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ABSTRACT
                     This paper examines the theoretical difficulties
inherent in basing social investment decisions solely on
considerations involving the additional tax payments and tax receipts
the investment generates. Although the conceptual issues raised are
quite general and could be applied to a wide variety of government
financed investments, emphasis is on application to manpower training
programs. Following the introductory section, major topics discussed
are Some Elementary Concepts in Public Project Analysis (a review),
The Case of Manpower Training, and An Assessment of Tax Based Ratios.
It is concluded that the use of any tax based cost/benefit ratio is
conceptually invalid in that these ratios do not serve as adequate
proxies for the net increase in socially useful output received
through manpower training programs and they discriminate quite
arbitrarily among people based on personal characteristics and other
factors that have little relation to the question of economic
efficiency. (HD)

A CRITIQUE OF THE ASBED COST/BENEFIT RATIOS

James P. Smith

December 1975

P-5571

A. Introduction

In this paper[1], I examine the theoretical difficulties inherent in
basing social investment decisions solely on considerations involving the
additional tax payments and tax receipts the investment generates. It has
often been suggested that it may be appropriate to evaluate the social
costs of government investments by the tax payments required to finance
the investment and to value the social benefits by the tax receipts that
result from the additional income attributed to the investment. Although
the rationale for this view is rarely stated explicitly, it is an idea
that reappears periodically under different guises. It can apparently
command strong support within the federal government. Because the policy-
makers directly concerned with overseeing programs are employed by the
federal government, there is a natural inclination to highlight those
receipts that pass through the budgetary process. If policymakers see
themselves as representing the interests of the taxpayer, the appeal of
an idea that is motivated by a desire that taxpayers receive a fair re-
turn of their tax dollar is understandable. The conceptual issues
raised here are quite general and could be applied to a wide variety of
government financed investments, but I will concentrate on its applica-
tion to manpower training programs. To state the question more pre-
cisely, I will investigate the conditions under which the true social
cost/benefit ratio is related to a cost/benefit ratio where costs are
defined only as the tax dollars used to finance manpower programs and
benefits are defined as the tax receipts from the net earnings gains due
to the manpower program. Referring to the first ratio as A and the second
ratio as B, under what conditions would B approximate A? As a corollary
to this issue is the question as to where any inconsistencies between the
two ratios lie.

[1] This paper was written under a personal services contract from the
ASPER Division of the Department of Labor. The views expressed are those
of the author and in no way involve the Rand Corporation or the Department
of Labor. I would like to thank William Gould and Ernst Stromsdorfer for
their comments and assistance.

- 2 -

Beginning with the Manpower Development and Training Act of 1962,
the commitment of the federal government to train and equip low skill
workers with new skills accelerated. This commitment expanded so rapidly
during the sixties that by 1968 President Johnson proposed to Congress a
two billion dollar manpower budget. The actual programs have taken many
forms among which the Job Corps, Neighborhood Youth Corps, Work Experience
and Training programs are the more prominent. But all have had the common
objective of attempting to permanently alter the income prospects of low
skill workers either through increased familiarity with the work environ-
ment or by directly enhancing their marketable skills. Partly due to
their use in other sectors of the government, especially the military,
there was almost immediate pressure on the policymakers involved to em-
ploy the techniques of cost/benefit analysis in choosing among alterna-
tive manpower programs. It is by now generally accepted that some type
of cost/benefit calculus is a conceptually appropriate criterion on which
to judge the social usefulness of these public expenditures. But many
issues concerning the appropriate method of computing these ratios[2] re-
main hotly debated topics. The list of items that should be included as
either costs or benefits, the assignment of prices that measure the true
social values of the included costs and benefits, and the correct dis-
count rate to use in comparing dated costs and benefits have all come
under careful theoretical scrutiny. Conceptual errors on any of these
matters can lead policymakers to distribute their budgetary resources in
an economically inefficient manner. This paper represents an attempt to
assess a particular method of computing a cost/benefit ratio (i.e. one that
uses tax payment and receipts) to determine whether it would lead to a
socially efficient allocation of resources.

The success of manpower training programs can be judged on grounds
other than economic efficiency. These programs are in part an income
transfer designed to alter the distribution of well being by increasing

[2] Cost/benefit ratios are used here as in the title as a generic term
for all techniques that involve comparing costs and benefits. It is not
meant to connote a particular method of conducting that comparison.

the relative wealth of low skilled labor. They differ from a straight cash
transfer since the receipt of the subsidy is conditioned on participation
in a training program. The rationale for the condition is presumably
to induce an individual to increase his human capital (wealth) so that
his new wealth position becomes self-sustaining and permanent. Since it
is fundamentally an attempt to alter the distribution of income, consid-
erations of equity in addition to economic efficiency are introduced.
However, the equity issue will be ignored here for a number of reasons.
First, the standard caveat applies that an economist·speaking as an econo-
mist has no special skills to offer for the normative judgments that equity
questions entail. Second, as a practical matter for any desired redistri-
bution of income, it is usually possible, and indeed preferable, to achieve
that redistribution in an economically efficient manner. Third, the use
of a cost benefit ratio based on taxes passing through the government can
obviously have different distributional consequences than one based on
other criteria. However in view of the underlying philosophy justifying
any cost benefit calculation, it would seem curious to choose between
alternative ratios on any criterion other than economic efficiency. More-
over, it has not been demonstrated that the use of a tax based ratio would
systematically tend to favor one group relative to another. Throughout
this paper I will only consider the efficiency aspects of these programs.
Thus, I invoke the assumption that the value of a dollar to individual A
is the same as the value to individual B. This is the common assumption
in all cost/benefit and welfare analysis, but it need not be correct. It
is left to one's imagination to determine how we should value the dollars
differently.

