

Advancements in Capital Budgeting Evaluation Practices: A Conceptual Analysis

Prof. Tatikonda Neelakantam

Professor, Department of Management Studies,
SUPRABHATH PG COLLEGE
Hyderabad, (A.P)- India .

Abstract:

Capital budgeting decisions are crucial to a firm's success for several reasons. First, capital expenditures typically require large outlays of funds. Second, firms must ascertain the best way to raise and repay these funds. Third, most capital budgeting decisions require a long-term commitment. Finally, the timing of capital budgeting decisions is important. When large amounts of funds are raised, firms must pay close attention to the financial markets because the cost of capital is directly related to the current interest rate.

This paper focuses on advances in Capital Budgeting Techniques theory and practice and its impact on the investment decisions at the same time focused on evaluation practices.

Key Words: *Capital budgeting techniques, Payback period, NPV, ARR, IRR, Cash outlays, etc.,*

Introduction:

Capital budgeting is one of the most important decisions that face the financial manager. Prior studies spanning the past four decades show financial managers prefer methods such as internal rate of return or non-discounted payback models over net present value; the model academics consider superior.

Capital budgeting refers to the process we use to make decisions concerning investments in the long-term assets of the firm. The general idea is that the capital, or long-term funds, raised by the firms are used to invest in assets that will enable the firm to generate revenues several years into the future. Often the funds raised to

invest in such assets are not unrestricted, or infinitely available; thus the firm must budget how these funds are invested.

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budgeting decisions require a long-term commitment. Finally, the timing of capital budgeting decisions is important. When large amounts of funds are raised, firms must pay close attention to the financial markets because the cost of capital is directly related to the current interest rate.

The need for relevant information and analysis of capital budgeting alternatives has inspired the evolution of a series of models to assist firms in making the "best" allocation of resources. Among the earliest methods available were the payback model, which simply determines the length of time required for the firm to recover its cash outlay, and the return on investment model, which evaluates the project based on standard historical cost accounting estimates. The next group of models employs the concept of the time value of money to obtain a superior measure of the cost/benefit trade-off of potential projects. More current models attempt to include in the analysis non-quantifiable factors that may be highly significant in the project decision but could not be captured in the earlier models.

Objectives of the Study:

1. To know the advanced evaluation practices in capital budgeting
2. To know which capital budgeting technique should be used by the financial managers.
3. To draw the inferences based on the empirical study of investigation
4. To draw the Conclusions and Suggestions.

DATA SOURCES AND METHODOLOGY

The study uses both secondary data. Secondary data will be collected from articles, research papers, and working papers on the topic concerned, web portals and books concerned. Data thus collected is processed, tabulated and analyzed by employing relevant statistical tools. Results of the study will be summarized and would be clearly described in the paper.

Literature Survey:

Capital budgeting decisions are extremely important and complex and have inspired many research studies. In an in-depth study of the capital budgeting evaluations, Marc Ross found in 1972, that although techniques that incorporated discounted cash flow were used to some extent, firms relied rather heavily on the simplistic payback model, especially for smaller projects. In addition, when discounted cash flow techniques were used, they were often simplified. For example, some firms' simplifying assumptions include the use of the same economic life for all projects even though the actual lives might be different. Further, firms often did not adjust their analysis for risk (Ross, 1986).

In 1972 **Thomas P. Klammer** surveyed a sample of 369 firms from the 1969 Compustat listing of manufacturing firms that appeared in significant industry groups and made at least \$1 million of capital expenditures in each of the five years 1963-1967. Respondents were asked to identify the capital budgeting techniques in use in 1959, 1964, and 1970. The results indicated an increased use of techniques that incorporated the present value (Klammer, 1984).

James Fremgen surveyed a random sample of 250 business firms in 1973 that were in the 1969 edition of Dun and Bradstreet's Reference Book of

Corporate Management. Questionnaires were sent to companies engaged in manufacturing, retailing, mining, transportation, land development, entertainment, public utilities and conglomerates to study the capital budgeting models used, stages of the capital budgeting process, and the methods used to adjust for risk. He found that firms considered the internal rate of return model to be the most important model for decision-making. He also found that the majority of firms increased their profitability requirements to adjust for risk and considered defining a project and determining the cash flow projections as the most important and most difficult stage of the capital budgeting process (Fremgen, 1973).

