Expected Internal Rate of Return (eIRR) as a Prioritization Metric

Decision Analysis Affinity Group Conference

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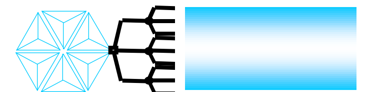
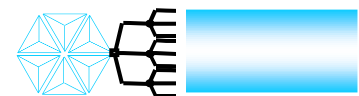


What risk-based project prioritization metric doesn't disadvantage early-stage development assets?

- eIRR incorporates defensible concepts
  - incremental, multiperiod cash flows
  - time value of money
  - decision-making flexibility
  - phase-appropriate risk
  - the non-risk adjusted precursor, IRR is familiar to management
- eIRR is a suitable gauge for measuring projects against important management goals
  - eIRR is consistent with maximizing ROI
  - eIRR is consistent with minimizing risk



$$eDC = \sum_{t=1}^{n} \frac{eCF_t}{(1 + IRR)^t}$$

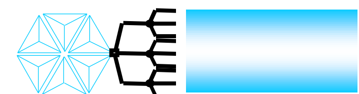
where eCF_t = expected commercial cash flows after tax through period t

eDC = expected development costs

n = number of periods in project's life

IRR = project's internal rate of return

A more appropriate name may be the IRR of expected free cash flows



Early-stage project's eNPV & eIRR reflect low probability of success

Cash Flows - Project A, Phase I

Cash Flow
Expected Cash Flow

800
700
600
500
400
300
200
100
0
-100
-200

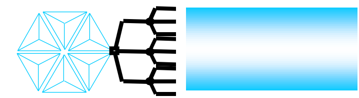
$ USD

Ph I, Ph II a, Ph II b, Ph III, Reg., 1, 2, 3, 4, 5

50% 40% 40% 50% 80% 3%

eNPV = $5 M

eIRR = 14%



Mid-stage project's eNPV & eIRR grow as costs are sunk and risk is resolved

Cash Flows - Project A, Phase II

Cash Flow
Expected Cash Flow

$ USD

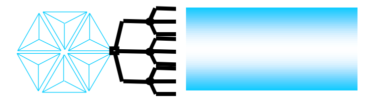
800
700
600
500
400
300
200
100
0
-100
-200

Ph I
Ph II a
Ph II b
Ph III
Reg.
1
2
3
4
5

40%
40%
50%
80%
6%

eNPV = $30 M

eIRR = 24%



Late-stage project's eNPV & eIRR balloon as the likelihood of expected future cash flows grow disproportionately

Cash Flows - Project A, Phase III

- Cash Flow
- Expected Cash Flow

$ USD

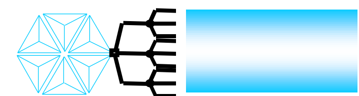
800
700
600
500
400
300
200
100
0
-100
-200

Ph I
Ph II a
Ph II b
Ph III
Reg.
1
2
3
4
5

50%
80%
40%

eNPV = $420 M

eIRR = 70%



eNPV outpaces eIRR growth as costs are sunk and risk is resolved (both metrics respond to a poor risk-resolution profile)