B. A Review of Some Elementary Concepts in Public Project Analysis

The best way of isolating the advantages or disadvantages of using a
tax based cost/benefit ratio is to review some elementary but fundamental
concepts pervasive to all social investment analysis. An appreciation of
these simple concepts makes the job of critiquing the tax based ratio rela-
tively straightforward. In reviewing these ideas, we will derive the cor-
rect method of comparing manpower programs as an ideal from which the tax
based technique can be judged. The basic problem in all project analysis

including manpower programs is devising a standard that enables us to compare public investment projects with one another (or with present consumption) In the treatment that follows, there is no pretense of originality or innovation. These notions have been developed by others and are now well embedded in the literature. They do represent the clearest thinking on these matters that I could find.

If economic efficiency is our goal, we want to select for any given cost, that set of projects producing the greatest increase in socially useful output. To some extent, this decision is similar to that faced by a private firm in choosing its investment strategy, including its investments in the human capital of its workers. But a number of complications makes the choice among public investments more difficult. Competitive firms can usually equate values with observable market prices. Output prices are reasonable proxies for per unit benefits and input prices are good measures of costs. However, it is not generally true that market prices reflect social benefits and costs. Discrepancies between social and private values (market prices) can emerge as a result of government taxes and subsidies, market imperfections, indivisibilities of public goods, monopoly power, or unappropriable benefits or costs (externalities). The essence of all project analysis is to identify the relevant costs and benefits connected with a project and to place the correct societal prices on them. Once these have been identified and valued, a rule is required by which we can compare alternative projects with different costs and benefits. One important component of this involves calculating the social rate of discount.

Economists have a precise definition of costs that often is not understood in common usage. Economists define social costs as opportunity costs - the value placed on the best foregone alternative. For example, the cost of employing resources in any industry is the maximum output these resources would have produced in the next best alternative industry. Budgetary or fiduciary costs and market prices do not always correspond to opportunity costs. The favorite example of a distinction between budgetary costs and social costs was the manpower costs of the military when the draft was in effect. Individuals were coerced into the armed forces and paid wages well below what they could have earned in the civilian sector. Measured by the taxes necessary to pay draftee wages, the budgetary costs of military manpower was low. However, the social costs valued at the foregone civilian

output of draftees were enormous. In the transition from the draft to
the volunteer system, there took place a large expansion in budgetary costs.
At the same time there undoubtedly was a reduction in social costs since
many potential draftees with relatively high foregone civilian opportunities
did not volunteer. Of course the low budgetary costs had behavioral con-
sequences in affecting the input mix of resources in the military and the
budgetary decisions of Congress. It would not have been correct to use
taxes or budget costs to value the social costs of the military.

Similarly, market prices can fail to reflect social values. Probably
the most important distortions that exist result from taxes. From a
worker's point of view, he is interested in the wage he receives net of
income taxes. It is this wage that governs the allocation of his scarce
time. From a societal viewpoint, it is the gross wage that measures the
social value of his labor. The division of payment of his social value
between himself and other taxpayers is of no importance when computing
the social value.

As these examples illustrate, the correct measure of costs and benefits
is a function of whose perspective we take. For manpower programs, there
are three main viewpoints; (1) the social view where costs are opportunity
costs and benefits are the alternative uses of the additional skills pro-
duced; (2) the private view (that of the trainee) where the only costs that
are relevant are those that he bears and the benefits are his additional
after tax income; and (3) the government or taxpayer's view where the costs
are the taxes required to pay for the program and the benefits are the
additional tax receipts therefrom. That these three viewpoints can diverge
motivates much of the controversy in analyzing public projects. In par-
ticular, in this paper we are interested in how well the governmental per-
spective approximates the social one. The existence of taxes alone means
that we must distinguish between the value to individuals and the value to
society. Once we have properly valued costs and benefits, we need a rule
which will array projects in terms of the highest net value.

Perhaps the central issue debated in public project analysis during
the 1950's and early 1960's involved the selection of a rule by which
projects should be ranked. Three main candidates emerged. It was argued

that one should choose the project (1) with the highest internal rate of return, (2) that had the highest net present value, (the present value of net benefits associated with the project discounted at the social discount rate), (3) where the ratio of the present value of benefits to costs was largest. By now a consensus has been reached that rule number two (selecting the greatest Net Present Value) is under quite general conditions the correct one to follow. Since Hirshleifer's classic article, it is well known that the internal rate of return contains mathematical as well as economic difficulties.[3] The internal rate of return is defined as that discount rate which equates the present value of benefits from a project to the present value of its costs. The mathematical problem is that the internal rate of return need not be unique. The complete series of costs and benefits extending into period N constitutes a polynominal equation of degree N. By Descartes rule of signs, the maximum number of real roots of a polynominal is determined by the number of sign changes in the polynominal. If net benefits become negative in any time period after the first positive net benefit, then we may be confronted with an abundance of riches - more than one internal rate. There is no solution to the problem of which rate to choose. The economic deficiency with an internal rate is more fundamental. Implicitly, one is assuming when one uses the internal rate that the dollar benefits received in the early periods can be reinvested at the internal rate. For example, if the internal rate is 40 percent, there must be other investment opportunities available that yield 40 percent so that the dollars accruing during the first benefit period of this project can have a return of 40 percent until the end of the project. If the market interest rate is 10 percent, this will simply not be true. Consider two mutually exclusive public investment opportunities with the first costing $1000 and yielding $500 per year forever. Let the second project cost $3000 with returns of $1000 per year. The internal rate of return on the first project is 50 percent and on the second project it is 33 percent. The higher internal rate criteria tells us to opt for project one but this could easily be a mistake. At market interest rates below 25 percent (a quite likely occurence), the second project has a larger net present value than the first.

