

The Diagnosis of Traditional Capital Investment Appraisal Techniques

(Relevant to AAT Examination Paper 4 – Business Economics and Financial Mathematics)

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The capital investment decision-making process needs evaluating, prioritizing and deciding among projects to assess which will give a company a competitive advantage. The decision maker has to understand how to apply capital investment appraisal techniques because the decision will affect the business's operation. For example, if a project is successful, the business can gain major strategic and operational advantages; but if it is failure, the business can lose opportunities.

In this article traditional approaches to capital investment appraisal – average return on investment, payback period and discounted cash flow –are discussed and their pitfalls addressed.

First, the main factors that the decision maker should take into account when considering a proposed investment in new or replacement assets are as follows:

- 1 The cost of capital
- 2 The duration of the project
- 3 The cash flow from the project and its timing

Three traditional investment appraisal methods are illustrated in the following example:

Example

CG Ltd is considering an investment project. It has a choice of three projects and the projects would require an investment \$600,000 in capital cost. CG Ltd 's existing return on capital is 10% and this is assumed to be the cost of capital. The forecast cash flows from the projects would be:

Table 1: Forecast Cash Inflow

Year	Project A \$	Project B \$	Project C \$
1	220,000	150,000	120,000
2	230,000	160,000	170,000
3	200,000	290,000	210,000
4	150,000	160,000	200,000
5	100,000	200,000	220,000
Total	900,000	960,000	920,000

Return on investment

Profitability is a relative measure of success. Each of the various capital investment appraisal measures relates the return (profits) of a business to its cost of capital. Return on investment is one of the widely used capital investment appraisal methods. Return on investment is defined as a measure the return of average annual profit earned to the initial/average capital outlay.

$$\text{Return on investment} = \frac{\text{The average annual profit earned over the life of the profit}}{\text{the initial capital outlay/the average capital outlay}} \times 100\%$$

Table 2: Return on Investment

Row		Project A	Project B	Project C
		\$	\$	\$
(1)	Cash inflow	\$900,000	\$960,000	\$920,000
(2)	Initial cost of capital	\$600,000	\$600,000	\$600,000
(3)	Incremental profit, (1) – (2)	\$300,000	\$360,000	\$320,000
(4)	Average profit, (3) / 5	\$60,000	\$72,000	\$64,000
(5)	Return on investment, (4) / (2) ×100%	10.00%	12.00%	10.67%

Using the return on investment method, Project B is the best choice for CG Ltd.

Return on investment is simple to calculate and easy to understand but its disadvantage is that the timing of the cash flows are not taken into account.

Payback Period

In order to take the timing of cash flows into account, the payback period method is introduced. The payback period is defined as the expected length of time required to cover the initial investment cost of capital.

$$\text{Payback period} = \text{Year before full recovery} + \frac{\text{Unrecovered cost at start of year}}{\text{Cash flow during year}}$$

Table 3: Cumulative Cash Inflow

Year	Project A		Project B		Project C	
	Cash Inflow	Cumulative Cash Inflow	Cash Inflow	Cumulative Cash Inflow	Cash Inflow	Cumulative Cash Inflow
	\$	\$	\$	\$	\$	\$
1	220,000	220,000	150,000	150,000	120,000	120,000
2	230,000	450,000	160,000	310,000	170,000	290,000
3	200,000	650,000	290,000	600,000	210,000	500,000
4	150,000	800,000	160,000	760,000	200,000	700,000
5	100,000	900,000	200,000	960,000	220,000	920,000

$$\text{Payback period}_{\text{Project A}} = 2 + \frac{\$(600,000-450,000)}{\$200,000} \times 12 = 2 \text{ years } 9 \text{ months}$$

Project A has \$450,000 cumulative cash inflow after 2 years, therefore the uncovered cost at the start of year 3 is $\$(600,000-450,000) = \$150,000$. The cash flow is \$200,000 in year 3.

Applying the same workings to Project B and C, we calculate

$$\text{Payback period}_{\text{Project B}} = 3 \text{ years}$$

$$\text{Payback period}_{\text{Project C}} = 3 + \frac{\$(600,000-500,000)}{\$200,000} \times 12 = 3 \text{ years } 6 \text{ months}$$

Using the payback period method we find that the investment in Project A is better than that of either Project B or Project C because the payback period for Project A is the shortest. Therefore, CG Ltd required a payback of three years or less. However, important disadvantages of the payback period method are that it does not take account of the time value of money and it ignores cash flows after the payback period.

The third method, the discounted cash flow technique, is a way of addressing the disadvantages of the payback period and improving the effectiveness of capital investment appraisal.

Discounted Cash Flow

Discounted cash flow is a method for ranking investment projects that uses the time value of money concept. To calculate discounted cash flow return, a rate of discount is used and this usually relates to the cost of capital. A net present value method is applied. The net present value is the present value of each cash flow, including both outflows and inflows, discounted at the project's cost of capital. The sum of these discounted cash flows gives the project's net present value. If the net present value is positive, then the return achieved is greater than the rate at which the cash flows have been discounted, and therefore the project should be accepted. If the net present value is negative, the project should be rejected. If two or more mutually exclusive projects both have a positive net present value, the project with the highest net present value should be chosen.

$$\text{Net present value} = CF_0 + CF_1 / (1+k)^1 + CF_2 / (1+k)^2 + \dots + CF_n / (1+k)^n$$

CF is the expected net cash flow in the period,

k is the project's cost of capital,

0 means year 0 (present), 1 means end of period 1, etc

Table 4: Discounted Cash Flow

Year	Discount Factor at 10%	Project A		Project B		Project C	
		Cash Flow	Discounted Cash Flow	Cash Flow	Discounted Cash Flow	Cash Flow	Discounted Cash Flow
		\$	\$	\$	\$	\$	\$
0	1.0000	(600,000)	(600,000)	(600,000)	(600,000)	(600,000)	(600,000)
1	0.9091	220,000	200,002	150,000	136,365	120,000	109,092
2	0.8264	230,000	190,072	160,000	132,224	170,000	140,488
3	0.7513	200,000	150,260	290,000	217,877	210,000	157,773
4	0.6830	150,000	102,450	160,000	109,280	200,000	136,600
5	0.5645	100,000	56,450	200,000	112,900	220,000	124,190
	Net Present Value:		99,234		108,646		68,143

All projects have a positive net present value and they achieve an excess value at 10% Project B has the highest net present value and it should be accepted.

Though discounted cash flow techniques take into account the time value of money and also consider total cash flows from the project, the difficulty is in determining the proper discount rate to be used in this technique.

Conclusion

Some financial factors are incorrectly used in the investment appraisal process, leading to weaknesses in the investment appraisal system. For example, future cash flows are evaluated in the absence of inflation. Discount rates used to appraise investment are often excessively high. In addition, traditional investment appraisal tends not to consider non-financial benefits. These non-financial benefits include healthy staff resulting in higher staff morale, and a better working environment affecting product quality and corporate image. The difficulty in quantifying these non-financial benefits into cash flows and failure to include them in the analysis is a problem.

However, traditional appraisal techniques are a powerful ways of appraising investment projects. There is a need though for all decision makers, when evaluating projects, to clearly understand of the pitfalls arising from the use of traditional appraisal techniques. The problems of traditional appraisals are not the techniques themselves. Instead, decision makers should recognize the techniques' limitations and be careful to make sure that the appraisal techniques are performed properly.