In 1965, J William Petty, David P. Scott, and Monroe M. Bird examined responses from 109 controllers of 1971 Fortune 500 (by sales dollars) firms concerning the techniques their companies used to evaluate new and existing products lines. They found that internal rate of return was the method preferred for evaluating all projects. Moreover, they found that present value techniques were used more frequently to evaluate new product lines than existing product lines (Petty, 1975)

Laurence G. Gitman and John R. Forrester Jr. analyzed the responses from 110 firms who replied to their 1977 survey of the 600 companies that Forbes reported as having the greatest stock price growth over the 1971-1979 period. The survey containing questions concerning capital budgeting techniques, the division of responsibility for capital budgeting decisions, the most important and most difficult stages of capital budgeting, the cutoff rate and the methods used to assess risk. They found that the discounted cash flow techniques were the most popular methods for evaluating projects, especially the internal rate of return. However, many firms still used the payback method as a backup or secondary approach. The majority of the companies that responded to the survey indicated that the Finance Department was responsible for analyzing capital budgeting projects. Respondents also indicated that project definition and cash flow estimation was the most difficult and most critical stage of the capital budgeting process. The majority of firms had a cost of capital or cutoff rate between 10 and 15 percent, and they most often adjusted for risk by increasing the minimum acceptable rate of return on capital projects (Gitman, 1977).

In 1981, Suk H. Kim and Edward J. Farragher surveyed the 1979 Fortune 100 Chief Financial officers about their 1975 and 1979 usage of techniques for evaluating capital budgeting projects. They found that in both years, the majority of the firms relied on a discounted cash flow method (either the internal rate of return or the net present value) as the primary method and the payback as the secondary method (Suk, 1981).

Evaluation Process of Capital

Budgeting:

Many companies follow a carefully prescribed process in capital budgeting. The process usually includes the following steps:

- 1 Project proposals are requested from departments, plants, and authorized personnel.
- 2 Proposals are screened by a capital budget committee.
- 3 Officers determine which projects are worthy of funding.
- 4 Board of directors approves capital budget.

Capital Budgeting Techniques:

Several models are commonly used to evaluate capital budgeting projects: the payback, accounting rate of return, present value, and internal rate of return, profitability index models and others.

The payback model measures the amount of time required for cash income from a project to exactly equal the initial investment. The accounting rate of return is the ratio of the project's average after-tax income to its average book value.

Academics criticize both the payback and the accounting rate of return models because they ignore the time value of money and the size of the investment.

When the net present value model is used, the firm discounts the projected income from the project at the firm's minimum acceptable rate of return (hurdle rate). The net present value is the difference between the present value of the income and the cost of the project. If the net present value of the project is positive, the project is accepted; conversely, if the net present value is negative, the project is rejected. The internal rate of return model equates the cost of the project to the present value of the project. The net present value and the

internal rate of return models overcome the time value of money deficiency; however, they fail to consider the size of a project.

Furthermore, the payback model does not consider returns from the project after the initial investment is recovered. The profitability index is a ratio of the project's value to its initial investment. The firm then selects the project with the highest profitability index and continues to select until the investment budget is exhausted. The profitability index overcomes both the time value of money and the size deficiencies.

Some decision makers have criticized the net cash flow method because they simply do not agree with the decisions indicated by the results from the models. In some cases, managers are reluctant to make important decisions based on uncertain estimates of cash flows far in the future. Thus, they consider only near-term cash flows or are distrustful of the output of the models. In others, managers may have predetermined notions about which projects to adopt and may, therefore, "massage" the numbers to achieve the result they desire. Thus, in many cases, the negative results occurred because of inappropriate input into the models, rather than from the models themselves. One area of particular concern is the choice of discount rate.

