FINANCIAL MANAGEMENT

SEMESTER-VI,

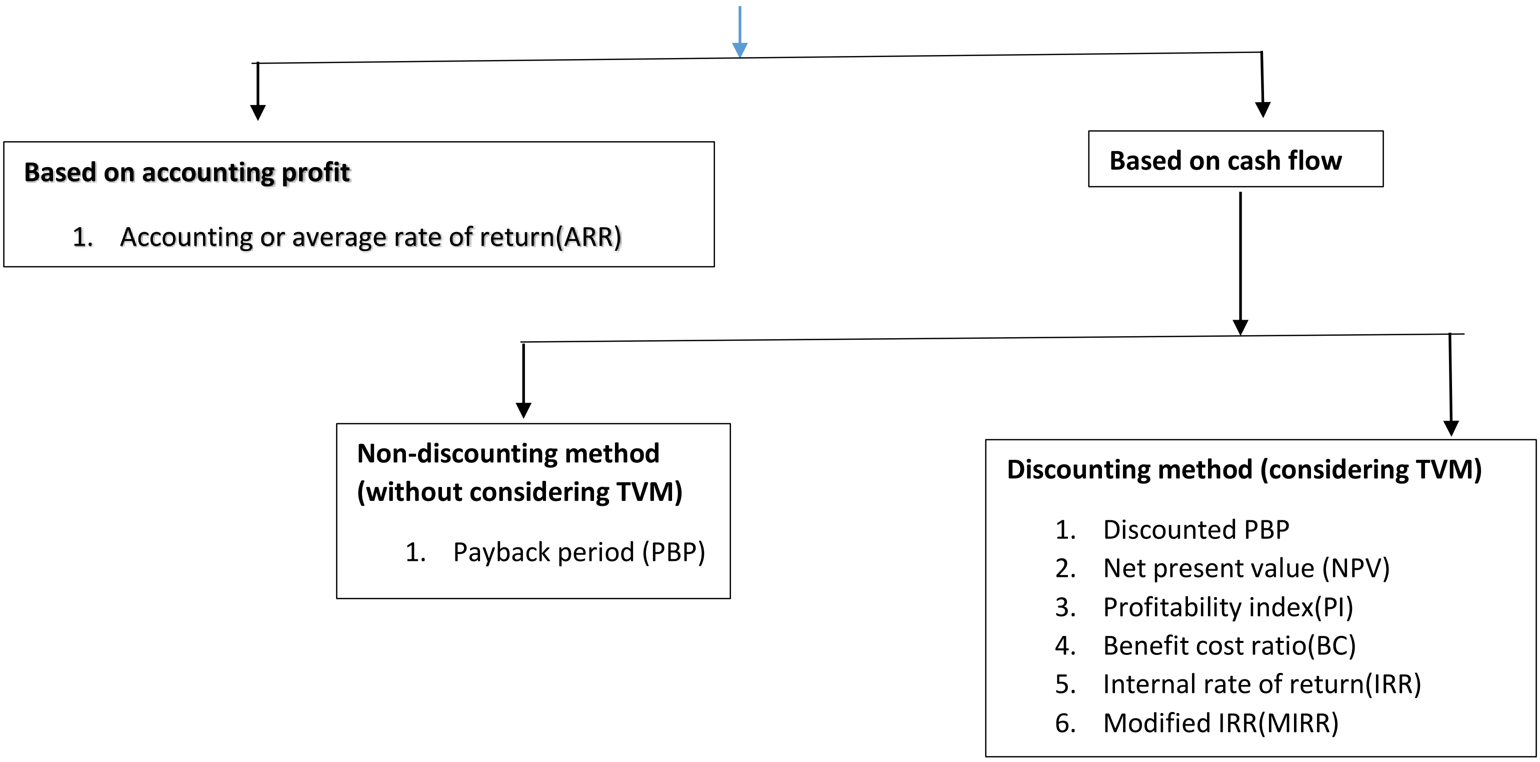
CAPITAL BUDGETING-II

CAPITAL BUDGETING OR CAPITAL EXPENDITURE DECISION

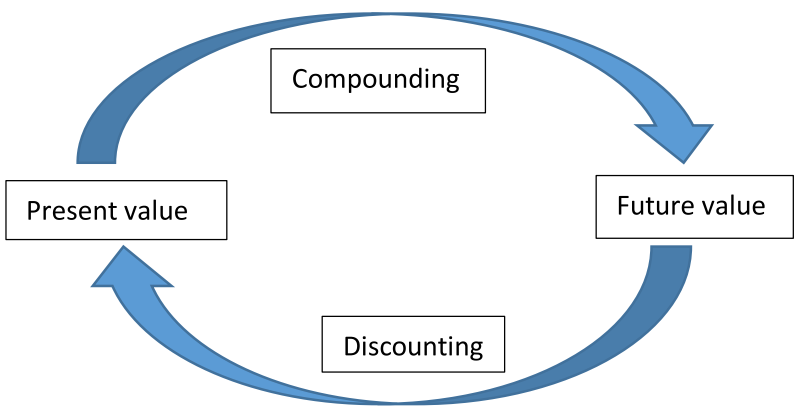
Capital expenditure decision is an investment decision of financial management, where investment can be done through long term assets like, fixed assets.

TECHNIQUES OF CAPITAL BUDGETING DECISION

EVALUATION METHOD



TIME VALUE OF MONEY (TVM): it implies that rupee received today has higher value then the rupee received in future. This preference for money now, as compared to future money, is called ‘time preference for money’ or ‘time value of money’ (TVM).



In capital budgeting decision we, use discounting technique of time value of money.

- ❖ Nature and types of cash flows
  - ➢ Initial outflow/s (at beginning of the project):

Initial outflow = cost of the assets + installation coat + cost of trial run, if any + additional working capital requirement – subsidy – tax incentives, if any.

  - ➢ Regular net cash flows (NCF) in subsequent years while the project is running:

Thus, subsequent NCF= tax adjusted regular NCF – other outflows + other inflows

= [EBIT(1-T)+D]- other outflows + other inflows

  - ➢ Last or terminal year's net cash flow:

Terminal year's NCF= tax adjusted regular NCF + scrap value(S) – dismantling expenses (DE) + recoverable working capital (WC)

= [EBIT (1-T) +D] + S – DE + WC

DISCOUNTING METHOD (CONSIDERING TVM)

