DIVISION OF THE HUMANITIES AND SOCIAL SCIENCES
CALIFORNIA INSTITUTE OF TECHNOLOGY
PASADENA, CALIFORNIA 91125

ALTERNATIVE POLICIES FOR UNEMPLOYMENT INSURANCE

Jeffrey A. Dubin
California Institute of Technology

Douglas Rivers
University of California, Los Angeles

SOCIAL SCIENCE WORKING PAPER 697

April 1989

ALTERNATIVE POLICIES FOR UNEMPLOYMENT INSURANCE

Jeffrey A. Dubin and Douglas Rivers

ABSTRACT

The effects of a wage subsidy program on the duration of insured unemployment are investigated using data from a demonstration project conducted by the Illinois Department of Employment Security. UI claimants were offered a voucher that could be presented to potential employers as an inducement for their hire. Participation in the subsidy program was voluntary and eligibility was limited to a ten week period following the initial UI claim. In principle, the subsidy should increase the demand for the unemployed worker's services by reducing an employer's net wage costs. It may also have supply effects if the expiration of eligibility for the subsidy causes an increase in search effort, though it is also possible that the subsidy causes workers to adjust their reservation wage levels upward. In practice, subsidies have stigmatic effects that tend to lower participation rates by high-skilled workers. As a result, participants in a subsidy program have longer average durations of unemployment than non-participants. However, correcting for self-selection, we find that wage subsidies can substantially increase a worker's probability of reemployment and that the net benefits of such a program exceed its cost. In addition, wage subsidies are compared to a search bonus proposal which is also cost effective, but, due to differences in participation patterns, has rather different effects.

Alternative Policies for Unemployment Insurance

Jeffrey A. Dubin
and
Douglas Rivers

1. Introduction

Wage subsidies represent an efficient and relatively low-cost method for reducing unemployment. In a wage subsidy program, job creation and hiring decisions remain the responsibility of private firms, though the cost is partially borne by government. Market incentives should promote the efficient allocation of resources and, when full employment is reached, subsidies can be reduced or eliminated without adverse consequences. In contrast to alternative employment policies, such as job training and public sector employment, which are notoriously expensive and inflexible, subsidy costs are relatively low and can be adjusted to changing labor market conditions.

Though in principle an attractive alternative to conventional unemployment policies, wage subsidies have been tried only rarely in the United States. Though the theoretical advantages of wage subsidies were recognized long ago by Pigou (1933) and Kaldor (1936), recent empirical studies (Burtless, 1985; Spiegelman and Woodbury, 1987) have raised questions about whether wage subsidies are a practical policy for unemployment. Will workers utilize subsidies if they are available? Do subsidies have stigmatic effects which are harmful to recipients? Who recaptures the subsidy? That is, is the primary effect of a subsidy to lower an employer's net wage costs and increase labor demand (in which case the employer is the primary beneficiary) or to raise the wage a worker can command and increase labor supply (in which case the worker is the primary beneficiary)? To what degree can a well-designed subsidy program mitigate the work disincentives of the current Unemployment Insurance (UI) system? Are wage subsidies cost-effective?

The purpose of the present paper is to evaluate the efficacy of wage subsidies for Unemployment Insurance (UI) recipients using data from a demonstration project conducted by the Illinois Department of Employment Security (DES). We also discuss an alternative proposal—a search bonus—that was included in the Illinois UI experiment and that has received favorable notice (Spiegelman and Woodbury, 1987). A careful comparison of the two proposals indicates that the effects of each are quite different, though each appears cost effective.

The paper is divided into seven sections. Section 2 briefly describes the Illinois UI experiment and discusses both the advantages and limitations of data obtained from

this experiment. We also identify some features of the Illinois experiment which have been neglected in prior analyses. Specifically, direct comparisons of experimental effects which ignore differential participation rates give a distorted picture of the impact of a subsidy program. Section 3 analyzes the utilization of wage subsidies based upon a simple signalling model. Sections 4 and 5 evaluate the impact of the subsidy and bonus programs on the duration of unemployment and reemployment earnings of program participants. Both the wage subsidy and search bonus programs have a positive impact, but upon different segments of the labor force. Section 6 reports a series of simulation results on the costs and benefits of the programs for different individuals. Our econometric model permits precise quantitative estimates of program effects that are free from selectivity biases in program participation.

2. Description of the Illinois UI Experiments

The data analyzed in this report come from a demonstration project conducted by the Illinois Department of Employment Security in 1984 and 1985. A total of 17,306 UI claimants in twenty-two DES offices between July 29, 1984, and November 17, 1984, were randomly assigned to three experimental groups: a control group (who were granted their normal UI benefits), a wage subsidy group (who were offered a wage subsidy voucher in addition to their normal benefits), and a search bonus group (who were offered a search bonus in addition to their normal benefits). After completing a baseline survey, 5,205 claimants were eliminated because they did not meet criteria for participation in the experiment (discussed below), leaving a total of 12,101 experimental subjects. Table 1 summarizes the experimental design and outcome variables.

The wage subsidy portion of the experiment consisted of a voucher that the subject could present to potential employers as an inducement for his or her hire. If the employer hired the claimant within ten weeks of the initial UI claim data and retained the claimant for at least four months (for thirty hours or more per week), the employer could submit the voucher for a payment of $500 from DES. The search bonus portion of the experiment had a similar structure, except that the payment was made to the claimant and no employer participation was involved. That is, claimants were not required (and presumably did not) inform employers of their participation in the experiment, and they, rather than the employer, submitted the voucher to DES and, in turn, received the $500 payment if they were employed for at least four months working thirty or more hours per week.

