

Semester 6

FINANCIAL MANAGEMENT

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CAPITAL EXPENDITURE DECISION

LECTURE 2

1. Internal Rate of Return

IRR is the time adjusted marginal rate of return over the cost of capital. IRR for single cash flow investment: $(C_1/C_0)-1$ where C_1 is the cash inflow after 1 year and C_0 is the initial investment. IRR for multiple equal cash flow investment is the rate which the NPV is equal to 0 which can be obtained by solving the following equation: $C_0 - C_1/r [(1-(1+r)^n)]$. In case of unequal cash flows, the procedure is same. Here, the equation to be solved is $[C_0 - (C_1/(1+r) + C_2/(1+r)^2 + \dots + C_n/(1+r)^n]$. In order to calculate the value, we have to apply a trial and error method. So, we shall try with any rate initially, if the NPV is negative, we try with a lower rate and vice versa. If $IRR > K_c$, the project is accepted and vice versa. IRR considers all cash flows associated with a project and if $IRR > K_c$, it will lead to maximization of shareholders value. If any project leads to multiple value of IRR, it may be difficult to take acceptance decision. This is possible if IRR (for 2 CIs and 1 CO) is calculated based on a quadratic equation $[x = \{-b \pm \sqrt{(b^2 - 4ac)}\}/2a]$. It may fail to predict correct choice between mutually exclusive projects under certain situation in comparison with NPV. In case of difference in ranking, equate NPV_A to NPV_B and solve for 'r'. If the opportunity cost of capital (discount rate) is lower than this 'r', then it will lead contradictory result. However, if discount rate is more than this 'r', they will project consistent result. In order to find out the better project in this scenario, the company may calculate NPV and IRR for incremental cash flows. The project that provides better return in terms of NPV and IRR is to be selected. IRRs are not value additive [$IRR(A) + IRR(B) \neq IRR(AB)$]. In NPV method, it is assumed that cash flows are reinvested at opportunity cost of capital, while in IRR method; it is assumed that they are reinvested at IRR. Modified IRR (MIRR): annual average cash flows are compounded at opportunity cost of capital and the terminal value of the average cash flow is equated to the cash outflow to solve for 'r'.

Example:

Project A, B, C are mutually exclusive projects

Project A: Investment: Rs. 16000. Cash inflows: Rs. 8000; Rs. 7000; Rs. 6000 at the end of each year for next 3 years.

Project B: Investment: Rs. 37500; Cash inflows: Rs. 10000 and Rs. 40000.

Project C: Investment: Rs. 20000; Cash flows: Rs. 10860, Rs. 10860 and Rs. 10860

Total fund available: Rs. 60000.

Cost of capital 16%.

2. Profitability Index

$PI = PV(C_t) / C_0$. If $PI > 1$, the project is accepted and vice versa. It is a relative measure of projects profitability and leads to increase in shareholders' wealth. There may be situations where in 2 mutually exclusive projects, decision taken based on NPV and PI is different. In that situation, the decision is to be made on incremental cash flows.

Example

Project A and Project B are mutually exclusive

Project A: Investment: Rs. 100000; Cash inflows: Rs. 40000; Rs. 30000; Rs. 50000; Rs. 20000.

Project B: Investment: Rs. 100000; Cash inflow: Rs. 40000 from year 1 to 4.

Opportunity cost of capital: 10%.