**SEMESTER** – **B.Com, SEMESTER 6**

**SUBJECT** – **FINANCIAL MANAGEMENT**

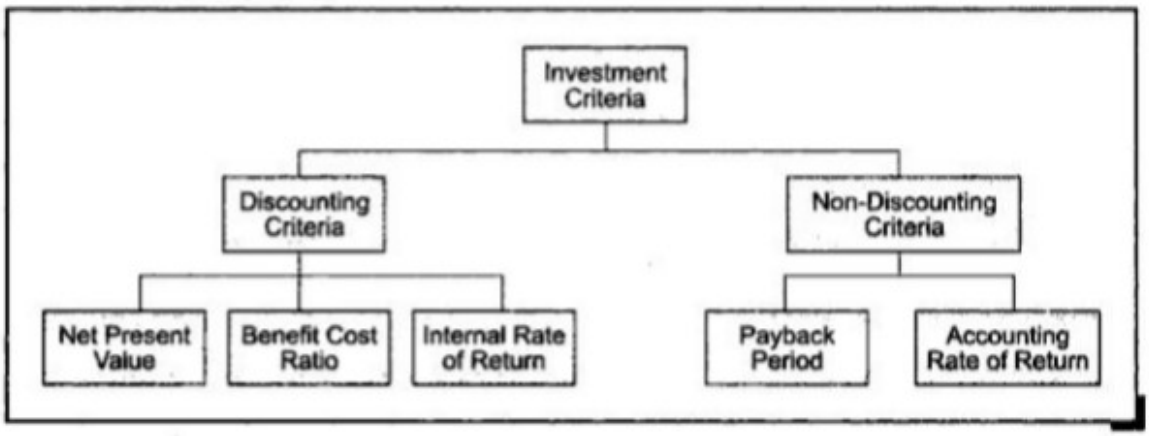
**NAME OF THE TEACHER** – **DEEPASHREE CHATTERJEE**

**LECTURE NO. – 4**

## CAPITAL BUDGETING

**Techniques of Capital Budgeting** **cont…**

(2) **Time adjusted techniques** - These methods take into consideration the time value of money and hence use discounting criteria.




The time adjusted and discounting techniques normally use the following techniques to assess the viability of a project:

1. Net Present Value technique

2. Internal rate of Return

3. Profitability Index

Now let us discuss each of these techniques in detail.

**Time adjusted / discounted cash flow techniques of capital budgeting:**

- **NPV- Net Present Value** - NPV is the most important discounting techniques in appraising the capital budgeting decisions. It calculates the investment decisions that involve cash flow occurring over multiple periods. The NPV of a project is the sum of the present values of all the cash flows positive and negative that is expected to occur over the life of the project. It is the process of calculating present values of cash inflows using cost of capital as an appropriate rate of discount and subtracts present value of cash outflows from the present value of cash inflow and find the net present value, positive or negative.

  In simple words NPV is the summation of the present values of the net cash inflows in each year over the cash outflows. The formula for NPV can be written as follows:

$$NPV = \frac{C1}{(1+K)1} + \frac{C2}{(1+K)2} + \frac{C3}{(1+K)3} + \ldots\ldots + \frac{Cn}{(1+K)n} - C_0$$

  The cash flows reoccurring in all the years should be added with salvage value and working capital released at the end of the life of the project. From this summation initial outflow should be deducted to get the absolute NPV. A project would be accepted if NPV is positive and rejected if it is negative. Zero NPV would mean that the firm is indifferent to accept or reject the project as it would leave the company's financial position unchanged. The NPV of a package of projects is simply the sum of the NPVs of individual projects.

  As a decision criteria NPV can also be used to make a choice between mutually exclusive projects. The various projects would be ranked on the basis of NPV. The project with highest NPV would be given the first rank followed by others in the descending order.

  NPV is the technique which recognises the time value of money. It takes into consideration the total benefits arising over the lifetime of the project.

This measure is an absolute measure so if two projects with similar outlays have different NPVs it is possible to make a right choice. But if the projects have different outlays then NPV may not give the right decision. This method can also not be relied on if two projects having different effective lives.

**Example 6**

A project PQR costs Rs 25000 now and is expected to generate cash inflows of Rs 9000, Rs 8000, Rs 7000, Rs 6000 and Rs 5000 in Years 1 to 5.The opportunity cost of the capital is 10%. Calculate the Net Present value for the project. Seeing the table we would calculate the present values of cash inflows

Rs 9000 ($PVF_{1, 0.10}$) + Rs 8000 ($PVF_{2, 0.10}$) + Rs 7000 ($PVF_{3, 0.10}$ ) + Rs 6000 ($PVF_{4, 0.10}$) + Rs 5000 ( $PVF_{5, 0.10}$) – Rs 25000. = Rs 27250 – 25000 = 2250.

The project PQR generates positive NPV and therefore creates wealth for the shareholders and hence should be accepted.

Let us understand this important technique with one more example.

**Example 7**

A new machine costs Rs 200000, requires no increased investment in working capital and is expected to yield Rs 60000 profit per year for 10 years, at that time its scrap value will be negligible. Assume SLM depreciation and a 30 % tax rate.

If management requires at least a 10 % return on any new investment, would the investment qualify?

