KATA ALUAN DARI NAIB CHANCELOR

Saya uchapkan tahniah kepada sidang pengarang yang berjaya mengeluarkan majallah "BUSINESSCOPE". Perniagaan adalah satu kegiatan yang banyak pengaroh dalam masyarakat kita dihari ini. Saudara perlu mempunyai saluran2 dimana fikiran dan komen2 ahli dapat dikemukakan kepada masyarakat umum dan majallah adalah satu saluran yang terpenting untuk tujuan ini.

Saya yakin dengan pengeluaran BUSINESSCOPE ini maka dapatlah masyarakat umum mengetahui kegiatan dan pendapat2 ahli pengarang.

Dengan ini saya uchapkan selamat mahuaya dan berharap majallah "BUSINESSCOPE" akan terus maju dengan pesatnya.

( PROFESSOR UNGKU A. AZIZ )
Naib-Chancelor.
HOW TO EVALUATE CAPITAL INVESTMENTS?

by

GURUPRASAD MURTHY*

Objective of Business

Every business has as its first dimension an economic dimension. Management decisions should therefore aim at economic performance which implies not only maximisation of profits today but also for the future. It implies the maximisation of the present value of future benefits. It means planning today for future success. And future success depends on the wisdom with which investment decisions are made. Investment decisions are defined as those acts of management which result in the commitment of resources, made in the hope of realising benefits that are expected to occur over a reasonably long future period of time. The problem is one of evaluating the profitability of new investments to accomplish the intended purpose of planning for future success.

The modus operandi of the investment evaluation process has ranged from highly subjective-intuitive-judgment based approaches to objective quantified approaches. Any evaluation of the future requires a modicum of subjective elements-judgement, intuition, and conjecture. Where formerly intuition used to be translated into decisions, today they are required to be developed in to precise quantitative explicit estimates of benefits (duration and timing) and costs. These explicit estimates are transformed into indices that indicate the profitability of the investment proposals. The acceptability of investment proposals prima facie is determined by assaying the profitability indicates against the cutoff point i.e. the fundamental standard of financial performance. Ultimately varying measures of intuition, judgment and experience influence the final decision. Formerly subjective judgement exclusively determined the future of business. Today objectivity greatly influence all business decisions.

Preamble

It is the purpose of this paper, with the aid of the data in Exhibit One, to

a) offer a comprehensive review of the indices used to assess and rank investment proposals,

b) provide a comparative study of the indices and attempt to identify and resolve to the possible extent the causes of conflict in rankings of investment proposals,

c) develop out of the above conflict an understanding as to which group of indices gives a best measure of investment profitability and where necessary which particular index within a group is preferable to the other/s and the reasons thereof.

* I acknowledge with thanks the assistance offered by my student, Mr. Sanjay Choudhuri in the preparation of the Exhibits presented in this paper.

Mr. Guruprasad Murthy is a member of the Faculty, Jamnalal Bajaj Institute of Management Studies, University of Bombay, Bombay.
### EXHIBIT ONE

**DATA**

*Figures in Rupees*

<table>
<thead>
<tr>
<th>INVESTMENT</th>
<th>t0</th>
<th>t1</th>
<th>t2</th>
<th>t3</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>25,000</td>
<td>25,000</td>
<td></td>
<td>2,500</td>
</tr>
<tr>
<td>Q</td>
<td>25,000</td>
<td>25,000</td>
<td></td>
<td>2,500</td>
</tr>
<tr>
<td>R</td>
<td>25,000</td>
<td>2,500</td>
<td>5,000</td>
<td>22,500</td>
</tr>
<tr>
<td>S</td>
<td>25,000</td>
<td>22,500</td>
<td>5,000</td>
<td>2,500</td>
</tr>
</tbody>
</table>

The following assumptions are made regarding the data in Exhibit One:

a. Outlay takes place at time t0 only.

b. Salvage Value of the investment at the end of its economic life is zero.

c. Risks, in respect of the proceeds (inflows) between time t1 and t3, are identical. They are equally riskless or are characterised by equal risk. There is no room for discrimination between the proposals on these grounds.

d. The proceeds between time t1 and t3 for all the proposals are either non-taxable (world of no taxes) or have been adjusted for tax purposes.

### Rule of Thumb Decisions

In certain situations it is possible to make use of rule of thumb decisions:

Comparing proposals P and Q it is obvious that P is inferior to that of Q because, although the outlays at t0 are identical and the amount and timing of proceeds are identical at t1, P earns nothing beyond t1 year, whereas Q earns Rs. 2,500 at t3. On grounds of duration of proceeds, Q scores over P. An objective evaluation measure should always indicate Q as superior to P. Again comparing R and S, S is superior to R. They have identical outlays at t0 and identical aggregate amount of proceeds between t1 and t3. However, in case of S a preponderant portion of the proceeds is entangled at t1. Therefore on grounds of timing S is superior to R. Any evaluation measure which violates the above ranking is obviously not an objective measure.

### Objective Evaluation of Investment Proposal

An objective evaluation of investment proposals should consider:

a) timing of the proceeds over the economic life of the investment proposal i.e. the fact that the quantities of proceeds at different points of time within the economic life of the proposals may vary from proposal to proposal;

b) duration of the proceeds i.e. number of years the proposal is capable of generating proceeds,

An objective evaluation measure has to consider the above factors before ranking the investment proposals. A proposal should be given a fair chance of standing first, by being allowed to score on any one of the two factors (timing or duration). The evaluation measure must possess a built-in mechanism to assess the investment proposals in the above fashion. In the following paragraphs the following measures of acceptability are reviewed:

(A) Payback Period

The payback period is defined as the number of years required to recover cash outlay at t0. It is computed by dividing the cash outlay by the average annual cash proceeds. If the proceeds are uneven the payback period is calculated by summing up the savings in the economic life of
the project till the sum is equal to the cash outlay at t0. If the proceeds are averaged when they are uneven the gestation period would also show positive proceeds.

The payback period vide Exhibit Two, has given identical ranking to P and Q although Q earns even at time t3. The payback method ignores the duration of proceeds beyond the payback period. It also ignores the timing of the proceeds within the payback period. Two proposals recovering the cash outlay in the same period but in different proportions within the payback period are ranked identically. However S is ranked superior to R.

It is easy to infer that the payback method lacks objectivity. The payback highlights the liquidity, rather than profitability, aspect of investment proposals and has a built-in bias for short lived proposals. However it can be used as a coarse screening device to assay investment proposals against a fundamental standard of maximum acceptable payback period laid down as cutoff point by top management.

(B) The Time Unadjusted Methods
The Time Unadjusted Methods comprise the following:

a) Return on Investment
b) Benefit-Cost Ratios
c) Proceeds per Rupee of Outlay
d) Single Year Rate of Return

Return on Investment
This method of figuring profitability takes the ratio of average annual profits (conventionally after deducting depreciation) to some measure of investment. There are several variants of this method. The investment can be defined as original investment, average investment (outlay at t0 divided by two) or Life-time Average Investment (Exhibits Three and Four). The ranking is identical under all the variants of the above method.

The ROI is measured against a minimum acceptable rate of return. Projects with rates of return greater than the minimum acceptable rate of return are acceptable. The variants of this technique have caused considerable confusion. Even the concept of investment is not very clear. Explicitly, inclusion of working capital is absent.

Benefit-Cost Ratios (Undiscounted)
This is the ratio between the sum of the benefits (gross/net) and the outlays associated with an investment proposal. The gross benefits/cost ratio is defined as \[ \frac{\sum P}{\sum 0} \] and the net benefit cost ratio is defined as \[ \frac{\sum (P-D)}{\sum 0} \] vide Exhibit Three.

The ranking given by the benefit-cost ratio methods is the same as the time unadjusted return on investment method.

Objectivity of ROI and Benefit-Cost Ratios
Exhibits Three and Four show that the above time unadjusted methods of assessing the investment proposals, giving identical ranks to the competing investment proposals, contravene the ranking given by intuition in respect of R and S. In ranking P and Q, Q is ranked superior to P. It possesses objectivity to the extent that it considers the duration of proceeds over the entire economic life of the investment proposal. It lacks objectivity in so far as it ranks S and R at par. It ignores the timing of the proceeds over the economic life of S and R and attaches the same value to proceeds disentangled at time t1 and t3. It provides a correct
measure of profitability if the following specific conditions are satisfied:

a) outlays occur at a single point of time

b) proceeds are uniform over the economic life of the proposals in question

c) economic life of the proposals correspond to the life assumed for book-keeping purposes.

