

1.040/1.401 - Project Management

# Project Financing and Evaluation

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# Outline

- Session Objective
- Project Financing
  - Public
  - Private
  - Project
  - Contractor
  - Additional issues
- Financial Evaluation
  - Time value of money
  - Present value
  - NPV & Discounted cash flow
  - Simple Examples
  - Formulae
  - IRR
- Missing factors

# Session Objective: To Understand

- The role of project financing
- Mechanisms for project financing
- Measures of project desirability
- Assumptions behind evaluation mechanisms

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# Critical Role of Financing

- Makes projects possible
- Difficulty of Financing is a major driver towards alternate delivery methods
  - Flexibility on owner financing
  - Flexibility for contractor financing
- Has major impact on
  - Riskiness of construction
  - Claims
  - Types of construction undertaken
  - Prices offered by Contractors

# The Role of Project Financing: How Does Owner Finance a Project?

- Public
- Private
- “Project” (joint-venture) financing

# Public Financing

- Sources of funds
  - General purpose or special-purpose bonds
  - Tax revenues
  - Capital grants subsidies
  - International subsidized loans
- **Public owners face restrictions (e.g. Bonding caps)**
  - Major motivation for public/private partnerships
- May group small construction projects to lower fixed financing costs
- Social benefits important justification
  - User surplus, benefits to region, quality of life, unemployment relief
- Important consideration: Exemption from taxes
- MARR much lower (e.g. 10%), often standardized

# Private Financing

- Major mechanisms
  - Debt
    - Borrow money
    - Retained earnings
    - Bonds (revenue, fixed coupon, convertible, balloon,...)
  - Equity
    - Offering equity shares
      - Stock Issuance e.g. in capital markets
    - Must entice investors with sufficiently high rate of return (CAPM)
- Because higher costs and risks, require higher returns
- MARR varies per firm, often high (e.g. 20%)



# Private Owners w/Collateral Facility

## Distinct Financing Periods

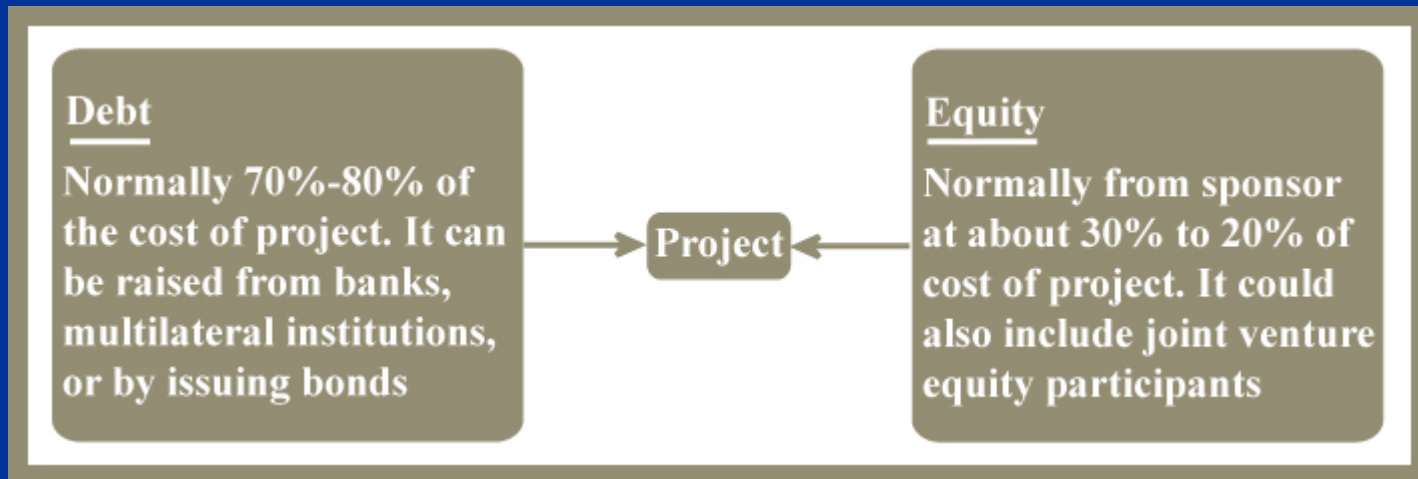
- Short-term: Construction period
  - Risky (and hence expensive!)
  - Major costs
  - Incomplete collateral (property may serve)
  - Borrowed so owner can pay for *construction*
- Long-term
  - Typically facility is collateral
  - Pays for
    - Operations
    - Construction financing debts
  - Typically much lower interest
  - Often paid for by tax revenues, project revenues, etc.
- Loans often negotiated as a package

# Lenders for Owners

- Lenders
  - Savings&Loan
  - Investment banks
  - REITs
  - Insurance companies
- Innovative methods: “Borrow” from contractor
  - Place burden of funding on contractor (BOT, Turnkey)
- Risk analysis typically done by lender

# Financial Structure & WACC

- $WACC =$  Weighted average cost of capital
- Derives from the cost of equity (higher) and cost of debt (lower).