Participation in the experiment was limited to persons between twenty and fifty-four years of age filing initial UI claims who were entitled to a full twenty-six weeks of benefits. Excluded were workers on lay-off with a definite recall date, union members

Table 1: Summary of Illinois UI Experiments*

	Control	Wage Subsidy	Search Bonus
Initial Claimants	3930	3953	4174
Agreed to Participate	—	65.2%	84.2%
Rehired Within 11 Weeks	54.5%	58.6%	59.4%
Notice of Hire Submitted	—	5.0%	18.3%
Voucher Paid	—	2.8%	13.7%

who find jobs through a hiring hall, recent veterans, and federal employees. Thus, the experimental subjects were somewhat more homogeneous than the UI population, though, because of the exclusion of laid-off workers with recall dates, they were also somewhat more likely to experience longer unemployment spells.

Experimental data are very valuable in determining the probable impact of alternative unemployment policies. Wage subsidies have both supply and demand effects that are difficult to sort out in nonexperimental data without making strong behavioral assumptions. Because the Illinois experiment actually implemented a wage subsidy and provided a comparable control group, the impact can be deduced directly by comparing control and treatment results. In fact, the DES contracted with the W. E. Upjohn Institute for Employment Research to provide an analysis of the experimental effects. The Upjohn report (Spiegelman and Woodbury, 1987) provides a careful analysis of the experimental results. It does not, however, attempt to model the economic behavior underlying the experimental responses; as a consequence, the interpretation of experimental effects and their implications on the choice between alternative unemployment policies remains an open issue.

We should also acknowledge some shortcomings and limitations in the Illinois data. One limitation of the Illinois data is that some of the key variables for policy analysis are not measured. For example, the Upjohn report relies on the number of weeks of UI benefits collected by the claimant to construct its unemployment duration variable. The difficulty, which is acknowledged, is that once a claimant exhausts the available

benefits, continued unemployment cannot be distinguished from reemployment in the uncovered sector. Quarterly earnings, rather than actual wage rates, are reported so that the wage variables confound the effects of unemployment duration and the reemployment wage. We have constructed unemployment spell lengths using the rehire data and have modeled quarterly earnings as a function of months employed and to variables measuring productivity. Nonetheless, neither the spell length nor wage variables are as reliable as one might wish.

There are also shortcomings in the experimental design. Subjects were informed of their assignment to treatment groups before they agreed to participate in the experiment. About 16 percent of the search bonus group and 35 percent of the wage subsidy group declined to participate in the experiment. This difference is at least partially attributable to the same sort of self-selection that would occur if such a voluntary program were implemented on a wide scale, and, to the extent that this is the case, the estimated experimental effects would still be unbiased. However, full scale implementation would undoubtedly increase participation rates somewhat. We have explicitly modeled program participation, allowing us to simulate the effects of increased participation levels. Also, we show that participation is critical in determining the range and nature of effects caused by a wage subsidy program. These effects were not analyzed in the Upjohn report.

The Illinois experiment also suffers from validity problems, particularly for an analysis of wage subsidies. Since the experiments were not publicized, the only way employers had of learning about the subsidy program was through the claimants themselves. This was not a problem in the search bonus experiment since no employer participation was required. In the wage subsidy experiment, there is evidence that claimants either were unable to explain the voucher to employers or chose not to inform them of their eligibility. In a full scale implementation, employers could be expected to be familiar with the wage subsidy program; so, the only reason for low utilization would be that claimants did not want to inform employers of their eligibility. We discuss these biases in Section 3 below.

The choice of a $500 subsidy or bonus amount is rather arbitrary and makes fine-grained analysis of policy variations difficult. We are particularly interested in subsidy policies where the amount of subsidy varies among recipients. Our analysis also indicates that subsidy amounts larger than $500 could also be supported without incurring any additional net expense, but, of necessity, some of these calculations involve extrapolations. An experimental design with varying subsidy amounts would permit direct and more reliable cost calculation for these alternatives.

Finally, the data have never been adequately cleaned. Some of the data (in-

cluded in the Upjohn analyses) are clearly inconsistent. Rehire dates precede claim dates, refile dates precede retire dates, and reported earnings are insufficient to qualify claimants for the benefits recorded. These are among the problems we located. Because we did not have access to the raw data, we were unable to determine the source of these inconsistencies. Our method has been to eliminate the 44 cases of inconsistent rehire dates from the sample. The impact of this deletion is relatively slight, though not inconsequential for estimating experimental effects. The earnings and refile data are, in our opinion, more suspect and any analyses based on these must be treated as provisional.

These reservations aside, we think that the Illinois data allow the most precise and reliable estimates of the impact of implementing wage subsidy programs. Ongoing data collection efforts will certainly modify some of the conclusions presented here, but the Illinois data provide a firm basis for a quantitative assessment of wage subsidy policies.

3. Participation

Not everyone who was offered a wage subsidy or search bonus agreed to participate in the program. There are a number a possible explanations for refusal to participate, ranging from inability to understand the programs to a possible "stigma" associated with being a subsidy recipient. A full-scale implementation of the program would reduce recipient confusion and uncertainty, but stigma effects, if they exist, might well remain. We focus our attention on the latter possibility.

As can be seen from Table 1, participation rates were significantly lower in the wage subsidy experiment than in those of the search bonus experiment (65.2% versus 84.2%). The wage subsidy is somewhat more complicated to explain, as it requires participation both by the claimant and the employer. For UI claimants to derive any benefit from the wage subsidy, they must persuade an employer that the subsidy can be used to offset their employment cost. For high wage workers, a small subsidy, such as that used in the experiment, might not be worth the bother.

Burtless (1985) has argued forcefully that subsidies can sometimes have a negative impact on recipient's reemployment chances by identifying them as members of a low-skill population which has been targeted for government assistance. Consequently, some members of the subsidized population may find it in their interest *not* to inform potential employers of their eligibility for a wage subsidy. This could account for the high refusal rates in the wage subsidy portion of the Illinois experiments. This possibility deserves closer examination.