Without these conditions the results derived from this set of approaches are subject to fairly wide errors. And this is an adequate handicap to discourage the use of the above methods.

Proceeds Per Rupee of Outlay

The proposals are ranked according to the rupee yield per rupee of resources expended initially. It is the same as the gross benefit-cost ratio. The average annual proceeds per rupee of outlay divides the total proceeds by the number of years of the project's useful life. The average annual earnings are divided by the original outlay. The ranking given by the latter method are different from the other time-unadjusted methods. It ranks P superior to Q, and R and S at par. It therefore lacks objectivity in respect of the time and duration dimensions of proceeds over the economic life of the investment proposals.

Single Year Rate of Return

This is a variant of the time unadjusted return on investment. This is a measure of profit in a single year, which may be the first year, the "first full year" or some other year. The proceeds may be compared against original investment, average investment over the entire life, average investment (outlay at t) divided by two, or average yearly investment in the year studied. In the last mentioned variant the proceeds generated over the entire economic lives of the competing proposals, save the year studied, are ignored. Given the investment base, the rankings vary upon the choice of the year. Erratic variations in the percentage rates of return result in different rankings.

(C) Time Adjusted Methods

It was noted at the outset that an objective measure to evaluate investment proposals should take into consideration the duration of the proceeds over the economic life of the proposals as well as the timing of the proceeds within the economic life of the proposals. The measures discussed thus far lacked objectivity in respect of at least one of the two requirements. It is therefore necessary to explore measures which possess objectivity with respect to time as well as duration. The measure which takes both the factors into consideration is the Discounted Cash Flow method.

The DCF method employs the Present Value Concept to evaluate the investment proposal. It converts proceeds received in varying amounts or equally, over the economic life of the investment proposals into a common measure, at a common time period (t0), called the present value of the future savings. The conversion is done with the aid of discount rate and present value tables. The rate at which proceeds are discounted should be equal to or greater than the minimum acceptable rate of return i.e. the cutoff point. If the present value of the proceeds is greater than the outlay at the cutoff point i.e. the Net Present Value (NPV) is positive or the discounted Benefit-Cost ratio (gross) is greater than unity or the discounted Benefit-Cost ratio (net) is positive the investment proposal is acceptable. Contrarywise, if the present value of proceeds is less than the outlay i.e. NPV is negative or gross Benefit-Cost ratio is less than unity or net benefit cost ratio is
negative the investment proposal is unacceptable.

A variant of the above technique is the Internal Rate of Return (IRR). Instead of using the NPV or Benefit Cost Ratios as the index to evaluate investment proposals, a time adjusted rate of return is employed to assess and rank investment proposals. The IRR is defined as the rate at which the present value of the future proceeds is exactly equal to the outlay at t=0. If the IRR is greater than the cutoff point the investment proposal is acceptable. If the IRR is less than the cutoff point the investment proposal is unacceptable. The IRR is arrived at by trial and error with the cutoff point providing a convenient starting point to perform computations.

In order to perform the above computations the present value tables are used. Tables A and B are used for unequal and equal savings per annum respectively, whereas Tables C and D are used for equal and unequal savings per month respectively.

**NPV Rankings at 6%**

At 6% discount rate the NPV methods (NPV, Benefit Cost ratios) ranking is as follows: S-1, R-2, Q-3 and P-4. The duration and timing of proceeds is in favour of S. It is rightly the superior proposal. However proposal R has the disadvantage in respect of the timing of proceeds. This works against R in competing with S. Also in competing with Q the timing disadvantage to R is more than offset by advantage of the duration and quantities of proceeds at a later time period to give R a second rank although Q has the advantage of durations as well as timing of proceeds. P is ranked last because the solitary advantage of timing is not adequate to sustain competition from other proposals which have duration and timing of proceeds in their favour.

The NPV concept possesses objectivity because it takes the duration as well as the timing of proceeds into consideration. It gives a fair chance to both these factors to interact before deciding the relative superiority of proposals. The IRR ranks S and Q superior to R and P respectively. This is consistent with the ranking by inspection. The IRR possesses objectivity in respect of duration and timing of proceeds. Also the IRR ranking of S and P are identical with those of NPV at 6%. S has the advantage of duration and timing of proceeds. P has the advantage of timing which is inadequate to overtake the competing projects.

Two points need attention:

a) NPV at 6% and NPV at 25% rankings are not identical.

b) NPV at 6% and IRR ranks Q and R in an opposite manner.

These issues will be discussed in turn.

**NPV at 6% versus NPV at 25%**

The ranks as seen from Exhibit Ten are as follows:

<table>
<thead>
<tr>
<th>NPV</th>
<th>P</th>
<th>Q</th>
<th>R</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>6%</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>25%</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

S has the advantage, to restate, of timing and duration (aggregate amount) of proceeds. It is the least worst. Removes from 2 to 4 because at 25% rate the disadvantage due to timing of proceeds is not more than offset by the advantage due to duration (aggregate amount) between t1 and t3 to enable R to prove less inferior than even P, nothing to say of S. Q has moved from 3 to 2. This is because at 25% the timing of proceeds works in favour of Q and duration is also in its favour. NPV at 6% and 25% and IRR rankings are consistent with the rankings by intuition. Changes in discount rates do not alter the objectivity character of the Time Adjusted Methods of assessing the investment proposals.
NPV at 6% versus IRR

The IRR ranks Q prior to R and NPV at 6% ranks R prior to Q. Which proposal is to be accepted? Insofar as accept or reject decisions are concerned both the methods give identical results. The IRR is greater than, equal to or less than the cutoff point at which the NPV is positive, zero or negative respectively. The problem arises only when ranking is necessary to make a choice from among a given set of mutually exclusive investment proposals. Neither the IRR nor the NPV method make any explicit assumption of what happens to the funds disentangled earlier. The cash flow configurations are different in terms of timing, duration and amount per unit of time. Therefore, what happens to funds disentangled earlier from the time of disentanglement to the time of the economic life of the longest lived proposal from among the competing proposals is a relevant piece of information crucial to the ranking process. The question is: What is the Reinvestment Rate? Neither the NPV nor the IRR make any explicit assumption about the reinvestment rate. However both the methods make implicit assumptions. The IRR assumes that the reinvestment rate is the IRR itself and the NPV assumes that the reinvestment rate is cost of capital. With these assumptions the IRR is bound to rank as superior to those proposals which have timing in their favour. S is superior to the other proposals. However the IRR of project Q is greater than that of proposal R. Since timing of proceeds is in favour of Q, ex hypothesi and the reinvestment rate is higher, Q is bound to be superior to R. The duration of proceeds (aggregate quantities) is in favour of R but this is not adequate to overtake Q which has the advantage of timing and high reinvestment of proceeds. Although Q had the advantage of timing it could not overtake R with NPV method at 6% since the rate at which reinvestment of proceeds took place was rather low. R, with its advantage of duration (at time t3), had adequate time to overtake Q. The issue to be resolved is not which of the two techniques (IRR and NPV) is the superior but which of the two assumptions is the more correct or logically defensible. In any firm the cutoff point is the minimum acceptable rate of return. It is not correct to assume that the reinvestment opportunities are as high as the IRR itself. If either assumption is suspect, explicit assumptions about the reinvestment rate will have to be made. If explicit estimates regarding reinvestment rates are not made and there is no cause to postulate successor proposals with reinvestment rates higher than cost of capital the cost of capital is the right and only surrogate of the reinvestment rate. The estimates regarding reinvestment rates is but a starting point to resolve the conflict between IRR and NPV in assessing and ranking mutually exclusive investment proposals.

(D) Terminal Value Method

Given the reinvestment rate the source of conflict between the IRR and the NPV can be isolated by comparing the wealth that accumulates at some future point of time i.e. the economic life of the longest lived proposals from among a set of two or more mutually exclusive set of investment proposals. The funds that are disentangled earlier will be reinvestment at the relevant reinvestment rate and the accumulated terminal value is arrived at after compounding the resources released at the reinvestment rate. With reinvestment rate equal to 6%. Terminal Value ranks are the same as those of NPV at 6%. Therefore R is superior to Q if reinvestment rate is 6%. With reinvestment rate equal to 25% the Terminal Value method ranks, proposals in a different fashion. Q is preferred to P and R because Q's timing and duration (aggregate quantities) of proceeds is in its favour to be ranked above P and R. P
is preferred to R because with excellent reinvestment opportunities (opportunity cost of loanable funds) the timing of proceeds is the important factor.

