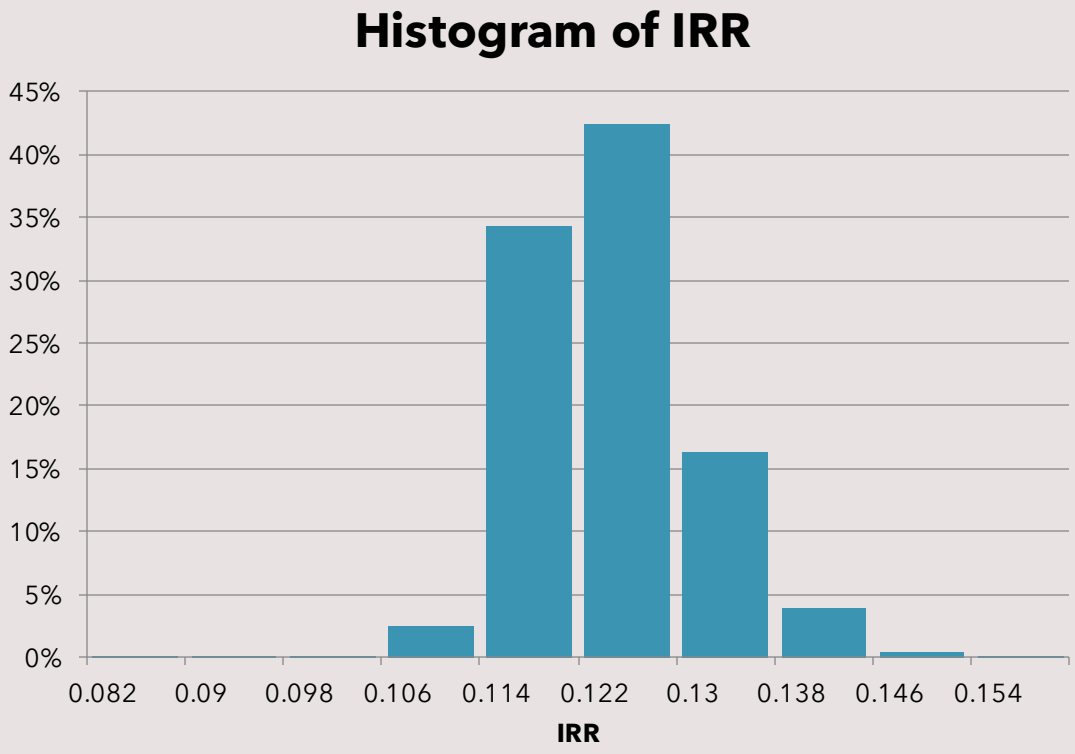
- All variables assumed to be deterministic.
- Demand assumed to grow at a fixed rate per year. (30%)
- No non-linearities in model (cap on capacity or decision)
- IRR and ROE calculated are highly optimistic (not realistic)

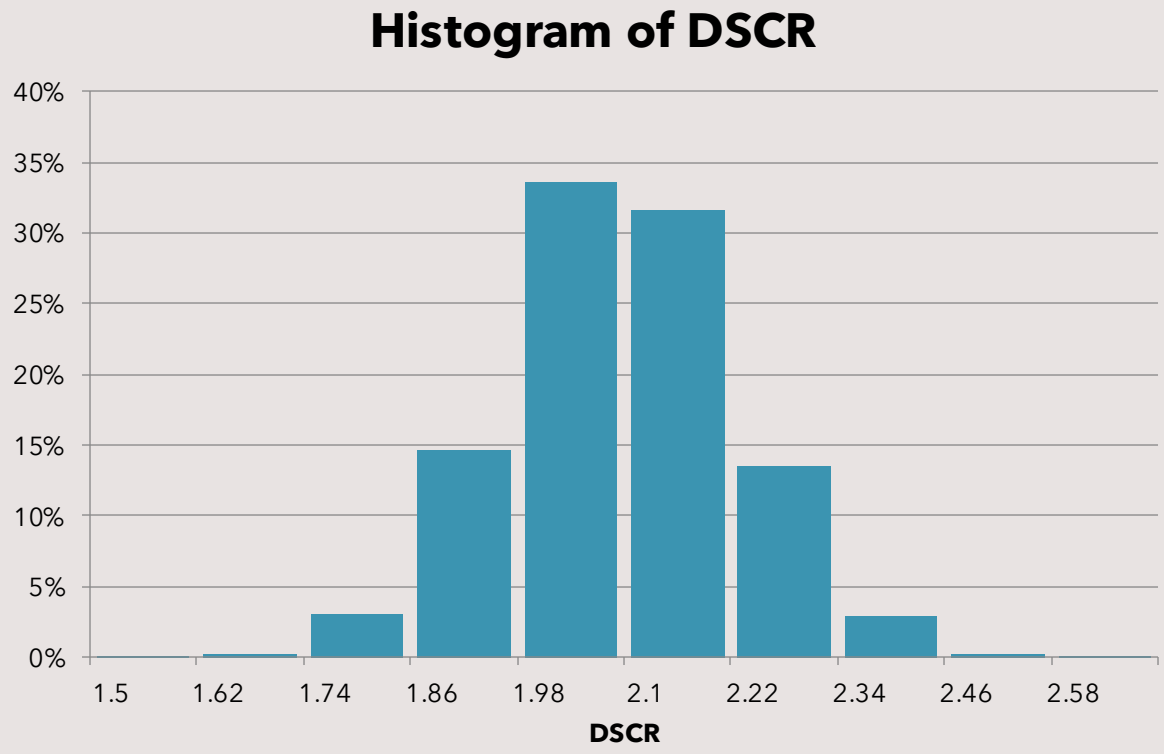
	Internal Rate of Return (IRR)
	Project Cost less IDC
	Operating Income
	Net Flows
IRR	23%
	Return on Equity (ROE)
	Equity Inflows
	Cashflow to equity holders
	Net Flows
ROE	53%
	Debt Service
	Cashflow available for debt service -(CADS) = EBITDA add fees
	Debt Service Payment
	DSCR
Requirement	1.4
Minimum	1.49
Mean	8.95
Maximum	26.58

Introducing real-world uncertainty

- Random walk used to project electricity demand, with a growth rate of the average of 30% per year.
- Non-linearities introduced in model:
  - *Cap on energy supplied based on capacity (real-world constraint)*
  - *Construction costs depends on base-capacity charge-rate (if prices are very low at the beginning of construction, build a smaller plant)*

Expectation vs Reality





Average IRR: 12%, Previous estimate: 23%

Average DSCR: 2.1, Previous estimate: 8.95

Strong form of the Flaw of Averages

Average IRR = 12%	IRR using average demand = 37%

Conclusions

- Adding uncertainty to model can produce more conservative (yet realistic) results as observed in the IRR and DSCR.
- Non-linearities in model highlight flaw of averages.

My favorite lessons from the course!

- Flaw of averages, gamer's approach
- Variance – average of area of squares
- Covariance – average of area of rectangles
- Bayes' Rule – ratio of areas
- Linear Regression – minimizing energy of springs

THANK YOU, SAM!