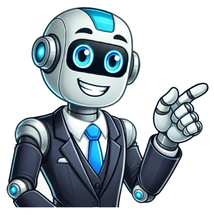
Click to verify



A discounted payback period is the number of years it takes to break even from undertaking an initial expenditure in a project. It's determined by discounting future cash flows and recognizing the time value of money. The discounted payback period is used in capital budgeting to evaluate the feasibility and profitability of a given project. The simpler payback period formula divides the total cash outlay for the project by the average annual cash flows. However, it's not as accurate as the discounted cash flow version because it assumes only one, upfront investment, and does not factor in the time value of money. So it's not as good at helping management to decide whether or not to take on a project. The discounted payback period is a metric used in capital budgeting to determine which projects to take on.More accurate than the standard payback period calculation, the discounted payback period factors in the time value of money.The discounted payback period formula shows how long it will take to recoup an investment based on the present value of the project's projected cash flows.The shorter a discounted payback period is, the sooner a project or investment will generate cash flows to cover the initial cost. Investopedia / Matthew Collins When deciding on any project to embark on, a company or investor wants to know when their investment will pay off, meaning when the cash flows generated from the project will more than cover the cost of the project or the investment. This is particularly important because companies and investors usually have to choose between more than one project or investment. So being able to determine when certain projects will pay back compared to others makes the decision easier. The basic method of the discounted payback period is to take the future estimated cash flows of a project and discount them to their present value (using discounted cash flows). This figure is compared to the initial outlay of capital for the investment. The period of time that a project or investment takes for the present value of future cash flows to equal the initial cost provides an indication of when the project or investment will break even. No cash flows after that will be diminished by the initial cost. The shorter a discounted payback period, the sooner a project or investment will generate cash flows to cover the initial cost. A general rule to consider is to accept projects that have a payback period that is shorter than the project's target timeframe. So, for example, management can compare the required break-even date to the discounted payback period. If the latter's metric (in years) is less than the required break-even date, that's a positive sign that can play into the decision of whether or not to give the project the go-ahead. To begin, the periodic cash flows of a project must be estimated and shown by each period in a table or spreadsheet. These cash flows are then reduced by their present value factor to reflect the discounting process. This can be done using the present value function and a table in a spreadsheet program. Next, assuming the project starts with a large cash outflow (or investment), the future discounted cash inflows are netted against the initial investment outflow. This process is applied to each additional period's cash inflow to find the point at which the inflows equal the outflows. At this point, the project's initial cost has been paid off, and the payback period is reduced to zero. The increase in inflation for consumer prices in the United States in April 2025, according to the Bureau of Labor Statistics. The core rate, which is adjusted to remove food and energy pricing, was 2.8%. Investors should consider the diminishing value of money when planning future investments. The payback period is the amount of time it takes a project to break even in cash collections using nominal dollars. Alternatively, the discounted payback period reflects the amount of time necessary to break even based not only on what cash flows occur but when they occur and the prevailing rate of return in the market. These two calculations, although similar, may not return the same result due to the discounting of cash flows. For example, projects with higher cash flows toward the end of a project's life will experience greater discounting due to compound interest. For this reason, the payback period may return a positive figure, while the discounted payback period returns a negative figure. Assume that Company A has a project requiring an initial cash outlay of $3,000. The project is expected to return $1,000 for each of the next five years, and the appropriate discount rate is 4%. The discounted payback period calculation begins with the -$3,000 cash outlay in the starting year (or period). The first year cash inflow is +$1,000. Using the present value discount calculation, the discounted payback period figure is $1,000/1.04 = $961.54. Thus, after the first period, the project still requires $3,000 - $961.54 = $2,038.46 to break even. After the discounted cash flows of $1,000/(1.04)2 = $924.56 in period two, and $1,000/(1.04)3 = $889.00 in period three, the net project balance is $3,000 - ($961.54 +$924.56 + $889.00) = $224.90. After receipt of the fourth year payment, which is discounted to $854.80, the project will have a positive balance of $629.90. Therefore, the discounted payback period is between three and four years. Example of Discounted Payback Period Present Value Discounted Value Net Cost Initial Investment -$3,000 -$3,000 -$3,000 Year 1 Cash Flow $1,000 $961.54 -$2,038.46 Year 2 Cash Flow $1,000 $924.56 -$1,113.90 Year 3 Cash Flow $1,000 $889.00 -$224.90 Year 4 Cash Flow $1,000 $854.80 +$629.90 Discounted Payback Period for Company A The standard payback period is calculated by dividing the initial investment cost by the annual net cash flow generated by that investment. First, determine the initial cost of an investment. The next step is to estimate the expected annual cash flows from the investment, as well as the discount rate (the value the cash flow loses with each successive year, due to inflation and the diminishing time value of money). Then calculate the present value of each instance of cash flow and subtract that from the cost. The discount payback period is the number of years it takes for the discounted cash flows to exceed the initial investment. The decision rule is a simple rule to determine if an investment is worthwhile, and which of several investments is most worthwhile. If the discounted payback period for a certain asset is less than the useful life of that asset, the investment might be approved. If a business is choosing between several potential investments, the one with the shortest discounted payback period will be the most profitable. The discounted payback period is a metric used to determine if an investment will be sufficiently profitable (in an acceptable time period) to justify its initial cost. It uses the predicted returns from the investment, and takes into consideration the diminishing value of future returns. The discounted payback period (DPP) is a success measure of investments and projects. Although it is not explicitly mentioned in the Project Management Body of Knowledge (PMBOK) it has practical relevance in many projects as an enhanced version of the payback period (PBP). Read through for the definition and formula of the DPP, 2 examples as well as a discounted payback period calculator. The discounted payback period is a measure of how long it takes until the cumulated discounted net cash flows offset the initial investment in an asset or a project. In other words, DPP is used to calculate the period in which the initial investment is paid back. In project management, this measure is often used as a part of a cost-benefit analysis, supplementing other profitability-focused indicators such as internal rate of return or return on investment. It can however also be leveraged to measure the success of an investment or project in hindsight and determine the point at which an initial investment has actually paid back. The discounted payback period is calculated by discounting the net cash flows of each and every period and cumulating the discounted cash flows until the amount of the initial investment is met. You will find the formula in the next section. This requires the use of a discount rate which can be either a market interest rate or an expected return. Some organizations may also choose to apply an accounting interest rate or their weighted average cost of capital. While the discounted payback period is still a comparatively handy indicator, it is more precise than the generic payback period as it considers the time of the occurrence of cash flows. The discounted payback period has a similar purpose as the payback period which is to determine how long it takes until an initial investment is amortized through the cash flows generated by this asset. The difference between both indicators is that the discounted payback period takes the time value of money into account. This means that an earlier cash flow has a higher value than a later cash flow of the same amount (assuming a positive discount rate). The calculation therefore requires the discounting of the cash flows using an interest or discount rate. The generic payback period, on the other hand, does not involve discounting. Thus, the value of a cash flow equals its notional value, regardless of whether it occurs in the 1st or in the 6th year. This may fit for the purpose of many high-level analyses. However, it tends to be imprecise in cases of long cash flow projection horizons or cash flows that increase significantly over time. If the expected return rate of an investment is used as the discount rate to calculate the discounted payback period, both indicators can be applied in conjunction to determine different types of payback periods: The generic payback period indicates in which period the investment has amortized based on investments and cash flows at face value.The discounted payback period (using the expected return rate) indicates in which period both the initial investment and the expected returns have been earned. The formula to calculate the discounted payback period is: DPP = y + abs(n) / p, where y = the period preceding the period in which the cumulative cash flow turns positive, p = discounted value of the cash flow of the period in which the cumulative cash flow is => 0, abs(n) = absolute value of the cumulative discounted cash flow in period y. In order to calculate the DPP, create a table with a column for the periods, cash flows, discounted cash flows and cumulative discounted cash flows. Identify y, n and p and insert the numbers in the above-mentioned formula (source: Clayman, Fridson, Troughton: Corporate Finance: A Practical Approach). Alternatively, you can use the calculator embedded in this article. Refer to the section below for an example of this calculation approach. Use this calculator to determine the DPP of a series of cash flows of up to 6 periods. Insert the initial investment (as a negative number since it is an outflow), the discount rate and the positive