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DISCOUNTING AND FISCAL CONSTRAINTS: WHY DISCOUNTING IS ALWAYS RIGHT

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DISCOUNTING AND FISCAL CONSTRAINTS:
WHY DISCOUNTING IS ALWAYS RIGHT

R. Thaler* - June 1979

→ In a recent article¹ Rolf Clark, says, "Instead of wondering whether defense managers should discount future costs, one should ask, 'Are defense managers fiscally constrained?' He concludes that under the existing institutional arrangements defense managers should not discount. In this paper ^{the author} will argue that, even under the existing institutional arrangements, they most certainly should discount. A

To understand what is wrong with Clark's argument it is necessary to carefully define what is meant by a discount rate.

A discount rate is simply a shorthand way of defining a firm's, organization's, or person's time value of money. This rate is always determined by opportunity costs. Opportunity costs, in turn, depend on circumstances. Consider the following example: An organization must choose between two projects which yield equal effective-

*Cornell University and Center for Naval Analyses.

¹Rolf Clark, "Should Defense Managers Discount Future Cost?" Defense Management Journal, March 1978, pp. 12-17.

ness (or profits in the case of a firm). Project A will cost \$200 this year and nothing thereafter. Project B will cost \$205 next year and nothing before or after. Notice that if project B is selected the organization will have an extra \$200 to use for a year. Whether project B is preferred simply depends on whether it is worth \$5 to the organization to have those \$200 to use for a year. That, in turn, depends on what the organization would do with the money. If the money would just sit around for the year, its time value is zero and project A should be chosen. However, if the money were put in a 5 percent savings account, it would earn \$10 in the year and thus the organization would gain \$5 by selecting project B.

What does it mean, then, to follow Clark's advice not to discount? This is precisely equivalent to using a zero rate of discount. From the preceding example, we see that this will only be appropriate if there is no time value to money, i.e., the opportunity costs are zero. Is there any reason to believe that the time value of money to DoD is zero? Specifically, does this follow from Clark's assumption that defense managers are fiscally constrained? The answer to both questions is no.

Consider a DoD manager who must choose between the two projects described above. Let us assume, as does Clark, that the manager's budgets for this year and next are fixed (which is how Clark defines "fiscally constrained").² According to Clark, project A should be selected since its undiscounted cost is lower. For this to be correct, as we have seen, it must be true that the manager's best alternative use of the \$200 spent on project A would "earn" less than \$5. Clearly this does not follow simply from the assumption of fixed budgets! Clark describes DoD policy as "maximize effectiveness subject to remaining within annual fiscal constraints." (p. 16) This implies that if a way to earn more than \$5 on the \$200 exists, the department should adopt project B.

A firm or individual would never be in a situation where the opportunity costs of funds were zero as long as banks paid positive interest rates, since they could always put their money in the bank. A DoD manager, on the other hand, cannot earn bank interest on funds withheld for a year. This is presumably why Clark argues

²A two-period example has been chosen to make the argument as simple as possible. However, everything that follows would apply to a more general N-period time horizon.

for a zero discount rate. However, there will generally exist other ways for the manager to "invest" funds which are available. Examples include cost-saving expenditures, conservation measures, and preventive maintenance. These kinds of expenditures, if they have positive rates of return, permit a manager to invest money just as if he were putting the money in a savings account.

Recall our simple example. Suppose a thorough analysis of cost-saving alternatives reveals that next year a maintenance project will be required at a cost of \$215. Call this project D. Alternatively the project can be done this year (at the same level of effectiveness) for only \$200. Call this project C. All of the options are displayed in table 1.

TABLE 1

	Costs in year 1	Costs in year 2
A	200	0
B	0	205
C	200	0
D	0	215
A&D	200	215
B&C	200	205

Notice that while the choice between A and B seems to depend on time preference, the choice between the com-

binations A and D or B and C is clear-cut. B and C are preferred at any non-negative rate of time preference.

This example illustrates two important points about discounting. First, a specific discount rate is needed because decisions tend to be made in isolation. The person deciding between A and B may not have control of C and D. Further, it is much too costly to determine all of the alternative uses for any particular amount of money. Thus the discount rate is a simple rule-of-thumb which helps make individual decision making easier and more effective. Second, the use of a positive discount rate does not imply that next year is less important than this year. It merely represents the rate at which this year's dollars can be converted into next year's dollars.