For example, Robert S. Raplan and Anthony A. Atkinson suggested, in 1985, that users often employ too high a discount rate, either by choosing too high a cost of capital or by using a higher rate as an adjustment for risk. An inappropriately high discount rate yields too high a hurdle rate or too low a net present value and thus a negative signal about the project. They recommend using a discount rate that reflects the firm's true cost of capital according to sound theory of finance. Moreover, they say that risk should be analyzed by modeling multiple scenarios (best to worst cases) in a manner similar to flexible budgeting. Finally, when the discount rate incorporates inflation, the user must be careful to adjust future cash flows for inflation as well (Kaplan, 1985).

Other areas of concern in using capital budgeting models involve appropriate comparisons. Decision makers sometimes consider a new project as discrete as and more independent of the rest of operations than it really is. They may assume that,

without the project, conditions will remain just as they have been while, in reality, the environment will change with or without it. Careful consideration needs to be given to what conditions will exist without the project as well as with it, so that it will be compared with the appropriate benchmark. In analyzing cash flows with the project, users must consider the interaction of the project with remaining operations to appropriately capture all of the costs and benefits. Sufficient projections should be made for start up cost, including new training, and computer costs. Without planning for these items in advance, there may be a tendency to scrimp on them as a result, later net cash flows will not be as positive as planned because the project is not running efficiently.

The greatest problem with the traditional present value methods, however, is that the entire decision must rest upon quantifiable cash flows. In today's high-tech environment, many new projects involve total redesign of the manufacturing environment. Although managers know that they must develop fully computerized design and manufacturing systems to be competitive in this fast-moving world, it is difficult if not impossible to quantify all of the benefits of such systems. The whole strategy of improving customer satisfaction through innovation, higher quality and speedier delivery must be implemented with massive refitting of the entire organization including its marketing and manufacturing components. Benefits of increased flexibility, quicker times through the manufacturing process, and improved customer relations may not be immediately reducible to cash flow figures. Also, new projects are simply steps in a continual, global process, even when cash flows can be quantified, it may be virtually impossible to separate the amounts into parts attributable to individual projects.

As a result of the complex nature of today's projects, new methods, such as multi attribute decision models and the analytical hierarchy process have been developed to incorporate the "softer" measures into the decision process. These approaches weigh and rate for importance, impact, and probability all factors that can be identified as relevant, from the ones that can be measured to those that are more subjective.

REVIEW OF PREVIOUS RESEARCH AND CAPITAL BUDGETING

METHODS:

While the IRR is the preferred capital budgeting method among practitioners, financial theorists are well acquainted with the objections to and limitations of using the IRR as a selection criterion among investment projects. Samuelson was one of the first theorists to note that an income earning investment may have multiple IRRs if some of the net cash flows are negative. Fisher's (1930) definitive statement concerning the deficiencies of the IRR became the dominant argument against yield-based capital budgeting methods. Later, Alchian noted the conceptual relationships between the NPV and yield-based capital budgeting methods and delineated the inconsistencies of Keynes' IRR when two mutually exclusive investments are considered. In response to criticism of Keynes' IRR, many theorists have sought to improve the IRR by creating alternative yield-based methods. Solomon attempted to correct the deficiencies of the IRR by computing a terminal value based on the compounding of the investment's cash flow stream at an explicit reinvestment rate equal to the firm's cost of capital. His simplified internal rate of return, IRR, is that rate that equates the project's terminal value to the initial cost of the investment. Clark, Hindelang, and Pritchard assert that a simplified modified internal rate of return, MIRR, similar to Solomon's measure will correct the deficiencies of the IRR. However, as demonstrated later in this research, this method is not consistent when a project's cash flows are non normal. Teichroew, Robichek, and Montalbano and Mao develop a five-step algorithm to correct the multiple root problem of the IRR. Unfortunately, their methods are not consistent when addressing the problem of time disparity among mutually exclusive investments. Lin noted that previous researchers (Arrow and Levhari, Flemming and Wright and Teichroew, Robichek and Montalbano) identified contradictory and ambiguous results when employing the IRR due to the differences in reinvestment rate assumption. Because cash flows are assumed to be reinvested at the corporate cost of capital when employing the NPV method, Lin corrected both problems unique to the IRR by making a similar assumption in the formulation of his Modified Internal Rate of Return, MIRR. McDaniel, McCarty and Jessell

