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# Labor Expenditures and Benefit-Cost Accounting in Times of Unemployment

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## **Abstract**

We summarize procedures for assessing the benefits and costs of using labor inputs in public projects. Examples are provided to illustrate how information on labor inputs can be analyzed and presented such that, should the analyst choose, labor services generate elements of both benefit and cost in times of high unemployment; however, this is not generally correct in times of full employment. Our analysis is consistent with the overall goal of identifying those projects which are estimated to improve efficiency—those with social benefits in excess of social costs.

**KEYWORDS:** labor, unemployment, surplus, tax

## Introduction

The analysis of labor input into public investments is a central and frequently misunderstood issue in benefit-cost evaluation. Benefit-cost analysis is often used to inform decision making in a political context in which advocates on one side of a debate may state that hiring labor is a benefit while those on the other side state that labor is a cost.

In this note we summarize the conceptual and implementation principles used by benefit-cost analysts to identify appropriate procedures for assessing the benefits and costs of using labor inputs in public projects. We provide examples to illustrate how information on labor inputs can be analyzed and presented such that, should the analyst choose, labor services generate elements of both benefit and cost in times of high unemployment. Our analysis is consistent with the overall goal of identifying those projects which are estimated to improve efficiency—those with social benefits in excess of social costs.

The treatment of labor is currently salient with relatively high national unemployment in the U.S.; moreover, both the economic stimulus package of 2009 (The American Recovery and Reinvestment Act) and that of 2010 (The Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act) were driven by macroeconomic concerns to increase output and decrease unemployment. These programs often involved public investments potentially subject to benefit-cost analysis, such as transportation, energy and environmental projects. The Congressional Budget Office (CBO, 2010) estimated that over 2 million jobs were saved in the last quarter of 2009 because of the 2009 law, and that the package had an even larger effect in 2010, with an employment gain in that quarter of up to 2.8 million jobs. More generally, policies and programs in any time period often are motivated in part by anticipated effects on the unemployed.

In a fully employed economy, the question of how to treat labor would not have particular salience and the standard procedure for valuing inputs to a project—namely, using the market price as the cost of the input—would be applied. Further, secondary impacts such as those potentially related to employment in indirectly affected markets are to be ignored as merely reflecting the reallocation of fully employed labor among alternative uses (Boardman, et al., 2011; OMB 1992, 2003). This is the typical and appropriate default approach that the opportunity cost of labor is measured by its market opportunity cost in well-functioning markets.

## **Valuing labor in times of significant unemployment**

However, in an economy with significant unemployment, about 9 percent at the time of this writing, it is clear that labor markets are some distance from their full employment equilibrium and automatically valuing all labor at the paid wage would lead to estimates of social cost, the desired measure, that are excessive. To the extent that workers employed by the projects would have remained without work in the absence of the project, society would be sacrificing no alternative output and the main cost would have been the loss of leisure time experienced by these workers. Because these leisure hours were not desired, their loss comes at a relatively low opportunity cost to the workers and hence to society. In such cases there is an element of truth to the presumption that a portion of the wage may be considered a benefit to the worker. The issue then is: In a period with significant unemployment, how should the work hours of project workers be valued to account for the fact that the opportunity cost of the working time of otherwise unemployed workers is less than what they may be paid?

An extended treatment in a widely-used text (Boardman, et al., 2011 p.99-106) focuses on disequilibrium in the labor market causing unemployment and suggests several ways to adjust the paid-out labor expenditures (nominal or budget cost) for the analytically correct social opportunity cost of labor based on the reservation wages of workers. The approaches described by Boardman et al. depend on the amount of information about the reservation wage and the portion of the labor supply curve from which the unemployed are drawn. The more the analyst knows, the more precise the opportunity cost estimate. The simplest results are based on the unemployed being randomly drawn from points along a linear labor supply curve. In that case, if the reservation wage for the supply curve is known, the estimated opportunity cost is the arithmetic average of the actual wage and the reservation wage; if the reservation wage is assumed to be zero and workers randomly drawn, then the estimate is one-half the wage.<sup>1</sup>