When would it be right to use a zero discount rate? A zero discount rate implies that the opportunity cost of funds is zero, or in other words that the rate of return on alternative investments is zero. This would be true only if every possible project which yielded a positive rate of return had been undertaken (and the department were forbidden from investing funds in any way). This would be a case where DoD was truly unconstrained (in that their budget was large enough for them to undertake

every project with a positive return, no matter how small). I do not think Commander Clark believes this to be the case.

If the circumstances necessary to justify a zero discount rate are unlikely, so are the consequences of using a zero rate undesirable. Analysts using a zero discount rate would indicate that many goods or services produced in the private sector (such as apartment buildings) should be produced by DoD. Using a positive discount rate that is approximately the rate of return in the private sector ensures the avoidance of such mistakes.

Some might argue that opportunity costs are fine in theory, but how can anyone know what rate to use in practice? This is a reasonable question, but the inability to calculate the correct discount rate with accuracy is no excuse for using a zero rate. In the absence of perfect knowledge, the OMB policy of using one rate, 10 percent, in all government agencies is quite reasonable. The correct response for DoD managers is straightforward. Discount all costs at 10 percent. Try to postpone costs if future costs will be less than 10 percent a year higher and to invest in cost reduction when enough future costs can be saved to yield a 10

percent rate of return. It can be shown that this policy will achieve maximum defense effectiveness for any given set of budgets. If not all cost-saving projects with returns greater than 10 percent can be adopted, then the department should really use a rate higher than 10 percent.

On the other hand, if all cost-saving projects yielding greater than 10 percent can be funded, then the opportunity cost for that department is less than 10 percent. Ideally, a department in this situation could lend money to another department which was constrained and earn 10 percent on the loan. This internal banking system would secure efficient investment of DoD funds. In the absence of this possibility, such departments should theoretically discount at a rate less than 10 percent. However, any department in this situation should also request less money, since the funds it is using are less productive than they would be elsewhere in DoD or other government agencies.

A final issue concerns the relationship between discounting and future operating and support costs. Clark argues that the use of a positive discount rate will induce managers to adopt projects with high future operating and support costs. However, as the example in

table 1 shows, discounting may lead to lower costs both now and later. Further, it is naive to think that the tendency to adopt programs with "back-loaded" costs stems primarily from an OMB directive (Circular A-94) to use a positive discount rate. Of much greater significance is the short-run outlook adopted by many decision makers. This may in turn stem from the DoD policy of frequent job changes.

Clark's position was attacked by Blanden and Frederickson.³ While their article is reasonable as far as it goes, it does not come to grips with the basic fallacy in Clark's argument: that the existence of fixed budgets implies the use of a zero discount rate.

Clark's recent reply⁴ indicates that he has not grasped the essence of the problem. In his figure 1 the decision maker must choose between project B with costs of \$100, \$100 and \$75 in years 1, 2, and 3 respectively, or project C with costs of \$77, \$100 and \$100, respectively. At a 10 percent discount rate C is preferred,

³James Blanden and Peter Frederickson, "The Role of Discounting in Problems of Choice," Defense Management Journal, November 1978, pp. 12-15.

⁴Rolf Clark, "Counterpoint: On Discounting," Defense Management Journal, March-April 1979, pp. 44-45.

but Clark argues that B should be chosen. He correctly states that the choice "depends on the opportunity for spending the residual amounts" -- the \$23 in year 1 or the \$25 in year 3. As I have shown, as long as the marginal expenditure in the defense department earns at least a 10 percent rate of return, it will be possible to invest the \$23 in year 1 in a cost-saving effort that will produce nearly \$28 in reduced costs in year 3. Clark responds that "it is entirely possible that having \$25 in year 3 may buy more effectiveness than having \$23 in year 1. This might be the case if the residuals are used to buy spares for some other system; the spares may be more necessary in year 3 than in year 1. In that case, the total effectiveness bought with a \$300 budget is greater if we choose B rather than C...." But investing in a productive cost-saving program in year 1 will produce more than \$25 to use in year 3. If money is needed so badly in year 3 then even more money should be welcome! Clark's verbal and mathematical analyses implicitly rule out such cost-saving programs without any justification. Once this possibility is allowed for, the logic of his argument disappears.

The correct analysis can be summarized as follows: (1) Not discounting is the same as using a zero discount rate. (2) Using a zero discount rate is only correct if

the opportunity cost of money is zero. (3) Fixed budgets do not imply that opportunity costs are zero. Therefore, (4) even in a world of fixed budgets, costs should be discounted.

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