develop a model, termed the MIRR_n, that is equivalent to Lin's MIRR but adjusts the terminus period in an attempt to accommodate projects with unequal lives. However, as demonstrated later in this research, both Lin's MIRR and McDaniel, McCarty and Jessell's MIRR_n do not maximize shareholder wealth and are inconsistent when investments differ in their economic lives.

Since Irving Fisher's persuasive argument over 100 years ago, the NPV has become a fundamental capital budgeting method in the appraisal of corporate investment projects. Fisher's elaborate justification of the NPV method is based on the conflicts of interest between consumption today, or foregoing immediate consumption, and investing for increased utility from future consumption. Fisherian theory assumes the purpose of investing is for the possibility of increased utility from future consumption or, in other words, wealth maximization based on both present and future consumption. To maintain theoretical soundness, this research also assumes wealth maximization in the following simulations and analysis.

Although the NPV does not suffer from the same deficiencies as the IRR and is professed as superior to Keynes' return method, the NPV also has deficiencies and is inconsistent in some investment environments. Specifically, the NPV has been shown to be inconsistent in selecting superior investments and ambiguous in maintaining the goal of wealth maximization in environments when investments have different economic lives and when efficient market assumptions are violated. This study demonstrates that while retaining the relevancy of a yield-based rate of return, the RRIA corrects for the inconsistencies of the NPV and maintains the goal of wealth maximization when selecting mutually exclusive projects of unequal lives and in

Environments of uncertainty

Yield based Capital Budgeting Method:

The preference of a yield-based capital budgeting method by corporate management is indisputable. Several recent survey studies note that corporate management emphatically prefer a yield-based capital budgeting method such as the IRR over alternative capital budgeting methods. In addition, these studies identified the NPV and Profitability

Index as the least popular methods despite each method's theoretical advantage.

Some researchers assert that the preference of a yield-based method over a discount cash flow method, such as the NPV, is because corporate management's implicit goals and objectives are different than the Fisherian assumption of wealth maximization. Mao found that corporate management did not explicitly state that the objective of the firm is to maximize shareholder wealth. In contrast, Petty, Scott, and Bird note that management's stated primary goal when selecting capital expenditure investments is the "maximization of the percent return on total asset investments." Therefore, to be appealing to corporate management and theoretically sound, a capital budgeting method must be expressed as a yield-based measure, maximize the percent return on invested assets and consistent in maximizing shareholder wealth. Given the assumption of Fisher's maximization theorem, most theorists assume the solution to corporate financing decisions involves maximizing the present value of shareholder wealth created by investment projects.

Kaizen Capital Budgeting Method:

Kaizen is the Japanese word for "continuous improvement." In organizations in which Kaizen is practiced, continuous improvements are made in processes. These improvements must show up in the budget as improved costs based on reductions in time and resource needs. Kaizen budgeting shows these improved costs. When comparing actual results with a Kaizen budget, the analysis shows whether or not a company met its goals, since unfavorable variances indicate missing the target.

Activity – Based Budgeting Method:

Activity-based budgeting (ABB) focuses on the costs of activities necessary to produce and sell products and services, rather than focusing on the functional department costs. ABB separates indirect costs into separate homogeneous cost pools and uses cause-and-effect criteria to identify cost drivers for each cost pool. Here are the four steps in ABB:

1. Determine the demand for each individual activity based on budget.
2. Determine the cost of performing each activity.

3. Calculate the cost of each activity as demand times cost.
4. Create the budget from the resulting costs.

Benefits of ABB:

- Creation of more realistic budgets
- Better identification of resource needs
- Linking of costs to outputs
- Clearer linking of costs with staff responsibilities
- Identification of budgetary slack (difference between actual/expected output and full capacity)

Whichever type of budget an organization uses as part of its management control systems, the key to good budgeting is to remember that budgets also affect employee behavior. To be effective, a budget must motivate managers to work toward the common goals of the company. A good budget requires clear, complete, and transparent communication from lower managers and staff to upper management, and this can be very difficult to achieve. Budgeting is a process currently in transition; it is increasingly seen as an important part of quality initiatives, continuous improvement initiatives, and value creation. Decisions made on the basis of budget information can have far reaching effects on all stakeholders. Care should therefore be taken in planning and undertaking the process of budgeting to make sure that the process is transparent and that it provides valid and realistic information to decision-makers.