1. **DISCOUNTED PAYBACK PERIOD METHOD (DPBP):** under this method, PBP period is ascertained by using the discounted NCF. DPBP may be defined as the project's break even period or investment recovery period after taking into consideration the time value of money. The main advantage of DPBP is that it takes into account both risk as well as time value of money.

   EXAMPLE-1

   The initial investment of project A is Rs.2,50,000. It is expected to generate net cash flow for the five years as: Rs.1,00,000; Rs.1,20,000; Rs.1,40,000; Rs.1,20,000 and Rs.80,000. The initial investment of project B is Rs.3,50,000. It is expected to generate net cash flow for the five years as: Rs.1,40,000; Rs.1,70,000; Rs.1,00,000; Rs.90,000 and Rs.70,000. Calculate the DPBP for both the projects using 10% cost of capital and offer your comment.

Solution

Computation of DPBP of project A

Year	NCF	Working for PVF	PVF	PV OF NCF	Cumulative PV of NCF
1	1,00,000	1/(1+0.1)^1	0.909	90,900	90,900
2	1,20,000	1/(1+0.1)^2	0.826	99,120	**1,90,020**
3	1,40,000	1/(1+0.1)^3	0.751	**1,05,140**	2,95,160
4	1,20,000	1/(1+0.1)^4	0.683	81,960	3,77,120
5	80,000	1/(1+0.1)^5	0.621	49,680	4,26,800
				TOTAL	13.80.000

Rs.2,50,000

An initial outflow of Rs.2,50,000 lies between Rs.1,90,020 and Rs.2,95,160

DPBP=2+ $\frac{\textbf{Rs.2,50,000- Rs.1,90,020}}{\textbf{1,05,140}}$

=2+ $\frac{\textbf{59.980}}{\textbf{1.05.140}}$

=2+0.57

=2.57 years.