A simple theoretical model clarifies the informational content of wage subsidies in

a competitive labor market. We envision a situation in which there is a large number of potential employers a worker could approach for employment, but in which the employers could not directly observe a worker's productivity at the time of a hiring decision. We assume that employers know the average marginal revenue product m_s of workers eligible for subsidies and m_u of workers ineligible for subsidies, as well as the fraction p of workers eligible for subsidies. Let s denote the amount of the subsidy. If the worker identifies himself as being a member of the subsidy population, the employer would be willing to offer a wage of

$$w_s = m_s + s,$$

assuming employers are risk neutral. Suppose, however, that only a fraction π of subsidized workers identify themselves as being eligible for the wage subsidy. Then, the average marginal revenue product of job applicants without wage subsidies is:

$$w_u(\pi) = \frac{(1-p)m_u + p(1-\pi)m_s}{1-p\pi}.$$

In a competitive labor market, this is the amount that an employer would be willing to offer an unsubsidized worker if π were known.

Since the subsidized worker decides whether or not to inform the employer of his or her eligibility for the wage subsidy before the employer makes a wage offer, we treat the worker as a Stackelberg leader. If $s \geq m_u - m_s$, all subsidized workers will inform employers of their eligibility for the wage subsidy since $w_s > w_u(\pi)$ for all $0 \leq \pi < 1$. If $s \leq (1-p)(m_u - m_s)$, none of the subsidized workers inform employers of their eligibility since $w_s < w_u(\pi)$ for all $0 < \pi \leq 1$. In the intermediate case where $(1-p)(m_u - m_s) < s < m_u - m_s$, the subsidized workers play a mixed strategy giving the equilibrium utilization rate:

$$\bar{\pi} = \frac{s - (1-p)(m_u - m_s)}{ps}.$$

It follows that $\bar{\pi}$ is increasing in s and p and decreasing in $m_u - m_s$. From this analysis, a few simple conclusions can be drawn: First, the utilization rate is increasing in the amount of the subsidy. Second, if the difference in productivity levels between the unsubsidized and subsidized populations is large, the utilization rate will be lower. Third, if the population eligible to receive wage subsidies is large, the utilization rate will be higher.

Utilization rates are unknown since some workers who agree to participate in the program may never inform potential employers of their eligibility for a wage subsidy.

However, non-participants are not supplied with vouchers and, hence, cannot possibly utilize the subsidy. Thus, we have chosen program participation as a proxy for utilization. The analysis above indicates that the relevant variables determining utilization in a wage subsidy program are the amount of the subsidy relative to expected earnings and demographic characteristics of recipients that might be associated with their market wage rates. Let a_i be a dummy variable indicating whether the individual agreed to participate in the program:

$$a_i = \begin{cases} 1 & \text{if subject } i \text{ agreed to participate;} \\ 0 & \text{otherwise.} \end{cases}$$

Let $\tau_i = 0, 1, 2$, or 3 denote which treatment group (control = 0, wage subsidy = 1, search bonus = 2) to which the individual was assigned and z_i a vector of individual characteristics (sex, race, age, wage on last job, and UI benefit level). To explain program participation given assignment to one of the treatment groups we have estimate binary logit models of the form:

$$\Pr(a_i|\tau_i = j, z_i) = \frac{\exp(\beta_j' z_i)}{1 + \exp(\beta_j' z_i)} \qquad (j = 1, 2)$$

The estimated logit models for participation in the two treatments are given in Table 2.

Participation rates are generally about 15 percent higher in the bonus experiment than in the subsidy experiment, as indicated by the larger value of the constant term in that equation. Hispanics were less likely to participate in either the subsidy or the bonus experiment. A study of earnings, benefits, and the remaining demographic indicators revealed that hispanics were about 8 percent less likely to participate in the bonus experiment and 18 percent less likely to participate in the subsidy experiment. Blacks were a bit less likely than whites to participate in the bonus experiment, but equally likely to participate in the subsidy experiment. Males were significantly more likely to participate in either experiment (by about 6 percent in the subsidy experiment and 3 percent in the bonus experiment). The explanation for lower participation by minority group members is unclear. Finally, the lower participation rates of women might be attributable to the presence of other earners in the household, this situation tending to reduce the costs of extended job search.

There is no significant impact of either base wage level (average weekly earnings in the two full quarters prior to initial filing of a UI claim) or weekly UI benefit level on the search bonus experiment. In the wage subsidy experiment, on the other hand, every additional \$100 of weekly income in the base period reduces participation by about 2 percent. This fact provides some support for the stigma explanation advanced

Table 2: Logit Estimates of Program Participation Rates

	Wage Subsidy	Search Bonus
Constant	1.70	2.62
	(0.47)	(0.59)
Male	0.28	0.20
	(0.07)	(0.09)
Black	-0.02	-0.45
	(0.08)	(0.10)
Hispanic	-0.92	-0.75
	(0.12)	(0.14)
Log Age	-0.12	-0.18
	(0.14)	(0.17)
Base Weekly Wage (in $100s)	-0.08	-0.03
	(0.03)	(0.04)
Weekly Benefit Amount (in $100s)	-0.41	0.26
	(0.12)	(0.15)
Log Likelihood	-2491	-1795
n	3953	4174
Percent Correctly Predicted	66.3%	84.1%

above. High wage workers appear to be reluctant to utilize the subsidy offered. Base period earnings, however, have a much smaller effect on participation than do weekly UI benefit levels. The average UI benefit in our sample is approximately $120 with a standard deviation of $40. A $40 increase in weekly UI benefits causes nearly a 10 percent decline in participation in the subsidy experiment. Contrast this effect to that observed in the search bonus experiment where the coefficient is positive (though not significant for $p < 0.05$). Wage subsidies are much more attractive to those with lower benefits. What little self-selection there is in the search bonus program does not screen out high earnings workers to any significant degree.

