

Application of net present value method and internal rate of return method in investment decision

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Abstract: With the unprecedented boom in business in recent years, investment choices have become the norm for many companies. Thus, how to select projects for investment has become an important issue for companies to consider. We have compared the two most common methods used in the market to calculate future earnings, the net present value method and the rate of return method. Most companies, when faced with a new project, choose to use these two methods to judge the future income, as well as the feasibility of the project. In this paper, the two methods are adopted for certain projects. The results of the calculations for using different calculation methods were analyzed and showed that both methods are feasible in investment income forecasting. When the forecasted return is lower than the market return, no investment is made. The two methods, NPV, and rate of return, can be referred to more often in future investment decisions.

1. Introduction

Investment decisions are important because they may reduce a certain amount of risk. Different choices may lead to different consequences, an unsuitable decision may waste money or a new opportunity. Decision-makers at all levels of an organization are often faced with major decisions related to capital investments. When faced with an investment decision, certain choices must be made between different options. Precisely, the significance of investment decisions lies in the fact that capital investments generally tie up a significant amount of capital in a business. Moreover, capital investments will usually have a significant impact on the future cash flows of the business, especially those investments that are likely to generate cash inflows only after the business has suffered cash outflows for several years. Besides, the recovery of many investments is not known with certainty at the time the investment occurs, so investment decisions are subject to risk and uncertainty. There is also the fact that once an investment decision is made, it is generally impossible to recover that decision, or at least it is very costly to do so. Finally, investment decisions have a direct impact on a company's ability to achieve its goals.

Usually, companies calculate the income and return by two methods. Net present value and rate of return method. They are two widely used methods for making investment decisions. Both methods provide some reasonable suggestions for people to make a judgment on the project. Moreover, these two methods have their advantages. The NPV method converts the net cash flows over the life of the project into a sum of equivalent present values at a predetermined target rate of return. The sum of NPV is also equal to the algebraic sum of the present value of all cash inflows and the present value of all cash outflows. Internal Rate of Return (IRR method), also known as Financial Internal Rate of Return (FIRR) and Internal Rate of Return (IRR), is a method to evaluate the financial efficiency of project investment by using the internal rate of return. The so-called internal rate of return is the discount rate when the total present value of capital inflow is equal to the total present value of capital outflow and the net present value is equal to zero. Without the use of electronic computers, the internal rate of return should be trial calculated using several discount rates until the one with a net present value equal to zero or close to zero is found. Therefore, both methods are feasible.

Everyone wants to have a money return rather than lose money when they invest, -so there is only

one project with an NPV greater than 0, people are willing to invest. If there are some independent projects with NPVs greater than 0, people are willing to invest too. But there are exclusive projects with NPVs greater than 0, people will only choose the one with the highest NPV.

In terms of internal rate of return, people only want to benefit, and they could only benefit if IRR is greater than the hurdle rate, so there are several independent projects with an IRR greater than the hurdle rate, people are willing to invest all of them. If there are some exclusive projects with IRR greater than an hurdle rate, people would only choose the one with the highest IRR.

2. Data and methods

We collect our data about some programs' Cash flow which is from our professor for our analysis.

(1) IRR for project A is 20%, IRR for project B is 19%.

(2) The company should accept project A. Because project A has a higher IRR, which means Project A is probable to have a higher return.

(3) No. there exist some possible problems with the IRR method:

1) IRR ignores the scale of the project

For example, a project with a \$100,000 capital outlay and projected cash flows of \$25,000 in the next five years has an IRR of 7.94 percent, whereas a project with a \$10,000 capital outlay and projected cash flows of \$3,000 in the next five years has an IRR of 15.2 percent. Using the IRR method alone makes the smaller project more attractive, and ignores the fact that the larger project can generate significantly higher cash flows and perhaps larger profits.

2) IRR ignores future costs

The IRR method only concerns itself with the projected cash flows generated by a capital injection and ignores the potential future costs that may affect profit.

If you are considering an investment in trucks, for example, future fuel and maintenance costs might affect profit as fuel prices fluctuate and maintenance requirements change. A dependent project may be the necessity to purchase vacant land on which to park a fleet of trucks, and such cost would not factor in the IRR calculation of the cash flows generated by the operation of the fleet.

3) IRR ignores reinvestment rates

Just assuming cash flows can be reinvested at the same rate, actually might not happen in reality.

The NPV method is based on the principle of assuming that the expected cash inflow will certainly be realized at the end of the year and treating the original investment as if it were borrowed at a predetermined discount rate. When the NPV is positive, the project will still have residual income after repayment of principal and interest, when the NPV is zero, nothing will be gained after repayment of principal and interest, and when the NPV is negative, the project will not have enough income to repay principal and interest.

The NPV method has wide applicability. The main problems of applying the NPV method is how to determine the discount rate, one way is to determine it according to the cost of capital, and another way is to determine it according to the minimum capital profit required by the enterprise.

