

Net present value (npv) payback essay sample

[Finance](#), [Investment](#)



Characteristically, a decision to invest in a capital project involves a largely irreversible commitment of resources that is generally subject to a significant degree of risk. Such decisions have far-reaching effects on a company's profitability and flexibility over the long term, thus requiring that they be part of a carefully developed strategy that is based on reliable appraisal and forecasting procedures.

In order to handle these decisions, firms have to make an assessment of the size of the outflows and inflows of funds, the life span of the investment, the degree of risk attached and the cost of obtaining funds.

One of the most important steps in the capital budgeting cycle is working out if the benefits of investing large capital sums outweigh the costs of these investments. The range of methods that business organisations use can be categorised in one of two ways: traditional and discounted cash flow techniques. Traditional methods include the Average Rate of Return and Payback; discounted cash flow (DCF) methods using Net Present Value and Internal Rate of Return.

NET PRESENT VALUE (NPV)

Net present value is a way of comparing the value of money now with the value of money in the future. A euro today is worth more than a euro in the future, because inflation erodes the buying power of the future money, while money available today can be invested and so grow.

The technique is a three-stage process:

to calculate the present value of each element of cash expenditure in a proposal and then, to add these individual present values together to provide a total present value of the expenditures;

to similarly calculate the present value of each element of cash income in a proposal and, then, to add these individual present values together to provide a total present value of the incomes;

to deduct the total present value of expenditures from the total present value of the incomes, in order to determine the net present value;

If this calculation produces an NPV that is positive, the signal is to accept the proposal. If, however the NVP is negative, the signal is to reject the proposal.

YearProject A

Cash flow Project B

Cash flow

130. 0005. 000

225. 00025. 000

325. 00025. 000

45. 00025. 000

55. 00020. 000

(Estimated cash flow, initial outlay of 50. 000)

The next figure sets out a present value analysis of both projects. The discount rate used is 14 per cent.

Project A Project B

Year Net cash flow Discount rate NPV Net cash flow Discount rate NPV

0 (50,000) 1, 0 (50,000) (50,000) 1, 0 (50,000)

1 30,000 0, 877 226, 316 5, 000 0, 877 24, 386

2 25,000 0, 769 519, 238 25, 000 0, 769 519, 237

3 25,000 0, 675 016, 875 25, 000 0, 675 016, 875

4 45,000 0, 592 12, 960 25, 000 0, 592 114, 802

5 55,000 0, 519 42, 597 20, 000 0, 519 410, 388

Total 17, 986 15, 688

Excess present value index: $17,986 / 50,000 = 0,36$

$15,688 / 50,000 = 0,31$

We can see that both these projects have positive net present values when discounted at 14 per cent and therefore are both acceptable. However, if only one of the projects can be undertaken (for whatever reason), project A should be chosen.

The excess present value index indicates that each 1 invested in project A generates 1,36 of present value (1 plus an excess of 0,36), while the

corresponding excess for project B is just 0, 31. Thus, investing in project A will result in a greater increase.

ADVANTAGES OF NPV

There are two major advantages of NPV as a capital expenditure appraisal technique:

it accurately recognises the “ time value of money” for all expenditures or receipts - irrespective of the exact time at which they are made or received;

it enables alternative proposals to be ranked in order of attractiveness;

It recognises the “ time value of money” by converting future expenditures and receipts to their corresponding present value on investment criteria, taking account of the exact date on which they are expected to be made or received.

Alternative proposals can be ranked in order of attractiveness. This is important when considering either “ mutually exclusive” proposals or “ capital rationing”.

DISADVANTAGES OF NPV

There are two major disadvantages of NPV as a method of appraising capital expenditure proposals:

the net present value requires the organisation to calculate an interest rate to use for appraising capital investment proposals;

the net present value calculation is only valid for the interest rate that has been used;

The interest rate that is used is usually the organisation's Weighted Average Cost of Capital (WACC). But this WACC can change and can be subject to disagreement. The NPV calculation is only valid for the interest rate that has been used. If an organisation has appraised its capital investment proposals using an interest rate of 14% it will have a series of "go" or "no go" decisions which will only be valid for an interest rate of 14%. If the interest rate rises to 15% or falls to 13%, the decisions will no longer be valid, the calculations will have to be re-worked and new decisions taken.

PAYBACK

The payback period is the most widely used technique and is literally the amount of time required for the cash inflows from a capital investment project to equal the cash outflows. The usual way that firms deal with deciding between two or more competing projects is to accept the project that has the shortest payback period. Payback is often used as an initial screening method.

Payback period = Initial payment / Annual cash inflow

So if 4 million Euro is invested with the aim of earning 500. 000 per year (net cash earnings), the payback period is calculated thus:

$$P = 4. 000. 000 / 500. 000 = 8 \text{ years}$$

This all looks fairly easy! But what if the project has more uneven cash inflows? Then we need to work out the payback period on the cumulative cash flow over the duration of the project as a whole.

Payback with uneven cash flows:

Of course, in the real world, investment projects by business organisations don't yield even cash flows. Let's have a look at the following project's cash flows (with an initial investment in year 0 of 400. 000):

Year	Cash flow	Cumulative cash flow
0	(400. 000)	(400. 000)
1	175. 000	(225. 000)
2	275. 000	50. 000
3	390. 000	440. 000
4	4100. 000	850. 000
5	560. 000	1410. 000
6	640. 000	2050. 000

The payback period is precisely 5 years.

The shorter the payback period, the better the investment under the payback method. We can appreciate the problems of this method when we consider appraising several projects alongside each other.

YearProject12345

0(50)(100)(80)(100)(100)

1550404030

21030203030

31520202040

42010201010

52020520

610201010

Payback period (yrs)43343

We can see that the payback period for three of the projects (2, 3 and 5) is three years. In this case, the three projects are of equal merit. But, here we must face the real problem posed by payback: the time value of income flows.

Because there is a time value constraint here, the three projects cannot be viewed as equivalent. Project 2 is better than 3 because the revenues flow quicker in years one and two. Project 2 is also better than project 5, because of the earlier flows and because the post-payback revenues are concentrated in the earlier part of that period.

Arguments in favour of payback

Firstly, it is popular because of its simplicity. Research over the years has shown that firms favour it and perhaps this is understandable given how easy it is to calculate.

Secondly, in a business environment of rapid technological change, new plant and machinery may need to be replaced sooner than in the past, so a quick payback on investment is essential.

Thirdly, the investment climate demands that investors are rewarded with fast returns. Many profitable opportunities for long-term investment are overlooked because they involve a longer wait for revenues to flow.

Arguments against payback

It lacks objectivity. Who decides the length of the optimal payback time? No one does – it is decided by pitting one investment opportunity against another.

Cash flows are regarded as either pre-payback or post-payback, but the latter tend to be ignored.

Payback takes no account of the effect on business profitability. Its sole concern is cash flow.

CONCLUSION

Despite the disadvantage discussed above, NPV is the single most valuable of the various methods of capital investment appraisal and the one that should be used as the basis of decision making in this area.

It is probably best to see payback as a measure of liquidity than profitability. On that basis the payback method should only be a preliminary screening device, which is inappropriate as a basis for sophisticated investment decisions.