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[3]See "The Optimal Theory of Investment," _Journal of Political Economy_, August 1958.

Similar difficulties exist when one uses benefit/cost ratios. The benefit/cost ratio is computed by first calculating the present value of benefits and the present value of costs associated with the project. Next a simple ratio of the present value of benefits to the present value costs is calculated. In the case of mutually exclusive investments, one is supposed to select the project with the largest ratio.[4] However, this rule can also lead to socially inefficient resource allocation. Consider again the two projects discussed above. At an interest rate of 10 percent (the social opportunity costs of funds), the social value of the additional output from project one is $4000 and from project two is $7000. Clearly project two is preferred. But the computed benefit/cost ratio is approximately 5 for project 1 and 3.3 for project 2. These simple examples illustrate why the net present value rule is superior to either the internal rate of return or benefit/cost ratio rules.

One reason why the internal rate of return proved to be so popular and was abandoned only reluctantly is that it is a self-contained statistic. One could compute an internal rate with data only on the costs and benefits associated with the individual project. Unlike the net present value rule, no assumption was required concerning the social discount rate.[5] The social rate of discount has been (and to some extent still remains) one of the more controversial subjects involving public project appraisal. Quite distinguished economists have suggested a number of discount rates with an embarrassingly large range. Since the choice between 4 percent or 10 percent discount rate could determine the acceptance or rejection of many projects, policymakers were understandably reluctant to employ a rule where the magnitude of one of the key parameters was in such dispute. However, whether we use government taxes or some other method to measure costs and benefits, there is no way of avoiding the question of an appropriate discount rate. The social discount rate issue is no different than refusing to place a value on the materials or labor used in manpower programs.

It is instructive to briefly examine the calculation of the "true" social discount rate because it illustrates two important components of all cost benefit analysis: (1) the distortions that may exist between private

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[4]If projects were not mutually exclusive and there was no capital rationing, one would undertake all projects with benefit/cost ratios exceeding 1.

[5]A social rate would be necessary as the cutoff point for selecting projects.

and social costs, and (2) the creation of shadow prices. The social dis-
count rate should in principle measure the value of alternative uses of the
funds used for the manpower program. Because of the manpower investment,
some private consumption or private investment that would have occurred is
displaced. If there were no distortions in the private capital market, the
existing market interest rate would measure the value of the foregone private
consumption and investment.[6] Distortions do exist with one of the more im-
portant due to the presence of corporate and personal income taxes. The
corporate income tax is a tax on capital in the corporate sector and as such
it creates a wedge between the social and private return on investments in
the private sector. From the point of view of the managers of corporations
and their stockholders, it is the after tax yield on their investment that
is relevant in their decision making. However, from the societal perspective
the before tax return on private capital measures the social value of the
investment. It is irrelevant socially that some of the returns of private
sector investments are distributed to stockholders and some to the public
at large through increased tax payments of corporations.[7] For example,
the same level of public expenditures and services could be maintained with
a reduced payment of all other personal and corporate income taxes. Since
a 6 percent private return on corporate investment translated into approxi-
mately a 12 percent social return, the private investment foregone should
be discounted at 12 percent.

Not all the funds required for manpower programs are absorbed by re-
duced private sector investment. Some of the manpower expenditures replace
private consumption. The before tax corporate return cannot be used to
measure the value of this private consumption foregone. Rather what is re-
quired is the subjective marginal rate of substitution between present and
future consumption. An adequate proxy for the consumer's discount rate on
future consumption is the return of bonds net of all personal income taxes.
If an individual with a marginal income tax rate of 33 1/3 percent purchases
a bond that yields 6 percent, he is willing to forego one dollar today (of

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[6]In reality, at any moment of time there exists numerous interest
rates. I am ignoring this complication in order to make a basic point
simply in the text.

[7]The reader should be reminded of the caveat regarding my ignoring inter
personal utility comparisons. Under any other assumption we would have to
consider the distribution of the benefits between members of society.

present consumption) if it yields a 4 percent return (increased future consumption).[8] Thus, the correct discount rate to use on that proportion of the manpower costs that replace private consumpt n would be 4 percent.

The complete picture is illustrated in Figur 1. Curves AA and A'A' represent the before and after tax marginal efficiency of capital respectively. Curves BB and B'B' are the before tax and after tax private savings functions. The market interest rate is r_o, the before tax return on corporate capital is r_1, and the discount rate for future consumption is r_2. The institution of manpower training valued at DE dollars shifts out the total investment curves to CC and C'C'. This reduces private investment by DF and increases savings by FE. The foregone private investment is represented by the shaded area under the before tax marginal efficiency of capital and the foregone private consumption by the shaded area under the B'B' curve. The appropriate shadow discount rate becomes a weighted average of the before tax corporate return on capital and the after tax rate of savings where the weights are the proportion of capital costs that come out of private investment and private consumption.

