

Managing Finance (MNGFIN)

Week 6: Making capital investment decisions

Accounting rate of return (ARR) and payback period (PP)

Textbook reading (Atrill & McLaney: Ch. 8)

With the goal of maximising wealth to shareholders, management in general and financial managers in particular have a substantial responsibility in determining what courses of action an organisation will undertake. Compounding the complexity of this responsibility is the likelihood that companies will be faced with various options and decisions in terms of the projects that may be pursued. The focus for this week is the examination of techniques that help financial managers analyse and evaluate such possibilities, allowing them to discern which projects will increase wealth and which will not, as well as the priority that each project should receive. In order to properly address these investment appraisal decisions, you will focus on two traditional evaluation methods: the accounting rate of return (ARR) and the payback period (PP).

One of the more traditional methods of evaluating capital investment decisions is the ARR, which expresses the average accounting profit generated by an investment as a percentage of the average investment made to earn that profit over the life of the project. To better understand how the ARR is computed and utilised, carefully examine the formula (p. 278) and example (Activity 8.2) that are provided in your reading. While the computation for the ARR is rather straightforward, it is important to understand what the final percentage provides for the financial manager. The percentage derived indicates how much the potential investment will increase or return to the organisation in terms of accounting profit. For example, in Activity 8.2, the investment decision in question would have an ARR of 11.1%, meaning that the accounting profit expected is approximately 11% more than it costs to invest in the project. Does this mean the company should pursue the project? It is impossible to tell from the information provided, because each organisation will have different percentage thresholds with regards to ARR that will support any decision to pursue the investment. The target ARR set by an organisation is the minimum rate that an investment must return before it can be deemed as acceptable, and this rate will vary depending on the specific requirements for each organisation.

While the ARR is rather simple to use, it has some serious shortcomings that may hinder its widespread use. First, when expressing values in percentage form, the total amounts are ignored. So a project with a higher ARR than another may seem like the better choice, but such a project may actually create a substantially lower amount of wealth for the organisation. Also, using the ARR to compare projects falls short with regards to the timing of profits because it is only based on the accounting profit rather than cash flows. Two projects may be comparable with regards to the

ARR, yet one project may return more profit in early years while the other returns a larger amount in later years.

Another traditional—and rather simple—method for evaluating capital investment decisions is the payback period (PP). By determining the length of time that it will take the original investment to be repaid, use of the PP helps to make up for one of the limitations of the ARR. Two projects that have comparable ARRs can be further examined by the PP method to determine which one will repay its investment sooner. The project with a smaller payback period would be deemed to be more attractive, as the costs will be recouped more quickly. This tool helps to incorporate the timing of cash flows between projects. As with the ARR, an organisation must have an acceptable threshold against which to compare the calculated PP.

Although the PP method helps to account for some timing of cash flows, it still ignores the overall profitability of projects, thus limiting its use. Simply using the PP as the sole criterion could possibly eliminate projects that would create more wealth than others or those that would return a higher percentage. As you make your way through this section, you will become better acquainted with the limitations of both ARR and PP and find that these two methods are best used in tandem. However, even when using both methods, there are still limitations, as neither accounts for risk, interest, or inflation. In the next topic, you will examine two contemporary methods for analysing capital investment decisions.

Net present value (NPV) and internal rate of return (IRR)

Textbook reading (Atrill & McLaney: Ch. 8)

While the ARR is helpful, it stops short of fully evaluating the profitability and suitability of a project from a financial perspective. Financial managers are not only concerned with accounting profits, as the ARR utilises, but also cash flows that result from projects. It is these cash flows that are used to cover costs and pay back investors. The two evaluation methods discussed in the previous section fail to incorporate the time value of money; as you well know, money received today is worth more than the same amount received at some time in the future. The use of net present value (NPV) incorporates the dimensions and timing of cash flow, as well as inflation and risk, and has become one of the most widely used and acceptable techniques for evaluating capital investment decisions.

To best understand the concept of NPV, you should pay careful attention to the methods of calculating the present values of cash flows and examples provided in the reading. As you will see, this technique reduces, or discounts, the cash flows for each time period based on some rate of interest, known as the *opportunity investment rate*. This calculation is necessary to perform because it is possible to invest a certain amount of money with a financial institution and receive a return in subsequent time periods. By discounting the cash flows for each time period, it is possible to determine the amount of investment that would be presently required to

achieve a future return. Once a present value for each time period has been determined, these amounts are then summed and compared to the total investment required for the project. To be acceptable, the project must show that the sum of the amounts is greater than amount of initial investment. The difference that is thus calculated is the NPV of the investment. A positive NPV means that the project returns are better than those of the financial institution for the same investment, and, as such, the decision to undertake the project is the correct decision. A negative NPV depicts the opposite scenario.

An important variable within the NPV evaluation method is the rate of interest used to discount the cash flows. (Note: Discounting tables are available in your text in Appendix E that can be used to calculate the present values of cash flows, for a series of different interest rates.) We can deduce that when the NPV of a project is positive, the rate of return for the project is higher than the interest rate used in the calculation. What interest rate to use in the calculation is an important consideration for the organisation, as this rate sets a minimum value that projects must return.