or negative cash flows for periods 1 to 6. The Calculator is determining the DPP. The present value of each cash flow, as well as the cumulative discounted cash flows for each period, are shown for reference. The numbers used in this example are stemming from the case study introduced in our project business case article where you will also find the results of the simple payback period method. In this analysis, 3 project alternatives are compared with each other, using the discounted payback period as one of the success measures. The following tables contain the cash flow forecasts of each of these options. The discount rate was set at 12% and remains constant for all periods. Project Option #1 Year – 1 2 3 4 5 6 Investment and Cost (outflows) – 5,000 -5,000 -1,000 – 500 – 500 -1,000 -1,000 Benefits and Earnings (inflows) – – 3,000 5,000 5,000 4,000 4,000 Net Cash Flow – 5,000 -5,000 2,000 4,500 4,500 3,000 3,000 Discounting cash flow formula -5000 / (1 + 12%) ^ 0 -5000 / (1 + 12%) ^ 1 2000 / (1 + 12%) ^ 2 4500 / (1 + 12%) ^ 3 4500 / (1 + 12%) ^ 4 3000 / (1 + 12%) ^ 5 3000 / (1 + 12%) ^ 6 Discounted net cash flow – 5,000 -4,464 1,594 3,203 2,860 1,702 1,520 Cumulative discounted cash flows – 5,000 -9,464 -7,870 -4,667 -1,807 – 105 1,415 The relevant rows – the years, the discounted cash flows and the cumulative discounted cash flows are bolded in this table. To calculate the DPP, we need to search: y (the period preceding the period in which the cumulative cash flow turns positive) which is year 5 in this example;p (discounted value of the cash flow of the period in which the cumulative cash flow is => 0) = 1,520, the periodic discounted net cash flow of year 6;abs(n), the absolute value of the cumulative discounted cash flow in period y, which amounts to -105. Inserting these numbers into the previously introduced formula [DPP = y + abs(n) / p] looks as follows: Discounted Payback Period = 5 + abs(-105) / 1520 = 5.07. Project Option #2 Year – 1 2 3 4 5 6 Investment and Cost (outflows) – 15,000 -1,000 -1,000 -1,000 – 500 – 500 -1,000 Benefits and Earnings (inflows) – 2,500 5,000 5,000 5,000 5,000 5,000 Net Cash Flow – 15,000 1,500 4,000 4,000 4,500 4,500 4,000 Discounting cash flow formula -15000 / (1 + 12%) ^ 0 1500 / (1 + 12%) ^ 1 4000 / (1 + 12%) ^ 2 4000 / (1 + 12%) ^ 3 4500 / (1 + 12%) ^ 4 4500 / (1 + 12%) ^ 5 4000 / (1 + 12%) ^ 6 Discounted net cash flow – 15,000 1,339 3,189 2,847 2,860 2,553 2,027 Cumulative discounted cash flows – 15,000 -13,661 -10,472 -7,625 -4,765 -2,212 – 185 In this example, the cumulative discounted cash flow does not turn positive at all. Therefore, a discounted payback period cannot be calculated. In other words, the investment will not be recovered within the time horizon of this projection. Project Option #3 Year – 1 2 3 4 5 6 Investment and Cost (outflows) – 3,000 -3,000 -2,500 -1,000 – 500 – 500 – 500 Benefits and Earnings (inflows) – – 3,000 4,000 4,000 3,000 3,000 Net Cash Flow – 3,000 -3,000 500 3,000 3,500 2,500 2,500 Discounting cash flow formula -3000 / (1 + 12%) ^ 0 -3000 / (1 + 12%) ^ 1 500 / (1 + 12%) ^ 2 3000 / (1 + 12%) ^ 3 3500 / (1 + 12%) ^ 4 2500 / (1 + 12%) ^ 5 2500 / (1 + 12%) ^ 6 Discounted net cash flow – 3,000 -2,679 399 2,135 2,224 1,419 1,267 Cumulative discounted cash flows – 3,000 -5,679 -5,280 -3,145 – 920 498 1,765 The cumulated discounted cash flow becomes positive in period 5. The discounted payback period is calculated as follows: Discounted Payback Period = 4 + abs(-920) / 1419 = 4.65 Option 1 has a discounted payback period of 5.07 years, option 3 of 4.65 years while with option 2, a recovery of the investment is not achieved. If DPP were the only relevant indicator, option 3 would be the project alternative of choice. Using the payback period (without discounting cash flows) would lead to an identical ranking yet option 3 with a PBP of 4.71 years and option 1 with 4.77 years are much closer while in option 2, the investment would be recovered after 5.22 years. In any case, the decision for a project option or an investment decision should not be based on a single type of indicator. You can find the full case study here where we have also calculated the other indicators (such as NPV, IRR and ROI) that are part of a holistic cost-benefit analysis. The discounted payback period is a good alternative to the payback period if the time value of money or the expected rate of return needs to be considered. The DPP can be used in a cost-benefit analysis as well as for the comparison of different project alternatives. *Assumes cash flows are equal**See below for simple and uneven cash flows version The discounted payback period formula is used to calculate the length of time to recoup an investment based on the investment's discounted cash flows. By discounting each individual cash flow, the discounted payback period formula takes into consideration the time value of money. The discounted payback period formula is used in capital budgeting to compare a project or projects against the cost of the investment. The simple payback period formula can be used as a quick measurement, however discounting each cash flow can provide a more accurate picture of the investment. As a simple example, suppose that an initial cost of a project is $5000 and each cash flow is $1,000 per year. The simple payback period formula would be 5 years, the initial investment divided by the cash flow each period. However, the discounted payback period would look at each of those $1,000 cash flows based on its present value. Assuming the rate is 10%, the present value of the first cash flow would be $909.09, which is $1,000 divided 1+r. Each individual cash flow would then be discounted to its present value until it is determined how long it would take to recoup the original $5,000. Example of the Discounted Payback Period Formula Using the prior example of a project that costs $5,000 with $1,000 annual cash flows. Assuming the company uses a discount rate of 10%, the discounted payback period for this example would be calculated based on the following equation: The equation for this example would be reduced to: which results in a discounted payback period of 7.273. Although this formula calculates results with decimals, it is important to consider that there may be a slight difference due to rounding and more importantly, that there may not be a such thing as a partial cash inflow. This may warrant rounding up to determine how long it would take to recoup the initial investment. The formula listed at the top of the page assumes that each cash flow is equal. In many cases, the cash flows will not be equal. The simple version of the discounted payback period formula is: This is not as much a formula, as a way of explaining that the discounted cash flow method discounts each inflow until net present value equals zero. Another method to simplify the calculation when cash flows are even is to use a table for the present value of annuity factor in order to solve n. The need to solve for n in the present value of annuity formula will be further explained in the following section. How is the Discounted Payback Period Derived? The formula shown at the top of the page assumes that all cash flows are equal. If all cash flows are equal, then the investment return is simply an annuity. The point of the discounted payback period formula is to calculate how long before the present value equals the initial investment(NPV = 0). Thus, since PV of the annuity equals the initial investment, solving for n, the number of periods, based on the present value of annuity formula can be used. The only difference between solving for n based on the PV of annuity formula and the formula shown at the top of the page is substituting PV for the initial investment since they are both equal. As stated in the prior section, the process of calculating the discounted payback period when all cash flows are equal could be simplified by using a present value of annuity table to calculate n. If the cash flows are uneven, then the longer method of discounting each cash flow would be used. Return to Top Payback period is the time required to recover the cost of initial investment, it the time which the investment reaches its breakeven points. It calculates the number of years we need to generated the initial cost of investment. Its recovery depends on cash flow only, it not even consider the time value of money. This method completely ignores accrual basic and the time value of money.The payback period will help the company to use their fund more effective, it recommends to invest in a project which has the shortest payback period. It will be less risky if we can receive money back faster. Payback Period Formula\[Payback\ Period = { {Initial\ Investment} \over Net\ Annual\ Cash\ Inflow}\]ExampleCompany A invests in a new machine which expects to increase the contribution of $100,000 per year for five years. There are no other expenses related to this additional machine. The cost of machine is $ 300,000. We assume all contributions equal to cash flow.Payback period = $ 300,000 / $100,000 = 3 yearsExample 2Company B is considering to invest in a new project. This project cost $ 300,000 expect to generate the cash flow as the following:YearCash Inflow per yearAccumulate cash inflow0(300,000) (300,000)150,000(250,000)2100,000(150,000)3100,000(50,000)4200,000150,0005150,000300,000The payback period would be: 3 years + 50,000/200,000 = 3.25 yearsWhat are the Advantages of Payback Period?Advantage of Payback PeriodEasy to understandIt is easy to understand for most people. The shorter the project takes to generate the initial investment, the less risk the company take and it expects to generate more profit.Easy to calculatePayback period calculation is not complicated, it does not even involve the present value.Reliable forecastThe short term forecast will more reliable and less fluctuate compare to the long term budget.Improve liquidityIt only focuses on the short term profit, the company liquidity will look better.What are the Disadvantages of Payback Period?Disadvantages of Payback PeriodIgnore the whole projectSome projects may generate low cash flow at the beginning which lead to a longer payback period. However, it may have a huge cash inflow after that. Without analyzing the whole project, we may not be able to understand its full potential.Focus on Cash flow, not profitThe cash inflow is not the profit, it can be miss understanding.Ignore time value of moneyThis method completely ignores the time value of money. The future cash flow has less value in the present.Discounted Payback PeriodDiscounted Payback period is the tool that uses present value of cash inflow to measure the time require to recover the initial investment. The concept is the same as the payback period except for the cash flow used in the calculation is the present value. It is the method that eliminates the weakness of the traditional payback period.Formula\[Discounted\ Cash\ Inflow = { {Actual\ Cash\ inflow} \over (1+i)^n}\]n is the number of period, can be month or yeari is the interest rate per period, it must be consistent with n above.