More formally, one can show that the shadow discount rate is

$$r* = [\frac{w_1}{1-T} + w_2 (1 - t)]$$ where T is the corporate income tax

rate, t is the personal income tax rate and w_1 and w_2 are the proportion of capital costs that come from planned investment and consumption. Furthermore, $w_1 = \frac{-\eta}{\Sigma-\eta}$ and $w_2 = \frac{\Sigma}{\Sigma-\eta}$ where η and Σ are the interest elasticity of the investment and savings function.

C. The Case of Manpower Training

Using these principles and economic efficiency as the only goal, we should select all projects that have a positive net present value. If projects are mutually exclusiv so that the selection of one eliminates the other, the project with the highest net present value is preferred. Furthermore, the social discount rate to use in calculating net present values is also knowable - it is the weighted average of the social return on capital

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[8] Because of the great variation in effective marginal tax rates among individuals, this can in practice become a difficult measurement problem. In principle one would want to value each dollar of foregone present consumption by the personal marginal rate of substitution of present for future consumption of the individual who gave up that dollar. Except perhaps for some gross adjustments for groups with large differences in tax rates, this would soon become unmanageable.

FIGURE 1
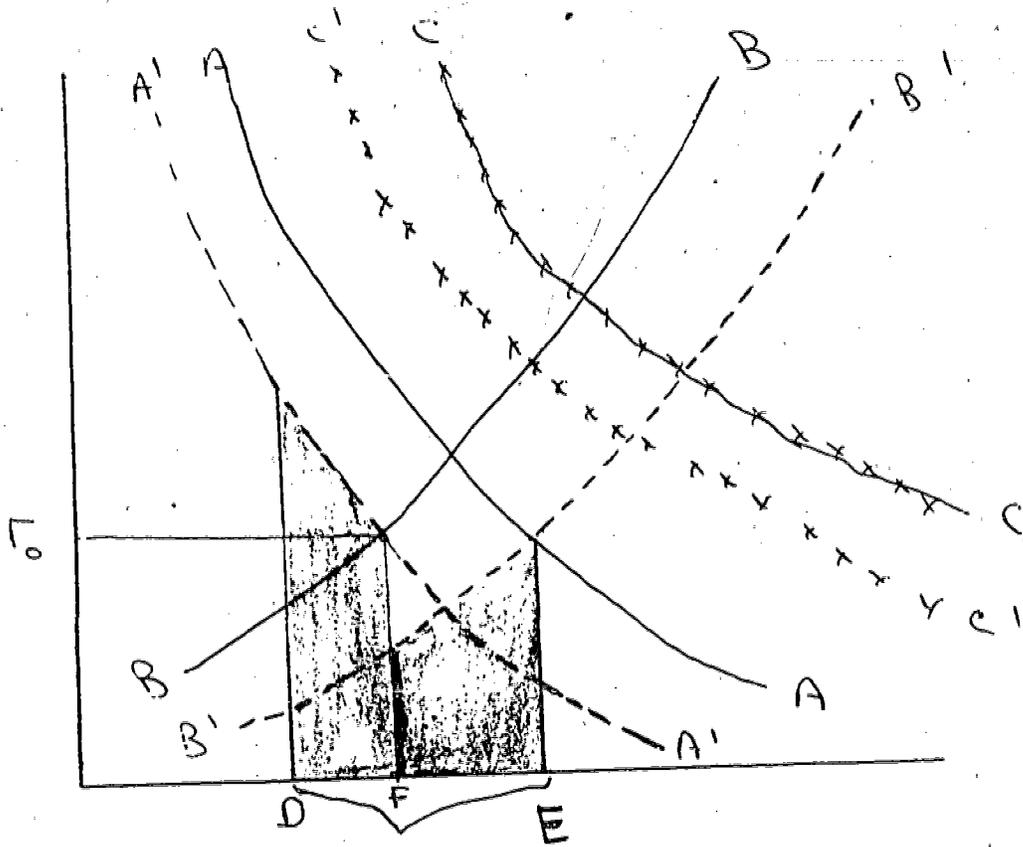
AA	Before tax marginal efficiency of capital (without manpower investment)
A'A'	After tax marginal efficiency of capital
BB	Before tax savings function
B'B'	After tax savings function
CC	Before tax marginal efficiency of capital (with manpower investment)
C'C'	After tax marginal efficiency of capital (with manpower progress)
r_o	Market rate of interest
DE	Total manpower investment
DF	Foregone private investment
FE	Foregone private consumption

and the marginal rate of substitution between present and future consumption. If this discount rate is employed and the net present value rule is followed, the social value of the return from manpower programs would be maximized. All that remains is to enumerate and value all the factors that should appear as either social costs and benefits of these programs.

Table 1 lists the major costs and benefits of manpower programs from three perspectives; the social, private and governmental or budgetary view. The basic social return from manpower programs is the increased earning capacity of the trainee. The purpose of training is to impart skills to workers so that their human capital will be larger.[9] In this respect manpower training is no different than any other form of human capital investment - a commitment of resources in the current period in the hope that this will yield additional earnings in the future. Note again one should recognize that it is the earnings before all income taxes that comprises the social return. Federal income taxes, and all social security taxes contributed by both the employer and employee are part of the social output due to training. From a social efficiency standpoint the distribution of this output between the trainee and the general public through any structure of tax revenues is unimportant. That is simply a question of the distribution of output and not its total value. In principle, one should include any increase in the non-pecuniary benefits associated with the job as part of the social return. In practice, the measurement problems are so severe that these are usually ignored. Of more consequence, the monetary value of all fringe benefits of the new job (above those received in the old job) can be a large part of the social return. Since fringe benefits are strongly positively correlated with skill level, neglecting them could lead to a serious underestimation of the net present value.