4. Effects on Duration of Unemployment

Both types of voucher were intended to encourage more intensive search on the part of UI claimants by making the voucher expire after eleven weeks. The other anticipated effect was that claimants in the treatment groups would be more likely to receive an acceptable wage offer in the early period of an unemployment spell and, consequently, experience a briefer duration of unemployment than members of the control group. The wage subsidy, for instance, should increase the amount employers are willing to offer the worker (since the $500 voucher payment could be used to offset increased labor costs) and, thus, it was anticipated, increase the chances the worker would receive an acceptable wage offer. The search bonus, on the other hand, encourages the worker to accept a lower wage than he or she might otherwise find acceptable, in exchange for the $500 voucher payment. In both cases, however, the effect would be the same: unemployment durations would be shortened and UI benefit costs would be reduced.

Figure 1 displays the percentage of claimants in each treatment group rehired within the first thirty weeks of filing their initial UI claim. Control group members are the slowest to be rehired. The search bonus appears to have the largest aggregate impact, but these comparisons neglect the impact of participation rates and other variables. Econometric methods are used to estimate the effects of wage subsidies on duration of unemployment spells.

Before turning to the econometric estimates, it is useful to consider the aggregate impact of the alternative programs, displayed in Table 3. The average length of a completed spell of unemployment in the control group is 13.7 weeks, compared to 12.7 and 12.5 weeks in the wage subsidy and search bonus groups, respectively. Thus, both programs appear to have a fairly substantial impact on duration of unemployment relative to the control group, with a fairly similar reduction in each. The bottom row of Table 3 compares the percentage of claimants in each group who exhaust their UI benefits during their first spell of unemployment. The aim of each program is to

Table 3: Effects of Experimental Treatments

	Control	Wage Subsidy	Search Bonus
Average Length of Completed Unemployment Spells (in Weeks)	13.7	12.7	12.5
Percentage Exhausting UI Benefits in First Spell	42.1	40.3	38.2

reduce this occurrence, and both programs appear to accomplish this to some extent. The search bonus fares best by this criterion, reducing the number of claimants who exhaust their benefits by 3.9 percent, compared to a reduction of 1.8 percent in the wage subsidy experiment.

4.1. Econometric Methods

In this section we describe the econometric approach that is used to estimate the effects of experimental treatments and participation on the duration of unemployment spells.

In each period a worker is classified into one of two states: unemployed or employed. The basic idea is to specify a hazard function giving the probability that an unemployed individual becomes employed conditional on his or her past employment experiences and socio-economic characteristics.

Let y_{it} denote the employment status of worker i in period t:

$$y_{it} = \begin{cases} 0 & \text{if unemployed during period } t; \\ 1 & \text{if employed during period } t. \end{cases}$$

The hazard at period t for a subject with treatment $\tau_i = j$ is the conditional probability in which an unemployed worker in periods $1, \ldots, t-1$ becomes employed in period t:

$$\begin{aligned} P_{it} &= \Pr(y_{it} = 1 | y_{i1} = \cdots = y_{i,t-1} = 0, x_i, \tau_i = j) \\ &= \frac{1}{1 + \exp(-\alpha_{tj} - \beta_{tj} a_i - \gamma_j' x_i)} \end{aligned}$$

where, as before, x_i is a vector of individual characteristics thought to be related to chances of finding a new job. The period effects α_{tj} are intended to capture dynamic

incentives created by the subsidy or bonus relative to the usual time pattern of escape rates found in the control group. The probability that an individual unemployed in period t fails to find a job in that period is $1 - P_{it}$.

The experimental design in the Illinois experiment guarantees that all UI claimants are eligible for a full twenty-six weeks of Federal benefits. Since we lack detailed information about prior employment histories, the eligibility criteria helps to reduce heterogeneity in out sample. We also control for wages in the period prior to the initial UI claim.

Each worker in our sample becomes unemployed and eligible for benefits during either the second or third quarter of 1984. For workers filing their initial UI claims in the third quarter, the experimental period is taken to be the third and fourth quarters of 1984. For workers filing their initial UI claims in the fourth quarter, the experimental period is taken to be the fourth quarter of 1984 and the first quarter of 1985. (Data is available through the third quarter of 1985, but we lacked confidence in the refile data for constructing longer term duration variables. Truncating the panel at six months makes the estimates less sensitive to outlying and probably unreliable observations.) We have estimated weekly, monthly, and quarterly models with roughly similar results, but will only report results using a monthly periodicity here. For each worker we calculate the number of months he or she is observed to be unemployed, denoted T_i. T_i takes on a maximum value of six months in our analysis and we simply record any individual whose spell of unemployment is longer than six months as a "censored" observation. Censoring occurs primarily because the panel is of fixed length so that the length of unemployment spells in progress at the end of the sampling period cannot be determined. Let c_i denote the worker's employment status after T_i periods of the unemployment spell:

$$c_i = \begin{cases} 0 & \text{if employed;} \\ 1 & \text{if unemployed.} \end{cases}$$

Observations for which $c_i = 1$ are censored, as the observed unemployment duration T_i does not represent a completed spell. The treatment of censoring is quite important for analyzing the Illinois experimental data. Approximately 40 percent of observed spells are censored, and comparing average censored spell lengths (as in Spiegelman and Woodbury, 1987) can give biased estimates of the effects of treatments on duration of unemployment.

It follows that the conditional probability of observing an unemployment spell of length T_i which is either complete ($c_i = 0$) or censored ($c_i = 0$) is:

$$L_i(T_i, c_i) = P_{i,T_i}^{1-c_i}(1 - P_{i,T_i})^{c_i} \prod_{t=1}^{T_i-1}(1 - P_{it}) \qquad (1)$$

From (1) we form the log likelihood for the full sample:

$$L = \sum_{i=1}^{n} \log L_i(T_i, c_i)$$

Maximizing L with respect to the unknown parameters (α, β, γ) yields consistent and asymptotically normal estimates; optimization is undertaken using a Newton-Raphson algorithm with optimal step-size. The large sample size, number of parameters to be estimated, and nonlinearity of the estimation problem make the analysis very computationally intensive.

