Capital Budgeting Part III

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Developments in capital Budgeting

- Selection between projects of unequal life.
- Example two machines for the same purpose having different life, initial investment and annual operating cost.
- PV (All cost)/PVIFA $_{r,n}$ is annual equivalent of PV of cost
- Select the machine with less annual equivalent.
- Projects may differ in capital structure and hence in WACC/discount route, hence investment decision linked to financing decision.

Developments in capital Budgeting

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Capital budgeting under constraints

- Limited fund and rationing
- Combination of packages
- Use of linear programming models to handle high number of projects and planning horizons for maximizing NPV

Techniques of assessing stand alone risks

- Sensitivity Analysis
- B.E.Analysis
- Simulation Analysis (Decision Tree Analysis)

Sensitivity Analysis

- Steps.
  - Assess optimistic, most likely & pessimistic cash flow estimates, and other factors.
  - Calculate NPV for each scenario by varying one variable at a time.
  - Select based on judgment.

Example

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Variable	Range		
	P	E	O
Investment(Cost)	24	20	18
Sales	15	18	21
Variable unit **cost@%of** sales price	70	66.67	65
Fixed cost	1.3	1.6	1.8

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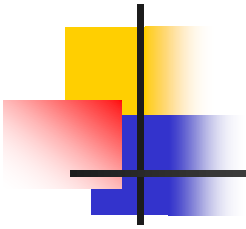

Merits

- Evaluates robustness of the project to likely changes in underlying variables.
- Steps to control undesirable variation can be taken by management.
- It is intuitive.

Demerit

- It does not consider the probabilities & likely outcomes/ scenario.
- Ignores the correlation in various variable themselves.
- Subjective

Scenario Analysis

- Identify correlations in variables.
- Configure some possible scenarios.
- Calculate NPV/IRR for each scenario.
- Select depending upon the probability of these scenarios
- Can do best & worst scenario analysis.

BE Analysis

- BE Analysis to see cut off sales under various scenarios and see whether it is possible or not?

Simulation

- Considers the probabilities of occurrence.
- Steps
  - Modeling the project indicating how NPV is related to individual parameter/ variable.
  - Specify values of parameters and probabilities.
  - Select a value at random from the probabilities distribution from each of the variable.
  - Determine NPV for a randomly selected variable.

Simulation--contd

- Repeat Step III to get large number of simulated NPVs.
- Plot frequency distribution and decide.

- Require judgment about probabilities.
- Computer can help.
- Forces to think about future.
- Good knowledge of market essential.

Decision Tree Model

- Used for step by step consequential project like R&D etc.
- Draw decision route tree
- Evaluate various alternatively.
- Select

Economic Appraisal

- Quantify incremental costs to the economy due this project
  - Tax Subsidies
  - Other subsidies
- Add these to cash outflows

Economic Appraisal -contd

- Quantify incremental economic benefits
  - Different Types of taxes paid
  - Income Tax
  - Saving in fuel
- Add benefits to inflows
- Calculate modified NPV or IRR

Social Cost Benefit Analysis

- Try to ascertain likely impact on society
  - Costs
    - Pollution Cost
  - Benefits
    - Employment
    - Road Connectivity
    - Area Development
    - Increased tax receipts of govt.
- Descriptive
- Normative

International Practices

Country/method	Pay back	IRR	NPV	ARR
US	59	52	28	13
Australia	61	37	45	24
Canada	50	62	41	17
Ireland	84	84	84	24
Japan	52	04	06	36
UK	76	39	38	28
Korea	75	75	60	68
Comment: One firm using more than one method				

US Practice*

Method	Primary		Secondary	
	No	%	No	%
IRR	60	53.6	13	14.0
ARR	28	25.0	13	14.0
NPV	11	9.8	24	25.8
Pay back	10	8.9	41	44.0
Profitability Index	03	2.7	02	2.2
Total	112	100	93	100
*Gitman & Forrester(1977)				

General Observations

- We use combination of methods and then decide.
- Agency problem has to be taken care of.
- Project Mgt very important.
- Post project appraisal mostly not done.
- Net Present Value of entire portfolio to be estimated

Estimation of cash flow

- Capital outflow by engineering people
- Sales by marketing sales dept
- Operating costs estimates by production department, purchase manager, personnel etc.
- Coordination by finance and to be seen that estimates out realistic and constraint.

Elements of Cash Flow

- Initial investment during construction period.
- Operating cash flows(post tax net inflows)
- Terminal cash inflow(after tax scrap sale)
- Duration of cash flow- lowest of the technological or physical or product life cycle(market life) or investment planning horizon.