\[Discounted\ Payback\ Period = {A +}{ {B} \over C}\]A is the nth period which project generate accumulated negative cash flow.B is the negative number at the end of period AC is the cash inflow of period A + 1ExampleCompany A has selected a project which costs $ 350,000 and it expects to generate cash inflow $ 50,000 for ten years. The cost of capital is 10%.YearCash FlowDFPresent ValueAcc Cash Flow 0 (300,000) 1.00 (300,000) (300,000) 1 70,000 0.91 63,630 (236,370) 2 70,000 0.83 57,820 (178,550) 3 70,000 0.75 52,570 (125,980) 4 70,000 0.68 47,810 (78,170) 5 70,000 0.62 43,470 (34,700) 6 70,000 0.56 39,480 4,780 7 70,000 0.51 35,910 40,690 8 70,000 0.47 32,620 73,310 9 70,000 0.42 29,680 102,990 10 70,000 0.39 26,950 129,940Discounted Payback period = 5 year + 34,700/39,480 = 5.87 years.Advantages of discounted cash flowEasy to calculateDiscounted payback is straight forward, there no special software or system requires.Easy to understandThe method is easy to explain to others. The shorter the payback period, the less risk of the project.Suitable for the tech industryThis tool is very good for high tech software where the product’s life is very short, so the shorter the payback, the better the project.Fill the gap of the payback periodPayback period ignore the time value of money so this method have fixed this issue.Limitation of Discounted Payback PeriodDiscounted Payback PeriodIgnore total project profitabilitySimilar to payback period, this method does not take into account the whole project profit. The project will be selected if it can payback in a short time.Focus on the early cash flowIn real practice, the early cash flow usually low. The project need sometime to generate significant cash flow. So such kind of projects will not be selected under discounted payback period.Ignore cash flow after payback periodThis method completely ignore the cash flow generate after the payback period. The project may take long time to payback but the cash flow after that is huge. So by ignoring it, we may select the less profitable project.Factor Effect Cash InflowThe impact on Discounted Payback periodDepreciationDepreciation expense is not the cash flow, so it must be excluded from cash flow calculation.Sunk CostThe sunk cost is the cost that already incurs, so it will not impact the decision. It needs to exclude from the calculation as it has no effect.Opportunity CostOpportunity Cost is the income that we give up in order to take any specific activities.Change in working capitalThe change in working capital will impact the cash flow of the project. The increase of working capital means the company has pay money to acquire them and vice versa. The discounted payback period is a capital budgeting procedure which is frequently used to determine the profitability of a project. It is an extension of the payback period method of capital budgeting, which does not account for the time value of money.It takes into account the time value of money by discounting the cash inflows of the project to their present values and then computing the time it will take for the sum of the present values of these cash inflows to equal the initial investment made in the project. The time value of money is the concept that a dollar today is worth more than a dollar in the future, because money can earn interest or returns if invested.This method of capital budgeting helps businesses in making decisions about whether a particular project is worth investing in or not, based on how quickly they can recover their initial investment taking into account the time value of money. The shorter the payback period, the more attractive the investment is considered.Unlike the regular payback period, the discounted payback period accounts for the risks and uncertainties that might be associated with future cash flows, and thus provides a more accurate and realistic assessment of the project’s profitability.The discounted payback period is a financial metric that helps evaluate the time it takes for an investment to generate enough cash flows to recover the initial investment, considering the time value of money.It addresses one of the limitations of the regular payback period by incorporating the concept of discounting future cash flows.The discounted payback period considers the present value of cash flows by applying a discount rate to account for the time value of money.Understanding the Discounted Payback PeriodThe Discounted Payback Period is a capital budgeting method used to determine the length of time it takes to break even on an investment in terms of its discounted cash flows. Unlike the simple payback period, which doesn’t account for the time value of money, the Discounted Payback Period takes this into consideration.The time value of money is a fundamental concept in finance that suggests that a dollar in hand today is worth more than a dollar promised in the future. This is because money available today can be invested and earn a return, hence growing over time. In other words, the purchasing power of money decreases over time due to factors such as inflation or interest rates.When evaluating investments or projects with long-term horizons, the Discounted Payback Period becomes particularly important. It adjusts future cash flows to reflect their reduced value, providing a more realistic view of when an investment or project will break even.To understand it, one should be familiar with two key concepts:Cash Flows These are the inflows and outflows of cash that will occur as a result of the investment or project. Inflows are the returns or revenues generated, while outflows represent the costs or expenses.Discount Rate This is the rate of return required from the investment. It represents the investment’s opportunity cost, i.e., the return foregone by choosing this investment over the next best alternative.The Discounted Payback Period calculation takes these cash flows and discount rate into account, providing a more nuanced understanding of the return period of an investment.Calculating the Discounted Payback PeriodThe calculation of the discounted payback period can be more complex than the standard payback period because it involves discounting the future cash flows of the investment.Here’s a step-by-step process on how to calculate it:Identify Cash Flows The first step is to determine the projected cash flows of the investment for each period (typically yearly). These can include revenues, savings, etc.Determine the Discount Rate The discount rate is often the required rate of return for the investment, or it could be the cost of capital. It represents the rate at which future cash flows will be discounted back to their present value.Calculate Discounted Cash Flows Next, you calculate the present value of each cash flow. This is done by dividing the cash flow by (1 + discount rate) raised to the power of the period number.The formula is:Discounted Cash Flow = Cash Flow / (1 + r) ^ tWhere:r = Discount Rate,t = Time (in periods).Cumulatively Add Discounted Cash Flows Add the discounted cash flows cumulatively until the sum equals or exceeds the initial investment. The period in which this happens is the discounted payback period.Remember, the discounted payback period provides the time in which the initial investment will be recovered in terms of discounted or present value cash flows. Unlike the simple payback period, it provides a more realistic timeframe, factoring in the time value of money.Interpreting the Discounted Payback PeriodShorter Payback Periods A shorter discounted payback period is typically preferable as it indicates that the investment will pay back its initial outlay sooner when considering the time value of money. This can be particularly important for businesses or investors with tight cash flow constraints or high capital costs.Comparison to Other Investments Comparing investment opportunities can involve considering their respective durations for recovering the initial investment. Generally, investments with shorter payback periods may appear more appealing, given similar levels of risk and potential return.Comparison to Non-discounted Payback Period If the discounted payback period is significantly longer than the non-discounted payback period, this can indicate that the later cash flows in the project’s life are significant. This could be a warning sign if those cash flows are risky or uncertain.Recovery of Capital By providing a timeframe in which the investment recovers its initial outlay in present value terms, the discounted payback period helps measure the risk of an investment. The faster the capital is recovered, the less risk the investment carries.However, like all financial metrics, it shouldn’t be used in isolation. It’s important to consider other financial metrics and factors specific to the investment before making a decision.Advantages of the Discounted Payback PeriodTime Value of Money Unlike the regular payback period, the discounted payback period takes into account the time value of money, providing a more accurate reflection of the investment’s profitability over time.Risk Assessment It helps to evaluate the risk of an investment by providing the time frame in which an investment is expected to break even. The shorter the payback period, the less risk the investment carries.Cash Flow Management This method is useful for cash flow management, as it indicates when the invested funds will be recovered, allowing for better planning and allocation of resources.Comparative Tool It can be used to compare different investment opportunities. An investment with a shorter discounted payback period may be considered more attractive, assuming other factors like risk and potential returns are equal.Simplicity Despite accounting for discounting, it remains a relatively simple and straightforward financial metric to calculate and interpret, making it accessible to investors of all levels.Flexibility The discounted payback period allows the discount rate to be adjusted according to the risk profile of the cash flows, thereby providing a more tailored analysis of an investment’s break-even point.Limitations of the Discounted Payback PeriodIgnores Cash Flows Beyond Payback Period The primary limitation of the discounted payback period is that it does not take into account the cash flows that occur after the payback period. This could lead to potentially profitable long-term investments being overlooked.Subjectivity in Discount Rate The discount rate used in the calculation is often subjective and can significantly impact the results. Small changes in the discount rate can lead to large changes in the payback period, making comparisons between investments difficult.No Profit Measure Unlike other investment appraisal methods, such as net present value (NPV) or internal rate of return (IRR), the discounted payback period does not give any indication of the profitability of an investment. It merely provides the time taken to recover the initial investment.Neglects Risk Variations Over Time The discounted payback period applies a constant discount rate over the entire investment period, which may not accurately reflect the changing risk profile of an investment over time.Arbitrary Cut-off Point The use of the payback period as a decision criterion involves an