Once the parameters have been estimated, it is straightforward to obtain an estimate of the expected amount of time individuals spend unemployed and their cumulative probability of reemployment as a function of the duration of time unemployed. The probability of being reemployed after s periods of unemployment is given by:

$$Q_i(s) = P_{is} \prod_{t=1}^{s-1} (1 - P_{it}), \tag{2}$$

so that the expected length of a (completed) unemployment spell for person i is given by:

$$E(T_i | c_i = 0) = \sum_{s=1}^{\infty} s Q_i(s). \tag{3}$$

Equations (2) and (3) will be used for simulation program benefits and cost in section 6.

4.2. Estimation Results

The estimated duration models are presented in Table 4. The explanatory variables include the logarithm of the individual's age, indicator variables for blacks, hispanics, and males, base period wages (defined as the average weekly earnings in the two full quarters prior to the initial UI claim), a program participation variable (*i.e.*, did the individual agree to participate in the wage subsidy and search bonus treatment groups), and the level of weekly benefits. The experimental participation variables and the weekly benefit variables are allowed to have two effects on the duration of unemployment, the first corresponding to the initial three months after the claim was filed and the second to the second three months after the claim was filed. The program incentives vanish after approximately three months. The first quarter agreement coefficient reflects additional incentive effect on participants relative to nonparticipants, while the second quarter agreement coefficient controls for unobserved attributes of participants relative to nonparticipants. Finally, we include

a set of period coefficients to capture pure time effects not explained by other variables. The duration models are presented separately for the control group and the experimental treatment groups in Table 4. To simplify the discussion, we interpret the coefficients in terms of percentage changes in hazard rates (holding the remaining variables at their mean values).

The control group reveals that being older, black, or hispanic decreases the probability of becoming employed. Blacks are about 10 percent less likely to escape unemployment in any month than whites and hispanics are about 15 percent less likely to escape than whites. A one percent increase in age is accompanied by about a 7 percent decrease in monthly escape rates. The base period wage effect is positive and significant, though quite small, indicating a slight tendency for higher wage individuals to become employed sooner. Higher benefits levels decrease the probability of becoming employed at least in the first three months of the unemployment spell. In the first three months following a UI claim, a $20 increase in weekly UI benefit level is associated with a one percent decrease in the escape probability. However, as the claimant exhausts his or her UI benefits, this effect vanishes with no significant impact of benefit levels in the second quarter of the UI spell. The period effects reveal little clear pattern with the exception of larger revealed probabilities of escape in the early months.

In the wage subsidy treatment group, a pattern of effects similar to that of the control group is found, with only a few exceptions. In this group, higher base period wages no longer increase the likelihood of becoming employed faster. The period effects take on a different pattern than in the control group and indicate a clear increase in the probability of becoming employed in the early periods. The differences in escape probabilities are as large as 15 percent between the second and six months of the unemployment spell. This corresponds well to the relationship shown in Figure 1 which indicates higher reemployment probabilities throughout the unemployment spell. Finally, there are no apparent participation effects for the wage subsidy group.

A comparison of the period coefficients of the control and wage subsidy groups indicates that the early period escape rates are significantly higher for workers assigned to the subsidy group. If it were possible to match control and subsidy subjects on all relevant attributes, the duration of unemployment should be the same (on average) for comparable individuals. Since workers in the wage subsidy group, whether or not they agree to participate in the subsidy program, become employed significantly faster than the control group, it is apparent that those individuals who choose to participate in the subsidy program have had their spells of unemployment shortened *relative to what they would have experienced if they had not been offered the subsidy.* Those who chose not to participate also have shorter durations of unemployment than

Table 4: Logistic Duration Models for Months Unemployed

	Control	Wage Subsidy	Search Bonus
Male	0.07	-0.08	0.05
	(0.05)	(0.05)	(0.05)
Black	-0.63	-0.61	0.63
	(0.06)	(0.06)	(0.06)
Hispanic	-0.30	-0.32	0.31
	(0.10)	(0.09)	(0.09)
Log Age	-0.43	-0.46	-0.48
	(0.10)	(0.09)	(0.09)
Base Weekly Wages	0.04	0.02	0.02
(in $100s)	(0.02)	(0.02)	(0.02)
Weekly Benefit (in $100s)			
First Quarter	-0.26	-0.29	-0.13
	(0.10)	(0.09)	(0.09)
Second Quarter	0.04	0.16	0.28
	(0.12)	(0.12)	(0.11)
Program Participation			
First Quarter	—	0.02	0.21
		(0.06)	(0.08)
Second Quarter	—	-0.07	0.00
		(0.08)	(0.10)
Period Effects			
Month 1	-0.66	-0.28	-0.66
	(0.35)	(0.34)	(0.33)
Month 2	0.06	0.42	0.22
	(0.35)	(0.34)	(0.33)
Month 3	-0.07	0.27	-0.06
	(0.35)	(0.34)	(0.33)
Month 4	-0.69	-0.49	-0.62
	(0.36)	(0.35)	(0.35)
Month 5	-0.92	-0.61	-0.78
	(0.36)	(0.35)	(0.35)
Month 6	-0.66	-0.66	-0.73
	(0.36)	(0.36)	(0.35)
Log Likelihood	-5970	-6216	-6659
n	3930	3953	4174

the average person in the control group—not because of any treatment effect (since they clearly derived no benefit from the subsidy), but because they were more likely to find a job quickly. We lack adequate measures of their characteristics to control for these self-selection effects, but the estimated duration model shows that the wage subsidy must in fact be responsible for a higher reemployment rate among subsidy participants.