Modigliani and Miller Method:

Modigliani and Miller propounded their view which is known as 'Modigliani-Miller Approach'. Their approach is identical with the net operating income approach. They have also concluded that in the absence of taxes, a firm's market value and the cost of capital remain constant to the changes in capital structure. In other words, an optimum capital structure does not exist. The net operating income approach leads to the same conclusion, but Modigliani and Miller have provided a behavioral justification in favor of this conclusion. That is, they refer to a particular behavior of the investors in support of this conclusion.

Assumptions

Their conclusion is based on the following assumptions:

- The capital market is perfect in the sense that investors have perfect knowledge of market forces; they are free to buy and sell securities; the cost of transactions is zero; and they behave rationally.
- Firms can be classified into different group consisting of firms having equal business risks. They can be divided into "equivalent risk class".
- Since all investors have complete information, they all use the same figure of net operating income of the firm to ascertain its market value.

All firms distribute the entire earning among their shareholders in the form of dividend. It means dividend payout ratio is 100%.

No corporate income taxes exist.

Under these assumptions, Modigliani and Miller have derived following propositions:

1. Market value of the firm and the cost of capital are independent of capital structure. In other words, a change in debt-equity ratio can have no effect on the market value of the firm as also on the cost of capital.
2. The expected yield on equity has two components the rate of equity capitalization when debts are non-existent plus a premium for the financial risk arising from debts. Therefore, the advantage of low-cost debt is offered by the increase in expected yield on equity.
3. The financing decision has no impact on the expected yield on equity. The financing decision and investment decision are therefore, independent of each other.

We shall consider in detail only first proposition which states that market value of a firm and the cost of capital are independent of the degree of financial leverage in capital structure. They explain this proposition in terms of the behavior of investors.

Arbitrage process

If the price of a product is unequal in two markets, traders buy it in the market where price is low and sell it in the market where price is high. This phenomenon is known as price differential or

arbitrage. As a result of this process of arbitrage, price tends to decline in the high-priced market and price tends to rise in the low-priced market until the differential is totally removed.

Modigliani and Miller explain their approach in terms of the same process of arbitrage. They hold that two firms, identical in all respects except leverage cannot have different market value. If two identical firms have different market values, arbitrage will take place until difference in the market values is removed completely.

To illustrate, let us suppose that there are two firms – X and Y- belonging to the same group of homogenous risk. The firm X is unlevered as its capital structure consists of equity capital only, while firm Y is levered as its capital structure includes 10 per cent debentures of Rs.1,00,000 in this case, according to traditional approach, the market value of firm Y would be higher than that of firm X. But according to M-M approach, this situation cannot persist for long. The market value of the equity share of firm Y is high but investment in it is more risky while the market value of the equity share of firm X is low but investment in it is safe. Hence investors will sell out equity shares of firm Y and purchase equity shares of firm X. Consequently the market value of the equity shares of firm Y will fall, while the market value of the equity shares of firm X will rise. Through this process of arbitrage therefore, the market values of the firms X and Y will be equalized. This is true for all firms belonging to the same group. In equilibrium situation, the average cost of capital will be same for all firms in the group.

The opposite will happen if the market value of the firm X is higher than that of the firm Y. In this case investors will sell equity shares of X and buy those of Y. Consequently market values of these two firms will be equalized.

This argument is based on the assumption that investors are well informed and behave rationally, and hence they engage in personal leverage or home-made leverage as against the corporate leverage to restore equilibrium in the market.