With reinvestment rate equal to 25% the speed with which funds are accumulated leads to a higher (terminal for P rather value) than R which has timing of proceeds against it and cannot therefore compete merely with duration (aggregate quantities) of proceeds at time t3. The lost which R sustains due to foregoing the reinvestment opportunities is unsurmountable. With reinvestment rate equal 6% the Terminal Value will always rank proposals in the same fashion as NPV. With reinvestment rate tending away from 6%, the Terminal Value method ranking shifts in favour of proposal with timing of proceeds in its favour in view of the opportunity cost of loanable funds. With reinvestment rate equal to 25% which is more than the highest prevailing IRR (15%) without violating objectivity, (S is still superior to R and Q to P), P with timing of proceeds as the only advantage ranks above R which has the advantage of duration of proceeds (aggregate quantities). The following points emerge:

a) Proposals possessing only timing of proceeds in its favour are not ranked above others unless its intrinsic worth at a common future date (usually proposal) is higher than the competing proposals. Intrinsic worth is functionally related to the opportunity cost of the loanable funds i.e. the reinvestment rate. If opportunity cost of funds disentangled equals 6% (reinvestment rate) R and Q are preferred to P. Favourable timing of proceeds is neither a necessary nor a sufficient condition to possess the highest intrinsic worth of a common future date.

b) Proposals with relatively unfavourable timing of proceeds but duration (aggregate quantities) of proceeds in its favour are also given an opportunity to prove their merit. With reinvestment rate at 6%, R is preferred to Q and P, and R is rated above Q. Unfavourable timing of proceeds is not necessarily a disadvantage to possess relatively highest profit producing potential at a common future date. Duration of proceeds is a sufficient though not a necessary condition to win the first rank.

c) With opportunity cost of loanable funds i.e. reinvestment rate equals 25% the ranking of proposals is altered. Since the wealth accumulating speed has changed drastically (from 6% to 25%) favourable timing of proceeds is a definite handicap and R cannot sustain the speed with which P accumulates wealth. If a proposal can win the highest rank even with one facet in its favour it is given an equal opportunity. P is therefore ranked above R. Timing of proceeds is a sufficient condition to win the first rank.

d) Even with drastic changes in the opportunity cost of loanable funds Terminal Value method ranks Q above P and S above R. It possesses objectivity and considers, like the Time Adjusted Methods, the timing as well as duration of proceeds. In addition it brings within its orbit the peripheral factors that are of crucial importance in the ranking of investment proposals.

Prof. Ezra Solomon's comments are as follows:

a) The valid comparison is not simply between two projects but between two alternative courses of action. The ultimate criterion is the total wealth that the investor can expect from each alternative by the terminal date of the longer lived project.
b) If the rate of return is to be used as an index of profitability, then the relevant rate is the per annum yield promised by each alternative course of action from its inception to a common terminal date in the future (usually the terminal date of the longer lived project).

c) If the present value is to be used as an index of relative profitability, the expected reinvestment rate or set of rates should be used as the discounting factor. These rates will be equal to the company’s present cost of capital only by coincidence.

The Terminal Value method is therefore a practical, purposeful, positive and powerful tool to assess the proposals’ profit producing potential and facilitate the ranking of the proposals according to their ability to accumulate wealth at a common future date after considering all facets of a proposal.

Other Time Adjusted Methods
The pure financing flows defines the inflows as the loan procured and the outflows as the interest payment and repayment of principal (where occasioned). The present value of outflows is compared with the present value of inflows. If the latter is greater than the former at the minimum acceptable rate of return the project is acceptable and vice-versa. A variant of the above technique is to consider a combination of the project flows and the financing flows. This is known as combined actual flows. Again, if the present value of inflows is greater than the present value of outflows the project is acceptable and vice-versa.

Concluding Remarks
It is proposed to offer the following concluding remarks:

a) The payback is the simplest measure of acceptability but is useful as a coarse screening device.

b) The time-unadjusted return on investment is condemned ‘ab initio’.

c) The DCF methods provide usually correct yardsticks to evaluate accept or reject investment proposals. However, in case of mutually exclusive investment proposals DCF methods (NPV and IRR) yield contradictory results.

d) When the NPV and IRR clash the Terminal Value method is recommended to resolve the conflict.

It is appreciated that the corporate executive faces a stupendous task in making a choice of techniques to evaluate investment proposals especially when he has to strike a rather delicate balance between several factors. Multiplicity of objectives helps only to aggravate the problem. When scarce resources (capital) have to be allocated to the competing ends (proposals) i.e. there is a budget, ranking one technique may give results different from those of another technique. The dilemma can be resolved to some extent by resorting to quantitative techniques (linear programming, integer programming). This may or may not give satisfactory results. But decisions based on the use of these techniques are bound to be inferior to those of intuition.

EXHIBIT TWO

<table>
<thead>
<tr>
<th>Payback Method</th>
<th>Payback* Period (in years)</th>
<th>Rand</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
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<td></td>
</tr>
<tr>
<td>Q</td>
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<td></td>
</tr>
<tr>
<td>R</td>
<td>2.8</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>1.5</td>
<td></td>
</tr>
</tbody>
</table>

* The payback period is computed by summing up the cash savings from t1 onwards till the sum is equal to the cash outlay at t0.

** In the Payback Method, the best proposal is that which has the shortest payback period.
### EXHIBIT THREE

#### TIME UNADJUSTED METHODS

<table>
<thead>
<tr>
<th>Average Investment</th>
<th>Lifetime Average Investment</th>
<th>Average Annual Proceeds</th>
<th>Average Depreciation</th>
<th>Proceeds (after Depreciation)</th>
<th>Average Income (after Depreciation)</th>
<th>Return on Average Investment</th>
<th>Benefit Cost Ratio (Gross)</th>
<th>Benefit Cost Ratio (Net)</th>
<th>Proceeds per Rupee of Outlay</th>
<th>Average Annual Proceeds</th>
<th>Proceeds per Rupee of Outlay</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rs.</strong></td>
<td><strong>Rs.</strong></td>
<td><strong>Rs.</strong></td>
<td><strong>Rs.</strong></td>
<td><strong>Rs.</strong></td>
<td><strong>Rs.</strong></td>
<td><strong>Rs.</strong></td>
<td><strong>P-D</strong></td>
<td><strong>P-D</strong></td>
<td><strong>P-D</strong></td>
<td><strong>P-D</strong></td>
<td><strong>P-D</strong></td>
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<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Q-2500</td>
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<td>12500</td>
<td>27500</td>
<td>25000</td>
<td>2500</td>
<td>834</td>
<td>3.3%</td>
<td>6.6%</td>
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<td>.1</td>
</tr>
<tr>
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<td>6.7%</td>
<td>13.3%</td>
<td>13.3%</td>
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</tr>
</tbody>
</table>

**NOTE:**

1) Average Investment is equal to the Outlay at t0 divided by two.

Lifetime Average Investment is equal to the average of the Average Annual Book Investments vide Exhibit 4.

Average Income (after depreciation) is Average Annual Proceeds less Annual depreciation.

2) In the Return-on-Investment Methods, the higher the percentage rate of return the better the proposal.

3) In the Benefit-Cost Ratio Methods (Gross and Net) the higher the ratio (gross or net) the better the proposal.

4) In the Proceeds per rupee of outlay methods (Total and Average) the higher the ratio the better the proposal.

5) In the Return on Investment Methods (excluding Net Benefit Cost Ratio Method) the annual is computed after deducting depreciation which has been computed assuming straight-line method.

