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Several traditional bases for the establishment of cutoff rates for investment acceptance are found inadequate by the author. He suggests using the overall cost of capital as the investment criterion —

DETERMINATION OF A CUTOFF RATE FOR NEW INVESTMENT DECISIONS

by Surendra S. Singhvi

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THE long-range planning efforts of a firm's management shape its future to a great extent. The investment decisions resulting from such plans strongly influence the firm's profitability and growth for several years into the future.

It is, therefore, imperative that the economic justification for these decisions should be based on some valid as well as objective criterion that will result in achieving goals that the management has established. The basic financial criterion is a cutoff rate or a minimum acceptable rate of return for any investment proposal. The basis for establishing such a criterion should be objective and consistent with the goals set forth by the management.

Several bases that are used for establishing cutoff rates by corpo-

rate management as "rules of thumb" can be misleading and inadequate. For instance, several firms use the past return on total capital invested as the cutoff rate for accepting new investments. If a firm has had poor earnings in the past, it would correspondingly have a low cutoff rate for accepting new investments and thus tend to perpetuate its poor earnings. On the other hand, if it had had high return on total capital invested, it might forego profitable investments unless the past high rates were achievable.

Thus, a firm's past return on total capital invested leaves the problem unsolved as to what rate should be used as a basis for establishing a cutoff rate for accepting new investment projects.

In this article it will be shown

that the overall cost of capital should be used as the basis for determining a cutoff rate for accepting new investment projects. In the latter part of the article, the overall cost of capital will be estimated for a major U.S. industrial corporation.

Within the United States, business practices with respect to the use of a cutoff rate vary from one firm to another. One common practice is to limit the size of the capital expenditures budget in a given period to the amount of internally available funds. Another widely used practice is to postulate an arbitrary cutoff rate of the order of 8, 12, 16, or 20 per cent per year. These practices involve a breach of the logical approach—viz., that investment projects should be accepted if the rate of return they promise is higher than the

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marginal cost of the funds needed to implement them. It is, therefore, suggested that a logical cutoff rate for accepting new investments should be the firm's overall cost of capital.

However, there is no clear agreement among academicians or financial executives as to how to measure the cost of capital. In a survey made in the mid-1960's by Professors Cohen and Robbins of 50 financial executives of leading firms on the question of measuring cost of capital, replies ranged from multi-page explanations to, "At present Cities Service Company does not calculate cost of capital."¹ On the one hand, the reply from the Standard Oil Company of Ohio for the same survey read, "We have been using a cost of capital concept in our financial planning and financial administration for more than fifteen years. While there have been modifications in some of our procedures in this period, the basic idea has not changed materially. . . ." On the other hand, the reply from Union Carbide reads:

Frankly, we do not measure the cost of capital, because we don't know how. Of course, we can and do measure the cost of specific increments of debt-type capital, but we do not know how to measure the "cost" of the current equity capitalization or the cost of internally generated funds, or how to weight them to obtain a composite cost of capital. Furthermore, the literature on the subject of the "cost of capital" is somewhat confusing and seems to be inconsistent in definition and method of computation.

In a recent survey of 100 U. S. manufacturing firms conducted by Ronald Williams of Beatrice Foods Co., it was found that 57 per cent

of these firms estimate the cost of capital.² However, these firms use different approaches in determining the cost of capital: For 12 firms, the cost of capital is slightly over the current prime interest rate; for 10 firms, the cost of capital equals the current return on assets; and for 29 firms, the cost of capital is determined using the weighted debt and equity cost.

The cost of capital for a firm may be defined as a weighted average of the cost of each type of capital. The weight for each type of capital is the ratio of the market value of the securities representing that source of capital to the market value of all securities issued by the firm. "Cost" in this context refers to the minimum rate of return that is required to justify the investment of each succeeding increment of available funds. Each source of capital available to a firm must be measured for its cost from the viewpoint of the present group of investors. According to John Childs of Irving Trust Company, "Cost of capital is the overall composite per cent net cost rate, after allowing for underwriters' compensation and expenses of financing, which investors require to induce them to provide all forms of long-term capital, in a competitive market, on an average over a period of years."³

The cost of debt capital is an after-tax yield to maturity. It can be calculated either using the present value (P.V.) tables or using an approximate method. In the former case, the cost of debt is the rate where,

$$\text{Net Proceeds} = \text{P.V. (Interest in } \$ \text{ per year for } n \text{ years)} + \text{P.V. (Principal to be repaid in } n \text{th year)}$$

In the latter case, the cost of debt is equal to:

² Williams, Ronald B., Jr., "Industry Practice in Allocating Capital Resources," *Managerial Planning*, May-June, 1970, p. 20.