Conceptually, social costs are also easy to identify. The social costs are all the resources foregone as a consequence of training. These

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[9]There are many other reputed returns from manpower training that are neglected here. These involve third party effects - those increases in social welfare that are not captured by the trainee or the government in the form of higher taxes. Since people other than trainees receive these benefits, they will not appear as higher trainee earnings. These externalities include reduced crime, better neighborhoods, etc. While they may be real components of the social return, they are ignored here because they will not affect any of the alternative cost/benefit ratios discussed in the text. All of them will underestimate social returns if third party effects are present.

TABLE 1

SOCIAL, PRIVATE, AND GOVERNMENTAL
MANPOWER PROGRAM COSTS AND BUDGETS

GROUP INVOLVED	COSTS	BENEFITS
Social	Earnings foregone of trainees Opportunity costs of all resources used in teaching and training Administrative Costs	Increase in before tax earnings of trainees due to program
Private	Loss in after tax earnings during training Direct training expenses paid by trainee (transportation, books, etc.) Minus (plus) the increase (decrease) in transfer payments during training	Increase in after tax earnings of trainees minus the decrease in transfer payment due to being a successful trainee

Government

Narrow Definition

	COSTS	BENEFITS
	Taxes necessary to pay direct costs of programs	Additional federal income ta (including social security taxes paid by employee and employer) on incremental e ings due to training

Broad Definition

	COSTS	BENEFITS
	Narrow definition plus taxes lost because of trainee foregone earnings during training Plus (minus) the increase (decrease) in transfer payment during training.	Narrow definition plus addit al state and local income sales taxes on additional come minus reduction in al transfer payments to suces trainee

include (1) the alternative value of all resources connected with administer-
ing manpower programs, (2) the value of all resources (teachers, capital,
equipment, etc.) employed in the training process, and (3) the foregone
earnings or opportunities of the trainees themselves. The first two
components are relatively transparent. The resources used in administra-
tion and training could have been employed elsewhere. The cost of using
them for manpower training is the largest value of the output foregone.
Moreover for these costs, market prices will usually serve as an adequate
proxy for their worth.

A less obvious part of the social costs are the foregone opportunities
of trainees. One of the fundamental insights of human capital theorists
was the observation that for many types of investments in people - education,
on the job training and the like - foregone earnings of the human investors
are likely to be a large fraction of the total investment costs. Instead
of attending school, individuals could be working. The loss of these
potential earnings is a legitimate part of the cost to the individuals and
to society of schooling. In fact, most studies by economists of the costs
of education and on-the-job-training indicate that foregone earnings are
the major part of the total investment cost. For those individuals who
would have worked, their before tax potential market earnings should be
added to the administrative and material costs to calculate the total
social costs.

A complication arises with manpower programs because many of the
participants were not working before joining the program. Some are
officially unemployed, some are new entrants into the labor force with
no previous work experience, and some are housewives. None of these
groups have market earnings to forego at the time of program entry. Al-
though the measurement problems are considerably more difficult, the op-
portunity cost notion applies to these persons as well. It is now common-
place in economics to recognize that the time value of women not engaged in
market work is positive and compares favorably with the value of time of
working women. Because the use of an hour of a housewife's time in one
non-market activity implies that her time cannot be employed in another
non-market activity, her time is scarce and valuable. Similarly, new
labor market entrants and even the unemployed are using their time in
activities that have value. Empirically, it would be necessary to impute a

value to the time of such individuals, and recently a number of statistical techniques have been developed for that purpose. It would clearly be grossly inaccurate to assume that it is zero. Conceptually then the computation of social costs and benefits of manpower programs is not that complex. The additional before tax earnings of trainees represent the benefits; the costs are all the resources involved in administration and training evaluated at their market prices plus the before tax foregone earnings of individuals who would have worked instead of being trained. For those who would not have worked, their imputed shadow wages can be used as a substitute for market earnings.

Although this paper is not concerned with the private return to training, it may clarify some issues to distinguish the private and social return. One crucial distinction results from taxes. On the benefit side the trainee considers only the after tax income he receives. He does not include in his return any of the additional taxes that were a legitimate component of the social return.[10] The private cost to the trainee is the decline in his after tax income during the training period. If a trainee's before tax earnings were $5000 and his average tax rate was 20 percent, the cost to him of engaging in training is $4000. We must add to these after tax foregone earnings all the direct costs of training paid by the trainee (books, transportation, etc.). Finally, transfer payments are included in the private cost even though they are not part of the social cost.