6) In the proceeds per rupee of outlay method the income is not adjusted for depreciation.
EXHIBIT FOUR

RETURRN ON LIFETIME AVERAGE INVESTMENT

<table>
<thead>
<tr>
<th></th>
<th>t1</th>
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<td>CBV</td>
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<td>0</td>
<td>0</td>
<td></td>
</tr>
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<td>Yearly Average</td>
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</tr>
<tr>
<td>Q-CBV</td>
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<td>CBV</td>
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<tr>
<td>Average</td>
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<td>4166</td>
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<table>
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<td>20834</td>
<td>12500</td>
<td>4166</td>
<td>12500</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>25000</th>
<th>16667</th>
<th>8330</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>16667</td>
<td>8333</td>
<td>0</td>
<td>12500</td>
</tr>
<tr>
<td>Average</td>
<td>20834</td>
<td>12500</td>
<td>4166</td>
<td>12500</td>
</tr>
</tbody>
</table>

**NOTE:**
1) Lifetime Average Investment is equal to the Average of the Average Annual Book Investments.

2) Average Annual Book Investment is defined as Yearly opening book value plus closing book value of investment divided by two.
# EXHIBIT FIVE

**SINGLE YEAR RATE OF RETURN (FIGURES IN RUPEES)**

<table>
<thead>
<tr>
<th></th>
<th>$P$</th>
<th>$Q$</th>
<th>$R$</th>
<th>$S$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First Year</td>
<td>Yr. 1</td>
<td>Yr. 2</td>
<td>Yr. 3</td>
</tr>
<tr>
<td>Cash Income</td>
<td>25,000</td>
<td>22,500</td>
<td>—</td>
<td>2,500</td>
</tr>
<tr>
<td>Depreciation</td>
<td>8,333</td>
<td>8,333</td>
<td>8,333</td>
<td>8,333</td>
</tr>
<tr>
<td>Single Year Income</td>
<td>0</td>
<td>16,667</td>
<td>(8,333)</td>
<td>(5,833)</td>
</tr>
<tr>
<td>Average Income</td>
<td>0</td>
<td>834</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opening Book Value</td>
<td>25,000</td>
<td>25,000</td>
<td>16,667</td>
<td>8,333</td>
</tr>
<tr>
<td>Closing Book Value</td>
<td>0</td>
<td>16,667</td>
<td>8,333</td>
<td>0</td>
</tr>
<tr>
<td>Average Book Investment in year studied</td>
<td>12,500</td>
<td>20,834</td>
<td>12,500</td>
<td>4,166</td>
</tr>
<tr>
<td>Lifetime Average Investment</td>
<td>12,500</td>
<td>12,500</td>
<td>12,500</td>
<td>12,500</td>
</tr>
<tr>
<td>Original Investment</td>
<td>25,000</td>
<td>25,000</td>
<td>25,000</td>
<td>25,000</td>
</tr>
<tr>
<td>Single Year Income on Average Book Investment in year studied</td>
<td>0%</td>
<td>79.8%</td>
<td>(66.6%)</td>
<td>(140%)</td>
</tr>
<tr>
<td>Single Year Income on Lifetime Average Investment</td>
<td>0%</td>
<td>133.2%</td>
<td>66.6%</td>
<td>(46.6%)</td>
</tr>
<tr>
<td>Single Year Income or Original Investment</td>
<td>0%</td>
<td>(66.6%)</td>
<td>(33.3%)</td>
<td>(23.3%)</td>
</tr>
</tbody>
</table>

**NOTE:**
1) In the Single Year Rate of Return method the higher the percentage rate of return the better the proposal.

2) In the case of single year income on average book investment in year studied the investment and income base would vary dependent upon the choice of the year to be studied. The relevant comparison for ranking is the first years return against each proposal or second third fourth years return against each proposal.

3) In the case of single year income on Lifetime Average Investment and original investment the investment base remains constant. However the relevant comparison is to be made as indicated in para (2).
the cost of capital. In case of the IRR, the reinvestment rate is the IRR itself.

9. If 6% is the cutoff point, Npv is computed at 6% and if the cutoff point is 25% Npv is computed at 25%.

8. In the benefit-cost ratio method, the higher the positive Cost Ratio the better the proposal.

7. In the Npv method, the higher the positive Npv the better the proposal.

6. In the Present Value method, the higher the present Value the better the proposal.

5. In the IRR method, the higher the Internal Rate the better the proposal.

4. Net Benefit/Cost Ratio is equal to (Cross Benefit)/Cost Ratio minus one.

3. Cross Benefit is equal to Present Value of Savings.

2. Npv of savings is equal to Present Value of Savings less Outflow at time T.

NOTE: 1. DCF Savings is defined as Cash Processes per annum.

<p>| | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>668</td>
<td>11</td>
<td>11</td>
<td>51</td>
<td>75</td>
<td>2240</td>
<td>2775.5</td>
<td>2775.5</td>
</tr>
<tr>
<td>133</td>
<td>899</td>
<td>82</td>
<td>82</td>
<td>7</td>
<td>7</td>
<td>8280</td>
<td>2775.5</td>
<td>2775.5</td>
</tr>
<tr>
<td>149</td>
<td>158</td>
<td>27</td>
<td>27</td>
<td>8</td>
<td>8</td>
<td>2120</td>
<td>2775.5</td>
<td>2775.5</td>
</tr>
<tr>
<td>10</td>
<td>008</td>
<td>11</td>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0000</td>
<td>2775.5</td>
<td>2775.5</td>
</tr>
</tbody>
</table>

DISCOUNTED CASH FLOW METHODS

EXHIBIT SIX
# Exhibit Seven

**Terminal Value Methods**

<table>
<thead>
<tr>
<th>Outflow</th>
<th>Rs.</th>
<th>Reinvestment Rate = 6%</th>
<th></th>
<th>Reinvestment Rate = 25%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Terminal Value Rs.</td>
<td>Net Terminal Value Rs.</td>
<td>Overall ROR Rs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>25000</td>
<td>28090</td>
<td>3090</td>
<td>89.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>39062.50</td>
<td>14062.50</td>
<td>64</td>
</tr>
<tr>
<td>Q</td>
<td>25000</td>
<td>30590</td>
<td>5590</td>
<td>81.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>41562.50</td>
<td>16562.50</td>
<td>60.15</td>
</tr>
<tr>
<td>R</td>
<td>25000</td>
<td>30600</td>
<td>5609</td>
<td>81.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>32656.25</td>
<td>7656.25</td>
<td>76.5</td>
</tr>
<tr>
<td>S</td>
<td>25000</td>
<td>33081</td>
<td>8081</td>
<td>75.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>43906.25</td>
<td>18906.25</td>
<td>57</td>
</tr>
</tbody>
</table>

**Note:**
1. Terminal Value of a proposal is defined as the wealth that it can accumulate at the end of the economic life of the longest lived proposal from among a set of mutually exclusive investment proposals. The accumulation of wealth is calculated by compounding funds disentangled at an estimated reinvestment rate.

2. Net Terminal Value is equal to Terminal Value of Inflows less Outlay at t0.

3. Overall ROR is equal to the ratio: Outlay/Terminal Value.

4. In the Terminal Value Method, the higher the Terminal Value the better the proposal.

5. In the Net Terminal Value Method, the higher the positive Net Terminal Value the better the proposal.

6. In the Overall Rate of Return method ranking is according to the **lowest** Rate of Return.
EXHIBIT EIGHT

PURE FINANCING FLOWS — DISCOUNT RATE = 6%.
(Figures in Rupees)

<table>
<thead>
<tr>
<th>Investment</th>
<th>Cash Inflow</th>
<th>Present Value of Outflow</th>
<th>NPV of Outflow</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>25,000</td>
<td>(27,500)</td>
<td>(25,943.5)</td>
</tr>
<tr>
<td>Q</td>
<td>25,000</td>
<td>(2,500)</td>
<td>(27,673.2)</td>
</tr>
<tr>
<td>R</td>
<td>25,000</td>
<td>(2,500)</td>
<td>(27,673.2)</td>
</tr>
<tr>
<td>S</td>
<td>25,000</td>
<td>(2,500)</td>
<td>(27,673.2)</td>
</tr>
</tbody>
</table>

**NOTE:**
1) Principal is to be repaid at the end of the economic life of the proposal.
2) Interest Rate is 10%.
3) In the pure financing flows, lower the NPV of outflows the better the proposal.
4) Net Present Value of Outflows is Present Value of Outflows less cash inflow at t0.