³ Childs, John F., "Profit Goals for Management," *Financial Executive*, February, 1964, p. 15.

¹ Cohen, Jerome B., and Sidney M. Robbins, *The Financial Manager: Basic Aspects of Financial Administration*, Harper & Row Publishers, Inc., New York, 1966, pp. 734-736.

The cost of capital for a firm may be defined as a weighted average of the cost of each type of capital. The weight for each type of capital is the ratio of the market value of the securities representing that source of capital to the market value of all securities issued by the firm.

$$\text{Approximate Cost} = \left(\frac{C + \frac{100 - P}{n}}{\frac{1000 + P}{2}} \right)$$

where, n = number of years to maturity

C = interest in dollars per bond per year

P = average market price per bond

Based on the present value concept, experts in the field have prepared bond tables which can be used to find out the cost of debt capital (or the yield to maturity).

The cost of common stocks is based on the expected earnings performance. Assume that a group of promoters is planning to start a business and is about to sell some shares of common stock. Such a business has no past earnings to report. Thus, it is clear at this point, the price that the firm can obtain for the stock is determined by investors' expectations concerning the future earnings and their evaluation of the business risk involved in the line of business. If the firm is able to net \$100 million for the sale of ten million shares of common on the basis of expected after-tax earnings of \$15 million, the cost of these funds is 15 per cent (ignoring any transaction cost for simplicity). The ratio of expected earnings to net price is used because investors as a group believe that this prospective yield of 15 per cent is equal to or better than the return obtainable from other investments of comparable risk. Consequently, the firm would injure its stockholders if it invested their money in any project that yields less than 15 per

cent after taxes, assuming no long-term debt at this point.

When one turns to consideration of the *cost of additional issues of common stocks*, one must recognize that new issues can be sold only at some price below the current market price. Also, the firm will net something less than the selling price because the investment banker will retain some portion of the price paid by the investing public.

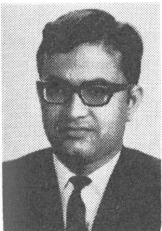
The cost of equity capital is most appropriately measured from the point of view of existing stockholders. It can be estimated in more than one way. One widely used procedure is to relate the expected earnings per share (Ea) and net proceeds per share (Pn) to the issuing company. Alternatively, one can use the dividend approach to estimate the cost of equity where such cost equals the current dividend yield plus the expected annual growth rate in dividends. One can also use present value tables to estimate the cost of equity capital. The cost of equity is the rate where,

(Current market price of the common stock) = P.V. (Dividends for n years) + P.V. (Dividends in the nth year × Dividend Multiplier)*

One can see here that the cost of capital is a discounted cash flow rate, and the concept is consistent with the usage of the discounted cash flow method of calculating rate of return on an investment project. The only difference is that the cost of capital is a rate of return from an investor's point of view (i.e., shareholder and bondholder) while the discounted cash flow return on an investment project is a rate of return from a firm's point of view.

One must recognize that the earnings retained within the company do have an opportunity cost. *The cost of using retained earnings*

The price a new firm can obtain for its stock is determined by investors' expectations concerning the future earnings and their evaluation of the business risk involved in the line of business. If the firm is able to net \$100 million for the sale of ten million shares of common on the basis of expected after-tax earnings of \$15 million, the cost of these funds is 15 per cent . . .



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versity. Dr. Singhvi has had articles in many professional journals and is co-editor of a forthcoming book, *Frontiers of Financial Management*, being published by South-Western Publishing Co.

* A dividend multiplier is the reciprocal of the dividend yield. Alternatively, one may prefer to capitalize the amount of dividend in the nth year by using the dividend yield.

is the minimum yield that must be earned on additional investments within the firm in order that the additional investment will be as valuable to the stockholder as a corresponding immediate increase in dividends. For practical purposes, the cost of using retained earnings equals the cost of common stocks (except for underwriting expenses saved by the firm).