Turning to the search bonus group we again see some differences relative to the control and wage subsidy groups. Notably, an increase in weekly benefits increases the likelihood of reemployment in the latter half of the sample period, as we found for both control and wage subsidy groups. We also see that those individuals who agree to participate in the search bonus experiment are more likely to become reemployed sooner, and, in fact, that the bonus has practically eliminated the employment disincentive effects of UI benefits in the first quarter of the UI spell. Finally, the period effects indicate that the search bonus group tends to have higher probabilities of reemployment in the early months following the claim data. Comparing the period coefficients across the groups (taking into account the mean effects of the nonperiod variables), we once again find that the treatment increases the probability of escaping unemployment, though the increase is slightly less for the search bonus than for the wage subsidy.

5. Reemployment: Wages and Retention

Both the wage subsidy and search bonus have been shown to shorten the duration of unemployment. What sort of jobs are found? Are wage levels affected? Do workers keep the jobs that they find? Since the length of time spent searching for employment is reduced by the subsidy and bonus programs, one possible effect of these programs might be to encourage workers to accept jobs for which they are not well-matched. Other things being equal, less time unemployed is desirable as workers' earnings will be greater, less will be spent on unemployment compensation, and more tax revenue will be collected. However, these advantages would be offset if the jobs taken were to pay lower wages or are to be eventually lost. In this section we investigate program effects on reemployment earnings and retention rates.

The two basic factors determining reemployment earnings during a period are the amount of time employed and, if employed, the wage rate. The amount of time employed in a post-treatment period (or equivalently the duration of an unemployment spell) was analyzed in the previous section. We now turn to an analysis of reemployment wages.

A baseline for comparing post-treatment wages is obtained by examining wage

Table 5: Average Weekly Earnings in Base Period

	Agreed to Participate	Did not Agree to Participate	All Claimants
Control	—	256	256
Wage Subsidy	244	286	259
Search Bonus	261	258	260
n	6094	5963	12057
F	13.4	13.5	0.5
p	<0.01	<0.01	0.61

differences prior to the experiment. Table 5 exhibits the average weekly earnings of claimants in the two full quarters prior to their filing for unemployment compensation. Random assignment of treatments insures that base wages are approximately the same in each group (varying between $256 and $260 per week). However, agreement to participate in the wage subsidy experiment is clearly related to base wages. Nonparticipants earn, on average, $42 more per week than participants. Note that participation is unrelated to base wages in the search bonus experiment. These differences should be borne in mind when comparing post treatment earnings.

Wages in the experimental period (the quarter in which the initial claim was filed and subsequent quarter) are shown in Table 6. Note that there is no significant wage effect in the search bonus experiment. Control group members earn, on average, $139 per week, compared to $141 for nonparticipants in the bonus experiment, and $147 for participants. Contrary to expectations, availability of the search bonus does not cause unemployed workers to accept lower wages than they otherwise might. It appears that workers do not adjust their reservation wages but engage in more intensive search to collect the bonus.

The wage subsidy results seem, at first glance, to be perverse. Subsidy participants fare worse than non-participants or control group members in terms of their post-treatment earnings. However, before reaching the conclusion that subsidies are

Table 6: Average Weekly Earnings in Experimental Period

	Agreed to Participate	Did not Agree to Participate	All Claimants
Control	—	139	139
Wage Subsidy	130	159	140
Search Bonus	147	141	146
n	5984	5828	11812
F	16.5	9.2	2.8
p	<0.01	<0.01	0.06

harmful, consider that subsidy non-participants earn significantly *more* ($159 per week on average) than either control group members ($139) or search bonus group members ($146). For one to believe that subsidies are harmful, one would have to simultaneously believe that refusing a subsidy somehow increases workers' wages relative to that of workers who were never offered a subsidy (the control group). This is entirely implausible. Fortunately, a simple explanation is available. In the base period, nonparticipants in the subsidy program earned, on average, $42 (or 17 percent) more per week than participants. In the experimental period, nonparticipants earned $29 (or 22 percent) more per week. The correct interpretation of the earnings data is that participation in the subsidy program has little impact on post-treatment wages.

Group means form a crude basis for comparison of treatment effects. To control for a variety of other variables, we estimated a set of regression equations relating experimental period earnings to the usual set of demographic variables, base period wages, months employed, and participation. Ordinary least squares (OLS) estimates are displayed in Table 7. The demographic variables exhibit an odd assortment of effects which are not relevant to the discussion here and will be ignored. We focus on participation, employment, and base period wage effects.

In all cases, as one would expect, earnings are determined primarily by amount of time worked. The interaction of months unemployed with base period wages is

Table 7: OLS Estimates of Average Weekly Wage Equation

	Control	Wage Subsidy	Search Bonus
Constant	-124.59	-121.82	30.94
	(26.17)	(24.00)	(31.13)
Male	14.78	5.29	3.22
	(3.89)	(3.58)	(4.51)
Black	-5.80	0.05	0.25
	(4.38)	(4.09)	(5.18)
Hispanic	-11.49	-5.50	6.67
	(7.23)	(6.68)	(8.50)
Log Age	33.59	6.84	5.75
	(7.51)	(5.30)	(8.79)
Base Weekly Wage	0.31	0.28	-0.32
	(0.02)	(0.02)	(0.02)
Months Unemployed	18.62	18.98	5.61
	(2.14)	(1.84)	(2.37)
Months Unemployed × Base Weekly Wage	0.05	0.06	0.11
	(0.01)	(0.01)	(0.01)
Participation Dummy	—	-11.86	-3.13
		(3.67)	(6.00)
R^2	0.39	0.39	0.41
n	3843	3866	4103
S.E.R.	116.79	111.10	138.93

included to capture the effect which shows that the benefits of employment (in terms of gross earnings) are greatest for those who can command the highest wages. It is interesting to note that the relationship between base and experimental period wages is strongest in the search bonus group. The regression estimates also indicate a significant participation effect: wage subsidy participants earn, on average, about $12 less per week in the experimental period.

The previous discussion indicates, however, that subsidy participants can expect to have longer unemployment durations for reasons unrelated to the subsidy itself. The correct procedure is to treat months employed as an endogenous variable and to apply an instrumental variables (IV) estimation procedure. (In addition to the included endogenous variables, the predicted duration from the duration models in Table 4 was used as an instrumental variables.) These estimates are presented in Table 8.