# General Requirements

- Character (attitude towards repayment)
- Capacity (ability to repay)
- Collateral (assets that can be taken in lieu of payment)

# Documentation Specifics

- Goal: To show that income can pay off mortgage debts
- Example documentation
  - *financial statements from owners (income, balance stmt)*
  - *clear title to land with appropriate zoning*
  - *design documents and cost estimates*
  - *Retained earnings accounts reconciliation*
  - *market research to demonstrate expected income*
  - *detailed pro-forma that shows projected income and expenses in the life of the loan*

# “Project” Financing I

- Investment in project thru special company
  - Often joint venture between several parties
- For larger projects due to fixed cost to establish
- Benefits
  - Off balance sheet (liabilities do not belong to parent)
  - Limits risk
  - More effective tax shields
  - Reduced agency cost (direct investment in project)

# “Project” Financing II

- Examples
  - Dulles Freeway
  - Eurotunnel
  - Eurodisney
  - Bangkok highway
- Need capacity for independent operation
- Key drawback: Tensions among stakeholders

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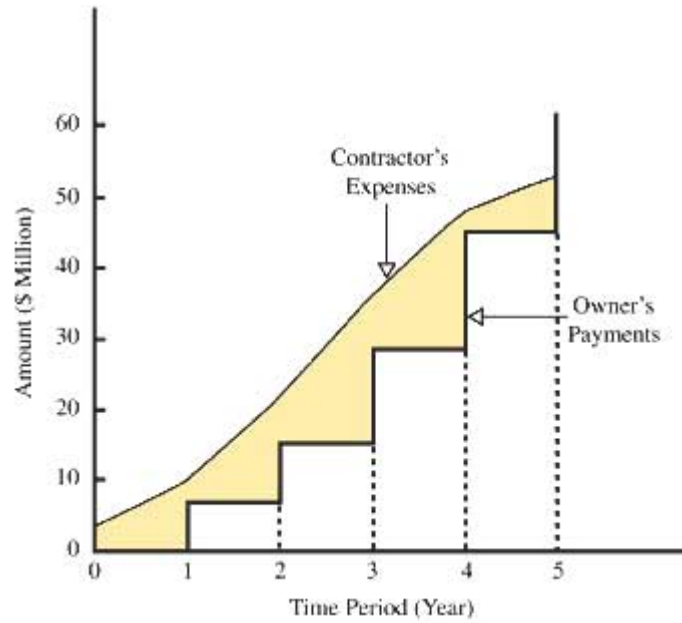
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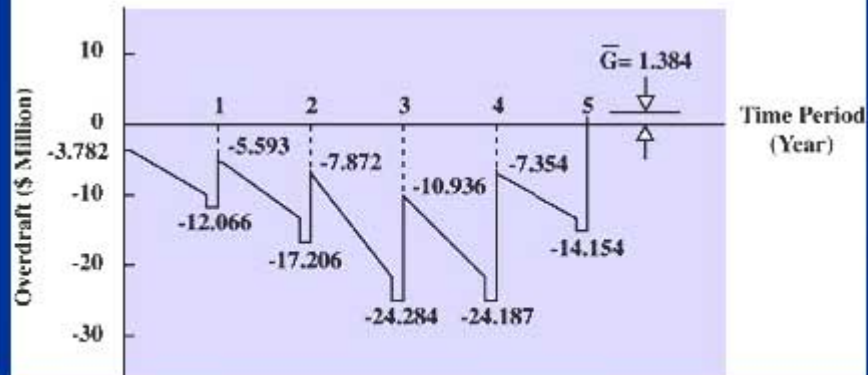
# Contractor Financing I

- Payment schedule
  - Break out payments into components
  - Often some compromise between contractor and owner
  - Architect certifies progress
- Contractor applies for *agreed-upon* payments
- Often must cover deficit during construction (<<than total cost)
  - Often schedule may not capture costs (equipment)
  - Can be many months before payment received
  - % Retainage standard (sometimes staggered; change @50%)

### Expenses and Payments



### Overdraft Including Interest Charges



# Contractor Financing II

- Owner keeps eye out for
  - Front-end loaded bids (discounting)
  - Unbalanced bids
- Frequently borrow from
  - Reserve
  - Banks (Need to demonstrate low risk)
- Interaction with owners
  - Some owners may assist in funding
    - Help secure lower-priced loan for contractor
  - Sometimes assist owners in funding!

