

Capital Budgeting Unconventional Problems

Caselet 1: Project Zenith (SunGlow Systems)

SunGlow Systems is evaluating Project Zenith, a solar component expansion proposal approved internally on December 15, **2017**. The project involves an initial capital outlay of **₹10,000** incurred on **1 January 2018**, followed by irregular operating cash inflows of **₹2,000 on 15 March 2018**, **₹2,500 on 15 August 2018**, **₹3,000 on 15 February 2019**, **₹2,500 on 15 June 2019**, and **₹2,000 on 31 December 2019**. The company uses a **12% weighted average cost of capital** for project evaluation.

Management wishes to evaluate the project using discounted cash-flow techniques that explicitly recognize irregular timing. The project is to be assessed using XNPV and XIRR, first by treating **1 January 2018** (the date of the first cash flow) as the valuation base date.

Additionally, management seeks to understand how the valuation interpretation changes when the project's economic value is measured as of the approval date, 15 December 2017, while maintaining all cash-flow dates and amounts unchanged. The objective is to compare the resulting XNPV values and interpret the meaning of "project value" under different base-date conventions.

Caselet 2: Project Zest (EcoTech Solutions)

EcoTech Solutions is assessing Project Zest, an environmentally focused technology upgrade that requires an initial investment of **₹15,000** as of **1 January 2022**. The project generates irregular operating inflows of **₹3,000 on 15 March 2022**, **₹4,500 on 15 July 2022**, **₹5,000 on 15 January 2023**, **₹2,500 on 15 June 2023**, and **₹3,500 on 31 December 2023**. Midway through execution, an additional maintenance investment of **₹2,000 is required on 1 October 2022**.

The firm evaluates projects at a **12% cost of capital** and initially relies on XIRR for return assessment. However, the additional midstream investment introduces multiple sign changes in the cash flow sequence.

Management wants to compute XNPV and XIRR and assess whether IRR remains a reliable decision metric under these circumstances. To address reinvestment realism, management also requires computation of XMIRR using a **finance rate of 12%** and a **reinvestment rate of 10%**, and to compare the insights provided by these measures.

Caselet 3: Project Spark (LuminaTech)

LuminaTech is considering Project Spark, a digital platform investment with significant upfront costs and irregular operating inflows. The project requires an initial outlay of **₹20,000 on 1 February 2021**, followed by inflows of **₹5,000 on 1 June 2021**, **₹6,000 on 1 November 2021**, **₹8,000 on 1 May 2022**, **₹4,500 on 1 August 2022**, and **₹3,000 on 1 December 2022**. The firm's nominal discount rate is **12%**, and expected long-term inflation is **5% per annum**.

Management initially evaluates the project using nominal cash flows discounted at the nominal cost of capital. However, for analytical consistency, it also wants to understand the project's value in real terms.

Accordingly, the cash flows are to be converted into real values by adjusting each cash flow for inflation based on exact timing, and the project is to be re-evaluated using a real discount rate derived from the Fisher relationship. The objective is to compare nominal and real XNPV estimates and interpret the importance of consistency between cash-flow measurement and discount rates.

Caselet 4: Project Bright (SolarVision)

SolarVision is evaluating Project Bright, a renewable energy installation that requires an initial investment of ₹18,000 as of **1 April 2019**. The project generates operating inflows of **₹6,000 on September 1, 2019, ₹7,500 on March 1, 2020, and ₹8,000 on December 31, 2020**. In addition to operating cash flows, the project requires a **working capital investment of ₹1,000 on 1 April 2019, which is fully recovered by ₹1,000 on 31 December 2020**.

The firm evaluates projects at a **12% discount rate** and uses XNPV and XIRR for decision-making. Management wants to understand how non-operating cash flows, such as working capital, affect project valuation when cash-flow timing is irregular.

The task is to recompute XNPV and XIRR after explicitly incorporating the working-capital lock-up and subsequent release, and to explain how these cash flows influence project value and return measures.

Caselet 5: Project Radiant (GreenLight Energy)

GreenLight Energy is considering Project Radiant, a clean-energy initiative supported by government subsidies. The project requires an initial investment of **₹25,000 on January 1, 2020, and generates operating inflows of ₹8,000 on July 1, 2020, ₹9,000 on January 1, 2021, ₹10,000 on July 1, 2021, and ₹11,000 on December 31, 2021**. Under the base case, the project is evaluated using a **discount rate of 9%**.

Management identifies a key risk related to the timing of subsidies. Under an alternative scenario, subsidy-linked inflows are delayed by **six months**, which increases project risk and raises the appropriate discount rate to **10%**.

The objective is to compute XNPV under both scenarios, incorporating the timing shifts and risk-adjusted discount rates, and to recommend whether the project remains acceptable once timing risk and financing risk are jointly considered.

Caselet 6: Project Horizon (BrightFuture Renewables)

BrightFuture Renewables is evaluating Project Horizon, a capital-intensive renewable project with irregular cash flows. The project requires an initial investment of **₹30,000 on 1 March 2018**, followed

by inflows of ₹6,000 on 1 December 2018, ₹8,000 on 1 June 2019, ₹10,000 on 1 January 2020, ₹9,000 on 1 October 2020, and ₹7,000 on 31 December 2021. The firm's discount rate is 12%.

While XNPV and XIRR indicate overall project attractiveness, management is concerned about liquidity and the timing of recovery. It therefore wants to compute the project's **discounted payback period using exact dates**, based on cumulative present values.

Additionally, management seeks a duration-like measure representing the weighted average time of discounted inflows, to complement traditional NPV-based decision metrics. The objective is to assess not only value creation but also the timing of value recovery.