arbitrary cut-off point. There is no logical reason why cash flows received one period after the payback period should be regarded as less important.Despite these limitations, it is still a useful tool for initial investment screening and can provide valuable insights when used in conjunction with other financial metrics.Examples of Discounted Payback PeriodExample 1: Individual InvestmentLet’s assume that you are an investor who has invested $10,000 in a project, expecting cash inflows of $3,000 per year for the next five years. If we consider the discount rate to be 10%, the discounted payback period can be calculated as follows:YearDiscounted Cash FlowCumulative Discounted Cash Flow1$2,727.27$2,727.272$2,479.34$5,206.613$2,253.94$7,460.554$2,048.12$9,508.675$1,862.84$11,371.51By the end of Year 5, the total discounted cash inflow is $11,371.51, which is more than the initial investment of $10,000. So, the discounted payback period would be somewhere in the 5th year. To be more precise, it would be 4 years plus the fraction of the 5th year needed to reach a total of $10,000, which can be calculated as: 4 + ($10,000 – $9,508.67) / $1,862.84 ≈ 4.26 years.Example 2: Business InvestmentA business invests $50,000 in a new machine that is expected to generate cash inflows of $15,000 for the next 5 years. If the company uses a discount rate of 8%, the discounted payback period can be calculated using the same method as shown in Example 1. The company would use this calculation to decide if the investment in the new machine is worth the cost based on when they would recover the initial investment considering the time value of money.Example 3: Real Estate InvestmentLet’s say a real estate investor decides to invest $200,000 in a rental property. The expected cash inflows from the rental income are $45,000 per year for the next six years. The investor uses a discount rate of 6% to account for the time value of money. Here is how it would be calculated:YearDiscounted Cash FlowCumulative Discounted Cash Flow1$42,452.83$42,452.832$40,050.78$82,503.613$37,783.96$120,287.574$35,645.82$155,933.395$33,631.34$189,564.736$31,731.64$221,296.37By the end of Year 6, the total discounted cash inflow is $221,296.37, which is more than the initial investment of $200,000. So, the discounted payback period would be somewhere in the 6th year. To be more precise, it would be 5 years plus the fraction of the 6th year needed to reach a total of $200,000, which can be calculated as: 5 + ($200,000 – $189,564.73) / $31,731.64 ≈ 5.33 years.Example 4: Technology InvestmentA technology firm decides to invest $2 million in the development of a new software product. The firm expects cash inflows of $700,000 per year for the next four years from the sale of this software. The firm uses a discount rate of 5% to account for the time value of money. The discounted payback period would be calculated using the same method as shown in the above examples. The firm would use this calculation to decide if the investment in the new software development project is financially viable based on when they would recover the initial investment considering the time value of money.What is the discounted payback period?The discounted payback period is a financial metric that measures the time it takes for an investment to recover its initial cost, taking into account the time value of money.How is the discounted payback period different from the regular payback period?The discounted payback period considers the present value of future cash flows by applying a discount rate, while the regular payback period does not account for the time value of money.Why is the discounted payback period important?It helps assess the risk and profitability of an investment by considering the timing and value of cash flows, providing a more accurate picture of its financial feasibility.What is the decision criteria for the discounted payback period?The decision criteria can vary depending on the organization’s goals, but it often involves comparing the calculated discounted payback period to a predetermined payback period or target set by the company.About PaulPaul Boyce is an economics editor with over 10 years experience in the industry. Currently working as a consultant within the financial services sector, Paul is the CEO and chief editor of BoyceWire. He has written publications for FEE, the Mises Institute, and many others. In this article, we will explore the theory and calculation of the discounted payback period, a key financial metric used in investment analysis. We will walk through its significance, break down the formula, and provide practical examples to illustrate how it is applied in real-world scenarios.When evaluating investments, businesses and investors often seek to understand how quickly they can recover their initial costs. While the traditional payback period provides a simple way to measure this, it has a major drawback—it ignores the time value of money.This is where the discounted payback period comes in. By factoring in the present value of future cash flows, the discounted payback period offers a more accurate assessment of when an investment truly breaks even. In this article, we will explore its significance, break down the calculation process, and provide practical examples to illustrate its application in real-world financial analysis.Table of ContentsHowever, before delving into the specifics of the discounted payback period, it is essential to first establish a clear understanding of the payback period itself.If you already know what is Payback period and the process of its calculation, you can skip the part and continue from the topic of discounted payback period.The payback period refers to the amount of time required to recover the initial investment made in a project through the project’s cash flows. Essentially, it measures how quickly a business “gets its money back.”Payback period formula: $$ \text{Payback} = \text{Years before full recovery} + \frac{\text{Unrecovered amount}}{\text{Cash flow in recovery year}} $$Example:Initial Investment: $1,000Year 1: $500, Cumulative Cash Flow: -$500Year 2: $400, Cumulative Cash Flow: -$100Year 3: $300, Cumulative Cash Flow: $200Here, full recovery happens between Year 2 and Year 3. The payback is: $$ 2 + \frac{100}{300} = 2.33 \, \text{years} $$This calculation shows that it takes 2.33 years to fully recover the initial investment.This is actually how you calculate the Payback period.If you want to calculate the payback period for two projects and compare them, you’ll have to choose the project that comes up with the shorter period. But always keep in mind if the projects are independent or mutually exclusive.In this figure, we have calculated the payback period for two projects using the same payback period calculation method and formula.Following the figure you can draw a timeline of a project, put the amount of cashflows year-wise, and cumulative cash flows, and then find out the time using the payback period formula. Drawing a timeline gives you a better representation of the project and helps you calculate more easily.We can see that, how easy calculating the payback period is and figuring out the number of years we need to recover the initial investment. But the payback period has a major flaw that makes it traditional and most companies avoid calculating the payback period.Ignores the Time Value of Money: A dollar today is more valuable than a dollar in the future, but this method treats all cash flows equally.The time value of money means that money you have today can grow over time if invested, making it more valuable than the same amount in the future. However, the payback period method assumes all cash flows are worth the same, ignoring how inflation or investment returns can change their value over time. This can lead to less accurate decisions when comparing projects.Discounted Payback Period is a more advanced way of calculating the payback period of a project. The discounted payback period accounts for the time value of money by discounting the project’s cash flows using the firm’s cost of capital (WACC).It helps you figure out how long it will take to recover the initial investment after adjusting the fact that future money is worth less than today’s money.The discounted payback period solves some of the issues associated with the regular payback period:Incorporates the Time Value of Money: By discounting future cash flows, it provides a more accurate view of when the project breaks even.More Reliable for Decision-Making: It reflects the true cost of capital and gives a clearer picture of when the investment is recovered.The discounted Payback period formula is the same as the payback period formula $$ \text{Payback} = \text{Years before full recovery} + \frac{\text{Unrecovered amount}}{\text{Cash flow in recovery year}} $$But here, you need to understand another formula to find out the discounted amount of the future cash flows, this is: $$ \text{Discounted Cash Flow} = \frac{\text{Cash Flow}}{(1 + r)^t} $$Where:r = Discount rate (cost of capital)T = Year in which the cash flow occursThis formula is the same as the formula for calculating the present value of money.Calculating the discounted payback period for the same project is shown in the above figure.In this figure, you can see that we have calculated the discounted cash flow for each year using the formula discounted cash flow, then we have calculated the cumulative discounted cash flows, and then using the actual discounted Payback period formula we have figured out the time.Note that, in the question paper you will be provided with the amount of cash flows with a discount rate but if you’re conducting any research, you can estimate the cash flows of a project by reading the blog I’ve written “Estimation of Cash Flows in Capital Budgeting”The discounted payback period is a valuable financial metric that refines the traditional payback period by incorporating the time value of money. Unlike the regular payback method, it provides a more accurate estimate of when an investment is truly recovered, making it a more reliable tool for decision-making. By discounting future cash flows using the firm’s cost of capital, businesses can assess project viability with greater precision, especially for long-term, high-cost investments.Understanding how to calculate the discounted payback period ensures better financial planning and risk management. Whether you’re comparing projects or analyzing investment returns, this method helps you make more informed, data-driven decisions. If you have any questions about the discounted payback period formula or calculation, feel free to ask!The payback period calculates the time required to recover an investment without considering the time value of money. In contrast, the discounted payback period adjusts future cash flows for discounting, providing a more accurate estimate of when an investment is recovered.The discounted payback period is important because it accounts for the time value of money, ensuring that future cash flows are appropriately discounted. This makes it a more reliable metric for evaluating the feasibility of long-term projects.While it improves upon the