Basic principles of estimation of cash flows

- Incremental cash flows-consider effect of product cannibalization, but competitors have to be kept away.
- Ignore
  - sunk cost being immaterial
  - Interest charges(DCF)
  - Depreciation (non-cash)
- Consider
  - Opportunity cost if any
  - Replacement cost

Basic Principles of Estimation--contd

- Incremental overhead cost due to concerned project
- Outlay on Working Capital
- Only post tax figures to be considered
- Consistency of method
- Incremental cash flow for replacement project

Bias in Estimation

- Under estimation of initial investment
- Over estimation of operating cash flow/ capacity utilization/demand
- Under estimation of salvage value
- Ignoring intangible benefits(Complementary products),economic & social benefit
- Estimation of economic & social benefit and adjustment of NPV essential in case of infrastructure/public utility projects

Sources of Positive NPV

- Entry barriers like
- Industry with high economy of scale offer cost advantage to existing firms and restrict new firms due to huge investment requirement
- High product differentiation.
- Cost advantage due to monopoly over raw materials
- Massive marketing net work
- Technological edge
- Government protection

Sources of Positive NPV

- Professional Project Management
- Effective Risk Management
- Managerial effectiveness
- Cost Controls
- Favorable economics

Capital Budgeting (CB)

- Most important issue of Financial Management.
- Involves decision about current outlay (may be spread over few years) of funds in expectation of a stream of benefit (net cash inflows) extending into future.
- Long term Financial consequence.

Capital Budgeting (CB)

- Larger outlay involved.
- Difficult to reverse (sunk cost) - heavy loss if assets are sold out premature.
- Strategic decision about how to allocate resources. (Capital)
- Strategic asset allocation Decision.

Role of Managers

- Identification of investment opportunities (Non Finance Executives).
- Assembly of such proposals (non-Finance executives)
- Estimation of profitability (non-Finance executives)
- Appraisal & evaluation of each project (Finance Manager)

Role of Managers--contd

- Selection of project on specified criteria/ policy (Top Mgt – BOD) depending upon value.
- Integration & preparation of capital budget (work program, M&P and RSP of Rly.) concerned dept.
- Implementations – variations & project control.
- Post project appraisal./ productivity test(Finance).

Identification of Investment opportunities

- Close monitoring of environmental changes (technology, demand, competition)
- Corporate business strategy based on SWOT analysis, consultation across organization and suggestions.
- Identify projects with specified features to capitalize opportunity. (Mostly by operating & marketing deptts followed by technical deptts.)

Assembly of proposals

- Preparation of all proposal in specified formats prescribed by finance.
- Approval by competent authority.
- Classified into
  - Replacement
  - Expansion
  - Capacity de-bottlenecking – Rationalization
  - New product proposals(Marketing)
  - Obligatory & welfare proposals (safety, pollution control, medical, fire protection etc.)

Appraisal / Evaluation of projects

- Assessment of profitability & Risk (concerned department in consultation with Finance)
- Multiple methods
- Reliability of estimates of income /demand/ capacity utilization and project cost
- Management capability of the promoters

Decision Making – Project Selection

- As per delegation.
- Over all funds availability/other schemes
- Works in progress
- Inter project Priorities
- Ranking of new projects as per profitability.
- Capital rationing for new projects

Preparation of Capital Budget

- Compilation of capital budget by integration of new projects with works in progress
- Approval by competent authority.
- Assurance of fund availability.
- Public participation-states/PSUs
- Private participation (BOT,BOLT, other variants.

Implementation

- Area pertaining to
  - Project Mgt & Control.
  - Use of network Techniques – PERT/CPM
  - Ill planned projects give big headache during implementation.
  - Disputes delays – Arbitration – defaults.

Post Project Appraisal

- Post Completion Audit – a feedback device.
- Compares actual cash flows/ IRR with estimated cash flows/ IRR.
- Done after standardization of performance.
- Highlights
  - Defects in estimation.
  - Defects in project planning & control
  - Judgmental bias.
- Benefits
  - Reveal precautions to be taken in future.
  - Caution the sponsors.

Focus of Appraisal

Types of Proposal	Focus
1. Mandatory	Cost effective way to fulfill requirement.
2. Replacement	▪Cost reduction (labour, raw materials, power) ▪Increase yield. ▪Improve quality (more demand) ▪Compare incremental cost with incremental benefits. (NPV)

Focus of Appraisal --contd

Types of Proposal	Focus
3. Expansion(Top Management)	▪Realistic forecast of growth.prospects ▪More careful analysis in reference to risk of cash flows/ demand.
4.Diversification (BOD)	▪Risk assessment ▪Suitable adjustment in IRR to accommodate risk. ▪Strategic direction.

Focus of Appraisal--contd

Types of Proposal	Focus
5.R & D Proposals	▪Use of sequential decision techniques like decision free/ option analysis. ▪High risk ▪Managerial judgment to gamble for future benefits.
6.Misc. Proposals (Interior decoration)	▪Personal preference of top management. ▪Limit the expenditure agreed upon as percentage of total outlay to control the damage.

Economic Appraisal

- Correctness of estimates of benefits to the economy (Fuel saving, taxes paid)
- Correctness of estimates of costs to the economy(subsidies, tax incentives etc.
- Adjustment of cash flows.
- Calculate economic NPV.

Social Cost Benefit Analysis

- Correct estimation of impact of projects on society.
- Pollution
- Road connectivity
- Employment
- Saving of foreign exchange

Social Cost Benefit Analysis

- Try to ascertain likely impact on society
- Description
- Normative

Financial Options

- Financially viable(bankable) projects
- ✓ Private equity and debt(BOT, BOO)
- ✓ Interest bearing capital from Govt
- Economically/socially viable(non-bankable) (developmental)
- ✓ Budgetary support/Grant
- ✓ Private participation (BOLT etc)
- ✓ Leasing to private sector