EXHIBIT NINE

COMBINED ACTUAL FLOWS

DISCOUNT RATE = 6%

<table>
<thead>
<tr>
<th></th>
<th>t1</th>
<th>t2</th>
<th>t3</th>
<th>PV of Inflows</th>
<th>PV of Outflows</th>
<th>NPV of Inflows</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>(23,585)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q</td>
<td></td>
<td></td>
<td></td>
<td>22,500</td>
<td>(232,150)</td>
<td>(19,890)</td>
</tr>
<tr>
<td></td>
<td>22,500</td>
<td>2,500</td>
<td>2,500</td>
<td>27,673.2</td>
<td>(27,673.2)</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>—</td>
<td></td>
<td>2,225</td>
<td>(4,198)</td>
<td>(4,198)</td>
<td>(19,730)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>20,000</td>
<td>2,500</td>
<td>2,093</td>
<td>27,673.2</td>
<td>(27,673.2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:**
1) In the combined actual flows method the higher the NPV of Inflows the better the proposal.
## EXHIBIT TEN

### SUMMARY OF BANKINGS

<table>
<thead>
<tr>
<th></th>
<th>P</th>
<th>Q</th>
<th>R</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspection</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Payback</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Return on Original Investment</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Return on Average Investment</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Return on Lifetime Average Investment</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Benefit-Cost Ratio (Gross)</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Benefit-Cost Ratio (Net)</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Proceeds per Rupee of Outlay</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Average Annual proceed per Rupee of Gutlay</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>2</td>
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</tbody>
</table>

"Single Year" Rate of Return

<table>
<thead>
<tr>
<th></th>
<th>(a) First Year</th>
<th>(b) Second Year</th>
<th>(c) Third Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Book Investment</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>in Year Studied</td>
<td>1</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Lifetime Average</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Investment</td>
<td>1</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Original</td>
<td>(a) First Year</td>
<td>(b) Second Year</td>
<td>(c) Third Year</td>
</tr>
<tr>
<td>Investment</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Net Present Value (Kr = 6)</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Net Present Value (Kr = 25%)</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Internal Rate of Return</td>
<td>4</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Gross Benefit-Cost Ratio (Kr = 6%)</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Net Benefit-Cost Ratio (Kr = 6%)</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Gross Benefit-Cost Ratio (Kr = 25%)</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Net Benefit-Cost Ratio (Kr = 25%)</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Terminal Value (Kr = 6%)</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Net Terminal Value (Kr = 6%)</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Overall ROR (Kr = 6%)</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Terminal Value (Kr = 25%)</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Net Terminal Value (Kr = 25%)</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Overall ROR (Kr = 25%)</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Pure Financing Flows (Kr = 6%)</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Combined Actual Flows (6%)</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

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"The Management of Corporate Capital"
"The Capital Budgeting Decision"
"Cost Accounting - A Managerial Emphasis"
"Capital Expenditure Decisions"
"Management Accounting"
"The Capital Expenditure Decision"
Current Marketing Scene in India
Marketing of Life Insurance Services
Coast of Capital
(An appraisal of concepts and Practice)
The Changing Face of the Indian Stock Exchanges
The Chakravarty Committee Report
Recommendations and its implication for Indian Financial System
Labour Through Plans
Scope and Limitation of Quantitative Techniques in Economics

OCCASIONAL PUBLICATION
COST OF CAPITAL
(AN APPRAISAL OF CONCEPTS AND PRACTICE)
Guruprasad Murthy

In the corporate goal formulation process, maximisation of the economic welfare of shareholder is the predominant desideratum. Effective fulfillment of this goal will naturally depend on the wise Management of the 'SOURCES OF FINANCE (Funds) and USES OF FINANCE (Funds). A project absorbs funds, acquired from different sources, during the gestation period. The different sources through which funds are acquired in a corporate situation include, broadly categorising, 'Ownership Capital' and 'Creditorship Capital'. In order to ensure that the assets portfolio, qualitatively and quantitatively satisfies the corporate end objective of shareholders' wealth maximisation it is necessary to lay down quantified bench-mark which can be used as a fundamental standard of financial performance against which proposals for long term uses of funds* can be assayed. Thus, we need a performance norm which can be used as a cut-off point to separate projects which merits allocation of funds from those that do not deserve funds allocation. In this segregation of projects between the said categories it... to be ensured that deserving projects yield a 'result-resource' ratio (a percentage rate of return) which exceed the cost of the different source of finance absorbed by the project. As a starting point, therefore, there is a need to evolve suitable inputs which can make possible the computation of cost of capital (or cost of different sources of finance severally and jointly). And the cost of capital in turn is used as an input in arriving at the Minimum Acceptable Rate of Return which acts as a cut-off point to distinguish between deserving projects and undeserving projects.

The minimum acceptable rate of return represents the minimum expectations from proposals claiming use of funds. Thus, it is not difficult to trace the logical relationship between the cost of capital and the minimum acceptable rate of return. The latter will always be greater than or equal to the former and both shall be expressed in a percentage rate of return form. It should be further clear that the minimum acceptable rate of return should be set below the cost of capital.

It is, the purpose of this paper to
(a) identify the information and concepts relevant to compute the cost of capital and lay down the minimum acceptable rate of return;
(b) provide suitable measures to express the cost of capital and the minimum acceptable rate of return and
(c) ascertain the practices prevailing in India, regarding the computation and use of the cost of capital

COST OF CAPITAL DEFINED:

Bierman and Smidt have defined cost of capital “as a weighted average of the cost of each type of capital is the ratios of the market value of the securities” representing that source of capital to the market value of all the securities” issued by the company. “The cost of capital is that rate of return which the enterprise is expected to earn on its investments so as to maximise the economic welfare of the shareholders.
Thus, we can say that:

(a) the cost of capital requires information relating to the price tag attached to different sources of funds.

(b) the final expression of the cost of capital is in a percentage form. Hence the information provided as inputs to compute the cost of capital shall necessarily be expressed in a percentage form.

(c) the cost of the different sources of finance is eventually averaged and presented as a composite cost. Further, the proportion of each source of finance to the total sources is also taken cognisance of for purpose of weighting. Hence, we need information which aids 'WEIGHTING AND AVERAGING'.

(d) the computation of cost of capital can rely on market value of the different sources of finance. In the alternative, the book value can also be used. So, information relating to book value and market value of the different sources of finance will be required.

The computation of the cost of capital, therefore, required information relating source of finance, price-tags to be attached to each source of finance, proportion of each source of finance to the total sources, the book-value/market value of different sources of finance.

**SOURCES OF FINANCE**

Sources of finance, to reiterate, may be classified as 'Ownership Capital' and Creditorship Capital'.

Ownership capital includes:

(a) Equity share capital;
(b) Preference share capital;
(c) Retained earnings;
(d) Depreciation, Depletion and Amortisation.

Creditorship Capital Includes:

(a) Debentures;
(b) Institutional/Individual loans (term lending institutions and public deposits);
(c) Accounts/Bills payable.

In so far as this paper is concerned, the relevant source for discussion will be the long term sources of funds. The cost of short term sources of finance outside the scope of this paper.

**COST OF BORROWING OR DEBT:**

The cost of debt capital can be identified with the periodic servicing charge i.e. the 'INTEREST RATE'. Here we may distinguish between privately placed debts and publicity raised debts. In the event of debts being privately placed the cost of debt may be defined as the contracted rate of interest. However, the interest so obtained required adjustment for TAXES in as much as 'INTEREST' is a tax-deductible charge to income. Hence, the cost of capital in general and debt in particular has to be computed on an after tax basis. The influence of taxes must be considered.

* The term security includes common and preferred stocks and all interest bearing Liabilities, including notes payable.
Thus, the relevant concept used to measure the cost of capital is the TAX ADJUSTED COST which may be algebraically defined as \((1-t)i\) where \(t\) = marginal tax rate and \(i\) = interest cost of privately contracted debt. So, if the interest rate if 10 per cent per annum and the marginal tax rate equals 60% per annum the tax adjusted cost of debt defined as \((1-t)i\) i will result in a tax adjusted burden of \((1-.6) \cdot .1 i\) i.e., .04 or 4 per cent. The implied assumption in the above computation is that the entire interest cost (100 per cent of the interest paid) is allowed as a tax deductible item. This assumption is valid by and large although not in every case. Thus, in the case of public deposits, the central Budget of (1975-76) has disallowed for tax purposes 15 per cent of the interest paid on public deposits. In other words only 85 per cent of the interest paid on public deposits is allowed as a tax deductible item. To quote the Finance Minister, in this budget speech of 1975-76, "The levy of a tax under Interest-Tax Act, 1974 on interest received by scheduled banks has had the effect of increasing on an average, the cost of borrowings from scheduled banks by about one per cent. The levy of this tax has, therefore, made the acceptance of deposits by non-banking non-financial companies of deposits by non-banking non-financial companies from the public all the more attractive, especially in the context of the selective credit control measures adopted by the Reserve Bank. Some corrective by way of a dis-incentive to borrowing from the public by these companies seems to be indicated so that credit planning according to the priorities laid down by the Government is not defeated. I propose, therefore, that in computing the taxable income of non-banking non-financial companies, only 85 per cent of the interest paid by them on public deposits will be allowed as expenditure for tax purposes."