traditional payback period, the discounted payback period still does not account for cash flows beyond the recovery period. This means it does not measure overall project profitability, making it less effective for evaluating long-term returns.There is no universal “good” discounted payback period—it depends on the industry, project type, and investment risk. A shorter payback period is generally preferred, but businesses should also consider profitability, risk, and return on investment.A higher discount rate reduces the present value of future cash flows, potentially increasing the discounted payback period. Conversely, a lower discount rate makes future cash flows more valuable, leading to a shorter discounted payback period.Tags: Discounted Payback PeriodPayback Period Calculates the amount of time that it will take for a project to "break even" The discounted payback period is a modified version of the payback period that accounts for the time value of money. Both metrics are used to calculate the amount of time that it will take for a project to “break even,” or to get the point where the net cash flows generated cover the initial cost of the project. Both the payback period and the discounted payback period can be used to evaluate the profitability and feasibility of a specific project. Other metrics, such as the internal rate of return (IRR), profitability index (PI), net present value (NPV), and effective annual annuity (EAA) can also be used to quantify the profitability of a given project. To make the best decision about whether to pursue a project or not, a company’s management needs to decide which metrics to prioritize. Management then looks at a variety of metrics in order to obtain complete information. Usually, companies are deciding between multiple possible projects. Comparing various profitability metrics for all projects is important when making a well-informed decision. Understanding Discounted Payback Period The discounted payback period is used to evaluate the profitability and timing of cash inflows of a project or investment. In this metric, future cash flows are estimated and adjusted for the time value of money. It is the period of time that a project takes to generate cash flows when the cumulative present value of the cash flows equals the initial investment cost. The shorter the discounted payback period, the quicker the project generates cash inflows and breaks even. While comparing two mutually exclusive projects, the one with the shorter discounted payback period should be accepted. Discounted Payback Period Formula There are two steps involved in calculating the discounted payback period. First, we must discount (i.e., bring to the present value) the net cash flows that will occur during each year of the project. Second, we must subtract the discounted cash flows from the initial cost figure in order to obtain the discounted payback period. Once we’ve calculated the discounted cash flows for each period of the project, we can subtract them from the initial cost figure until we arrive at zero. Practical Example Assume a business that is considering a given project. Below are some selected data from the discounted cash flow model created by the company’s financial analysts: As we can see here, the project returns a positive discounted cash flow in its first year and sees its yearly discounted cash flow grow to $3,000 in later years. We also learn that the project cost is $7,500. Using the given information, we can calculate the discounted payback period as follows: In this case, we see that the project’s payback period is 4 years. Since the project’s life is calculated at 5 years, we can infer that the project returns a positive NPV. Thus, the project will likely add value to the business if pursued. Payback Periods One observation to make from the example above is that the discounted payback period of the project is reached exactly at the end of a year. Obviously, that may not always be the case. In other circumstances, we may see projects where the payback occurs during, rather than at the end of, a given year. In such situations, we will first take the difference between the year-end cash flow and the initial cost left to reduce. Next, we divide the number by the year-end cash flow in order to get the percentage of the time period left over after the project has been paid back. The next step is to subtract the number from 1 to obtain the percent of the year at which the project is paid back. Finally, we proceed to convert the percentage in months (e.g., 25% would be 3 months, etc.) and add the figure to the last year in order to arrive at the final discounted payback period number. Pros and Cons of Discounted Payback Period The discounted payback period indicates the profitability of a project while reflecting the timing of cash flows and the time value of money. It helps a company to determine whether to invest in a project or not. If the discounted payback period of a project is longer than its useful life, the company should reject the project. One of the disadvantages of discounted payback period analysis is that it ignores the cash flows after the payback period. Thus, it cannot tell a corporate manager or investor how the investment will perform afterward and how much value it will add in total. It may lead to decisions that contradict the NPV analysis. A project may have a longer discounted payback period but also a higher NPV than another if it creates much more cash inflows after its discounted payback period. Such an analysis is biased against long-term projects. Related Readings We hope you enjoyed reading CFI’s explanation of the Discounted Payback Period. To keep learning and advancing your career, the following CFI resources will be helpful: Understanding the Discounted Payback Period is essential for individuals seeking to make informed investment decisions. This financial metric evaluates the time required to recover an investment while accounting for the time value of money, thus providing a clearer perspective on cash flow dynamics.This article offers a comprehensive breakdown of the Discounted Payback Period, including a step-by-step guide on how to calculate it and its implications for assessing investment opportunities.Additionally, it examines the limitations of this metric and its role in guiding financial decision-making. Engaging with this material will enhance one’s financial knowledge significantly.Key Takeaways:Discounted Payback Period is a financial metric that calculates the time it

risk tolerance.3. Assessing Risk and ReturnUtilizing the Discounted Payback Period enables investors to evaluate both the risk and return associated with an investment, providing valuable insights into the project's likelihood of success and the potential for financial loss. This balance is crucial for effective investment management and strategy development.By incorporating the time value of money, this method facilitates a precise determination of how quickly an investment will recover its initial costs while also considering the risks that may affect cash flows. It offers a clearer perspective on investment performance by quantifying the timeframe needed to recoup expenditures. Investors can effectively compare various projects, allowing for informed decisions that align risk levels with expected returns.This significant financial metric promotes a comprehensive understanding of potential pitfalls and advantages, ultimately guiding strategic choices in evolving market conditions. A discounted payback period is the number of years it takes to break even from undertaking an initial expenditure in a project. It's determined by discounting future cash flows and recognizing the time value of money. The discounted payback period is used in capital budgeting to evaluate the feasibility and profitability of a given project. The simpler payback period formula divides the total cash outlay for the project by the average annual cash flows. However, it's not as accurate as the discounted cash flow version because it assumes only one, upfront investment, and does not factor in the time value of money. So it's not as good at helping management to decide whether or not to take on a project. The discounted payback period is a metric used in capital budgeting to determine which projects to take on.More accurate than the standard payback period calculation, the discounted payback period factors in the time value of money.The discounted payback period formula shows how long it will take to recoup an investment based on the present value of the project's projected cash flows.The shorter a discounted payback period is, the sooner a project or investment will generate cash flows to cover the initial cost. Investopedia / Matthew Collins When deciding on any project to embark on, a company or investor wants to know when their investment will pay off, meaning when the cash flows generated from the project will more than cover the cost of the project or the investment. This is particularly important because companies and investors usually have to choose between more than one project or investment. So being able to determine when certain projects will pay back compared to others makes the decision easier. The basic method of the discounted payback period is to take the future estimated cash flows of a project and discount them to their present value (using discounted cash flows). This figure is compared to the initial outlay of capital for the investment. The period of time that a project or investment takes for the present value of future cash flows to equal the initial cost provides an indication of when the project or investment will break even. No cash flows after that will be diminished by the initial cost. The shorter a discounted payback period, the sooner a project or investment will generate cash flows to cover the initial cost. A general rule to consider is to accept projects that have a payback period that is shorter than the project's target timeframe. So, for example, management can compare the required break-even date to the discounted payback period. If the latter's metric (in years) is less than the required break-even date, that's a positive sign that can play into the decision of whether or not to give the project the go-ahead. To begin, the periodic cash flows of a project must be estimated and shown by each period in a table or spreadsheet. These cash flows are then reduced by their present value factor to reflect the discounting process. This can be done using the present value function and a table in a spreadsheet program. Next, assuming the project starts with a large cash outflow (or investment), the future discounted cash inflows are netted against the initial investment outflow. This process is applied to each additional period's cash inflow to find the point at which the inflows equal the outflows. At this point, the project's initial cost has been paid off, and the payback period is reduced to zero. The increase in inflation for consumer prices in the United States in April 2025, according to the Bureau of Labor Statistics. The core rate, which is adjusted to remove food and energy pricing, was 2.8%. Investors should consider the