Economic Evaluation Method and Empirical Study of Project Feasibility Study

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Abstract: The project decision-making process of project investment decision-making, especially state-owned capital investment, is mainly divided into preliminary feasibility study and feasibility study. After the implementation of the "Decision of the State Council on Investment System Reform", the feasibility study of the project is basically no longer approved by the government. The premise of the project, but the investment entity still needs to consider the construction time, location and scale of the project in the investment decision-making process, whether it is technically feasible, whether it is economically reasonable, and of course, social benefits and other factors, and economic analysis is investment decision-making. The most important determinants, this paper mainly compares several methods of economic evaluation of project investment feasibility study, and conducts empirical research with a wind power project.

1. Introduction

In the investment decision-making process, the investment entity should consider the construction time, location and scale of the project, whether it is technically feasible or not, and whether it is economically reasonable. Of course, it also includes social benefits. However, for ordinary investors, it is still concerned whether the project can be profitable. A basic indicator for evaluating the viability of an investment plan is cash flow, which is divided into initial cash flow, operating cash flow, and ending cash flow. There are two general categories of analytical methods, one is the discounted cash flow method (dynamic) and the undiscounted cash flow analysis method (static).

2. Advantages and Disadvantages of Project Investment Economic Analysis Methods

As mentioned above, economic analysis is divided into static and dynamic categories. The analysis methods have their own advantages and disadvantages and scope of application. The specific analysis methods are as follows:

2.1 Net Present Value Method (Npv)

The net present value is the total present value of the net cash flow of each year discounted at a certain discount rate during the life of the investment project, minus the balance after the initial investment.

The first step is to calculate the annual net cash flow from operations; the second step is to calculate the total present value of future cash flows; the third step is to calculate the net present value, NPV = total present value - initial investment.

All present value calculations contain interest rate assumptions based on reinvestment of cash flows during the project period. If there are multiple schemes with a net present value greater than zero, the scheme with the largest net present value is optimal.

Set a cash flow for an investment project: CF_0, CF_1,..., CF_t; market value of the project: (r is the discount rate).

$$NPV = CF_0 + \frac{CF_1}{1+r} + \frac{CF_2}{(1+r)^2} + \ldots + \frac{CF_t}{(1+r)^t}$$

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In the statistics on the CFO's use of investment decision analysis methods, the obvious NPV method is more commonly used, mainly because: the NPV method uses cash flow rather than profit; the profit may contain human factors; the NPV method includes the entire cash flow of the project; The NPV method makes a reasonable discount on cash flow. But at the same time not all companies use the NPV method for investment decisions. In general, the advantage of the net present value method is that it considers the time value of money and can reflect the net income of various investment schemes. The disadvantage is that it cannot reveal that the individual investment schemes themselves may reach the actual rate of return (yield), and the internal rate of return method compensates for this deficiency.

2.2 Internal Rate of Return (Irr)

The internal rate of return method is the discount rate when the present value of the future cash inflow of the project is equal to the present value of the cash outflow. In general, the internal rate of return can be understood as the contribution of a unit of investment to the value of the company.

$$NPV = CF_0 + \frac{CF_1}{1+IRR} + \frac{CF_2}{(1+IRR)^2} + \ldots + \frac{CF_t}{(1+IRR)^t} = 0$$

The main defects of internal rate of return are as follows:

(1)IRR Defect 1: The difference between borrowing and lending. Consider the following two items A and B:

Table 1 Irr Defect Analysis of Items a and B

Project	CF0	CF1	IRR	NPV@10%
A	-1000	1500	50%	364
B	1000	-1500	50%	-364

Project A is an investment (lending out of funds) and hopes to have high returns. Therefore, IRR is higher than opportunity cost is a good project; Project B is borrowing funds and hopes that the borrowing rate is low, so IRR is lower than opportunity cost is a good thing. But from the perspective of net present value, the results are quite different.

(2)Defect 2: Some project IRRs do not exist, such as items C and D below, and IRR cannot be calculated according to mathematical methods.

(3)Defect 3: Some projects have multiple IRRs. For example, there are two discount rates for item E with NPV equal to 0, which are -50% and 15.2%, respectively, as shown in Figure 1.

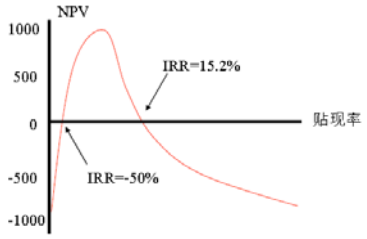

Fig.1 Schematic Diagram of Project e Internal Rate of Return

(4)Defect 4: Mutual exclusion of project analysis is not reliable. At the same time, when the time distribution of cash flows of mutually exclusive projects is different, the use of IRR method for investment decision will also cause problems.

Therefore, it can be seen that the advantage of the internal rate of return method is that the consideration is the time value of funds, reflecting the true reward of the project, and the concept is easy to understand. The downside is that the calculations are complicated.

2.3 Profit Index Method (Profit Index Method)

Profit Index (PI) = Current Cash Flow Present Value / Initial Investment = 1 + Net Present Value / Initial Investment

Assumption: If only $300,000 is available for investment, which items should I choose?