The above proposal is now a legislative enactment under the Income Tax Act. Thus, in terms of S 40 (A) (8). "For and from the assessment year 1976-77, 15% of interest paid by non-banking non-financial companies on deposits received by them from the public will not be allowed in computing the total income subject to certain exceptions." In the event of the restriction of the fiscal relief to 85% of the interest paid on public deposits the formula for defining the tax adjusted cost is \((1-t) \cdot 85i + .015i\)

where \(t\) is defined as the marginal tax rate and \(i\) = interest cost. The 10 per cent interest cost burden which was diluted to 4 per cent by the formula \((1-t)i\), will now work out as follows:

\[
\begin{align*}
(1-t) &= 0.85 + 0.15 \\
&= (1-t) \cdot 0.85 + (0.15 \times 0.19) i \\
&= (0.84 \times 0.085) + (0.15 \times 0.01) \\
&= 0.072 + 0.0015 = 0.0735 or 7.35 per cent.
\end{align*}
\]

The tax adjusted cost of debt is, therefore, functionally, related to the interest rate. The interest rate ceiling on convertible debentures is 13.5 per cent and the interest rate ceiling on non-convertible debentures is 15 per cent. Again, the interest rate ceiling on public deposits is 15 per cent.

Accordingly, the cost of each one of the said sources of debt will be different depending upon:

\[\text{Finance Ministers Budget Speech 1975-76, Part B Para 1.3}
\]

\[\text{3 The Income Tax Act, Taxmann's Publication.}\]
(a) Whether we use the formula 
\[(1-t)(1 + i) - [(1-t) .65 + .15 i]^{*}\]
(b) the interest rate and
(c) the relevant tax rate.

Now, insofar as debt which is publicly placed is concerned the concept of measuring the cost of capital is the same as the privately placed debt. However, the inputs used to influence the arithmetic of the amount of debt and the interest rate can vary. Hence, the computational modalities will undergo a change. For privately raised borrowings the contracted rate of interest is used. For debt which is publicity placed the market yield or the contracted rate can be made use of.

In the computation of the cost of debt, which is publicly placed quotations regarding the market price, would be used in addition to the coupon rate (contracted rate of interest) and the book value of the debt. Thus, if the company has raised debentures which may have a face value of Rs. 500,000 at the time of issue (say 1-1-1980) and the coupon rate (contracted interest rate) is 12 per cent per annum. Let us say, further that the debenture is being quoted at a market price of Rs. 120 per debenture with face value of Rs. 100. The question now is which if the above pieces of information should be the relevant inputs to compute the tax adjusted cost of the debenture finance and further what is the tax adjusted cost of debenture interest—Thus, we can have either is (a) market rate concept or (b) coupon rate concept. If the market rate is used, the tax adjusted cost of debt will \((1-t) i\) with \(t = \text{yield} - \text{market price per debenture}\) is \((1 - .6) .1\) or \(.04\) (say 4 per cent). However, if the coupon rate of 12 per cent is used the tax adjusted cost of debt would be \((1 - .6) i\) i.e., \((1 - .6) .12\) or \(.12 \times .12\) i.e., \(.048\) or 4.8 per cent. Thus, the tax adjusted cost of debt when the 'MARKET RATE' is used differs (is lower) from the tax adjusted cost of debt when the 'COUPON RATE' is used. The choice between the coupon rate and market rate is a question left to the attitudes of decision makers and to some extent the information evaluators. It is believed in some quarters that current cost should be used for current decisions, rather than historical data. The cost of debt is the current yields, prevailing at the time of calculations, instead of the contracted rate. The yield is preferred because the debt scrip may be quoted at a premium or discount. As Joel Dean opines that "The first step in finding the company's cost of capital is estimate for the relevant time period the market value of debt".\(^{4}\) Therefore, the odds are very heavily placed against the use of the coupon rate. It may be prudent to use the market information, compute the yield and ascertain the tax adjusted cost of debt, in the manner presented above. But there is another point of view too, Given the tax adjusted cost of debt based on the 'Market Value' concept and 'Book Value' concept a question arises as to what is the end purpose served by the above referred tax adjusted cost of debt. There can be two purposes. One management can use it to ascertain the cost of borrowed funds to aid financial decision making. In such situations the relevant tax adjusted cost of debt is the 'Book Value/Coupon Rate' concept rather than the market value concept. This is

\(^{*}\) With effect from the assessment year 1986-87 the provision relating to disallowance of a portion of the interest paid by companies on their deposits is... to be discontinued. (1986-87 budget papers Govt. of India)
because management are not concerned, really speaking, with the market value of the debt portfolio. They are interested in the periodic incidence of interest charges caused by the debt contracted over the life of the debt. And this incidence, or liability to pay interest to the creditors is an independent function of the market value of the debt portfolio.

The second use of the cost of the debt is to aid individual investors who are holders of debt in terms of their respective personnel investment portfolios, to shift from one asset to another based on the investment opportunities. In this case, the relevant concept is the tax-adjusted cost of debt based on the market value/yield. Because if alternative portfolios in the market can fetch a higher return than the yield from the debt portfolio, the investor question. Of course, the investor would naturally prefer the status quo if yield in alternative investment outlets do not compare well with the present yield. In fact, in such cases the phrase cost of capital is a misnomer. What we are talking about is the benefits of holdings on the debt in lieu of alternative assets. Because the interest on the debt is the income or benefit to the debt holder. And further the tax rate which is relevant is the tax rate of the individual/s concerned. Thus, if we adopt the above approach we can arrive at the followings possible conclusions:—

1. for Corporate investment decisions which are likely to absorb debt capital as a source of finance the relevant concept to ascertain the cost of capital is the book-value and coupon rate; and

2. for investment portfolio decisions, where debt is one of the several alternative portfolios the yield concept will be the relevant and also the right kind of input.

PREFERENCE SHARES

Preference Shares, in accordance with Section 85 of the Companies Act are those shares which have a preferences over the equity shares with respect to repayment of capital and payment of dividends. The periodic consideration payable to the preference shareholders is labelled as 'DIVIDENDS'.

'Dividends' are appropriations charged to the Profit and loss Appropriation, Account unlike 'Debt' which is an expense debited to the Profit and Loss Account. So, the question of tax deductibility does not arise in the case of dividends. Further, insofar as preference shares are concerned the periodic dividends payable on preference share is regulated by Government directives. The directive, "The rate of dividend on preference share does not exceed the rate notified by the Central Government from time to time as applicable to such securities...." Further, in pursuance of sub-clause (ix) of Clause 5 of the Capital Issues exemption order 1969... the Government have increased with immediate effect the rate of dividend on preference shares to be issued under the authority of the said order as that rate which does not exceed 11 per cent per annum (12.9.1974). Again, on 6.11.1981 the Central Government increased with immediate effect the rate of dividend on preference shares from the existing 11 per cent to 13.5 per cent. And with effect from 19th May 1984, the ceiling on the dividends payable to preference shareholders is raised to 15 per cent.

4. Joel Dean, Capital Budgeting p. 45
Considering the salient features of the preference shares as mentioned above, an important input required to compute the cost of preference shares will be the rate of dividend stipulated at the time of the share issue. And the maximum rate, prescribed in the existing Government directive/s, is the ceiling on the dividends payable on preference shares as a source of capital. However, the choice between the ‘Coupon Rate’ and the ‘Yield’ (dividends per share — Market price per share) still remains. Since we have said earlier that the use of the marker information i.e., the ‘Yield’ is relatively more acceptable proposition the same fact holds true for preference share too. Now, given a preference share with a face value of Rs 100 and contracted dividend rate of 15 per cent per annum two points need be noted:

(a) if the coupon rate is used the cost of preference share capital is 15 per cent; and

(b) if the yield is used the cost of preference share capital will be dividends per share — market price per share or Rs. 15 / Rs. 90 i.e., 16.6 per cent (Assuming that the preference share of Rs. 100 face value is quoted below par at Rs. 90 (say))

XIII.6 COST OF SHAREHOLDERS EQUITY

It may not be of place to mention that the concepts concerning the cost of equity capital are rather mysterious, compared to the concepts relating to cost of debt and preference shares. As Joel Dean has aptly put it "The cost of equity capital presents more formidable estimating problems.. than cost of debt capital."

And again he says - estimates of debt cost can be made highly precise in comparison to the uncertainties of estimating costs of equity capital."

The cost of equity capital can be computed by—
(a) the dividend-yield method;
(b) the earning-price basis;
(c) the cash flow concept.

Dividend — Price Basis

The cost of equity capital is equal to the anticipated periodic return (dividends) by the equity shareholders.

