

MBA Teaching Note 07-04

Some Problems in Capital Investment Terminology

Finance is a relatively young subject, having appeared in business curricula starting in the 1940s. But that is long enough for some bad habits to become so ingrained that we can scarcely hope to break them. The terminology used in the topic conventionally known as “capital budgeting” is an excellent case in point.

Capital Budgeting or Capital Investment?

We teach capital budgeting as the study of how companies decide which assets to invest in. We develop the criterion that a company should invest in assets whenever the value created is positive. The decision, commonly known as the capital budgeting decision, is more accurately referred to as the capital investment decision. Reference to this process as “capital budgeting” automatically suggests that there is a limit (i.e., a “budget”) on the amount of capital investment a company might make. Such limits are properly treated under the topic of “capital rationing,” wherein we learn that no firm should limit its capital investment if the project creates value for the shareholders. This value, as we know, already accounts for the marginal cost of the capital required to finance the project. Hence, there is little justification for ever turning down a value-creating project. Thus, capital rationing should never be done.

Of course, in reality some firms do ration capital. Textbooks typically tell us that capital rationing can be used as a control device that can be used when decision makers do not trust those who estimate the figures from which capital investment decisions are made. As we know, many managers are empire-builders, wanting more and more projects under their command. Moreover, managers (indeed, any human being) tend to be overly optimistic about the projects that reflect their creativity. Thus, capital rationing can control some of the empire-building and personal biases of lower-level managers.

While this argument sounds sensible, it works more like a band-aid on a problem in need of major surgery. If empire-building and excessive optimism over one’s own projects are a serious problem, they should be controlled in other ways. At the very least, all projects that create value but are rejected because of an inadequate budget should be scrutinized carefully.

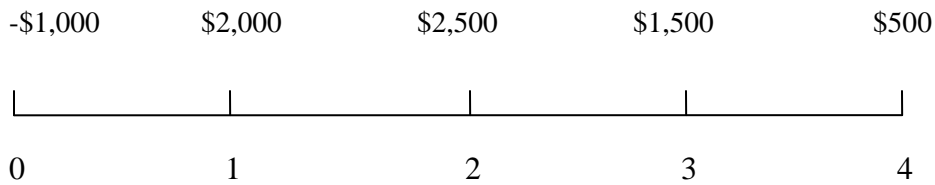
The main point I am making here, however, is that capital rationing is a form of capital investment with a budget constraint on the total amount to be invested. But “capital budgeting” as a term to describe the entire capital investment process is misleading. “Budgets” imply limitations on funds, i.e., capital rationing, and there will not always, and hopefully not often, be such limits that force companies to reject projects that create value for shareholders.

In short, we ought to call this process the “capital investment decision.” But old habits die hard. Some textbook writer should take the bold step of banning the use of the term “capital budgeting” for the more accurate “capital investment.” But I am not optimistic.

Net Present Value

The concept of net present value is one of the greatest and simplest decision rules in finance. We teach that a capital investment decision should be made on the basis of whether the project creates a positive net present value. In this case, the shareholders benefit. But let us see why the term “net present value” is misleading.

A typical definition of net present value is *the present value of the cash inflows minus the initial outlay*. Such a definition works fine for certain types of projects. Consider the cash flows in the diagram below.



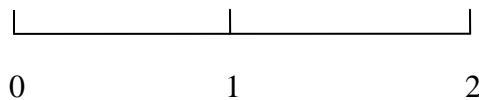
This project has the conventional characteristic of requiring an initial outlay at the start, followed by a series of positive cash flows. Given a cost of capital, say 15%, we can easily find the so-called Net Present Value, in the following manner:

$$\frac{\$2,000}{(1.15)^1} + \frac{\$2,500}{(1.15)^2} + \frac{\$1,500}{(1.15)^3} + \frac{\$500}{(1.15)^4} - \$1,000 = \$3,902.$$

We followed the standard rule: find the present value of the cash inflows and subtract the initial outlay.

But consider an alternative project. Suppose we have a construction firm and win a bid to build a large facility. We will be paid \$10 million consisting of \$5 million up front, another \$2.5 million after the first year if the project is on time, and \$2.5 million one year later when the project is completed. We will incur costs of \$4 million at the start, \$2 million at the end of year one and \$3.5 million at the end of year two. These cash flows are as follows:

\$5,000,000	+\$2,500,000	+\$2,500,000
-\$4,000,000	-\$2,000,000	-\$3,500,000
= \$1,000,000	= \$500,000	= -\$1,000,000



In this case, there is no initial outlay so how can we calculate the Net Present Value, at least under the conventional definition?¹ It is easy if we recognize that the conventional definition of Net Present Value is limited to a very specific case. We can always calculate the present value of all of the cash flows, whether positive or negative, over the life of the project. This figure is more appropriately viewed as the value of the project. In the above project, we have

$$\$1,000,000 + \frac{\$500,000}{(1.15)} - \frac{\$1,000,000}{(1.15)^2} = \$678,639.$$

In short, we should not use the term “Net Present Value.” We ought to just call this figure the value of the project. Such a definition will fit every conceivable project. But it is unrealistic to expect that such old habits, ingrained as they are into finance textbooks since the 1940s, will ever fade away.

Profitability Index

I have written another MBA Teaching Note, MBATN07-02, on some problems with the profitability index. At this point, I just want to note that another problem not mentioned in that

¹Students should also recognize that this is one of the types of project that poses problems for the conventional definition of the internal rate of return. It is sometimes referred to as a *borrowing project* because the project, like a loan, generates a positive cash flow at the start. In borrowing projects, we learn that low rates of return, like low rates on a loan are preferred. Also, the nature of the cash flow pattern here results in there being no discount rate that makes the NPV equal zero. Hence, the IRR is not defined for this problem.

note is what we call it. We spend a great deal of time getting finance students out of the habit of thinking in terms of profits. We want them to think in terms of cash values and asset values. By calling this measure the “profitability” index, we do a great disservice. The profitability index, after all, is a measure of the present value of the cash flows to the initial outlay. Hence, it is not a measure of profitability.

I would suggest that we call it the *value index*, but I have no illusions that anything will change. If everyone else is calling it the profitability index, unfortunately I will remain compelled to call it that as well.