Introduction to Finance

L7

Financial Decision making

- Every decision has future consequences that will affect the value of the firm. These consequences will generally include both benefits and costs.
- More generally, a decision is good for the firm's investors if it increases the firm's value by providing benefits whose total value exceeds their cost.
- But comparing costs and benefits is often complicated because they occur at different points in time, may be in different currencies, or may have different risks associated with them.
- To make a valid comparison, we must use the tools of finance to express all costs and benefits in common terms.
- *Valuation Principle*- one of the central principle of finance- which use current market prices to determine the value today of the costs and benefits associated with a decision
- It answers the question: *Does the cash value today of a decision's benefits exceed the cash value today of its costs*

Financial Decision making

- The first step in decision making is to identify the costs and benefits of a decision
- Thenext step is to quantify these costs and benefits.
- In order to compare the costs and benefits,-we need to evaluate them in the same terms (usually present cash value)

Financial Decision making

- Example: different units of trade
- 400 bushels of wheat traded for 10 yards of cloth. Is this decision beneficial or not?
- Bushels of wheat –per unit price – Rs 25
- Yards -per unit price= Rs.2000
- We will convert both into present cash value
- 400 bushels of wheat cost= 25*400= Rs.10000
- 10 yards of cloth (total returns)= 2000*10=Rs 20000
- Benefit/ net value of the decision = (Returns-cost)= Rs 10,000

Financial Decision making

- Example: different units of trade
- 400 bushels of wheat traded for 10 yards of cloth. Is this decision beneficial or not?
- Bushels of wheat –per unit price – Rs 25
- Yards -per unit price= Rs.2000
- We will convert both into present cash value
- 400 bushels of wheat cost= 25*400= Rs.10000
- 10 yards of cloth (total returns)= 2000*10=Rs 20000
- Benefit/ net value of the decision = (Returns-cost)= Rs 10,000
- Note: Here the valuation for comparison is done on the basis of market price. It implies market price captures the current value of a good/services.

Financial Decision making

- Market prices to determine cash value:

  Whenever a good trades in a **competitive market**—by which we mean a market in which it can be bought *and* sold at the same price—that price determines the cash value of the good. As long as a competitive market exists, the value of the good will not depend on the views or preferences of the decision maker.

Valuation Principle

- Market prices to determine cash value:

  Whenever a good trades in a **competitive market**—by which we mean a market in which it can be bought *and* sold at the same price—that price determines the cash value of the good. As long as a competitive market exists, the value of the good will not depend on the views or preferences of the decision maker.

- Thus, by **evaluating cost and benefits using competitive market prices**, we can determine whether a decision will make the firm and its investors wealthier. This point is one of the central and most powerful ideas in finance, which we call the **Valuation Principle**:

- *Valuation Principle: The value of an asset to the firm or its investors is determined by its competitive market price. The benefits and costs of a decision should be evaluated using these market prices, and when the value of the benefits exceeds the value of the costs, the decision will increase the market value of the firm.*

- For analyzing financial decision, we apply valuation principle to decisions whose costs and benefits occur at different points in time and develop the main tool of project evaluation, the *Net Present Value Method*.

Example: Project/decision evaluation

- A company has invested Rs. 1 Lakh in a project today. After the commencement of the project, it could provide Rs. 105000 after one year to the firm. How will you value this project investment? Is it beneficial to the firm/SHs?

Example: Project/decision evaluation

- A company has invested Rs. 1 Lakh in a project today. After the commencement of the project, it could provide Rs. 105000 after one year to the firm. How will you value this project investment? Is it beneficial to the firm/SHs?
- Net Benefit= Cost- Benefit
- Net Benefit=?

Example: Project/decision evaluation

- A company has invested Rs. 1 Lakh in a project today. After the commencement of the project, it could provide Rs. 105000 after one year to the firm. How will you value this project investment? Is it beneficial to the firm/SHs?
- Net Benefit= Cost- Benefit
- Net Benefit=5000
- However this calculation ignores the timing of the costs and benefits, and it treats money today as equivalent to money in one year.

Time value of money

- In general, a rupee today is worth more than a rupee in one year.
- If you have Re.1 today, you can invest it. For example, if you deposit it in a bank account paying 7% interest, you will have Rs.1.07 at the end of one year.
- We call the difference in value between money today and money in the future the **time value of money**.

Time value of money & Interest rate

- In general, a rupee today is worth more than a rupee in one year.
- If you have Re.1 today, you can invest it. For example, if you deposit it in a bank account paying 7% interest, you will have Rs.1.07 at the end of one year.
- We call the difference in value between money today and money in the future the **time value of money**.
- By depositing money into a savings account, we can convert money today into money in the future with no risk. Similarly, by borrowing money from the bank, we can exchange money in the future for money today. The rate at which we can exchange money today for money in the future is determined by the current interest rate
- **The interest rate allow us to convert money from one point in time to another**
- (What rate allow us to convert money from one currency to another?)