Thus, the future dividends over a number of years can be related to the market price of the share to ascertain the cost of equity capital. This ratio of dividends per share divided by the market price per share is popularly known as the ‘YIELD’. The anticipated dividend is essentially an exercise in forecasting the share-holders expectations regarding the periodic returns on the shares held. And, invariably the forecast about the future performance of the share, with respect of dividends, will be made after taking cognisance of the historic data. As Beirman and Smidt say—

it is not unreasonable to assume that the stock-holder is in general basing his expectation or the future on the past.

Thus, when the anticipated dividend per share is constant, the cost of equity capital may be defined as —

5 Joel Dean, Capital Budgeting, p. 47 and p. 46
(Ke = D ÷ P)
Where, Ke = cost of equity capital
D = dividends per share
P = market price per share

So, if D = Rs. 10 per share and market price per share is Rs. 150/- the cost of equity capital is (Rs. 10 ÷ Rs. 150) i.e., 6.6 per cent. The above formula holds true only if—

(a) the dividend per share is constant;
(b) the dividends are assumed to flow in for an indefinite number of years; and
(c) no bonus shares are issued.

It may be observed that if dividends paid, for some reasons zero, the cost of equity capital, according to the definition is ZERO. In the yield method, there is an underlying implication that as dividends tend to zero the cost of capital also tends to zero. Also, the above formula as it stands, ignores growth consideration.

But, the share holders along with the stock market sentiments, are likely to expect favourably changes in the dividend rates. Therefore, the above formula has to be modified to build in the anticipated growth component. The revised formula can be presented as follows :—

ke = D ÷ P + G
Where, Ke = cost of equity capital
D = dividends per share
P = market price per share
G = anticipated annual percentages rate of increase in future dividends.

Assume that the current dividend is Rs. 12 per share whose face value is Rs. 100 and market value is Rs. 120. Also assume that the anticipated increase in the annual percentage dividend rate is 4.

Ke may then be computed as —
(12/120 + 4) per cent or 14 per cent.

If the yield basis is not acceptable as a measure of the cost of equity capital, the alternative is a slightly broader version. Thus, the cost of equity capital can be defined as the earnings per share divided by the market price per share.

OR

(ke = E ÷ P)
Where, ke = cost of equity capital
E = earnings (profits after interest, taxes and dividends on preference share.
P = Market price per share.

The numerator represents the results expected by the shareholders from the shares, which may be based on the latest available historic data, or average past performance plus anticipated changes. The denominator shows the resources to be committed at market prices. The earning price ratio has the following characteristics:—
1. it influences the stock market prices of the shares;
2. the numerator shows the results expected by the shareholder;
3. the denominator indicates the sacrifice the shareholders is willing to make to continue to hold or to acquire the portfolio;
4. a low ratio indicates that the shareholder is willing to make a big sacrifice for a low return and vice-versa;
5. it is yardstick used in financial analysis and signals the attitude of the existing shareholders and potential investors.

There is a school of thought which believes that the cost of capital is not the earnings-price ratio but the incremental earnings before taxes required to sustain the market price of the share divided by the monetary investment in a project.

It is submitted in this regard that the above formula has not considered the cash flow aspect in dealing with the cost of equity capital. If the cash flow concept is introduced the formula to measure the cost of equity capital can be presented as follows:—

Profit after Interest taxes
and dividends on preference
shares + Current Depreciation
Shareholder's Equity + Accumulated Depreciation
in conclusion, we may say---------

(a) If the future is likely to resemble the past the earnings price ratio is not a 'bad index', of the cost of equity capital;

(b) If the future is bleak, an earnings price based on historic trends may be rather high resulting in an unduly strict standard with respect to the use of equity capital.

(c) If the past has been characterised by poor performance the earnings-price ratio may be a rather loose standards to be allowed as a norm to justify the use of equity capital.

Joel Dean has vehemently criticised the practical utility of the "earnings-price". He says—

"The most universally used measure of the cost of equity capital is the ratio of current prices to current earnings, which would seem to be irrelevant from either management's or the market's view point. Its implication about investor sophistication namely, that the market expects current conditions to continue indefinitely — is hard to accept."6

NOW, A COMPOSITE COST OF CAPITAL — WEIGHTED AVERAGE COST OF CAPITAL:

We have just discussed the cost of different sources of finance individually viz. debt, preference shares and equity shares. But the fact remains that we have not yet arrived at a single measure of the cost of capital. Suppose, the tax adjusted cost of debt is 8 per cent, the cost of preference shares 12 per cent and cost of equity capital 23 per cent. Are we justified in saying that the cost of capital is 45 per cent. The answer is 'NO'.

6 Joel Dean, Capital Budgeting, p. 48.
In a live capital structure while we do encounter the different sources of finance, the proportion of each source to the total rupee value of the capital structure varies. Hence, the figures should be appropriately adjusted according to the relative importance of source vis-a-vis the total sources of finance. This adjustment for relative importance takes place by a process of WEIGHTING which attaches a weight to each source of finance in the capital structure. Thus, if we have three principal sources of finance viz. debt, preference shares and owners funds and use the following symbols.

KO = Composite cost of capital  
Ki = Cost of debt  
Kp = Cost of preference shares.  
Ke = Cost of shareholders equity.  
W1 = Proportion of debt capital to total capital.  
W2 = Proportion of preference share capital to total capital.  
W3 = Proportion of shareholders equity to total capital.

We can say that—

\[ W_1 + W_2 + W_3 = \text{or 100 per cent} \]

and \( KO = KiW_1 + KpW_2 + KeW_3. \)

The Ko so arrived at is the 'weighted average cost of capital' and is the sum of the products of the cost and weights identified against each source of finance. Accepting the above 'modus Operandi', it may be noted that the rates used as price tags and weights employed to quantify relative proportion of each source of finance to the total, the cost of capital can be arrived at using HISTORIC DATA/MARKET DATA.

Given that the cost of debt = 8 per cent, cost of Preference Shares = 12 per cent and Cost of shareholders equity = 25. And further that \( W_1 = 50\%; W_2 = 10\% \) and \( W_3 = 40\%. \)

the weighted average cost of capital (KO)

\[ = KiW_1 + KpW_2 + KeW_3 \]

\[ = (.08 \times .5) + (.12 \times .10) + (.25 \times .40) \]

\[ = .04 + .012 + .1000 \]

\[ = 4\% + 1.2\% + 10\% \]

\[ = 15.2 \text{ per cent.} \]

Practices of Respondent Companies*

It is now proposed to present the practices of respondent companies relating to:

(a) Existence or otherwise of the idea of the 'Cost of Capital', and 
(b) Uses of Cost of Capital.

The concept of the cost of capital seem to be fairly well known, although not very popular, amongst the respondent companies in as much as while 72 per cent of the companies did calculate to cost of capital, 28 per cent (i.e., more than one fourth of the respondent companies) did not regularly use the cost of capital. However, including the two companies which calculated the cost of capital only for large projects and three companies which calculated the cost of capital rarely though, the total number of companies which make use of the idea of cost of capital comes to 41 (or 82 per cent of the respondent companies).
It is interesting to observe, from the comments of the companies using the concept of the cost of capital some redeeming features:

(a) Only ten companies made explicit mention about the use of the weighted average cost of capital, the others were silent rather than reticent.

(b) Only five companies made explicit mention of the tax implications and related adjustments in the computation of the cost of capital. Perhaps, the companies are reticent to disclose the use (sometimes misuse) of the tax advantages concomitant to different sources of finance.

(c) Companies did make use of short-term source of finance for long-term uses in flagrant violation of the nice text-book principles of financial management.

The Companies not using the cost of capital also had interesting comments to make. Thus,

(a) Surfeit of cash justified ignoring the cost of capital. The company is aware of the concept, but the financial position being comfortable, the scientific computation of cost of capital has not been attempted. The need just does not arise. The company had, on several occasions, cash balance of not less than a crore of rupees.

(b) Rigorous computations concerning cost of capital are done only for the personal satisfaction of individuals. To quote the company: Recommendation of the finance department of a particular mix of source of finance based on cost considerations are rarely accepted. Thus, rigorous financial analysis based on cost of finance is conducted for personal satisfaction of the individuals concerned.

(c) Only the source and mix of finance are considered because the Minimum acceptable rate is deemed to be much in excess of the cost of capital. Hence, it is generally taken for granted that the project will earn more than the cost of finance. In fact, it is approved only if this condition is met with a reasonable margin.

(d) Sources of finance are considered but the cost of finance is neither computed nor used. The sources of finance are considered to the extent of the leverage required and the extent of capital incentives available. The cost of finance is not directly used during the evaluation.