The IV estimates also show very large effects of months employed on experimental period earnings, as well as small effects (though still significant) of participation on experimental period earnings. These estimates will be used to produce the simulation results reported in the next section.

The results to this point indicate little or no adverse effects of either the wage subsidy or search bonus program on post-treatment earnings. Perhaps, it might be argued, that although workers in the treatment groups were able to find jobs with satisfactory wage rates, they were still not well-matched to the jobs found and would eventually be laid off again. This turns out not to be the case. The data in Table 9 indicate no significant differences between the groups in the percentage of rehired workers who subsequently refile for UI benefits (by the August 31, 1985, when data collection was terminated). In fact, the refile rates are considerably lower (about 24 percent) in cases where the voucher was paid, versus about 42 percent for the entire sample. The experimental data provide no evidence that the churning of workers is a serious or even minor problem.

6. Cost–Benefit Analysis

The evidence presented in the preceding sections demonstrates that the availability of wage subsidies decreases the expected duration of unemployment spells without any adverse effects on reemployment wages and retention rates. These findings, while at variance with some prior research on wage subsidies, are not themselves enough to justify adoption of a subsidy program. This section provides a cost–benefit analysis of wage subsidies and search bonuses.

Both the wage subsidy and search bonus treatments lead to a reduction in UI

Table 8: IV Estimates of Average Weekly Wage Equation

	Control	Wage Subsidy	Search Bonus
Constant	-115.63	-106.30	64.84
	(29.76)	(28.86)	(39.72)
Male	13.51	5.90	-1.36
	(3.96)	(3.72)	(4.92)
Black	-4.17	1.95	2.74
	(4.60)	(4.53)	(6.01)
Hispanic	-10.02	-4.23	6.31
	(7.32)	(6.97)	(9.23)
Log Age	34.20	40.92	0.94
	(7.59)	(7.22)	(9.71)
Base Weekly Wage	0.22	0.09	-0.06
	(0.05)	(0.04)	(0.04)
Months Employed	13.54	3.98	-39.75
	(6.08)	(5.84)	(7.44)
Months Unemployed × Base Weekly Wage	0.09	0.15	0.32
	(0.02)	(0.02)	(0.02)
Participation During	—	-11.59	-8.31
		(3.81)	(6.54)
R^2	0.40	0.43	0.31
n	3843	3866	4103
Standard Error	116.01	107.07	150.56

Table 9: UI Refiling Rates

	Control	Wage Subsidy	Search Bonus
UI Claimants	41.9% (2240)	42.8% (2341)	41.4% (2565)
Nonparticipants	—	43.4% (820)	43.3% (379)
Participants	—	42.5% (1521)	41.0% (2186)
Voucher Paid	—	24.1% (112)	23.7% (566)

benefits paid during the first spell of unemployment, as noted by Spiegelman and Woodbury (1987). In the control group, each claimant was paid an average of $2,279 during their first spell of unemployment. An average decrease of $115 was observed for wage subsidy recipients compared to a reduction of $199 in the search bonus group (see Table 10). Both reductions are statistically significant. However, these calculations mask important differences between participants and nonparticipants in the experiments. When we control for agreement to participate, we find no significant differences between the wage subsidy and search bonus groups. For nonparticipants, the average total UI benefit varies in a narrow interval between $2,204 and $2,287. For participants in each of the experimental treatment groups, the average total UI benefit ranges between $2,057 and $2,099. A reduction in UI benefit payments results only if the claimant agrees to participate in one of the programs; nonparticipants, on the other hand, receive about the same amount of UI benefits as control group members. Once participation is taken into account, both the wage subsidy and search bonus appear to be equally effective in reducing UI benefit payments.

Spiegelman and Woodbury (1987) argued that the proper comparison between the groups is not first spell UI benefits, but over a longer period, such as the entire year following the initial UI claim. The logic of their argument is that the subsidy or bonus could encourage workers to take jobs for which they are not well-matched. As a consequence, subsidy or bonus recipients might be more likely to lose the jobs they

Table 10: Average UI Benefits During First Spell

	Participants	Nonparticipants	All Recipients
Control	—	\$2,279	\$2,279
Wage Subsidy	\$2,099	\$2,287	\$2,164
Search Bonus	\$2,057	\$2,204	\$2,080
F	0.60	0.88	13.57
n	6094	5963	12057
p	0.35	0.55	< 0.01

take and to refile for unemployment later in the year. The authors cite as evidence in support of this claim data similar to that in Table 11. In comparing total UI benefits over the year following the initial UI claim, we find the same ranking as before: control group members receive the most (\$2,491), followed by the subsidy group (\$2,427) and the bonus group (\$2,329). The difference between the control and bonus groups is significant, but that between the control and subsidy group is not. Spiegelman and Woodbury conclude on the basis of this evidence that a wage subsidy would not be effective in reducing UI payments.

This conclusion, however, neglects the difference in participation rates. Among claimants who agreed to participate in either the wage subsidy or search bonus program, there is no significant difference in benefits paid during the claim year. The average total benefit paid to subsidy participants was \$2,349 compared to \$2,309 for bonus recipients. (The difference is too small reject a hypothesis of no difference.) Similarly, among nonrecipients the differences are also insignificant. These results on benefit payments are consistent with our earlier finding that treatment (subsidy or bonus) is unrelated to refiling rates.

Lower participation rates mean that the potential total benefits from the subsidy program are smaller than those from the search bonus program, but benefits constitute only one side of the cost–benefit ledger. The subsidy program is much less costly than the search bonus program in terms of the costs of subsidies or bonuses paid. Over one third of the claimants assigned to the subsidy program decline to

Table 11: Average UI Benefits Over Benefit Year

	Participants	Nonparticipants	All Recipients
Control	—	$2,491	$2,491
Wage Subsidy	$2,349	$2,574	$2,427
Search Bonus	$2,309	$2,439	$2,329
F	0.85	1.74	9.37
n	6094	5963	12057
p	0.36	0.18	< 0.01

participate, greatly reducing the potential costs of the program as well. In fact, the per-claimant cost of the wage subsidy is only $14, compared to $68 for the search bonus. Thus, average net benefits of both programs are positive and relatively similar.