Relative Growth of eNPV vs eIRR

eIRR

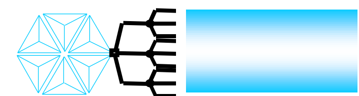
80%
70%
60%
50%
40%
30%
20%
10%
0%

$(50) $- $50 $100 $150 $200 $250 $300 $350 $400 $450

eNPV

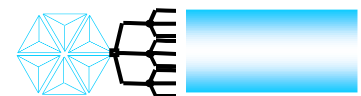
Project A
Project A delayed risk

Ph. III
Ph. II
Ph. I
Ph. III
Ph. I&II

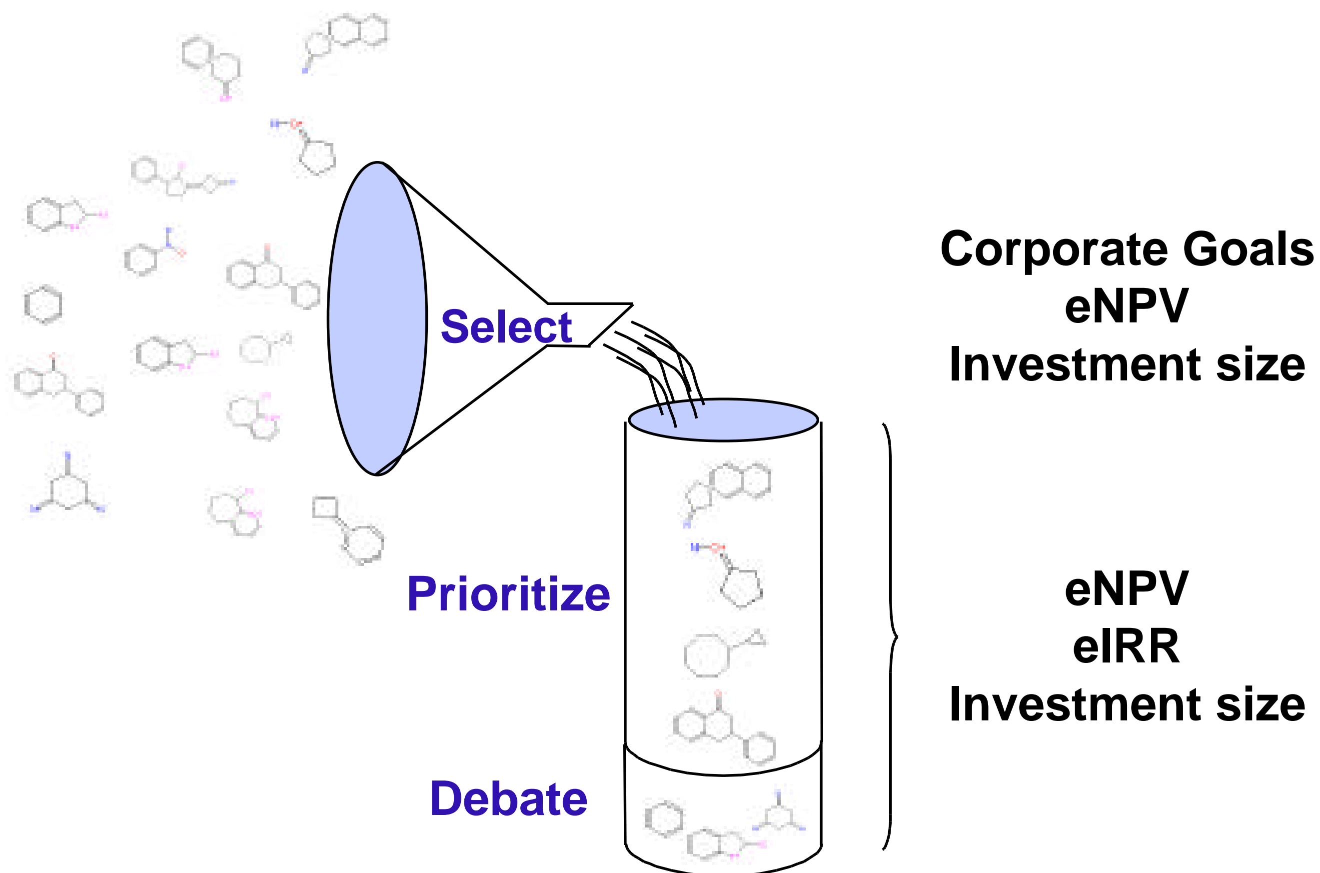


eIRR fills a gap left by eNPV

- Summarizes project information in a single rate of return
- Communicates a project's performance level
- Considers the returns expected from investors
- Frames the discussion of opportunity cost
- WACC is the project selection threshold

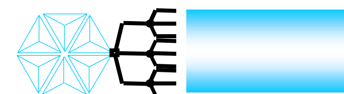


eIRR rounds out the discussion when debating projects on the margin



Corporate Goals
eNPV
Investment size

eNPV
eIRR
Investment size



When used with other metrics, eIRR helps complete the picture of a project's expected economic contribution

- To ensure project-to-project comparisons are fairly assessed, portfolios should be evaluated by development phase
- Early and Late phase portfolios should be funded from separate budgets