The cost of convertible securities depends upon the probability of conversion of such securities into common stocks at a given time. If the probability of conversion of a majority of convertible securities in a given period is very remote, it seems reasonable to use the cost of convertible securities without conversion. However, when the probability of conversion is very high in a given period, it seems reasonable to use the cost of common stocks. In the case of convertible preferred stocks, the cost before conversion equals the preferred dividend per share divided by the net proceeds per share to the company. Computation of the cost of capital of a specific convertible security must be based upon the assumed time pattern for conversion, and since some variability is to be expected in possible results it is suggested that the management use the cost-of-capital rate which is most conservative.⁴

The company's cost-of-capital rate varies from time to time due to several factors such as the dividend payout, the capital structure, the expected growth rate, and the risk classification of the firm. It is possible that a major investment can change the overall cost of capital for a firm. For example, C.I.T. Financial Corporation has acquired firms producing X-ray equipment and greeting cards. While the income of a finance company is relatively stable and its assets are quite liquid, these features are not characteristic of the income streams

and assets of manufacturing firms. With the change in the basic risk class, existing ratios of debt to equity that were viewed as suitable for a finance company may be considered inappropriate for the diversified firm. Continued diversification along these lines may cause stockholders to demand higher rates of return on their investments and so raise the cost of capital. Consequently, the cost-of-capital estimate should be reexamined periodically by the management. Also the management of a diversified firm should consider using separate cost-of-capital rates for different enterprises.

Measuring the cost of capital for a firm serves numerous purposes:⁵

- (a) It indicates, at any given time, the relative cost of pursuing one line of financing rather than another.
- (b) It is useful in helping management move toward an optimal capital structure.
- (c) The present cost of financing by means of a given type of security may be compared with the estimated future costs of financing by the same method to judge whether the present is the right time to undertake such financing.
- (d) The overall cost of capital for a firm may be compared with the estimated discounted cash flow rate of return on a proposed investment project to judge whether to proceed further.

One of the important uses of the cost of capital is to provide the management with a relatively objective criterion in determining whether an investment proposal should be accepted. Because of this, the cost-of-capital rate is also referred to as the "minimum required rate of return," the cutoff or hurdle rate for investment decisions.

So far it has been shown that the company should invest its

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⁴ Jean, William H., *Capital Budgeting: The Economic Evaluation of Investment Projects*, International Textbook Company, Scranton, Pa., 1969, pp. 58-60.

⁵ Cohen and Robbins, *op. cit.*, p. 734.

funds in those projects which yield more than the cost of capital. Since many capital expenditure projects are selected by the firm which do not yield any direct monetary return (i.e., pollution control equipment, parking facilities for employees, or a new office building), the cutoff rate for selecting discretionary investment projects should be higher than the overall cost of capital. The cutoff rate should be established for discretionary projects in such a way that the average return on total capital expenditures in a given period will be equal to or greater than the overall cost of capital. For example, if 20 per cent of total capital expenditures yield zero per cent return, the cutoff rate on the remaining 80 per cent of capital expenditures should be at least 12 per cent if the cost of capital equals 10 per cent.

One must start with the cutoff rate which is equal to the cost of capital and raise the cutoff rate to reflect any unusual risk inherent in a particular project. For instance, cutoff rates vary for different types of capital expenditures such as cost reduction, expansion of existing facilities, a new product or business in the United States, and overseas investments. It should be recognized that in considering investment projects, a decision maker is confronted with *tradeoffs between risk and return*. Hence, it is desirable to use some systematic method to distinguish various projects according to the degree of risk involved. The degree of risk involved in a given project can be measured based on the probability of realizing the estimated incremental sales or revenues over the economic life of the project, estimated initial cash outflows, and estimated salvage value. Additionally, the decision maker must consider the degree of competence of the local management group which will be responsible for implementing the project.

ABC Corporation is one of the nation's 100 largest industrial corporations. Its sales have increased

by 50 per cent in the last decade. Its securities are listed on the New York Stock Exchange, and the number of common stockholders is approximately 80,000. ABC Corporation has been selected in this study because it is in the process of expansion and diversification, and the executives of moderately growing companies like ABC Corporation must ask from time to time, "What should be the minimum rate of return on new investment projects?" Numerous corporations in the United States are currently in the process of developing the cost-of-capital concept as a basis of determining the cutoff rate in capital budgeting.

The following *assumptions* are made in order to measure the overall cost of capital for ABC Corporation as of January, 1972:

(a) The cost of short-term debt, except revolving credit, is excluded since such cost is not very significant.

(b) Revolving credit taken down is considered as a long-term debt, since such loans can be used by ABC Corporation for more than one year and the dollar cost is significant.

(c) Industrial revenue bonds for this purpose are considered to be long-term debt on the assumption that ABC Corporation will fulfill its obligations to the local governments which have issued these bonds to lease facilities to ABC.

(d) The average income tax rate is 50 per cent.

(e) Net proceeds to ABC, if common stocks are issued, will be equal to 85 per cent of the average market price.