At this stage it is necessary to understand what personal leverage means. If the market value of a

levered firm is high investors sell its equity shares. In addition to the money received in exchange of equity shares. They borrow funds on their personal account and invest in the unlevered firm to obtain the same return for smaller investment outlay. This activity is known as personal leverage or home-made leverage.

Conclusion

The results of this study are both encouraging and thought provoking. Encouraging in the sense that the most popular method of evaluating capital budgeting projects, the internal rate of return, is one of the discounted cash flow methods.

The results are thought provoking, if for no other reason than the popularity of the payback method in evaluating capital budgeting projects. The payback method ignores the time value of money, which is considered a serious flaw. Further, the payback method measures the length of time it takes to recover the initial investment and ignores cash flows beyond the recovery period. Given the serious flaws, the payback method enjoys such popularity because...

First, the payback method is simple to calculate and understand. Many firms use a team approach to evaluate capital projects. These teams are composed of individuals with varied backgrounds and training. When persons of varied backgrounds come together as a team, it is important that everyone understand the evaluation techniques used. The measurement of the time it takes to recover the initial investment is something that is easily understood.

Second, the payback period focuses on short-term profitability. Managers who use the payback can readily identify projects that have the earliest prospect of profitability. At this time, the application by industry of the most sophisticated models that incorporate "soft" factors is still in its infancy. Without these newer models, some decision makers may simply feel that the cost of dealing with the complexity of the traditional discounted cash flow models is simply not justified by the less than complete decision analysis that is provided.

This study has made a significant contribution to the research of capital budgeting methods by delineating several factors that are paramount to the

development of a consistent yield-based method. Previous research analyzing the deficiencies of the IRR asserted that simply correcting the multiple root problems by compounding the investment's cash flows at a rate of return equal to the corporate cost of capital will correct the IRR's deficiencies. However, counter to previous research, this research demonstrated that compounding an investment's cash flows at the corporate cost of capital is not sufficient to correct the deficiencies of the IRR but rather several factors are important when developing a consistent yield-based capital budgeting measure.

Specifically, to maintain wealth maximization in a yield-based method, this study demonstrates that the method must distinguish between financing and investment cash flows, adjust to investments with differing economic lives, recognize the time disparity in the cash flow stream between mutually exclusive investments, and maintain the value additive principle. While the RRIA developed in this study is a significant addition to the current pedagogy of capital budgeting methods and corrects for inconsistencies in the IRR, MIRR, MIRR, and NPV the method is open to future research when analyzing investments of differing size.

Kaizen budgeting takes into account the continuous improvement processes to reduce the budgeted numbers. Unfavorable variances will indicate that an improvement goal has not been achieved. ABB focuses on costs of activities rather than functional department costs. The four steps of ABB are 1) determine demand for each activity, 2) determine the cost of performing each activity, 3) calculate the cost of each activity as the demand times the cost, and 4) create the budget by accumulating all the activities and their costs. Benefits include 1) ability to set more realistic budgets, 2) better identification of resource needs, 3) linking of costs to outputs, 4) clearer linking of costs with responsibilities, and 5) identification of budgetary slack.

If we compute net present values using the Modigliani-Miller capital budgeting paradigm, that they should optimize the firm's capital structure by trading off costs of distress against equity costs, and finally that they should worry about risk.

Management amounts to pure schizophrenia and does not have the slightest intellectual foundation in modern finance theory. Either total risk matters, in which case it has to be managed throughout the corporation and in principle affects all of the firm's decisions, including the choice of projects and the choice of the firm's capital structure or total risk does not matter, in which case we have not learned anything over the last twenty-five years. Since we are unaware of any empirical evidence that shows that total risk does not matter at the firm level but we are aware of plenty of empirical evidence that shows it matters, we do not see how we can ignore total risk. Taking into account the impact of a project on the firm's total risk is straightforward. Doing so will insure that our teaching and our recommendations are on solid footing, that they incorporate what we have learned in corporate finance over the last twenty-five years, and that firms maximize their value when they follow the procedures we advocate.

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