Time value of money & Interest rate

- In general, a rupee today is worth more than a rupee in one year.
- If you have Re.1 today, you can invest it. For example, if you deposit it in a bank account paying 7% interest, you will have Rs.1.07 at the end of one year.
- We call the difference in value between money today and money in the future the **time value of money**.
- By depositing money into a savings account, we can convert money today into money in the future with no risk. Similarly, by borrowing money from the bank, we can exchange money in the future for money today.
- The rate at which we can exchange money today for money in the future is determined by the current interest rate. **The interest rate allow us to convert money from one point in time to another. Interest rate implies the market price today of money in the future**
- (What rate allow us to convert money from one currency to another?)

Time value of money & Interest rate

- Suppose the current annual interest rate is 7%. By investing or borrowing at this rate, we can exchange Rs.1.07 in one year for each Re.1 today.
- More generally, we define the **risk-free interest rate**, r_f , for a given period as the interest rate at which money can be borrowed or lent without risk over that period.
- We can exchange $(1 + r_f)$ dollars in the future per dollar today, and vice versa, without risk. We refer to $(1 + r_f)$ as the **interest rate factor** for risk-free cash flows; it defines the exchange rate across time, and has units of "Rs in one year/Rs today."

Time value of money & Interest rate

- As with other market prices, the risk-free interest rate depends on supply and demand.
- In particular, **at the risk-free interest rate the supply of savings equals the demand for borrowing**.
- After we know the risk-free interest rate, we can use it to evaluate other decisions in which costs and benefits are separated in time **without knowing the investor's preferences.**

Time value of money & Interest rate

- **Value of Investment in one year:**
- if the interest rate is 7%.
- Cost= (Rs.1,00,000)(1+ *r f)*= (Rs.1,00,000)(1+ *7%)*= (Rs.1,00,000)(1.07 *)= Rs.107,000 in one year*
- *Rs.107,000* in one year is the opportunity cost of spending Rs. 1 lakh to the project. The investors/firm has given up *Rs.107,000* they could have earned after 1 year
- Both cost and benefit are in terms of cash after one year. Hence we can compare it
- Net benefit= 105,000-107,000= - Rs 2000 in one year
- As net benefit is negative, we should reject the project investment

Time value of money & Interest rate

- **Value of Investment at present:**
- Instead of comparing value at future, we can also compare the values at present.
- In our example we can evaluate what is the present value of benefit of Rs.105000 after one year. In another terms, how much should we invest in risk free investment (ex: bank) to get 105000 after one year.
- We can determine this amount by following method.
- Benefit = (Rs. 105,000 in one year) / (1+ *r f)*= Rs. 105,000/1.07= Rs 98,130.84 today
- This is also the amount the bank would lend to us today if we promised to repay Rs. 105,000 in one year.
- Net Benefit= Rs 98,130.84-Rs100,000=- Rs.1869.16 today

- Negative net benefit- investment not recommended

Time value of money & Interest rate

- **Present v/s future value**
- This calculation demonstrates that our decision is the same whether we express the value of the investment in terms of dollars in one year or dollars today: We should reject the investment.
- Indeed, if we convert from dollars today to dollars in one year,
- (- Rs.1869.16)(1+ *r f)=* (-Rs.1869)(1+ *7%)= -Rs.* 2000 in one year
- we see that the two results are equivalent, but expressed as values at different points in time.
- When we express the value in terms of rupees today, we call it the **present value (PV)** of the investment. If we express it in terms of rupees in the future, we call it the **future value (FV)** of the investment.

Time value of money & Interest rate

- **Discount factor and rates:**
- When computing a present value, we can interpret the term :
- $\frac{1}{1+r} = \frac{1}{1.07}$ =0.934 as the *price* today of Rs1 in one year.
- Note that the value is less than Rs1—money in the future is worth less today, and so its price reflects a discount. Because it provides the discount at which we can purchase money in the future, the amount $\frac{1}{1+r}$
- is called the one-year **discount factor**. The risk-free interest rate is also referred to as the **discount rate** for a risk-free investment.

Example

- **Problem**
- The cost of rebuilding a Bridge to make it safe was approximately Rs.3 billion in 2024. At the time, engineers estimated that if the project were delayed to 2025, the cost would rise by 10%. If the interest rate were 2%, what would be the cost of a delay in terms of Rs in 2024?

Example

- **Problem**
- The cost of rebuilding a dam to make it safe was approximately Rs.3 billion in 2024. At the time, engineers estimated that if the project were delayed to 2025, the cost would rise by 10%. If the interest rate were 2%, what would be the cost of a delay in terms of Rs in 2024?
- **Solution**
- If the project were delayed, it would cost Rs. 3 billion $*$ 1.10 $=$ Rs 3.3 billion in 2025.
- To compare this amount to the cost of Rs.3 billion in 2004, we must convert it using the interest rate of 2%:
- Rs.3.3 billion $/($ 1.02 $)=$ Rs.3.235 billion in 2024
- Therefore, the cost of a delay of one year was
- Rs. 3.235 billion - Rs. 3 billion $=$ Rs. 235 million in 2024
- That is, delaying the project for one year was equivalent to giving up Rs. 235 million in cash.