Computation of DPBP of project B

Year	NCF	Working for PVF	PVF	PV OF NCF	Cumulative PV of NCF
1	1,40,000	1/(1+0.1)^1	0.909	1,27,260	1,27,260
2	1,70,000	1/(1+0.1)^2	0.826	1,40,420	2,67,680
3	1,00,000	1/(1+0.1)^3	0.751	75,100	**3,42,780**
4	90,000	1/(1+0.1)^4	0.683	**61,470**	4,04,250
5	70,000	1/(1+0.1)^5	0.621	43,470	4,47,720
				TOTAL	15,89,690

Rs.3,50,000

An initial outflow of Rs.3,50,000 lies between Rs.3,42,780 and Rs.4,04,250

DPBP=3+ $\frac{\textbf{3,50,000- 3,42,780}}{\textbf{61,470}}$

=3+ $\frac{\textbf{7,220}}{\textbf{61,470}}$ **= 3+0.117 =3.12 years.**

Comment: DPBP of project-A (being 2.57 years) less than DPBP of project-B (being 3.12 years); so, project-A is to be accepted.

2. NET PRESENT VALUE (NPV) METHOD

Net present value is the sum of discounted value of all cash flows (both outflow and inflow) of a project. By discounting the cash flows of different periods it provides a common base for comparison. This method explicitly recognise time value of money.

NPV= Present value of cash inflows – present value of cash outflows

If we take the previous example, then computation of NPV is-

Project-A

NPV=13,80,000 – 2,50,000

= 11,30,000

Project – B

NPV = 15,89,690 – 3,50,000

=12,39,690

Decision rules-

If NPV > 0 (zero), then project is accepted. In case of mutually exclusive projects, project having highest NPV is possible.

3. PROFITABILITY INDEX (PI)

PI is a variation of the NPV rule. While NPV is an absolute measure, PI is a relative measure. PI is the ratio of the present value of **all future net cash flows to initial cash outflows.**

PI is calculated-

$$PI=\frac{\text{PRESENT VALUE OF CASH OUTFLOWS}}{\text{PRESENT VALUE OF CASH INFLOWS}}$$

Do not consider subsequent outflows in the denomination.

Decision rule-

If PI >1, the project is profitable. In case of mutually exclusive projects, project having highest PI is most profitable.

4. **Benefit-cost ratio (BC ratio)**

Unlike profitability index (PI), BC ratio separates all inflows and outflows of the project. BC ratio is the ratio of the present value of all future cash inflows to initial cash outflows and PV of all future cash inflows. Thus, BC ratio is to be calculated as follows:

$$BC = \frac{\text{PV of Future cash inflows}}{\text{Initial outflows + PV of future cash}}$$

Decision rule-

If BC>1, the project is profitable. In case of mutually exclusive projects, project having highest BC is most profitable.

5. **Internal rate of return (IRR)**

IRR is based on the discounting technique and gives the projects own rate of return. IRR can be defined as that rate of discount at which the NPV of the project is zero. In other words,

IRR ⟶ PV of cash inflows = PV of cash outflows

Steps in computation of internal rate of return of a project:

Step 1: The amount of initial investment required for the project is to be computed carefully by considering cost of purchase, installation charges and basic working capital.

Step 2: The effective working life of the project is to be estimated carefully.

Step 3: The interim or intermitted investment, if any required for the project are also to be computed very carefully.

Step 4: the first trial IRR can be determined by adopting the following method.

$$\textbf{Quotient} = \frac{\text{Initial outlay}}{\text{Annual average cash inflows}}$$

Provided the cash inflows are even.

Step 5: next find out two rates from the PVF table which is equal to the value of quotient for that number of years which is equivalent to the useful life of the project. Usually, there is no such rate which is exactly equal to the value of quotient. Thus, a lower rate and higher rate nearest to the value of quotient should be selected. Greater the variance in the inflow of cash, wider should be the lower and higher rate.

Step 6: next find out the NPV both at the higher and lower rate.