diminishing value of money when planning future investments. The payback period is the amount of time it takes a project to break even in cash collections using nominal dollars. Alternatively, the discounted payback period reflects the amount of time necessary to break even based not only on what cash flows occur but when they occur and the prevailing rate of return in the market. These two calculations, although similar, may not return the same result due to the discounting of cash flows. For example, projects with higher cash flows toward the end of a project's life will experience greater discounting due to compound interest. For this reason, the payback period may return a positive figure, while the discounted payback period returns a negative figure. Assume that Company A has a project requiring an initial cash outlay of $3,000. The project is expected to return $1,000 for each of the next five years, and the appropriate discount rate is 4%. The discounted payback period calculation begins with the -$3,000 cash outlay in the starting year (or period). The first year cash inflow is +$1,000. Using the present value discount calculation, the discounted payback period figure is $1,000/1.04 = $961.54. Thus, after the first period, the project still requires $3,000 - $961.54 = $2,038.46 to break even. After the discounted cash flows of $1,000/(1.04)2 = $924.56 in period two, and $1,000/(1.04)3 = $889.00 in period three, the net project balance is $3,000 - ($961.54 +$924.56 + $889.00) = $224.90. After receipt of the fourth year payment, which is discounted to $854.80, the project will have a positive balance of $629.90. Therefore, the discounted payback period is between three and four years. Example of Discounted Payback Period Present Value Discounted Value Net Cost Initial Investment -$3,000 -$3,000 -$3,000 Year 1 Cash Flow $1,000 $961.54 -$2,038.46 Year 2 Cash Flow $1,000 $924.56 -$1,113.90 Year 3 Cash Flow $1,000 $889.00 -$224.90 Year 4 Cash Flow $1,000 $854.80 +$629.90 Discounted Payback Period for Company A The standard payback period is calculated by dividing the initial investment cost by the annual net cash flow generated by that investment. First, determine the initial cost of an investment. The next step is to estimate the expected annual cash flows from the investment, as well as the discount rate (the value the cash flow loses with each successive year, due to inflation and the diminishing time value of money). Then calculate the present value of each instance of cash flow and subtract that from the cost. The discount payback period is the number of years it takes for the discounted cash flows to exceed the initial investment. The decision rule is a simple rule to determine if an investment is worthwhile, and which of several investments is most worthwhile. If the discounted payback period for a certain asset is less than the useful life of that asset, the investment might be approved. If a business is choosing between several potential investments, the one with the shortest discounted payback period will be the most profitable. The discounted payback period is a metric used to determine if an investment will be sufficiently profitable (in an acceptable time period) to justify its initial cost. It uses the predicted returns from the investment, and takes into consideration the diminishing value of future returns. December 24, 2024 December 24, 2024/ Steven Bragg The discounted payback period is the period of time over which the cash flows from an investment pay back the initial investment, factoring in the time value of money. It is primarily used to calculate the projected return from a proposed capital investment opportunity.Advantages of the Discounted Payback PeriodThere are several advantages associated with the discounted payback period, which are as follows:Considers the time value of money. Unlike the regular payback period, the discounted payback period accounts for the time value of money by discounting future cash flows. This provides a more realistic measure of an investment's profitability.Includes a risk assessment. By emphasizing early cash flows and their discounted value, it helps identify investments that are less risky and recover costs sooner in today's value terms.Simplicity. The discounted payback period is easy to calculate and understand, making it accessible for decision-makers without requiring advanced financial expertise.Emphasizes liquidity. Since the discounted payback period highlights the timeframe to recover initial costs, it aligns with liquidity concerns, which are especially critical for businesses with tight cash flows.Presents a decision rule. The discounted payback period provides a clear-cut decision rule: if the discounted payback period is shorter than the project’s lifespan or a predefined threshold, the project is deemed acceptable.Disadvantages of the Discounted Payback PeriodThe key disadvantage of the discounted payback period is that it suffers from a higher level of complexity than the standard payback period. The standard payback period calculation is intended to be quite simple, and can be derived with minimal calculations. This is not the case when discounting is introduced to the formulation.Formulation of the Discounted Payback PeriodThe basic formula to determine the payback period is:Amount invested ÷ Average annual cash flows = Payback periodRelated AccountingTools CoursesCapital BudgetingFinancial Analysis The discounted payback period is instead derived by following these steps:Create a table in which is listed the expected cash outflow related to the investment in Year 0.In the following lines of the table, enter the cash inflows expected from the investment in each subsequent year.Multiply the expected annual cash inflows in each year in the table by the applicable discount rate, using the same interest rate for all of the periods in the table. No discount rate is applied to the initial investment, since it occurs at once.Create a column on the far right side of the table that lists the cumulative discounted cash flow for each year. The calculation in this final column is to add back the discounted cash flow in each period to the remaining negative balance from the preceding period. The balance is initially negative because it includes the cash outflow to fund the project.When the cumulative discounted cash flow becomes positive, the time period that has passed up until that point represents the payback period.To make the calculation even more accurate, include in subsequent periods any additional cash outflows to pay for the project, such as may be associated with upgrades or maintenance.The Difference Between the Payback Period and Discounted Payback PeriodThe payback period is the amount of time it takes for the cash flows from a project to pay back the initial investment. This is not the same as the discounted payback period, where those cash flows are discounted back to their present value before the payback calculation is made. Because no discounting is applied to the basic payback calculation, it always returns a payback period that is shorter than what would be obtained with the discounted payback period calculation.Related ArticlesAdvantages of the Payback MethodHow to Calculate the Payback PeriodPayback MethodPayback PeriodPayback Reciprocal December 24, 2024/ Steven Bragg/ A discounted payback period is the number of years it takes to break even from undertaking an initial expenditure in a project. It's determined by discounting future cash flows and recognizing the time value of money. The discounted payback period is used in capital budgeting to evaluate the feasibility and profitability of a given project. The simpler payback period formula divides the total cash outlay for the project by the average annual cash flows. However, it's not as accurate as the discounted cash flow version because it assumes only one, upfront investment, and does not factor in the time value of money. So it's not as good at helping management to decide whether or not to take on a project. The discounted payback period is a metric used in capital budgeting to determine which projects to take on.More accurate than the standard payback period calculation, the discounted payback period factors in the time value of money.The discounted payback period formula shows how long it will take to recoup an investment based on the present value of the project's projected cash flows.The shorter a discounted payback period is, the sooner a project or investment will generate cash flows to cover the initial cost. Investopedia / Matthew Collins When deciding on any project to embark on, a company or investor wants to know when their investment will pay off, meaning when the cash flows generated from the project will more than cover the cost of the project or the investment. This is particularly important because companies and investors usually have to choose between more than one project or investment. So being able to determine when certain projects will pay back compared to others makes the decision easier. The basic method of the discounted payback period is to take the future estimated cash flows of a project and discount them to their present value (using discounted cash flows). This figure is compared to the initial outlay of capital for the investment. The period of time that a project or investment takes for the present value of future cash flows to equal the initial cost provides an indication of when the project or investment will break even. No cash flows after that will be diminished by the initial cost. The shorter a discounted payback period, the sooner a project or investment will generate cash flows to cover the initial cost. A general rule to consider is to accept projects that have a payback period that is shorter than the project's target timeframe. So, for example, management can compare the required break-even date to the discounted payback period. If the latter's metric (in years) is less than the required break-even date, that's a positive sign that can play into the decision of whether or not to give the project the go-ahead. To begin, the periodic cash flows of a project must be estimated and shown by each period in a table or spreadsheet. These cash flows are then reduced by their present value factor to reflect the discounting process. This can be done using the present value function and a table in a spreadsheet program. Next, assuming the project starts with a large cash outflow (or investment), the future discounted cash inflows are netted against the initial investment outflow. This process is applied to each additional period's cash inflow to find the point at which the inflows equal the outflows. At this point, the project's initial cost has been paid off, and the payback period is reduced to zero. The increase in inflation for consumer prices in the United States in April 2025, according to the Bureau of Labor Statistics. The core rate, which is adjusted to remove food and energy pricing, was 2.8%. Investors should consider the diminishing value of money when planning future investments. The payback period is the amount of time it takes a project to break even in cash collections using nominal