As noted above, it is possible to place an investment with a financial institution and receive a return on the investment. So, it is important that the interest rate used in the NPV calculation at least incorporates the interest rate that can be achieved through safer investments, such as banks or government securities. However, organisations would desire a higher rate of return than those just mentioned, in part to account for the risk involved with undertaking projects and also to account for inflation. Therefore, the interest rate used to discount the cash flows generated by the project would most likely incorporate a premium for risk and inflation, known as the *risk premium*. Organisations are also able to adjust this risk premium for different projects based on the amount of risk perceived. The rate most often used in NPV computation is the cost of capital for the organisation. This represents the average cost of acquiring funds, either through issuing bonds or stock. While you will examine the cost of capital later in this module, it is important to realise that it is this cost, represented as a rate of interest, which must be considered when evaluating projects.

In determining the interest rate to be used when calculating the NPV, you may begin to see how this rate is being developed as the minimum rate of return that is acceptable for a project. For example, if a company uses 20% as the interest rate for its NPV calculations and the NPV of the project is exactly £0.00, we are able to determine that the rate of return for the project is also 20%. Thus, the project meets the threshold and can be considered acceptable.

However, the organisation may desire that projects not only have a positive NPV, but also meet a predetermined rate of return, such as the internal rate of return (IRR). More specifically, IRR is the interest rate that would create indifference between making an investment or not; this metric is calculated for a value of the NPV equal to zero. The IRR is determined by 'backing into' it through an examination of NPV. As you will see, and as the authors state, this process can be very time consuming if

completed by hand, so the use of computer software is often employed. This process is accomplished by calculating the NPV of projects using different rates and eliminating them until one gives an NPV equal to zero. For evaluation purposes, the IRR serves both as a threshold rate for individual projects and as a comparison rate between projects. However, IRR does very little for evaluating wealth generation, making NPV a superior measure.

The examples provided throughout this reading will help to illustrate how each method is computed as well as how each is used for evaluation.

Appraisal methods in practice

Textbook reading (Atrill & McLaney: Ch. 8)

Now that you have examined some of the techniques used for analysing capital investment decisions, it is important to consider their actual use in the current business environment. After reviewing the advantages and disadvantages of each method, it would be easy to assume that most organisations would choose to utilise the NPV and IRR methods as their primary evaluators of projects. However, as the statistics show, many organisations still rely on the traditional ARR and PP methods. Quite simply, these methods are less complex in terms of calculating, but that does not make them less useful. The PP method, even in spite of its limitations, is still very popular due to its simplicity. The trends also show that organisations are utilising combinations of these techniques more often, rather than relying on one entirely.

Nevertheless, the NPV and IRR methods have become the most popular ones utilised by many CFOs, as these techniques provide a greater amount of useful information for making investment decisions, and they account for such variables as the timing of cash flows, risk, and inflation. The reading examines the real-world use of the methods covered as well as some practical considerations that must be recalled when evaluating investment decisions.

Dealing with risk

Textbook reading (Atrill & McLaney: Ch. 8)

In computing NPV, organisations are able to account for some risk by adding a risk premium onto the interest rate used to discount the cash flows. As projects differ, different risk premiums can be used. However, this method still falls short of accounting for and dealing with the risk involved with projects. NPV is still based on projections of cash flows, sales revenues, cost savings, etc., which are likely to vary to some degree. Also, projects often span a considerable amount of time, which increases the likelihood of inaccurate cash flows (especially those closer to long term) as well as adverse conditions that might impact the project as a whole.

One method that financial managers use to help analyse the risk involved with a project is sensitivity analysis. This technique requires a careful examination of the

key variables affecting the project, such as sales volume, sales price, operating costs, initial outlay, financing costs, and project life. Each variable is examined to see how changes to it might ultimately affect the viability of the project. Example 8.3 in your reading demonstrates how such analysis is conducted. While this technique is insightful, it does have its limitations. It takes advanced methods, such as linear programming—which are beyond the scope of this module—to permit a simultaneous sensitivity analysis to be performed. Also, it leaves decision making subjective, as no clear decision rules are present.

Another method for analysing risk is to develop an expected NPV of a project with the use of probabilities, which act as weights. Cash flows for each period are adjusted by the probability of that amount actually occurring; expected present value for each period is discounted using the chosen discount rate. The sum of the discounted expected values of cash flows will be the expected NPV. While the decision-making criteria are the same, a positive expected NPV indicates a viable project. This alternative method, which includes the notion of uncertainty associated with each option or alternative—and as such uses probabilities to gauge the value of the expected cash flows—must be used with caution. The calculation risk involved with the use of this method stems from the determination of the probabilities. These are, for most cases, subjective assessments of the likelihood that each of the options will occur. The assessments, albeit subjective, are functions of the experience level of the managers involved in the investment decision. Carefully review the examples provided in the reading to better understand how expected NPV is derived as well as its limitations.

Managing investment projects

Textbook reading (Atrill & McLaney: Ch. 8)

Even with the use of appropriate evaluation methods, such as NPV and IRR, organisations and financial managers still have much to consider with regards to choosing and managing investment projects. Managers must consider the amount of investment funds that are available to them as well as the source of these funds. Determining the most viable projects is an exercise in futility if the amount of funds available is unknown. Managers will know how best to allocate the funds once the most profitable projects have been identified.

The reading for this topic outlines the five stages of managing investment projects and discusses important considerations at each stage. We have already mentioned two of these stages, determination of investment funds available and identification of profitable projects. After these stages comes a more thorough evaluation of the selected projects that helps to determine the quality of each proposal and the ability of the managers who will be in charge. After projects have been approved, it is vital that they be continually monitored through consistent and timely reporting, which will help managers to detect any variations. This enables the project to be better

controlled while providing managers the opportunity to develop corrective courses of action if needed.