An easy way to distinguish an economist from the bureaucrat is to ask them how they would handle transfer payments. Their distinct treatment of these funds illustrates clearly the economist's use of the opportunity cost concept. Manpower training will typically induce a complex series of reactions in the entire public transfer system. Initially, this may consist principally of subsistence payments to trainees during the training period. Following training, there may be lower welfare and unemployment compensation received by successful trainees. There is a temptation for those in control of the Federal budget, and the general public as well, to view the increased transfers during training as a cost and the lower future transfers as a

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[10] One qualification involves social security taxes. If an individual's future expected social security receipts are related to the taxes he puts into the social security system, then some part of these taxes are included in the private return. There is real question about how firm the link is between current contributions and future receipts in this program. This is a controversial area that is beyond the scope of this paper.

benefit. From an economic perspective, these transfers constitute neither real social costs or benefits. Economic costs exist if real resources (that have alternative uses) are used in the process. Economic benefits are present if the set of obtainable output from a given amount of re- sources is increased. Straight transfers do not qualify since there is no absorption of resources caused by the payment of additional subsistence during training and no enlargement of resources due to the lowered future compensation. The gain to taxpayers of a dollar reduction in future wel- fare payments is matched by the loss of a dollar to the trainee. Socially, the net effect is zero.[11] Taken alone, the exchange of dollars can be a misleading indicator of the existence of benefits and costs. Dollar pay- ments are useful when they measure incentives to transfer resources at their opportunity costs. It is not the dollar payment but the use of the resource that constitutes the opportunity costs. With the exchange of dollars between individuals through the political process, no resources are lost.[12] The larger consumption opportunities of one member are off- set by the lower consumption possibilities of another. The trainee sees things quite differently. These transfers can easily alter the private return to training. The trainee will subtract from his future perceived benefits the expected decrease in all public subsidies. Any new public dollars re- ceived during the training process will lower the private cost to him of undertaking training.

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[11]A number of qualifications of this statement can be mentioned. First, there are typically administrative costs of processing these trans- fers. If there is a reduction in administrative costs as transfers are reduced, there is a social benefit. Second, many of these payments are not pure transfers. Rather, they are conditioned upon certain aspects of an in- dividual's behavior like the absence of market work. By distorting incen- tives the transfers could have produced welfare costs. If the number of people involved in transfer system is reduced, there may be a social benefit.

[12]This statement should not be taken too seriously. In political pro- cess where allocation decisions are made, resources are used. Because there are competitors for the dollars that are distributed, individuals are willing to incur costs to receive some of the benefits. So these considerations which are part of the new economics of politics are ignored here.

The final perspective I consider is that of the government. It is
this view that argues for tax based cost/benefit ratios. Those who favor
a tax based ratio seem to be asking the following question - will the tax-
payer receive a fair return on his tax dollars used for manpower training?
The taxpayer's return is the additional tax receipts on the larger earnings,
of trainees; the government expenditures on manpower training are his costs.
At least two issues create ambiguity: (1) should any induced effects on
government expenditures or taxes be counted; (2) should tax benefits and
costs to governmental units other than the Federal government be considered?
A narrow definition includes in the benefits the tax revenue from the addition-
al earnings and as costs the direct government expenditures in training workers.
This definition is narrow since it ignores all induced changes in government
expenditures and taxes that are a predictable consequence of manpower training.
The induced change in expenditures consist principally of the lower expected
transfer payments in the future and the larger transfer payments of other
Federal government agencies during training. Whether those who favor a tax
based cost/benefit ratio would include these induced effects in their calcu-
lations depends upon the underlying philosophy that motivates the tax based
ratio. The narrow view treats each Federal program as a distinct entity whose
direct costs and expenditures should be justified by the new Federal taxes
these expenditures induce. On the other hand, if the Federal taxpayer is
taken as the unit upon whom benefits and costs are computed, some might
argue that all the induced changes in Federal expenditures are on a par
with the direct manpower expenditures. That is, a dollar increase in tax
receipts from the new earnings is equivalent to a dollar decrease in Federal
unemployment benefits. This takes the Federal budget itself as sacrosanct.
The argument against considering these induced changes in federal expenditures
is that they are simple transfers. If the trainee himself is thought of as
a member of society, the dollar reduction in unemployment insurance that was
a gain to "taypayers" is a loss to him.

Another unsettled issue involves the governmental units one should in-
clude in the tax accounting. Although manpower programs are Federally funded,
their existence will inevitably have an impact on the taxes collected and ex-
penditures made by many other levels of government. Most directly, the ad-
ditional earnings caused by federally financed manpower training will be

subjected to state and local income taxes. More indirectly, states and
localities will gain new revenues from sales taxes as the larger earnings
are used for the consumption of goods and services. There are losses in-
curred as well. During the training period, local and state income taxes
will decline to the extent that there are trainee foregone earnings (hence
no longer taxable). And, as we saw at the Federal level, there can be in-
direct effects on the amount of governmental expenditures. Many state and
local transfer payments, i.e. unemployment compensation, welfare payments,
may be reduced in the future due to the enhanced earning capacity of suc-
cessful trainees. Similarly there could be increases in some of state
and local transfer payments during the training period.

From an overall governmental perspective, the larger state and local
income taxes due to the higher earnings of trainees are a legitimate part of
the total returns from training. The lost personal income tax revenues of
these local units during the training period are part of the social costs
of these programs. Since the potential before tax income measures the
foregone social opportunities, sales tax revenues are not counted since this in
come was already included in the after personal income tax income of
trainees. The reduced transfer payments (welfare, unemployment compensa-
tion) after training and any new transfer payments during training by any
governmental unit do not represent social costs or benefits. As we have
just seen, the benefit or cost to the trainee is offset by a cost or bene-
fit to the taxpayer.

Whether state and local income taxes are relevant depends once again
on whether an exclusively Federal view is taken. Manpower programs will
probably increase local taxes in the communities where the trainees work.
People in these communities may or may not be indifferent to a dol-
lar increase in state income tax receipts or Federal income tax. State
and local taxes may be more acceptable to them than federal taxes if the
benefits received are more closely tied to local tax payments. Of course,
residents of California are unlikely to be sanguine about the higher taxes
received by residents of New York State because of the Federally funded man-
power programs in New York.

