

Week 5

Introduction to Capital Budgeting

1. Introduction and the Calculation of Relevant Cash Flows

a) Introduction

- A capital budget generally represents planned investments in fixed assets over a period of time.
 - Process of developing and analyzing investment projects and deciding which ones should be included in the capital budget.
 - Involves an examination of relevant cash flows
- Basic Distinctions when categorizing investment decisions
 - Conventional cash flow pattern
 - Initial net cash outflow followed by net cash inflows
 - Non-conventional
 - One or more cash outflows after the initial outflow
 - Relevant net cash flows subsequent to initial investment may take the form of either an annuity or a mixed stream
 - Investment projects
 - Either expansion of firms activities or replacement of existing assets
 - Group of possible investment projects
 - Either independent or mutually exclusive

b) Determining a Projects Relevant Cash Flows

- Relevant cash flows are the incremental after tax cash flows attributable to the project
 - Initial investment
 - Annual operating net cash flows during the life of the project
 - Terminal cash flow (if any)
- Relevant project incremental after tax cash flow for year or time t = (after tax cash flow for firm with project undertaken) – (after tax cash flow for firm without undertaking project)
 - For capital budgeting purposes, do not include interest expenses or other costs of financing

c) Detailed Example (See VUWS pg. 69)

2. Capital Budgeting Models

a) Payback Period

- Expected number of years required for the project to payback initial investment
- Management must set that they think is an acceptable maximum period

b) Net Present Value (NPV)

- *See Formula Sheet*
- $NPV > 0$ - acceptable
- Project with higher NPV is preferred

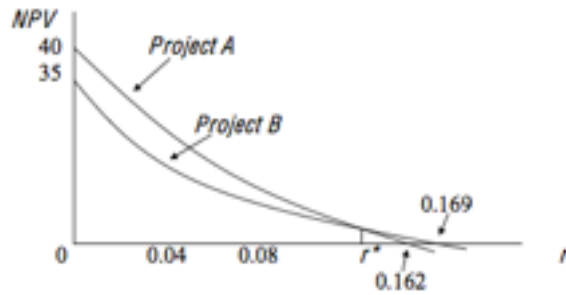
c) Internal Rate of Return

- Interest/discount rate that makes $NPV = 0$
- IRR substituted for Projects Cost of Capital in NPV Formula
- $IRR > r$ (relevant cost of capital) - acceptable
- Highest IRR preferred

d) NPV Profiles and Comparison of the NPV and IRR Methods

- NPV Profiles
 - Graph NPV against cost of capital (r)

- Point where NPV line cuts r axis is the IRR



$$r^* = 0.1294 \quad (12.94\%)$$

- Inconsistent rankings by the NPV and IRR methods may occur in situations where
 - The projects' initial investments differ
 - There are differences in the timing of the cash flows of the projects
- Ultimate cause of conflicting rankings
 - NPV method assumes cash flows are reinvested at r
 - IRR method assumes cash flows are reinvested at the IRR
- NPV more correct as net cash flows from a project can be
 - Paid to debt and equity investors who on average require a return equal to the cost of capital, or
 - Used as a source of capital that would otherwise be raised at the firm's cost of capital.
- Non conventional cash flows - multiple IRRs can occur
- Advantage of IRR
 - Indication of the safety margin associated with the project

Week 6

Capital Budgeting Continued

3) Projects with unequal lives - The Annualized NPV (ANPV) or Equivalent Annual Value (EAV) Approach

- Steps involved
 - I. Find NPV for each competing project
 - II. Find constant periodic payment that, if received over the projects life, would yield a present value of annuity = to projects NPV
 - III. If we assume continuous replacements are made at the end of each projects life, the project that will add most value = one with highest ANPV

4) Risk and Capital Budgeting

a) Introduction

- Risk associated with given investment - risk the projected project cash flows not realised
- NPV method - risk is the variability of NPV around its average or expected value
 - Some probability distribution

b) Sensitivity and Scenario Analysis

- Sensitivity Analysis
 - Sensitivity of NPV to changing one variable at a time is gauged
 - Often 3 basic cases for a variable are analysed
 - Expected (most likely)
 - Good (best or optimistic)
 - Bad (worst or pessimistic)
- Scenario Analysis
 - Sensitivity of results to a whole set of variable changes is gauged

c) Simulation

- Allows estimation a probability distribution of NPV of a project
- Also allows us to gauge more readily the expected (most likely) NPV and the variability of NPV around this average

d) Risk Adjusted Discount Rates

- Accounts for risk and the time value of money in one measure.
- In RADR method riskier assets' cash flows are discounted at a higher rate
- Use NPV formula, swapping r for RADR
- RADR I determined with reference to estimated relationship between a measure of total risk and the rate of return required to at least maintain firm value

Basic Cash Management

1) Introduction - Working Capital

- Current Assets or working capital
 - Cash and marketable securities
 - Accounts receivable
 - Inventories
- Current Liabilities
 - Accounts Payable
 - Short-term loans
 - Accruals (wages to be paid)
- Net Working Capital
 - Current Assets - Current Liabilities

- Net working capital management involves managing current assets and liabilities so as to achieve a balance between profitability and risk that contributes positively to the firm's value
- Higher net working capital, less risk firm faces of technical insolvency (not being able to pay bills)
- However too many current assets or too low a use of low cost short-term financing can lead to lower profits and lower firm value

2) The Operating and Cash Conversion Cycles

• Operating Cycle

- Time from the beginning of the production process to the collection of cash from the sale of the finished product

- $OC = \text{Average Age of Inventory (AAI)} + \text{Average Collection Period (ACP)}$

$$\bullet \text{ AAI} = \frac{365}{\text{Inventory turnover}} = \frac{365}{\frac{(\text{Annual}) \text{ Cost of Goods Sold}}{\text{Average Inventory}}}$$

$$\bullet \text{ ACP} = \frac{\text{Average Accounts Receivable}}{\text{Average Credit Sales Per Day}} = \frac{\text{Average Accounts Receivable}}{\frac{\text{Annual Credit Sales}}{365}}$$

- Generally longer the OC, greater the firm's need for financing
- Cash Conversion Cycle
 - CCC represents the time the firm's cash is tied up between payment for production inputs and receipt of payment from sale
 - Differs from OC as firm can delay payments for input due to granting of trade credit
 - Difference represented by average payment period (APP)
 - $CCC = OC - APP$
 - $APP = \frac{\text{Average Accounts Payable}}{\text{Annual Credit Purchases per day}} = \frac{\text{Average Accounts Payable}}{\frac{\text{Annual Credit Purchases}}{365}}$
 - Positive CCC implies that negotiated liabilities must be used to support operating assets. Interest of the firm to minimise their use
 - Direct relationship between length of CCC and the level of resources invested in the CCC
 - No. of resources invested in CCC
 - = Inventory + Accounts receivable - Accounts payable
 - To reduce resources invested in CCC
 - Reduce AAI and ACP; Increase APP
 - Generally done by
 - Turning over inventory as quickly as possible
 - Collecting accounts receivable as quickly as possible
 - Appropriately managing mail, processing and clearing time
 - Paying accounts payable as slowly as possible

3) Cash Management Techniques

• Section 14.5 of Text