dollars. Alternatively, the discounted payback period reflects the amount of time necessary to break even based not only on what cash flows occur but when they occur and the prevailing rate of return in the market. These two calculations, although similar, may not return the same result due to the discounting of cash flows. For example, projects with higher cash flows toward the end of a project's life will experience greater discounting due to compound interest. For this reason, the payback period may return a positive figure, while the discounted payback period returns a negative figure. Assume that Company A has a project requiring an initial cash outlay of $3,000. The project is expected to return $1,000 for each of the next five years, and the appropriate discount rate is 4%. The discounted payback period calculation begins with the -$3,000 cash outlay in the starting year (or period). The first year cash inflow is +$1,000. Using the present value discount calculation, the discounted payback period figure is $1,000/1.04 = $961.54. Thus, after the first period, the project still requires $3,000 - $961.54 = $2,038.46 to break even. After the discounted cash flows of $1,000/(1.04)2 = $924.56 in period two, and $1,000/(1.04)3 = $889.00 in period three, the net project balance is $3,000 - ($961.54 +$924.56 + $889.00) = $224.90. After receipt of the fourth year payment, which is discounted to $854.80, the project will have a positive balance of $629.90. Therefore, the discounted payback period is between three and four years. Example of Discounted Payback Period Present Value Discounted Value Net Cost Initial Investment -$3,000 -$3,000 -$3,000 Year 1 Cash Flow $1,000 $961.54 -$2,038.46 Year 2 Cash Flow $1,000 $924.56 -$1,113.90 Year 3 Cash Flow $1,000 $889.00 -$224.90 Year 4 Cash Flow $1,000 $854.80 +$629.90 Discounted Payback Period for Company A The standard payback period is calculated by dividing the initial investment cost by the annual net cash flow generated by that investment. First, determine the initial cost of an investment. The next step is to estimate the expected annual cash flows from the investment, as well as the discount rate (the value the cash flow loses with each successive year, due to inflation and the diminishing time value of money). Then calculate the present value of each instance of cash flow and subtract that from the cost. The discount payback period is the number of years it takes for the discounted cash flows to exceed the initial investment. The decision rule is a simple rule to determine if an investment is worthwhile, and which of several investments is most worthwhile. If the discounted payback period for a certain asset is less than the useful life of that asset, the investment might be approved. If a business is choosing between several potential investments, the one with the shortest discounted payback period will be the most profitable. The discounted payback period is a metric used to determine if an investment will be sufficiently profitable (in an acceptable time period) to justify its initial cost. It uses the predicted returns from the investment, and takes into consideration the diminishing value of future returns. Updated: February 6, 2023 KEY TAKEAWAYS Discounted payback period refers to how long it takes to recoup your original investment. Discounted payback period accounts for money’s time value, which makes it a more accurate metric than the regular payback period. To calculate discounted payback period, you need to discount all of the cash flows back to their present value. Discounted payback period refers to time needed to recoup your original investment. This includes interest, using a discounted cash flow. In other words, it’s the amount of time it would take for your cumulative cash flows to equal your initial investment. The payback period value is a popular metric because it’s easy to calculate and understand. However, it doesn’t take into account money’s time value, which is the idea that a dollar today is worth more than a dollar in the future. Discounted payback period does account for money’s time value, which makes it a more accurate metric. To calculate discounted payback period, you need to discount all of the cash flows back to their present value. The present value is the value of a future payment or series of payments, discounted back to the present. You can think of it as the amount of money you would need today to have the same purchasing power as a future payment. Discounted payback period refers to the number of years it takes for the present value of cash inflows to equal the initial investment. Discounted payback period serves as a way to tell whether an investment is worth undertaking. The lower the payback period, the more quickly an investment will pay for itself. To calculate discounted payback period, you will need to know the following: The initial investment The cash inflows for each year of the investment The discount rate Once you have this information, you can use the following formula to calculate discounted payback period. Discounted payback period calculation is: For example, let’s say you have an initial investment of $100 and an annual cash flow of $20. If you’re discounting at a rate of 10%, your payback period would be 5 years. To calculate the payback period using Excel, you can use the PV function. For our example, the formula would look like this: PV(10%,5,-100,-20) This would give you a payback period of 5 years. You can also use the payback period formula to calculate the required rate of return. This is useful if you’re trying to decide if a project is worth your investment. The required rate of return is the minimum rate of return that you would accept for an investment. To calculate the required rate of return, you would use this formula: For our example, the required rate of return would be 20%. This means that you would only invest in this project if you could get a return of 20% or more. The main advantage is that the metric takes into account money’s time value. This is important because money today is worth more than money in the future. The discount rate represents the opportunity cost of investing your money. With positive future cash flows, you can increase your cash outflow substantially over a period of time. Remember that the cost of capital changes from its initial cost. Depending on the time period passed, your initial expenditure can affect your cash revenue. If you have a cumulative cash flow balance, you made a good investment. Thus, you should compare your year-end cash flow after making an investment. Another advantage of this method is that it’s easy to calculate and understand. This makes it a good choice for decision-makers who don’t have a lot of experience with financial analysis. Discounted payback period calculation is a simple way to analyze an investment. However, there are some limitations to this method. One limitation is that it doesn’t take into account money’s time value. This means that it doesn’t consider that money today is worth more than money in the future. Another limitation is that it only looks at the cash flows from the project. It doesn’t consider other factors such as risk or profitability. Despite these limitations, discounted payback period methods can help with decision-making. It’s a simple way to compare different investment options and to see if an investment is worth pursuing. Let’s say you’re considering investing in a new project. The project has an initial investment of $1,000 and will generate annual cash flows of $200 for the next 5 years. The discounting of cash flows rate is 10%. The payback period measure for this project is 4.17 years. This means that it will take 4 years and 2 months to recoup your initial investment. The required rate of return is 19.6%. This means that you would need to earn a return of at least 19.6% on your investment to break even. Now let’s say you’re considering investing in a different project. The project has an initial investment of $1,000 and will generate annual cash flows of $100 for the next 10 years. The discount rate is 10%. The payback period for this project is 10 years. This means that it will take 10 years to recoup your initial investment. The required rate of return is 9.1%. This means that you would need to earn a return of at least 9.1% on your investment to break even. As you can see, the required rate of return is lower for the second project. This means that it’s a better investment. Discounted payback period process is a helpful metric to assess whether or not an investment is worth pursuing. When using this metric, it’s important to keep in mind that a longer payback period doesn’t necessarily mean an investment is bad. You should also consider factors such as money’s time value and the overall risk of the investment. What is the difference between discounted payback and payback period? Payback period refers to the number of years it will take to pay back the initial investment. Discounted payback period takes into account money’s time value. How do you calculate payback period with irregular cash flows? To calculate payback period with irregular cash flows, you will need to calculate the present value of each cash flow. Is discounted payback the same as NPV? No, payback period analysis is not the same as net present value. Payback period doesn’t take into account money’s time value or cash flows beyond payback period. NPV takes into account all of these factors. What is simple payback period and discounted payback? Payback period refers to how many years it will take to pay back the initial investment. Discounted payback period takes into account money’s time value. The simple payback period doesn’t take into account money’s time value. Discounted payback method is a capital budgeting technique used to evaluate the profitability of a project based upon the inflows and outflows of cash. Under this technique, we first discount project’s all cash flows to their present value using a preset discount rate and then determine the time period within which the initial investment would be recovered. Since this method takes into account the time value of money, it can be considered as an upgraded variant of the simple payback method. The discounted payback method tells companies about the time period in which the initial investment in a project is expected to be recovered by the discounted value of total cash inflow. Additionally, it indicates the potential profitability of a certain business venture. For example, if a project indicates that the funds or initial investment will never be recovered by the discounted value of related cash inflows, the project would not be profitable at all. The company should therefore refrain from investing its funds in such project. The formula for computing the discounted payback period is the same as used to compute the simple or traditional payback period with uneven cash flow. It is given below: Discounted payback period = Years before full recovery + (Unrecovered cost at start of the year/Cash flow during the year) The following example illustrates the computation of both simple and discounted payback period as well as explains how the two analysis