D. An Assessment of Tax Based Ratios

After this somewhat elaborate introduction, evaluating the useful-
ness of tax based cost/benefit ratios is a straightforward task. The

criterion by which we will judge any tax based ratio is whether it ranks manpower projects by their social net present values. A tax based ratio will be deficient and lead to sub-optimal decisions if it produces rever- sals in the ordering of projects. This will be especially severe if it alters the sign of the social net present value of certain types of pro- jects. We know that the correct method of computing the social net present value is to count as the benefits the increase in before tax earnings of trainees that are a direct consequence of training. The social costs are all the resources employed in training valued at their foregone opportun- ities - administrative costs, direct expenditure costs of government (materi- als, teachers, rental value of capital equipment) and the foregone earnings of trainees. Using the symbols explained in Table 2, the social net present value (SNPV) may be expressed as follows:[13]

$$SNPV = -(y_o + D) + \frac{y}{r}$$

Before comparing the SNPV with a tax based one, three aspects of the government viewpoint raised earlier must be resolved: (1) the inclusion of all indirect government expenditures induced by manpower training, (2) the place of state and local governments, (3) and the tax losses due to lower foregone earnings of trainees. It would be conceptually incorrect to have these induced changes in government expenditures in the tax based ratio. The primary reason is that these expenditures are typically trans- fers that do represent net costs or benefits to society. These payments will arbitrarily inflate benefits for groups with the largest induced reductions in future transfers. If these transfers are included, the tax based ratio will tend to favor such groups and lead to a socially inefficient selection of projects. Although the additional state and local taxes are

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[13]This obviously involves a number of simplifications. First, an assumption that all costs occur instantaneously at time zero. On the bene- fit side, it assumes a constant earnings gain for all future years and an infinite life. These assumptions are employed not because they describe the actual cost and benefit consequence of manpower programs, but simply because they simplify the mathematical presentation. None of the substantial points made in the text would be changed if the formulas more realistically described the actual process.

TABLE 2

A Short Glossary of Symbols

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y Increase in after tax income of trainees as a consequence of training

y_o Foregone earnings of trainees during training

D Direct costs of training = administrative and all costs associated with training except foregone earnings

r Social discount rate

t Tax rate

NPV   Net present value

SNPV   Social net present value

$GNPV^1$ Tax based net present value excluding lost tax receipts

$GNPV^2$ Tax based net present value including lost tax receipts

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part of the social return to those projects, this does not necessarily imply that state and local taxes should be in the tax based ratio. Since a tax based ratio considers only part of the benefits and costs in any case, the issue is whether incorporating the state and local taxes makes these ratios better approximations of the true SNPV. I will demonstrate below that there are instances in which adding state and local taxes gives a closer approximation to the social value and cases in which it makes matters worse.

The third issue concerns whether one should count on the cost side the decline in government taxes during the training period. One can conceive of a tax based ratio that adds the loss in income tax receipts to direct expenditures. In what follows, I will investigate the properties of two types of tax based ratios. The difference between them is simply that one of them will add the lost income tax receipts to the cost of manpower training. In general, we cannot determine whether either of these tax

base ratios understates or overstates the SNPV. Taking the ratio which
ignores the loss in tax receipts during training, the net present value
is

$$GNPV^1 = -D + t\frac{y}{r}$$

This method leaves out a cost - the foregone earnings of trainees - and
simultaneously deflates the benefits by the tax rate. It treats the three
elements comprising the SNPV quite differently. On the cost side, all the
direct costs are counted dollar for dollar, but foregone earnings are com-
pletely ignored. On the benefit side, only a fraction of the benefits ap-
pear. Not surprisingly, this ratio does not match very closely the SNPV of
projects. GNPV would equal SNPV by pure happenstance if the capitalized value
of the future increase in after tax income equaled the foregone earnings
component of costs. If the capitalized value of the additional after tax
income is larger than foregone earnings, $GNPV^1$ is less than SNPV. Adding
in state and local taxes will obviously make $GNPV^1$ larger relative to SNPV.
But since $GNPV^1$ could have exceeded or fallen short of SNPV, we cannot de-
termine whether including state and local taxes makes matters better or
worse.

   The second tax based ratio is

$$GNPV^2 = -D - ty_o + t/\frac{y}{r}$$

Since this ratio differs from the first only in that we have another cost,
$GNPV^1$ is greater than $GNPV^2$. This ratio treats the benefits and foregone
earnings costs symetrically since they are both deflated by the tax rate.
However, the two types of costs are weighted differentially. Direct cost
are dollar for dollar, but foregone earnings are only a fraction on the
dollar. Once again we cannot state a priori if this second tax base ratio
exceeds or is less than the SNPV. The two net present values are the same
when the present value of social benefits is just offset by the foregone
earnings.[14] Because the SNPV of a project will be positive only when the
benefits cover at least the foregone earnings costs, $GNPV^2$ can be employed
as a conservative discriminator. Any project with a positive $GNPV^2$ must
necessarily have a positive SNPV, although a negative $GNPV^2$ does not im-
ply a negative social value. However, if we had two mutually exclusive

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[14]

$$SNPV - GNPV^2 = (\frac{y}{r} - y_o) 1-t$$

projects with positive $GNPV^2$, it would not generally be correct to select
the one with the higher $GNPV^2$. $GNPV^1$ can not be used even in this limited
sense - its sign does not supply information about the sign of SNPV. If
$GNPV^2$ is used, state and local taxes should be included for an increase in
the tax rate drives the social value and $GNPV^2$ closer together. The con-
servative rule with $GNPV^2$ (accepting only positive values) adds to the num-
ber of correctly chosen projects when state and local taxes are counted.
The difficulty with this ratio is that it does not treat the two types
of costs symetrically. Direct expenditures are fully counted while only
a fraction of the foregone earnings costs are entered. This tends to tip
the scale towards projects where foregone earnings are a larger part of
the total costs.