Table 2 Pi Analysis For Different Projects

Project	NPV	Investment	PI
A	230000	200000	1.15
B	141250	125000	1.13
C	194250	175000	1.11
D	162000	150000	1.08

You should choose the portfolio with the highest weighted average profitability index:

WAPI(B+D)=1.13(125/300)+1.08(150/300)+0.0(25/300)=1.01

WAPI(A)=0.77

WAPI(B+C)=1.12

It can be seen that the advantage of the profit index method is that considering the time value of funds, it can truly reflect the profitability of investment projects, and it is easier to compare different projects with different initial investments. The downside is that the index can only represent profitability, not the wealth that may actually be obtained, especially in the comparison of mutually exclusive projects, which may lead to erroneous results.

2.4 Average Rate of Return

Average rate of return (ARR) = average cash flow / initial investment amount

The advantage of the average rate of return is that it is simple, easy to understand, and easy to calculate. The disadvantage is that the time value of funds is not considered, and the determination of the necessary average rate of return is highly subjective.

2.5 Payback Period

The payback period method is a method of making investment decisions based on the length of time required to recover the original investment amount. The method is simple to calculate and reflects the turnover speed of the fund to a certain extent, but it only pays attention to the return result of the project, and does not pay attention to the future development of the project, which is not conducive to measuring the true profitability of the project.

Table 3 Analysis of Investment Payback Period for Different Projects

Project	CF0	CF1	CF2	CF3	Payback period	NPV@10%
A	-2000	500	500	5000	3	2624
B	-2000	500	1800	0	2	-58
C	-2000	1800	500	0	2	50

The advantage of the payback period method is that the concept is easy to understand, the calculation is relatively simple, and the shortcoming is that the time value of the currency is neglected, and the cash flow situation after the expiration of the payback period is not considered. In fact, long-term investment projects tend to have poor initial profitability and high returns in the middle and late stages. The payback method always gives priority to projects that are quick and profitable. It is a common method used in past investment evaluations. Currently, it is mainly used as an auxiliary means. For this reason, there are now discounts. The current investment recovery period method.

3. Comparison of Investment Decision Analysis Methods

3.1 The Advantages and Disadvantages of Static Comparative Analysis

The payback period is a comprehensive indicator reflecting the ability of the project to repay the total investment amount and the turnover rate of funds. This method reflects the recovery rate of investment and is easy to calculate, but ignores the time value of money and the investment income after the project payback period, so that the company only pays attention to the current project and delays the overall strategic decision. The average rate of return method requires companies to determine in advance the necessary conditions to be met, and subjective. This method has a credit problem that can be manipulated artificially for a certain period of time by using accounting

techniques.

3.2 The Pros and Cons of Dynamic Comparative Analysis

Compared with the static method, the discounted technology method fully considers the time value of money, which is more scientific and reasonable. The most commonly used methods are the net present value method and the internal income method. The most important method in traditional investment decision analysis methods is the net present value analysis method in dynamic analysis. To determine whether a project is a good investment opportunity, you need to consider whether its value exceeds the cost and has a positive net present value. Internal rate of return and net present value are two competing approaches to investment decision-making. Although similar conclusions are often drawn, the following differences still exist:

The investment decision conclusions are different. The net present value of the project is expressed in currency and reflects the absolute amount. The internal rate of return is a percentage and reflects the profitability; Differences in the assumption of return on investment: The net present value method assumes that the cash flow during the project period is reinvested at the cost of capital, while the internal rate of return law assumes reinvestment at the internal rate of return.

4. Empirical Analysis of Economic Analysis of Feasibility Study of a Wind Power Project

4.1 Engineering Idea

The project plans to install 25 wind turbines with a capacity of 2000kw. The corresponding installed capacity is 50MW, and the annual on-grid power generation is 111.802GW•h. The annual single-machine equivalent full-load operation hours is 2236 hours, and the capacity coefficient is 0.2553.

4.2 Project Design Budget

The static investment of the project is 42806.33 million yuan; the static investment of kilowatts per unit is 8561.27 yuan/kW; the dynamic investment is 45731.23 yuan; the dynamic investment per unit kilowatt is 9146.25 yuan/kW.

4.3 Economic Benefit Analysis

According to the current accounting system and tax regulations, the on-grid electricity price during the project operation period is 0.61 yuan/kWh, and the subsidy is 0.01 yuan/kw. The financial indicators of the project are shown in Table 4 below:

Table 4 Financial Indicators For Measuring Projects

Analysis index	unit	Numerical value	Remarks
Total return on investment	%	7.39	
Investment tax rate	%	5.99	
Capital profit rate	%	22.27	
Total investment internal rate of return	%	10.03	After tax
Capital internal rate of return	%	21.53	
Payback period	Year	9.07	After tax

5. Conclusion

The non-discounted cash flow indicator does not take into account the time value of funds. It is unscientific. For example, the payback period method can only reflect the recovery rate of investment and cannot reflect the main objective of the investment – the net present value, and the average rate of return method. The static analysis method lacks the discriminating ability for investment schemes with different lifespans, different capital investment and different time returns, and is now gradually used as an auxiliary means of decision-making. What needs to be emphasized more is that due to the extensive application of advanced technologies such as computers, the

problem of difficult calculation of discounted indicators has been completely solved, which has also accelerated the promotion of discounted indicators. Of course, for the various indicators of discounting, there are also some emphasis and advantages and disadvantages, and appropriate analysis methods should be selected for different projects. For large-scale engineering projects, such as the wind power project in this paper, various analysis methods are generally used together, and comprehensive judgments have been made to make reasonable decisions.

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