approaches differ from each other. An opportunity arises for a company which requires an initial investment of $800,000 now. The amount of cash inflows expected from the new opportunity are: Year-1: $250,000 Year-2: $400,000 Year-3: $300,000 Year-4: $450,000 The management’s discount rate is 12%. Required: Compute the simple and discounted payback periods of the new investment opportunity. Is this investment opportunity acceptable under two methods if the maximum desired payback period of the management is 3 years? The simple payback method dos not take into account the present value of cash flows. Simple payback period = Years before full recovery + (Unrecovered cost at start of the year/Cash flow during the year)= 2 + *150,000/300,0002.5 years *$800,000 – $650,000 We see that in year 3, the investment is not just recovered but the remaining cash inflow is surplus. The initial investment of the company would be recovered in 2.5 years. The project is acceptable according to simple payback period method because the recovery period under this method (2.5 years) is less than the maximum desired payback period of the management (3 years). The discounted payback method takes into account the present value of cash flows. *Present value factor at 12%: 1/(1 + 0.12)^1 = 0.893; 1/(1 + 0.12)^2 = 0.797; 1/(1 + 0.12)^3 = 0.712; 1/(1 + 0.12)^4 = 0.636 Alternatively we can use present value of $1 table to obtain these factors. The formula and computations are similar to simple payback period. Discounted payback period = Years before full recovery + (Unrecovered cost at start of the year/Cash flow during the year)= 3 + *44,350/286,200= 3.15 years *$800,000 – $755,650 According to discounted payback method, the initial investment would be recovered in 3.15 years which is slightly more than the management’s maximum desired payback period of 3 years. The project is therefore not acceptable according to this analysis. From above example, we can observe that the outcome with discounted payback method is less favorable than with simple payback method. Since discounting decreases the value of cash flows, the discounted payback period will always be longer than the simple payback period as long as the cash flows and discount rate are positive. The main advantages and limitations of using a discounted payback method are listed below: It takes into account the time value of money by deflating the cash flows using the company’s cost of capital. The method is cash based so it reveals the period within which the cash will be available for reuse elsewhere. The concept backing the method is easy to understand and apply. Both simple and discounted payback method do not take into account the full life of the project. The overall benefit and profitability of a project cannot be measured under either of the two approaches because both ignore the cash flows that may occur beyond the payback period. It may become a relative measure. In many situations, the project’s discounted payback period may be longer than the maximum desired payback period of the management but other measures like accounting rate of return (ARR) and internal rate of return (IRR) etc. may favor the project. The accuracy of the output only depends on the accuracy of the input provided, like the accuracy of cash flow figures, the timing of cash flows which affects their present values, and the discount rate used to deflate the cash flow etc. The discounted payback method may seem like an attractive approach at first glance. On closer inspection, however, we find that it shares some of the same significant flaws as the simple payback method. For example, it first arbitrarily chooses a cutoff period and then ignores all cash flows that occur after that period. This approach might look a bit similar to net present value method but is, in fact, just a poor compromise between NPV and simple payback technique. If you have already gone to the trouble of calculating the discounted cash flows over the life of the project, you might just as well add up all the discounted cash flows to get the project’s net present value for your decision. Practice exercises and problemsPractice quizzes A discounted payback period is the number of years it takes to break even from undertaking an initial expenditure in a project. It's determined by discounting future cash flows and recognizing the time value of money. The discounted payback period is used in capital budgeting to evaluate the feasibility and profitability of a given project. The simpler payback period formula divides the total cash outlay for the project by the average annual cash flows. However, it's not as accurate as the discounted cash flow version because it assumes only one, upfront investment, and does not factor in the time value of money. So it's not as good at helping management to decide whether or not to take on a project. The discounted payback period is a metric used in capital budgeting to determine which projects to take on.More accurate than the standard payback period calculation, the discounted payback period factors in the time value of money.The discounted payback period formula shows how long it will take to recoup an investment based on the present value of the project's projected cash flows.The shorter a discounted payback period is, the sooner a project or investment will generate cash flows to cover the initial cost. Investopedia / Matthew Collins When deciding on any project to embark on, a company or investor wants to know when their investment will pay off, meaning when the cash flows generated from the project will more than cover the cost of the project or the investment. This is particularly important because companies and investors usually have to choose between more than one project or investment. So being able to determine when certain projects will pay back compared to others makes the decision easier. The basic method of the discounted payback period is to take the future estimated cash flows of a project and discount them to their present value (using discounted cash flows). This figure is compared to the initial outlay of capital for the investment. The period of time that a project or investment takes for the present value of future cash flows to equal the initial cost provides an indication of when the project or investment will break even. No cash flows after that will be diminished by the initial cost. The shorter a discounted payback period, the sooner a project or investment will generate cash flows to cover the initial cost. A general rule to consider is to accept projects that have a payback period that is shorter than the project's target timeframe. So, for example, management can compare the required break-even date to the discounted payback period. If the latter's metric (in years) is less than the required break-even date, that's a positive sign that can play into the decision of whether or not to give the project the go-ahead. To begin, the periodic cash flows of a project must be estimated and shown by each period in a table or spreadsheet. These cash flows are then reduced by their present value factor to reflect the discounting process. This can be done using the present value function and a table in a spreadsheet program. Next, assuming the project starts with a large cash outflow (or investment), the future discounted cash inflows are netted against the initial investment outflow. This process is applied to each additional period's cash inflow to find the point at which the inflows equal the outflows. At this point, the project's initial cost has been paid off, and the payback period is reduced to zero. The increase in inflation for consumer prices in the United States in April 2025, according to the Bureau of Labor Statistics. The core rate, which is adjusted to remove food and energy pricing, was 2.8%. Investors should consider the diminishing value of money when planning future investments. The payback period is the amount of time it takes a project to break even in cash collections using nominal dollars. Alternatively, the discounted payback period reflects the amount of time necessary to break even based not only on what cash flows occur but when they occur and the prevailing rate of return in the market. These two calculations, although similar, may not return the same result due to the discounting of cash flows. For example, projects with higher cash flows toward the end of a project's life will experience greater discounting due to compound interest. For this reason, the payback period may return a positive figure, while the discounted payback period returns a negative figure. Assume that Company A has a project requiring an initial cash outlay of $3,000. The project is expected to return $1,000 for each of the next five years, and the appropriate discount rate is 4%. The discounted payback period calculation begins with the -$3,000 cash outlay in the starting year (or period). The first year cash inflow is +$1,000. Using the present value discount calculation, the discounted payback period figure is $1,000/1.04 = $961.54. Thus, after the first period, the project still requires $3,000 - $961.54 = $2,038.46 to break even. After the discounted cash flows of $1,000/(1.04)2 = $924.56 in period two, and $1,000/(1.04)3 = $889.00 in period three, the net project balance is $3,000 - ($961.54 +$924.56 + $889.00) = $224.90. After receipt of the fourth year payment, which is discounted to $854.80, the project will have a positive balance of $629.90. Therefore, the discounted payback period is between three and four years. Example of Discounted Payback Period Present Value Discounted Value Net Cost Initial Investment -$3,000 -$3,000 -$3,000 Year 1 Cash Flow $1,000 $961.54 -$2,038.46 Year 2 Cash Flow $1,000 $924.56 -$1,113.90 Year 3 Cash Flow $1,000 $889.00 -$224.90 Year 4 Cash Flow $1,000 $854.80 +$629.90 Discounted Payback Period for Company A The standard payback period is calculated by dividing the initial investment cost by the annual net cash flow generated by that investment. First, determine the initial cost of an investment. The next step is to estimate the expected annual cash flows from the investment, as well as the discount rate (the value the cash flow loses with each successive year, due to inflation and the diminishing time value of money). Then calculate the present value of each instance of cash flow and subtract that from the cost. The discount payback period is the number of years it takes for the discounted cash flows to exceed the initial investment. The decision rule is a simple rule to determine if an investment is worthwhile, and which of several investments is most worthwhile. If the discounted payback period for a certain asset is less than the useful life of that asset, the investment might be approved. If a business is choosing between several potential investments, the one with the shortest discounted payback period will be the most profitable. The discounted payback period is a metric used to determine if an investment will be sufficiently profitable (in an acceptable time period) to justify its initial cost. It uses the predicted returns from the investment, and takes into consideration the diminishing value of future returns.