It is obvious that we cannot rely on either one of these tax based
ratios to give the correct signal to the policymaker. Using either ratio,
projects that are socially useful can be rejected. Similarly, they can
induce us to accept a project that should be rejected. This alone is
sufficient to argue against the use of these tax based ratios. But their
most serious defects are illustrated by the manner in which they would lead
policymakers to discriminate among prospective trainees. The level of
benefits with $GNPV^1$ is a simple function of the tax rate faced by the
trainee after training. The higher the marginal tax rate on this additional
earnings, the larger the benefits. Therefore, for any given level of costs
and its distribution between D and y_o, government agencies would tend to
select as trainees those individuals with the highest marginal tax rate.
Using $GNPV^1$ tends to favor precisely the wrong type of people. Because
they are not counted as part of the costs, it discriminates in favor of
those with high foregone earnings. It also discriminates for any given in-
crease in income in favor of those who have the highest marginal tax rate.

Strictly followed, $GNPV^1$ will select for manpower programs persons with
the highest incomes. Not only will this lead to social inefficiency, its
income distributional consequences seem perverse. Since all individuals do
not face an identical tax rate schedule, $GNPV^1$ will discriminate on the
basis of other personal characteristics in addition to income. The following
types of people will be favored; single people relative to married; married
families without children relative to those with children, and people with
low medical expenses. Such a list could be expanded to reflect any

24

discriminatory characteristic of the tax system itself.

Another difficulty with the tax based ratio is that all social bene-
fits that escape the tax system will not appear in these ratios. As soon
as items are not registered as taxes, the tax based ratio will not rank
correctly. On the cost side, the major omission will be the foregone op-
portunities of those trainees that do not result in lost taxes. The best
examples are the trainees who were working housewives, new labor market en-
trants, or unemployed. The time of such individuals has value and real
opportunities are foregone by engaging in training. But since they did not
pay any taxes, there is no corresponding cost item in the tax based ratio
to match their foregone opportunities. Compared to trainees who would
have had market earnings during training, the tax based ratio prefers
those whose best opportunity without training is outside the market sector.

Some social benefits also do not pass through the tax system. Some
important examples are fringe benefits, with pension plans being the most
prominent. Fringe benefits are not taxed when they are earned. In fact
this avoidance of income taxes accounts for the spectacular growth in the
fraction of income received in this form. Because fringe benefits are as
much a part of the income received by workers as their direct current
period wages, they should appear in the social return to training. The
fraction of total wages paid in the form of fringe increases with
skill level. Thus as a consequence of training, workers probably will re-
ceive a larger proportionate increase in their fringe wages. The tax
based ratio ignores this component of the return and discriminates against
those who are trained for occupations with relatively high fringe packages.

There is a special case in which the second tax based ratio will cor-
rectly rank projects. This case is relevant if (1) all social costs of
manpower programs consist exclusively of the foregone market earnings of
workers and (2) there is a constant marginal tax rate with no exemptions.
Under these circumstances, the government becomes a partner in the invest-
ment sharing in all costs and benefits in a neutral fashion. The net pres-
ent values of the tax based ratios will simply be proportional to the social
net present values with the marginal tax rate serving as the proportionality
factor. Since all social NPV are reduced by the same proportion, the tax
based ratio will maintain the relative ranking of all projects. Furthermore,

no project with a positive social NPV could have a negative one with the
tax related one. To illustrate, let the social costs of the program be
$1000 in foregone earnings and let the social benefits be $200 per year.
At a discount rate of ten percent the NPV would be $1000. If individuals
faced a marginal tax rate of 20 percent, the tax loses would be $200 and
the future tax gains $40 per year with a $GNPV^2$ of $200.[15]

E. Conclusion

Simply stated, the use of any tax based cost/benefit ratio is concep-
tually invalid. These ratios do not serve as adequate proxies for the net
increase in socially useful output received through manpower training pro-
grams. They discriminate quite arbitrarily among people based on personal
characteristics and other factors that have little relation to the question
of economic efficiency. Moreover, they would have perverse equity effects
as well tending to favor those whose wealth is high. The government tax
receipts represent only a fraction of the benefits that result from such
training. The direct budgetary costs similarly measure at best only some
of the costs of these programs. Since costs and benefits are not reduced
proportionally, there can easily be reversals in the proper ordering of
public investments when tax based ratios are used. The reason why tax
-based ratios lead us astray is that taxes per se are neither costs nor
benefits. Taxes fundamentally are transfers. They are collected from
some individuals in society and given to others as government expenditures.
Since the collection of a tax does not reduce the real resources of society,[16]
it is not surprising that tax based ratios are of little use for social
planning.

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[15]More generally, $SNPV = -y_0 + \frac{y}{r}$ and $GNPV^2 = -ty_0 + t\frac{y}{r}$ to that
$GNPV^2 = (t)SNPV$.

[16]I am obviously ignoring here any welfare costs due to the altering
of incentives.