Methods of Project Evaluation

1. Present Worth Method
2. Future Worth Method
3. Annual Worth Method

Present Worth Method

- Present Worth (PW) is also called Discounted Cash Flow (DCF), Present Value (PV) and Net Present Value (NPV). The interest rate is also referred to as the discount rate.
- Three Types of Categories: 1. The Single Project 2. Mutually Exclusive Set, 3. Independent Project Set.
- **The Single Project** = Called “The Unconstrained Project Selection Problem; No comparison to competing or alternative projects
- **Mutually Exclusive** (ME) = Only one of the feasible (viable) projects can be selected from the set. Once selected, the others in the set are “excluded”. Each of the identified feasible (viable) projects is (are) considered an “alternative”. ME alternatives compete with each other
- **The Independent Project** Set = Given the alternatives in the set, more than one can be selected, Deal with budget limitations, Project Dependencies and relationships. May or may not compete with each other – depends upon the conditions and constraints that define the set

Present Worth – A Function of the assumed interest rate.

- If the cash flow contains a mixture of positive and negative cash flows – • We calculate: – PW(+ Cash Flows) at i%; – PW(“-” Cash Flows) at i%; – Add the result!
- We can add the two results since the equivalent cash flows occur at the same point in time!

Present Worth – A Function of the assumed interest rate. • If P(i%) > 0 then the project is deemed acceptable. • If P(i%) < 0 then the project is deemed unacceptable! • If the net present worth = 0 then, – The project earns exactly i% return – Indifferent unless we choose to accept the project at i%.

Calculations of Present Worth Method

Present Worth is the difference between present worth of cash inflows and the present worth of cash outflows at a given rate of interest.

NPW(i)= PW (i) cash inflows – PW (i) cash outflows

There are six condition for present worth comparison

1. Cash Flows should be known
2. Time value of money is assumed to remain unchanged during the study period.
3. Interest rate should be known
4. Comparison should not include intangible consideration.

Cash- Flow Transactions

- **The cost dominated cash flow**

$PW(i) = P + C_1/(1+i)^1 + C_2/(1+i)^2 + \ldots\ldots + C_n/(1+i)^n - S/(1+i)^n$

The Revenue dominated cash flow

$PW(i) = -P + R_1/(1+i)^1 + R_2/(1+i)^2 + \ldots\ldots + R_n/(1+i)^n + S/(1+i)^n$

Where, P is the initial investment

Cj is the net cost operation and maintenance at the end of the year

Rj is the net revenue

S is the salvage value

. i= the discount rate of interest

Method Consists of Present worth Method

- Estimation of project cash inflows and cash outflows
- Selection of an appropriate rate of discount
- Determination of project life (n).
- Computation of NPW (i)
- Evaluation of Single Project:

i. If NPW>0, then accept the project for investment
ii. If NPW<0, then reject the project
iii. If NPW=0, then remain indifferent

Features of Present Worth Method

1. The NPW method is based on the assumption that the intermediate cash inflows of the project are re invested at a rate of return equal to the cost of capital of the firm.

1. The NPW of project is inversely related to discount rate.

Example: The investment amount of a project is 75,000. 1st year return is 24,400, 2nd year return is 27,340 and 3rd year return is 55,760. with 15 % rate of interest and 3 year time period the PW is

PW(15%)= -75K+24400 (P/F,1,15%)+27340(P/F,2,15%)+55760(P/F,3,15%)

-75K+24400(1+15/100)-1+27340(1+15/100)-2+55760(1+15/100)-3

=-75K+21217.39+20672.96+36663.10

=3553.46

INV=6,50,000…RETURN=1,62,500, N=8, R=15%..NPW=?

NPW(15%)= -650000+162500 (P/A, 15%, 8)

- M1.. RS 450,000, M=27,000, N=15
- M2=5,40,000, M=28,500, N=15
- PW(M1)=-4,50,000-27,000(P/A,15%,15)
- PW(M2)= -540000-285000(P/A,15%,15)

Future Worth Method

Future worth of a cash flow is its equivalent value at the end of the project life. Net future worth is the difference between the future worth of cash flows and the future worth of cash outflows at a given rate of interest.

NFW(i)= FW (i) cash inflows – FW (i) cash outflows

If cash flow stream is revenue dominated, then future worth

$FW(i) = -P+(1+i)^{n}+ R_1/(1+i)^{n-1}+ \ldots\ldots+ R_n+S$

If cash flow stream is cost based dominated, then future worth

$FW(i) = P+(1+i)^{n}+ C_1(1+i)^{n-1}+ C_2(1+i)^{n-2} \ldots\ldots+ C_n-S$

Evaluation of Single Project

i. If NFW>0, then accept the project for investment

ii. If NFW<0, then reject the project

iii. If NFW=0, then remain indifferent

Evaluation of alternative Projects:

1. Greater the NFW (i) , better is the project , if the project cash flow pattern is revenue Dominated
2. Smaller the NFW (i), better is the project, if the project cash flow pattern is cost dominated.

Example:

- The investment amount of a project is 75,000. 1st year return is 24,400, 2nd year return is 27,340 and 3rd year return is 55,760. with 15% rate of interest and 3 year time period, calculate the future worth method.

FW (15%)= -75,000 (F/P,15%,3)+24,000(F/P,15%,2)+ 27,340

(F/P,15%,1)+ 55,760

= 5,404.38

Annual Worth Method

Annual worth is a measure of cash flows in terms of equivalent equal payments made on an annual basis. AEW is obtained by converting the equivalent value of a given set of cash flows into a series of uniform annual payments.

AEW (i)= NPW (i)* (A/P,i,n)

i. If AEW>0, then accept the project for investment

ii. If AEW<0, then reject the project

iii. If AEW=0, then remain indifferent

Evaluation of alternative Projects:

1. Greater the AEW (i) , better is the project , if the project cash flow pattern is revenue Dominated

2. Smaller the AEW (i), better is the project, if the project cash flow pattern is cost dominated

EXAMPLE……

The Investment amount of a project is 20,000 with the salvage value of 4,000 and each year cash inflows are 4,400. with 5 year time period and 10% rate of interest, AEW will be=

PW (10%)= -20,000+4,400(P/A,10%,5)+4,000(P/F,10%,5)

= -836.88

AE (10%)= -836.88 (A/P,10%,5)

= -220.76

AE(10%)<0 indicates the rejection of the project. There will be an equivalent loss of Rs 220.76 per year.

Thank You….