**Solution**

**Calculation of CFAT**

| | |
|---|---|
| **EBDT** | **60000** |
| **Less dep** | **20000** |
| **EBT** | **40000** |
| **Less Taxes@30%** | **12000** |

| | |
|---|---|
| **EAT** | **28000** |
| **Add Depreciation** | **20000** |
| **CFAT** | **48000** |

Computation of NPV for the Year 1 to 10 the cash flow remains the same. In the tenth year also, there is no release of working capital and scrap value so taking value from the table A-4, the 10th year at discount factor 10 %, the value obtained is 6.145 which is to be multiplied by 48000 , ie 48000 x 6.145 = Rs 2,94,960 and the present value of cash inflows would be Rs 294960.

From this cash outflows is deducted, i. e. Rs (2,94,960 – 2,00,000) and the NPV is derived of Rs 94,960.

**IRR- Internal Rate of Return**

The second technique of discounted cash flow for appraising capital investment decisions is the IRR. The other name for this technique is yield on investment, marginal efficiency of capital, marginal productivity of capital, rate of return, time adjusted rate of return and so on. IRR method also considers time value of money by discounting the cash streams. It is the rate of return that a project earns. It is defined as the discount rate (r) which equates the aggregate present value of the net cash inflows (CFAT) with the aggregate present value of cash outflows of a project. It can also be defined as that rate which gives the project NPV equal to zero. According to Joel Dean (1951), IRR takes into account the magnitude and timing of cash flows.

The IRR is compared with the discount rate to decide whether the proposal should be accepted or rejected. If IRR exceeds the discount rate the project would be accepted and if the IRR doesn't exceeds the discount rate it would be rejected. If IRR is equal to the discount rate the firm is indifferent as to whether to accept or reject the project. If the project IRR is greater than the cost of capital, the project should be accepted. If the IRR is less than the cost of Capital the project should be rejected. If IRR is equal to the cost of capital, the project may be accepted.

To understand this technique let us see a numerical example.

**Example 8**

A project needs an investment of Rs 13,85,000. The cost of capital is 12%. The net cash inflows are as follows:

| Year | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| CFAT (Rs) | 300000 | 400000 | 600000 | 300000 | 200000 |

Calculate IRR.

**Solution:**

Computation of IRR is based on the cash flow after taxes. In this method the evaluator selects any discount rate (by calculating Fake Payback period) to compute present value of cash inflows otherwise, the cost of capital taken as first trail. If the calculated present value of the cash inflows is higher than the present value cash outflows, then, the evaluator has to try a higher rate and vice versa. After arriving at the NPV applying both these rates, interpolation method is applied to arrive at the actual IRR where the NPV would be 0.

Fake PBP = (Initial Investment/Average Annual cash flow) = 1385000/360000=3.847

Referring to the PV of an annuity of one rupee table, we find that the fake payback period of 3.847 lies in between 10% and 8% so

| Year | CFAT | DF@8% | DCIF* | DF@10% | DCIF* |
|---|---|---|---|---|---|
| 1 | 300000 | .926 | 277800 | .909 | 272700 |
| 2 | 400000 | .857 | 342800 | .826 | 330400 |
| 3 | 600000 | .794 | 476400 | .751 | 450600 |
| 4 | 300000 | .735 | 220500 | .683 | 204900 |
| 5 | 200000 | .681 | 136200 | .621 | 124200 |
| Total | | | 1453700 | | 1382800 |
| Less: Cash outflow | | | 13,85,000 | | 13,85,000 |
| NPV | | | 68400 | | -2200 |

- DCIF means Discounted Cash Inflow, i.e. Present Value of Cash Inflow

| Discounting Rate | NPV |
|---|---|
| 8% | 68400 |
| ➢ IRR | ----------0 |
| 10% | -2200 |

Thus through interpolation, we have to find that rate of discounting where NPV = 0, which lies between 8% and 10%. Applying interpolation, we get:

$$\frac{IRR-8\%}{10\%-8\%} = \frac{0 - 68400}{-2200-68400} + 8\%$$

➢ $IRR = \frac{-68400 \times 2\%}{-70600} + 8\%$

$= \frac{-1368}{-70600} + 0.08 = .0193 + .08 = .094$ or 9.4%

Hence, IRR of the project is 9.4%. Now since the IRR is less than the cost of capital, i.e 12%, the project cannot be selected.

**Profitability Index**

This is another time adjusted capital budgeting technique. The profitability index approach measures the present value of returns per rupee invested. It is the ratio of the present value of cash inflows at the required rate of return to the Present value of cash outflow of the investment.

$$PI = \frac{\text{Present value of cash Inflow}}{\text{Present value of Cash Out flow}}$$

It is a relative measure but NPV is the absolute measure. Profitability Index is measured by dividing Present value of cash inflows by Present value of outflows. Profitability index is

used for capital rationing because NPV does not give the right insight if Projects require different initial outlays. This method is also known as the Benefit cost ratio because the numerator measures the benefits and the denominator measures the cost.

**Accept Reject Criterion**

A Project will qualify for acceptance if the profitability index exceeds one. When profitability is equal to one, the firm is indifferent to the project.

**Example 9**

The Initial cash out flow of a project is Rs 1000000 and it can generate cash inflow of Rs 400000, Rs 300000, Rs 500000 and Rs 200000 in years 1to 4. If the discount rate is 10%, then calculate Profitability Index.

Solution: Present value of cash flows need to be calculated first and here it is equal to 1123500.

$$PI = \frac{1123500}{100000.} = 1.12$$

The project has a P.I greater than 1, so it will be accepted.

**Summary**

The capital budgeting Proposals needs a careful analysis which can be done through the various discounted and non discounted techniques. These techniques have their own advantages and disadvantages. The discounted techniques are superior to non discounted techniques as they take into consideration the time value of money and the benefits occurring in the total life of the project.