Net Present value and the NPV decision rule

- **Net Present Value**
- In practice, most corporations prefer to measure values in terms of their present value—that is, in terms of cash today.
- We use the Valuation Principle to derive the concept of the *net present value*, or *NPV*, and define the "golden rule" of financial decision making, the *NPV Rule*.
- When we compute the value of a cost or benefit in terms of cash today, we refer to it as the present value (PV). Similarly, we define the **net present value (NPV)** of a project or investment as the difference between the present value of its benefits and the present value of its costs:
- ***NPV*** = ***PV*** **(Benefits) -** ***PV*** **(Costs)**
- *As long as the NPV is positive, the decision increases the value of the firm and is a good decision regardless of your current cash needs or preferences regarding when to spend the money.*

Net Present value and the NPV decision rule

- **Net Present Value (NPV) Decision Rule**
- *When making an investment decision, take the alternative with the highest NPV. Choosing this alternative is equivalent to receiving its NPV in cash today..*

- **Accepting or Rejecting a Project.** A common financial decision is whether to accept or reject a project. Because rejecting the project generally has NPV = 0 (there are no newcosts or benefits from not doing the project), the NPV decision rule implies that we should
- ■ Accept those projects with positive NPV because accepting them is equivalent to receiving their NPV in cash today, and
- ■ Reject those projects with negative NPV; accepting them would reduce the wealth of investors,
- whereas not doing them has no cost (NPV = 0).If the NPV is exactly zero, you will neither gain nor lose by accepting the project ratherthan rejecting it. It is not a bad project because it does not reduce firm value, but it doesnot increase value either.

Examples

Net Present value and the NPV decision rule

1. Suppose your firm is offered the following investment opportunity: In exchange for $500 today, you will receive $550 in one year with certainty. If the risk-free interest rate is 8% per year then find out the decision?

Net Present value and the NPV decision rule

1. Suppose your firm is offered the following investment opportunity: In exchange for $500 today, you will receive $550 in one year with certainty. If the risk-free interest rate is 8% per year then find out the decision?

- $NPV = \$509.26 - \$500 = \$9.26$ today

Net Present value and the NPV decision rule

2. Your firm needs to buy a new $9500 high-speed printer. As part of a promotion, the manufacturer has offered to let you pay $10,000 in one year, rather than pay cash today. Suppose the risk-free interest rate is 7% per year. Is this offer a good deal? Show that its NPV represents cash in your pocket.

Net Present value and the NPV decision rule

2. Your firm needs to buy a new $9500 high-speed printer. As part of a promotion, the manufacturer has offered to let you pay $10,000 in one year, rather than pay cash today. Suppose the risk-free interest rate is 7% per year. Is this offer a good deal? Show that its NPV represents cash in your pocket.

- If you take the offer, the benefit is that you won't have to pay $9500 today, which is already in PV terms. The cost, however, is $10,000 in one year.
- We therefore convert the cost to a present value at the risk-free interest rate: and find NPV
- $NPV = \$9500 - \$9345.79 = \$154.21$ today
- The NPV is positive, so the investment is a good deal. It is equivalent to getting a cash discount today of $154.21, and only paying $9345.79 today for the printer

Net Present value and the NPV decision rule

3. Suppose you started a Web site hosting business and then decided to return to college. Now that you are back in collede, you are considering selling the business within the next year. An investor has offered to buy the business for Rs 200,000 whenever you are ready. If the interest rate is 10%,which of the following three alternatives is the best choice?

- 1.. Sell the business now.
- 2. Scale back the business and continue running it while you are in college for one more year,and then sell the business (requiring you to spend Rs.30,000 on expenses now, but generating Rs.50,000 in profit at the end of the year).
- 3. Hire someone to manage the business while you are in school for one more year, and then sell the business (requiring you to spend Rs.50,000 on expenses now, but generating Rs.100,000 in profit at the end of the year).

Net Present value and the NPV decision rule

- Suppose you started a Web site hosting business and then decided to return to college. Now that you are back in collede, you are considering selling the business within the next year. An investor has offered to buy the business for Rs 200,000 whenever you are ready. If the interest rate is 10%,which of the following three alternatives is the best choice?
- 1. Sell the business now.
- 2. Scale back the business and continue running it while you are in college for one more year,and then sell the business (requiring you to spend Rs.30,000 on expenses now, but generating Rs.50,000 in profit at the end of the year).
- 3. Hire someone to manage the business while you are in school for one more year, and then sell the business (requiring you to spend Rs.50,000 on expenses now, but generating Rs.100,000 in profit at the end of the year).

- **Best decision- one with highest NPV**
- **NPV1 = Rs 2 lakh; NPV 2: Rs 197273; NPV3=Rs. 222,727**
- **Choosing third option ,hiring a manager is like receiving Rs.222,727 today**