The following formula is used to measure ABC's cost of equity capital, (K_e):

$$K_e = \left(\frac{E_o}{P_{\bar{x}}} + g \right) \times \left(\frac{100}{1} \right)$$

where, E_o = Current earnings per share

$P_{\bar{x}}$ = Average market price per share

g = Growth rate in future earnings

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EXHIBIT I

WEIGHTED COST OF CAPITAL FOR ABC (JANUARY, 1972)

Sources of Long-Term Funds	Market Value in Dollars	% of Total Funds	After-Tax Cost in %	Weighted Cost in %
Long-term debts	\$ 439,697,000	31.7	3.41	1.08
Convertible Preferred (3,985,000 shares x \$27)	107,595,000	7.8	7.78	0.61
Common Equity (28,888,000 shares x \$29)	837,752,000	60.5	15.17	9.18
TOTAL	\$1,385,044,000	100.0%	—	10.87%

ABC's earnings per share (E_0) for the year ending on December 31, 1971, are \$3.00. ABC common stock prices during 1971 averaged \$29 (High = \$33, and Low = \$25).⁶ Therefore, net proceeds per share to ABC, if new common shares are sold, will be equal to \$24.65. The growth rate of future earnings as estimated by the investing public usually is more relevant and objective than one estimated by the corporate management. Value Line Investment Survey estimates a 3 per cent growth rate for ABC.⁷ By substituting these figures in the formula, one finds that the cost of equity for ABC Corporation is:

$$K_e = \left(\frac{3.00}{24.65} + .03 \right) \times \left(\frac{100}{1} \right) = 15.17\%$$

⁶ It is suggested that one should use the average price of the common stock instead of the price of common stock for any single day. The average price provides stability to the cost-of-capital estimates and need not be revised every day in response to daily market price fluctuations. However, one can use the average price for the last 6, 12, or 18 months or use the average of the monthly average prices for 6, 12, or 18 months depending upon the market price fluctuation pattern.

⁷ The estimated 3 per cent growth rate in cash earnings is based on a 5-year average centered from 1964-68 to 1971-75. It is assumed here that the growth rate for the earnings per share over a long period will be the same as for the cash earnings per share. One can also use the estimate regarding growth rate in future earnings made by another independent agency. However, one should use the source of information consistently.

The following formula is used to measure ABC's cost of convertible preferred stocks, (K_p):

$$K_p = \frac{\text{Dividend Per Share on Preferred}}{\text{Average Market Price of Preferred}} \times \frac{100}{1}$$

Considering the higher dividend yield on ABC's convertible preferred stocks as compared to ABC's common stocks and the nature of the call provision, it is the author's opinion that the majority of these convertible stocks are not likely to be converted in the next four to five years. Hence, the cost of these convertible securities is considered the same as for straight preferred stocks. The dividend per share on these convertible preferred stocks is \$2.10, and the average market price for these securities is \$27.00. By substituting these figures in the formula, one finds that the cost of convertible stocks is:

$$K_p = \left(\frac{2.10}{27.00} \right) \times \left(\frac{100}{1} \right) = 7.78\%$$

Using the approximate method, the after-tax cost of long-term debt capital for ABC Corporation as of January, 1972, amounts to 3.41 per cent. In the approximate method, the average market prices of the respective bond issues are used. For the revolving credit of \$100 million taken down, the effective interest rate reflects an assumption of a compensatory balance requirement.

Weights are based on the aver-

age market price for common stocks, convertible preferred stocks, and long-term debts. Since retained earnings are reflected in the market price of the common stock, retained earnings need not be shown separately as a source of long-term funds. As per Exhibit I, above, ABC's combined cost of capital as of January, 1972, is 10.87 per cent. This means that ABC management must not accept any discretionary project yielding less than 10.87 per cent if it plans for higher earnings per share and return on investments. If ABC plans to grow at least at the rate which is anticipated by the investing public, the cutoff rate for discretionary investments must be higher than its combined weighted cost of capital.

In this article an attempt has been made to show how the cost-of-capital concept can be used by those responsible for making investment decisions. The cost-of-capital concept, if understood and used with care by the management, can be the valid and objective basis for determining the cutoff rate, which can be further adjusted for the varying degrees of risk involved in investment proposals. While estimating the cost-of-capital rate, one should be consistent from one period to another, and trivial matters having little impact on the overall cost-of-capital rate should be overlooked. Though the measurement of the cost-of-capital rate is somewhat crude at the present time, it should be kept in mind that a crude measure of a right concept is far better than a right measure of a crude concept.