



Chapter 9

Discounted Cash Flow

What is discounted cash flow?

Discounted cash flow (DCF) is a way of evaluating different investment opportunities by determining how much each project is worth. The business can then decide to invest in the project that yields the highest return.

*Discounted Cash Flow –
used to evaluate different investment opportunities.*

Discounted cash flow starts by recognising that an investment is worth the net present value or NPV of its future free cash flows.

We are only interested in cash, in this case. It doesn't matter how many sales a business achieves or how much profit this makes if their customers don't pay what they owe and remain debtors forever. The value of these sales is zero if the business receives no cash for them.

*In the long run – only cash matters, not profit.
Debtors may never pay!*

How can I use discounted cash flow to decide which projects to invest in?

A business, or project, is only worth the total amount of cash it will receive over the years (future free cash flow).

However, cash which will be received in the future is not worth as much as cash received today. For example, would you rather get paid this month's salary this

month, or next year? When you take out a mortgage, you pay the bank interest because they are giving you cash today - which is very valuable - in return for cash you will pay back in the future, which is not worth as much.

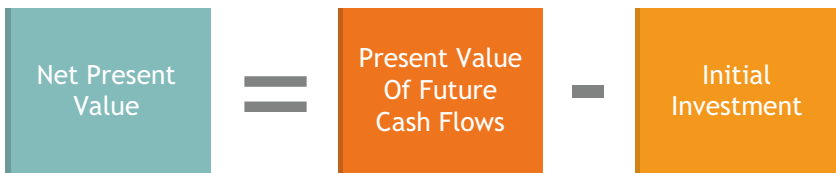
Cash in the future is not worth as much as cash today.

If an investment will return cash in the future, you need to know how much this future cash is worth today: its present value.

*Present value –
the current value of cash to be received in the future.*

The net present value of the project is calculated by subtracting the investment amount from the present value of future cash flows.

Net present value = present value of future cash flows – initial investment



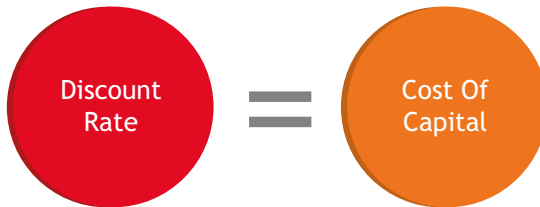
Only projects with positive net present values are profitable and should be considered as suitable for investment.

How do we calculate the present value of a future cash flow?

First, we need to know the organisation's discount rate. That is, how much more valuable cash is when received this year, than next year – expressed as a percentage.

Discount rate – how much more valuable cash received in one year is, as a percentage, than cash received in the next

We can use an organisation's cost of capital, or the interest rate at which it borrows money, as its discount rate.



For example, if the company pays 7% to borrow money, its discount rate is 7%. So, cash received a year earlier is worth 7% more to the business.

A higher discount rate means that a firm is in greater need of liquidity today, and does not place as much value on cash earned in the future. It will be less likely to invest in long-term projects.

*A high discount rate:
the firm needs liquidity today
less likely to invest in long-term projects*

The next formula can be used to calculate the present value of a future cash flow, or the discounted cash flow.

$$\text{Present value} = \text{cash flow} / (1 + r)^n$$

*n = how many years into the future the business
receives the cash inflow*

r = the discount rate, written as a decimal

The present value equals the cash flow received after n years, divided by one plus the discount rate r, to the power of n.

In this formula, n represents how many years into the future the business receives the cash inflow.

The discount rate r, must be written as a decimal, so 7% is written as 0.07.

If the business receives £10,000 after two years, the present value of this cash flow is 10,000 divided by 1 plus 0.07 to the power of 2, which equals £8,734.

$$\text{Present value of year 2} = 10,000 / (1 + 0.07)^2 = \text{£8,734}$$

If the business receives £20,000 after three years, the present value of this cash flow is 20,000 divided by 1 plus 0.07 to the power of 3, which equals £16,326.

This gives a total present value of £8,734 plus £16,326 which equals £25 060.

$$\text{Present value of year 3} = \text{£20,000} / (1 + 0.07)^3 = \text{£16,326}$$

$$\text{Total present value} = \text{£8,734} + \text{£16,326} = \text{£25,060}$$

If there are no further future cash flows for this project, its net present value is found by subtracting the initial investment cost (say, £23,000).

The net present value or discounted cash flow equals the present value of future cash flows, minus the initial investment, which is £25,060 minus £23,000 – totalling £2,060.

Since the net present value is positive, this project seems like a good prospect for investment. The business can compare this project with others that also have positive NPVs, to decide whether to invest or not.

The diagram illustrates the calculation of Net Present Value (NPV) using three circles. A teal circle on the left is labeled 'Net Present Value'. It is followed by an equals sign. In the center is an orange circle labeled 'Total Present Value'. This is followed by a minus sign. On the right is a yellow-orange circle labeled 'Initial Investment'. Below this visual equation, the numerical calculation is provided: = 25,060 - 23,000 = £2,060.

$$\text{Net Present Value} = \text{Total Present Value} - \text{Initial Investment}$$

$$= 25,060 - 23,000 = \text{£2,060}$$

Positive NPV – the business should consider this project

If the company in our example faced higher borrowing costs, perhaps with a discount rate of 12%, the net present value of this project would decrease. The cash it would earn in the future is not as valuable to the company as the cash it would have to invest today.

Higher discount rates decrease NPVs because future cash inflows are not as valuable to the firm.

If the present value is calculated with a discount rate of 0.12, our total present value decreases to £22,208.

Our net present value now becomes £22,208 minus £23,000, which equals £792 (negative).

Since the net present value is negative, the project should not be considered, because the business' capital cost is higher than the returns the project will yield.

$$\text{Total Present Value} = 7,972 + 14,236 = \text{£}22,208$$

$$\text{Net Present Value} = 22,208 - 23,000 = -\text{£}792.$$

Negative NPV – the project should not be considered further

“It doesn’t matter how many sales a business achieves or how much profit this makes if their customers don’t pay what they owe and remain debtors forever.”