Step 7: the exact value of r can be found out by adopting the following formula:

$$\mathbf{R} = \text{lower rate} + \frac{\boxed{\text{NPV at the lower rate- initial outflow}}}{\boxed{\text{NPV at the lower rate – NPV at the higher rate}}} \times \boxed{\text{Difference between higher and lower rate}}$$

Decision rule-

If IRR> WACC, the project is profitable. For mutually exclusive projects, project with highest IRR is to be accepted.

EXAMPLE-2

Following information relate to a project having initial investment of Rs.2,00,000.

Year	1	2	3	4	5
NCF	50,000	40,000	65,000	75,000	50,000

Calculate the IRR of the project and comment on its acceptance if the WACC is 11%. For the purpose, following PVF are provided-

Year	1	2	3	4	5
PVF at 8%	0.926	0.857	0.794	0.735	0.681
PVF at 10%	0.909	0.826	0.751	0.683	0.621
PVF at 12%	0.893	0.797	0.712	0.636	0.567
PVF at 15%	0.870	0.756	0.658	0.572	0.497

SOLUTION

Of the given rates, let us start with 10% rate to minimize the number of trials. The reason being, if 10% is not the rate we will have to switch either to 8% or to 12%. But if we take 8%, we might have to consider 10% and also 12% for better result.

Calculation for IRR:

Year	NCF	At 10% rate		at 12% rate	
		PVF	PV of NCF	PVF	PV of NCF
1	50,000	0.909	45,450	0.893	44,650
2	40,000	0.826	33,040	0.797	31,880
3	65,000	0.751	48.815	0.712	46,280
4	75,000	0.683	51,225	0.636	47,700
5	50,000	0.621	31,050	0.567	28,350
			2,09,580		1,98,860

We see that, at 10% rate, total PV of NCF is Rs.2,09,580 which is greater than initial outflow= Rs.2,00,000. So we try for a higher rate of 12% (as given in the question). At 12% rate, total PV of NCF is Rs.1,98,860 which is lesser than initial outflow Rs.2,00,000. Thus we can conclude that the IRR is in between 10% to 12% rate. Now let us apply simple interpolation to find the approx. rate of IRR.

$$R = 10 + \frac{2{,}09{,}580 - 2{,}00{,}000}{2{,}09{,}580 - 1{,}98{,}860} \times \text{(difference of HR-LR)}$$ **=10+(0.89x2)=11.78%**

Comment: since IRR is greater than WACC of 11%, the project should be accepted.

6. **Modified internal rate of return (MIRR)**
   MIRR is that rate of return of a project which considers future cash flows to be re-invested at the cost of capital of the firm or any other realistic rate rather than at an arbitrary rate.

- **Ranking of competing projects, evaluation of projects with unequal lives and capital rationing**

1. **Ranking of competing projects**: when there is more than one project, the project having the highest PI is to be preferred first and according to the highest PI other projects are to be ranked (or preferred). NPV will not work in such situation as the initial outflows of different products may be different and as a result the project having higher initial outflows may produce higher NPV. NPV is an absolute measure whereas PI is a relative measure and PI indicates how much NPV will be produced against an initial investment of Rs.1. so PI is an effective measures in such situation.
2. **Capital reasoning:** consider a situation where a company has more than one profitable project to accept, but it doesn't have available fund to accept all project. It is a State of fund constraint. In such a situation, the firm needs to allocate it's restricted fund among the most profitable project to maximize wealth. Decision making in such a cases are called capital reasoning, i.e. distributing the limited resources to some of the profitable projects and to reject other projects (although those are also profitable).
   Allocation of funds based on divisibility and indivisibility of projects:
   In case of divisible projects: first allocate the funds (equal to the initial investment) to the projects in order of their PI to the extent possible and then partial fund to the next most profitable project.
   In case of indivisible projects: in such a situation, partial allocation is not possible. So we should consider different combinations of projects that can be taken up within the limits of total fund and the resultant total NPV. The combination yielding maximum NPV should be accepted. Remember, under this situation the firm may be left with some surplus (idle/unutilized) fund.

To be continue…