These adjustments for unemployment are related to the work of Haveman and Krutilla (1967) on the likelihood of drawing a worker from the unemployed pool as a function of the level of unemployment and to the important paper by Harberger (1971) in an international setting. Haveman and Krutilla considered both issues of the opportunity cost of unemployed labor and secondary or general equilibrium effects.<sup>2</sup> The basic point remains that in times of significant unemployment, adjustments both for the opportunity cost of unemployed labor

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<sup>1</sup> Related adjustments for benefits from employment and training programs are discussed in Greenberg (1997) where omission of opportunity cost may overstate program benefits.

<sup>2</sup> Analytical methods have considered that the opportunity costs of otherwise unemployed labor is greater than zero, and that general equilibrium effects also need to be included.

and the effect on unemployed labor through general equilibrium effects should be made. Beyond adjustments to the opportunity cost of employing otherwise unemployed labor, some analysts note that to the extent that the leisure time involuntarily imposed on unemployed workers confers negative utility, then employing these workers yields an additional positive social benefit.<sup>3</sup> Consistent with the analysis of opportunity cost, if it is indeed the case that such hours convey disutility, then adjusting the expenditure required to hire such workers should also reflect this effect. However, as workers are only probabilistically drawn from the unemployed, the estimation of such surplus value is not straightforward (Boardman, et al., 2011; Krutilla, 2005).

### **Communicating opportunity cost and distributional impact**

No matter the adjustment that is made, the benefit-cost analysis requires that the dollar value of the expenditures on workers be communicated and shown in the analysis so that the basis for the adjustment can be made in a transparent way. The benefit-cost analyst can present information that takes into account the social cost of unemployed labor while also providing information of concern to other stakeholders. We identify three relevant values that enable the analyst to fully account for the wellbeing effects and their distribution due to employing labor during a period of high unemployment. These three components are:

1. The social opportunity cost of employing otherwise unemployed labor, denoted by  $C$ . This value is equal to the reservation wage of the unemployed workers, denoted by  $R$ . It reflects the value that unemployed workers place on the leisure time that they relinquish when they accept work. This central value is that identified in the literature as the efficiency measure of labor cost during periods of unemployment (See Boardman, et al., 2011, and Haveman and Krutilla, 1967).
2. The money cost of hiring the workers; this wage payment is made to the worker and is denoted by  $W$ ; taxpayers typically incur a cost equal to  $W$  in the form of higher taxes, denoted by  $T$ .
3. The benefit (surplus) experienced by workers, equal to the wages they are paid in excess of their reservation wage; we denote this by  $S$ .

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<sup>3</sup> One way of thinking about this effect is to consider the employment of an otherwise unemployed worker to convey a 'surplus' or 'rent' to the worker in excess of their reservation wage. Note that this surplus is different from the unemployment benefit that may be received by the worker, which benefit is simply a transfer payment from taxpayers, and hence has a social impact which is zero.

These values are shown in Table 1. Social opportunity cost (C) is the initial value in the Table as it is the primary economic concept describing social costs. As indicated, C is equal to the worker’s reservation wage (R). The remaining items in the table are values relevant to determining which groups in society gain and which lose because of the hiring of a worker; the worker gains a surplus or ‘rent’ equal to the amount he/she is paid over and above his/her reservation wage; it is a transfer from taxpayers to the worker. Taxpayers lose the taxes that they pay in support of the worker wage payment. Taxpayer costs (T) and the wage payment (W) are equal to each other abstracting from any marginal excess burden of taxation.

If the worker is hired in times of full employment, the wage payment (W) is equal to the reservation wage (R), and both are equal to social opportunity cost (C). In this case, there is no worker surplus (S) and no transfer from taxpayers to the worker. If the worker is hired when there is high unemployment, it is likely that the reservation wage (R) is less than the wage payment (W), and a worker surplus (S) will exist. In this case, the surplus contributes to the net social benefit of the project and is an economic interpretation of the statement that a benefit exists from hiring the unemployed separate from the benefit of the output of the project.