The theoretical basis of the net present value method is based on the time value of money. With any long-term investment, it is expected that the total future return is greater than the original amount invested. However, since future returns and investment expenses occur in different periods, a simple comparison. They must be compared based on the same time to see whether the investment is worthwhile. Therefore, the total amount of the future increase in earnings must be converted to present value at the cost of capital rate or an appropriate rate of return and then compared to the present value of the investment. If the NPV of the chosen investment plan is zero or negative, the wealth of the enterprise will not increase but may also decrease after adopting the plan; on the contrary, if a positive NPV plan is adopted, the assets of the enterprise will increase. The advantage of NPV is that it takes into account the time value of money and uses all the net cash flows of the project during the calculation period; its disadvantage is that it cannot directly reflect the actual level of return of the investment project from a dynamic perspective.

In the selection of investment options, NPV and IRR indicators are the two more commonly used indicators for evaluating investment options. Under the given conditions, the conclusions obtained

from the two evaluation indicators are consistent. However, when selecting investment options, there are often factors that do not meet the established conditions, such as different initial investments in each investment project or inconsistencies in the amount and timing of cash flows, which lead to inconsistent conclusions of these two evaluation indicators. This requires us to choose between the two. Since the NPV index has the advantages of simple calculation, consistent with the financial management objectives of the enterprise, reasonable reinvestment assumptions, and no multiple solutions or no solutions, the NPV index should be chosen to evaluate the feasibility of investment projects when inconsistent conclusions are reached by using the NPV and IRR indexes.

3. Data and methods

3.1 Data

We have analyzed and calculated our data, and the following table shows our calculations.

Table 1. The differences of two investments's cash flows over the same time period

Project	CF_0	CF_1	CF_2	CF_3	CF_4
A	-430	230	179	124	94
B	-430	70	138	240	260

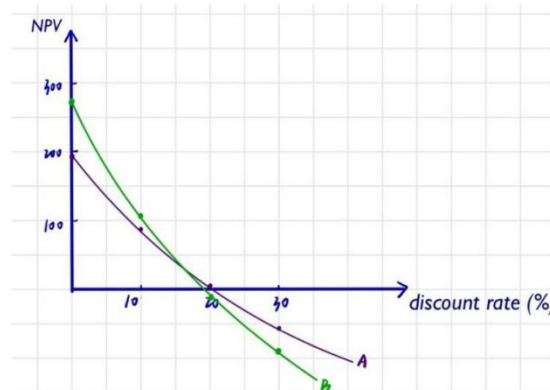


Figure 1. The difference of two investments's internal rates of return

3.2 Results

As shown in Figure 1, a diagram with the x-axis (discount rate) and y-axis (NPV) is drawn. This case requires us to work out the internal rates of return of projects A and B, next, to identify in which circumstances we could benefit if we choose project A and project B. At first, to make the decision clearer to be explained.

In terms of project A, since the IRR is 20%, it is obvious to see that NPV is positive if the discount rate is lower than 20%; inversely, if that is higher than 20%, NPV turns to negative, which means if the discount rate is lower than 20%, A is accepted. Similarly, since the IRR of B is 19%, people could accept this project if the discount rate is lower than 19%.

Net present value (NPV) is the difference between the present value of cash inflows and the present value of cash outflows over some time. NPV is used in capital budgeting and investment planning to analyze the profitability of a projected investment or project.

The internal rate of return (IRR) is a metric used in financial analysis to estimate the profitability of potential investments. The internal rate of return is a discount rate that makes the net present value (NPV) of all cash flows equal to zero in a discounted cash flow analysis.

4. Conclusion

Also, there is something to mention about the two rules. NPV is an actual value while IRR is a rate. NPV and IRR could give the same conclusions as well. First, if the project only changes the sign once; second, if-the project is a single project, choose or not choose; third, if the discount rate is flat

because IRR assumes the same discount rate.

However, both advantages and disadvantages of IRR are summarized: in terms of advantages, this method finds the time value of money, and hurdle rate not required. (projects can be selected where the IRR exceeds the estimated cost of capital).

In terms of disadvantages, IRR ignores the scale of the project. For example, a project with a \$100,000 capital outlay and projected cash flows of \$25,000 in the next five years has an IRR of 7.94 percent, whereas a project with a \$10,000 capital outlay and projected cash flows of \$3,000 in the next five years has an IRR of 15.2 percent. Using the IRR method alone makes the smaller project more attractive, and ignores the fact that the larger project can generate significantly higher cash flows and perhaps larger profits. Also, IRR ignores future costs, the IRR method only concerns itself with the projected cash flows generated by a capital injection and ignores the potential future costs that may affect profit. If you are considering an investment in trucks, for example, future fuel and maintenance costs might affect profit as fuel prices fluctuate and maintenance requirements change. A dependent project may be the necessity to purchase vacant land on which to park a fleet of trucks, and such cost would not factor in the IRR calculation of the cash flows generated by the operation of the fleet.

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