(e) Construction industry practice provides advanced from clients and other sources, hence, cost of finance does not bother the companies. The company commented as follows: "In construction industry, a

* Fifty companies responded to various question on "Cost of Capital" and its use in practice.
certain percentage of project cost is initially paid as an advance to the contractor, being the customers' (clients') initial investment in preliminary work. Advance is also secured from the project authorities for purchase of heavy machinery on hypothecation arrangements. This may be the guarantee by the bank and carry certain percentage of interest for working capital. The company depends on bank finance for purchase of machinery. In the case of the economy wanting to own machinery I.D.B.I. deferred payment facilities are used. However, the economics of alternate sources of finance are also worked out when tendering for a project, but the cost of capital, per se, is not computed."

(f) This is done by the Finance Division which consolidates the central, the central, regional and divisional proposals into total company proposals and then prepares a ways and means budget. This budget includes — funds generated, funds required, funds available for capital expenditure. In the case of deficit, it is met by Share Capital/Bonds, Term Loans, Overdrafts, Fixed Deposits and Short Term Borrowings. This also gives an idea of the corporate hurdle rate.

**TABLE 2**

<table>
<thead>
<tr>
<th>Measure economic-worthiness, project viability and calculate internal rate of return</th>
<th>Nos. of Companies</th>
<th>% to 50</th>
</tr>
</thead>
<tbody>
<tr>
<td>29</td>
<td>58</td>
<td></td>
</tr>
</tbody>
</table>

| Optimal use of Internal Resources | 1 | 2 |
| Select Lending Institutions | 5 | 10 |
| Debt servicing Potential | 3 | 6 |
| Capacity to Commit Funds | 3 | 6 |
| Did not calculate Cost of Capital | 9 | 18 |

Given the cost of capital, a question which immediately arises is the use made of the cost of capital. Table 2 presents the different purposes to which the cost of capital is put to in the respondent companies. The responses were revealing. 58 per cent of the respondent companies use the cost of capital to measure the project viability and capacity to offer a rate of comparable to the cost of capital. Of the 29 companies, not less than ten companies used the cost of capital as a starting point in the discounting process to arrive at the internal rate of return. Nine companies did not have anything to say because they just did not compute the cost of capital. However, the remaining 12 companies had some unique things to say relating to the use of cost of capital.

1. One said that the cost of capital is used as an input to ensure optimal resource allocation between competing uses of funds.
2. Three companies use the cost of capital as a target rate and the debt servicing potential of the project in assayed vis-a-vis the said target rate.
Five companies use the cost of capital to identify the cost of alternative sources of finance and select the cheapest source (individual/institutional) source of finance.

Three companies use the cost of capital as a benchmark against which the capacity to commit funds is measured. Given the cost of capital, two aspects are simultaneously taken care of:

(a) can the project cash flows sustain the obligations concomitant to the funds raised; and

(b) can the company afford to commit funds of a given amount by borrowing and incurring interest/amortisation obligations? Or should the company wait for super-normal situations where the situation of surplus cash increase the capacity to commit funds and reduces, the obligations on accounts of interest/amortisation?

Another company said that they use the cost of capital to know the following:

(1) terms and conditions of finance;
(2) convertibility;
(3) rate of interest; and
(4) security required

The project viability is as sayed against the overall terms and conditions of the sources of finance. Companies which used the cost of capital to perform the routine function of arriving at the hurdle rate in assaying investment proposals said as follows:

(a) Identifying cost and benefits of the project. Sources and mix of finance determine the cost of finance. The cost of finance is used for comparison with the discounted cash flow rate of return.

(b) To assess project economic performance, in terms of liquidity and profitability.

(c) The weighted average cost of capital (after taxes) is used as a cut-off point to assess the project viability.

(d) The availability and cost of finance are usually the sole dictators as to whether the project is to be implemented or not. This is so because the other factors in project evaluation in a special environment like ours can usually be fairly accurately estimated and controlled. The control is often exercised not merely by the company but by the Central Government, too. Finance, however, is often not easily forthcoming and, therefore, constitutes the key factor.

**MINIMUM ACCEPTABLE RATE RETURN**

The earlier section has highlighted the concepts concerning cost of capital and also pointed out the prevailing practices regarding the computation and use of cost of capital. We are now set to identify the conceptual inputs required to arrive at the minimum acceptable rate of return which is defined as a rate which is greater than or equal to the cost of capital. So, the question arises, how to go about identifying the inputs required, given the cost of capital, to arrive at the minimum acceptable rate of return.

In arriving at the minimum acceptable rate of return, a company may wish,
in fact will invariably like, to distinguish between risky projects and not so risky projects. Projects which are risky are bound to require a threshold rate which is above those used for other projects regarded as not so risky or relatively less risky. The required rate of return on a turn et lathe is different from that of a newly initiated venture, say in Nigeria, or Vietnam.

Again, there are some companies which allow for gradation in hurdle rate. The gradation is functionally related, once again, to the risks. It is not difficult to find companies having at least two cut-off rates, one for the normal risk projects and another for the high risk projects. Some companies go a step further and grade risk as low (optimistic projects), high risk (pessimistic projects) and normal risk (routine projects). Again, if the company has to take cognisance of liquidity conservation as a part of the appraisal objective, the gradation of projects will be related to the cash generation potential of the project.

So, Projects having a long gestation period and consequent blocking of funds, will have to successfully surpass a higher (Stricter) cut-off point than projects enjoying quick disentanglement of liquid resources.

Contrarywise, if profitability is the guiding factor and liquidity not really important, the above guideline gets altered.

Projects having longer economic lives may encounter, relatively lower cut-off point than projects which are unstable with short economic lives, although both kinds of projects have to surpass the floor rate of return required on new projects.

Of course, the criteria used to lay down the cut-off point in general and multiple cut-off points in particular will vary from company to company depending upon the:

(a) objectives of investment decisions;
(b) techniques used to measure the economic worthiness of investment proposals; and
(c) economic conditions of the company.

Another popular strategy is to use any one or more of the following:
(a) The expected return from new projects;
(b) The actual return from ongoing projects;
(c) The actual return in the industry; and
(d) The target return from ongoing projects.

The expected return from new projects aims at assessing the expectations of management relating to the return on a new project. However, in the absence of a benchmark, the outcome is usually the product of managerial judgement. Due to the non-availability of a ‘norm’ to set the target return, the approach becomes a semantic illusion.

The actual return from existing investment: The actual return is the historic-return involving the data in retrospect, while the assessment of a project’s performance relates to the future prospective returns. The computational methodology of the historic rate of return and prospective rate of return is entirely different. Hence, the built-in anomalies pose a serious threat to the tenability of the historic rate of return. The prospective rate of return itself tends to vary, depending on the assumptions made regarding to
inputs (outlays costs, and benefits). And, it is a notorious fact that the historic rate of return stemming from the accountant's records also tends to be diverse, depending on the accounting policies.

Further, even if the historic rate and prospective rate are in fact comparable, this method itself would encounter formidable objections and practical implementation difficulties.

The next concept for establishing a cut-off point is actual return of the industry. Instead of using the actual return on the existing investments in the company the cut-off point is being linked with the historic performance of investments in an external situation, viz. the industry. Thus, we can have a variety of industries in an economy and a variety of hurdle rates. If a company has multi-product/multi-divisional business, each product/division can draw its own independent inspiration from the respective industry to arrive at the cut-off point. It may be noted that in this method, we are making an assumption that the retrospect performance is adequate as an input to establish performance norms for prospective projects. But the odds against the industry return are also rather heavy. First, it is a statistical index only. It does not show the hurdle rate with respect to investment opportunities. It speaks of average performance of a group of firms operating in the industry in question. However, a particular company is concerned with what funds are available to it and what investment opportunities it comes across. And it is a question of matching the demand for funds with the supply of funds. If demand for funds is greater than supply, and the latter is a serious constraint, some prospective proposals may have to be suspended if not totally rejected. Should demand be less than the supply of funds, the excess capital may go begging for want of effective suitable investment outlets. That is all that can happen. And in either case, the industry performance does not really matter. To quote Terborgh "A valid investment threshold must be found in the relation between the company's own investment opportunities and its own financial availabilities. It is internally derived. Accordingly, it can be borrowed neither from other companies nor from the industry as a whole."

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7 George Terborgh, The required return from investment projects studies in Business investment strategy, 4, A MAPI CTA Research Study, P.11 presented as follows.