Table 1: Accounting for Labor Costs, Benefits, and Transfers

Item	Value	Notes
Social opportunity cost (worker reservation wage)	$C = R$	See Boardman, et al. (2011); Haveman and Krutilla (1967).
Worker reservation wage	R	The wellbeing loss experienced by worker from working.
Wage payment made to worker by taxpayers	W	The financial or budget cost of hiring the worker.
Tax paid by taxpayers to pay worker wages	T	The additional taxes necessary to pay for hiring the worker.
Surplus to worker (transfer from taxpayers to worker)	$S = (W - R) = (W - C)$	Wage payment in excess of reservation wage (R) or social opportunity cost (C); also implies $W = S + R = S + C$

### Example

Using the terms defined in Table 1, the net benefit implications of the presence of high unemployment become clear. Consider a hypothetical project that will clear some debris that citizens are willing to pay \$110 to have cleared. Assume that the benefits are spread evenly throughout the society and both the payment and the clearance occur today in order to abstract from discounting.

In the first case, assume that the economy is fully employed. Workers are paid \$100 ( $W$ ), but incur opportunity costs of \$100 due to the value of leisure in equilibrium, which is their reservation wage ( $R$ ) and the full social opportunity cost ( $C$ ). In this case,  $W = R = C$ , the typical default assumption. Hence, the social benefits (\$110) of the project exceed the social opportunity costs of the labor expended (\$100) and the project generates net benefits of \$10, considered an improvement in efficiency (optimization of the project size is not considered here). Some analysts may wish to identify the distributional impacts tracing both the gross cost to taxpayers (-\$100) and the wage payment to workers (+\$100); adding this information does not affect the net social benefits of \$10.

In the second case, assume that the worker is not fully employed. The opportunity cost is the reservation wage and will likely be less than \$100, say \$80. The wage paid to them ( $W$ ) exceeds their reservation wage ( $R$ ), and hence the worker gains a surplus ( $S$ ) of \$20. In this case, the social net benefits of the project are \$30 (\$110 - \$80), not \$10 as in the full employment case, thus reflecting an additional benefit and increased efficiency in times of significant unemployment.

In this second case, analysts may wish to distinguish the various components of net social benefits within their analysis in order to reveal these distributional effects. Table 2 illustrates several alternative presentations that all result in the same net benefits. In this example, the surplus gain to workers ( $S$ ) represents the difference between expenditures to cover wage costs ( $W$ ) and the opportunity cost experienced by workers represented by their reservation wage ( $R$ ). This surplus gain is equal to an equivalent taxpayer transfer to workers of \$20; the net benefit remains \$30 but the total cost equals the budgetary expenditures. This representation may be useful in some presentation settings. An alternative representation would reveal only the gross flows, indicating a wage payment to the worker of \$100 and a taxpayer cost of \$100.

Table 2: Alternative presentations of unemployment and social net benefits

	<i>Basic Opportunity Cost Method</i>	<i>Using Surplus Method</i>	<i>Using Gross Flows Method</i>
<b>Benefit</b>			
Social Benefit of Project	110	110	110
Workers	N.A.	20	100
<b>Total Benefit</b>	<b>110</b>	<b>130</b>	<b>210</b>
<b>Cost</b>			
Expenditures	N.A.	N.A.	100
Social Oppo cost	80	80	80
Transfer from Taxpayer	N.A.	20	N.A.
<b>Total Cost</b>	<b>80</b>	<b>100</b>	<b>180</b>
<b>Net Benefit</b>	<b>30</b>	<b>30</b>	<b>30</b>

N.A. = Not applicable.

Even though the opportunity costs of labor may change with employment conditions, positive net benefits are required in order to improve economic efficiency. In the example above, if the value of clearing the debris is less than \$80, then the project would not pass a benefit-cost test.

In conclusion, a net social benefit may result from hiring workers who would otherwise be unemployed workers. While the presence of unemployment may alter the net benefits of a project compared to the full employment case, there is no guarantee that the existence of unemployment automatically justifies projects. The full set of social benefits and costs must be accounted for.

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