# Contractor Financing III

- Owner often has more favorable terms for lending
  - Collateral, size, stability, etc.
- 3-way agreements sometimes sought between
  - Contractor
  - Owner
  - Bank
  - Basically, bank pays contractor according to progress
    - *Payment request submitted with progress report monthly by contractor*
    - Owner then submits “draw request” to bank
- Problem: Difficult with traditional design-bid-build

# Contractor Funding IV: Schedule of Values

- Recent innovation
- Framework for payments
- Agreed upon in contract
  - Often structure proposed by owner
- Should be checked by owner (fair-cost estimate)
- Often based on “Maserformat” cost breakdown structure
- Minimizes need for front-end loading via explicit payment for e.g. mobilization, etc.

# Contractor Loans: Additional Provisions

- Cost consultant (verify progress)
- Consultant for evaluation of construction plans
- Valuation of completed property
  - Likelihood of successfully paying mortgage
  - Value of collateral if seized
- Project monitoring
- Interests transcend project boundaries

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# Latent Credit

- Many people lenders due to delays in payments
  - Designers
  - Contractors (AIA A101 provides some relief)
  - Consultants
  - CM
  - Suppliers
- Temporary lowering of costs common in lean times
  - Suppliers
  - Contractors
  - Manufacturers



# Role of Taxes

- Taxes offer incentives for different types of activities
- Tax deductions for
  - Depreciation
    - *Depreciation : “the process of recognizing the using up of an asset through wear and obsolescence and of subtracting capital expenses from the revenues that the asset generates over time in computing taxable income”*
  - Mortgage Interest
- Targeted tax credits

# Personal Liability

- Despite presence in limited-liability corporations, *individuals* are often held responsible

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# Opportunity Cost & The Time Value of Money

- If we assume
  - money can always be invested in the bank (or some other reliable source) now to gain a return with interest later
  - That as rational actors, we will never make an investment which we know to offer less money than we could get in the bank
- Then
  - money in the **present** can be thought as of “equal worth” to a larger amount of money in the future
  - Money in the **future** can be thought of as having an equal worth to a lesser “present value” of money

# Equivalence of Present Values

- Given a source of reliable investments, we are indifferent between any cash flows with the same present value – they have “equal worth”
- Key: Costs/revenues coming to/from spare money
- This indifference arises b/c we can convert one to the other with no extra expense e.g.
  - Future to present cost: Deposit present value into bank now (deposit will grow to size of future value)
  - Present to future cost: Borrow present value from bank now; pay off (future value) in future

# Present Value (Revenue)

- How is it that some future revenue  $r$  at time  $t$  has a “present value”?
- Answer: Given that we are *sure* that we will be gaining revenue  $r$  at time  $t$ , we can take and spend an immediate *loan* from the bank
  - We choose size of this loan  $l$  so that at time  $t$ , the total size of the loan (including accrued interest) is  $r$
- The revenue  $l$  is the *present value* of  $r$ .

# Present Value (Cost)

- How is it that some future cost  $c$  at time  $t$  has a “present value”?
- Answer: Given that we are *sure* that we will bear cost  $c$  at time  $t$ , we immediately deposit a sum of money  $x$  into the bank yielding a known return
  - We choose size of deposit  $x$  so that at time  $t$ , the total size of the investment (including accrued interest) is  $c$
  - We can then pay off  $c$  at time  $t$  by using this money
- The size of the deposit (immediate cost)  $x$  is the *present value* of  $c$ .

# Notion of Net Present Value

- Suppose we had
  - A collection (or *stream*) of costs and revenues in the future
  - A certain source of borrowing/saving (at same rate)
- The net present value (NPV) is the sum of the present values for all of these costs and revenues
  - Treat revenues as positive and costs as negative



# Understanding Net Present Value

- NPV (and PV) is *relative to a borrowing/savings rate*
  - This is the rate for the “reliable source”
- NPV specifies the
  - Value of the cash stream *beyond* what could be gained if the revenues were returns from investing the costs (at the appropriate times) in the “reliable source”
    - “Reliable source” captures the *opportunity cost* against which gains are measured
  - Amount that could “pocket” now while using the “reliable source” to pay all costs needed for the investment (e.g. via borrowing)

# Discounted Cash Flow

- Computing Present Value (PV) of costs & benefits involves successively discounting members of a cash flow stream
  - This is because the value of borrowing or investment to/from the “reliable source” rises exponentially
- This notion is formalized through
  - Choice of a **discount rate**
    - In the absence of risk or inflation, this is just the interest rate of the “reliable source” (gain through opportunity costs)
  - Applying the discounted cash flow method