The interaction of participation rates with costs and benefits, however, is more complex than the above discussion would suggest. The participation decision should be treated as endogenous. As we have shown in section 3, nonparticipants in the wage subsidy experiments tend to have higher base wages and benefit rates than nonparticipants. Self-selection tends to produce a population of subsidy participants who have longer than normal unemployment durations. Those who decline to participate do so because they expect to find a job fairly quickly and believe the subsidy would be of little or no help in finding new employment. If these same individuals were offered a search bonus, they would be likely to participate and *collect* the bonus without any change in their search behavior. In this sense, the lower participation rates of the wage subsidy program are a desirable feature. Wage subsidies tend to be most effective for those with longer expected durations of unemployment, lower base wages, and benefit amounts.

The wage subsidy and search bonus programs, we have argued, have rather different effects on different segments of the labor market. To analyze these effects more closely and to determine the net costs or savings that arise in each case, a series of model simulations were conducted. The simulations below vary race (black and

white), sex (female and male), and UI benefit levels ($80, $120, and $160, corresponding to the mean benefit level plus or minus one standard deviation; Illinois UI benefits were capped at $160, so this value also represents the maximum possible payment.). For each simulation, age and base period earnings were set equal to the sample mean value for individuals of the same race and sex.

The first step in producing a cost-benefit analysis is to simulate the response of various typical workers to the alternative programs. Equation (2) was used to compute monthly escape probabilities, which are displayed in Tables 12a–d. For each month we have calculated an escape (or rehire) probability giving the fraction of workers who would be expected to find jobs that month. For example, 5 percent of the black females receiving an $80 weekly UI benefit would be expected to find a job in the same month in which they initially filed their UI claim. We have also calculated the cumulative fraction of workers in each category who would have found jobs after a certain number of months. To continue the previous example, in the month after their initial UI claim, about 15 percent of black females receiving $80 in weekly UI benefits would be reemployed: 5 percent found their jobs in the first month, and 10 percent of the 95 percent remaining unemployed after the first month would find jobs in the second month.

The typical pattern in all of the simulations is that escape probabilities are higher in the earlier stages of unemployment spells if either the wage subsidy or search bonus program is adopted. Eventually, the cumulative probability of being rehired levels off, with similar (though usually slightly higher in the bonus group and lower in the control group) values under each of the programs. The programs would affect the aggregate unemployment rate by reducing the amount of time each unemployed worker would spend unemployed.

The effects of the programs are largest for black females. Throughout most of simulation period, the subsidy and bonus programs reduce unemployment by between 5 percent and 6 percent. For black males, the reduction is typically between 2 percent and 3 percent, though for high benefit levels the search bonus can have a larger impact (in the neighborhood of 5 percent).

In the case of white females, the wage subsidy is more effective at lower levels of UI and the search bonus at higher levels. At the $80 weekly benefit level, the search bonus reduces unemployment (relative to the current system, represented by the control group) by about 4 percent, while the wage subsidy reduces unemployment by about 6 percent. At the maximum benefit level ($160), the search bonus reduces unemployment by nearly 9 percent, compared to a 7 percent reduction for the wage subsidy. A similar pattern, though typically with smaller reductions, is observed for

Table 12: Simulated Unemployment Durations—Black Female

Month	Control		Wage Subsidy		Search Bonus	
	Rehire Probability	Cumulative Probability	Rehire Probability	Cumulative Probability	Rehire Probability	Cumulative Probability
	$80 Benefit					
1	0.05	0.05	0.07	0.07	0.05	0.05
2	0.10	0.15	0.12	0.18	0.12	0.17
3	0.09	0.22	0.11	0.27	0.10	0.25
4	0.06	0.27	0.07	0.32	0.07	0.30
5	0.05	0.31	0.06	0.37	0.06	0.34
6	0.06	0.35	0.06	0.41	0.06	0.38
	$120 Benefit					
1	0.05	0.05	0.06	0.06	0.05	0.05
2	0.09	0.13	0.11	0.16	0.12	0.16
3	0.08	0.20	0.10	0.25	0.09	0.24
4	0.06	0.25	0.08	0.30	0.07	0.30
5	0.05	0.29	0.07	0.35	0.06	0.34
6	0.06	0.34	0.06	0.39	0.07	0.38
	$160 Benefit					
1	0.04	0.06	0.05	0.05	0.05	0.05
2	0.08	0.12	0.10	0.15	0.11	0.16
3	0.07	0.18	0.09	0.22	0.09	0.23
4	0.06	0.24	0.08	0.29	0.08	0.29
5	0.05	0.28	0.07	0.34	0.07	0.34
6	0.07	0.32	0.07	0.38	0.07	0.39

Table 13: Simulated Unemployment Durations—Black Male

Month	Control		Wage Subsidy		Search Bonus	
	Rehire Probability	Cumulative Probability	Rehire Probability	Cumulative Probability	Rehire Probability	Cumulative Probability
	$80 Benefit					
1	0.05	0.05	0.06	0.06	0.06	0.06
2	0.11	0.16	0.12	0.17	0.17	0.18
3	0.09	0.24	0.10	0.26	0.10	0.26
4	0.07	0.29	0.07	0.31	0.07	0.32
5	0.05	0.33	0.06	0.35	0.06	0.36
6	0.07	0.37	0.06	0.38	0.06	0.40
	$120 Benefit					
1	0.05	0.05	0.06	0.06	0.06	0.06
2	0.10	0.14	0.11	0.16	0.12	0.17
3	0.09	0.22	0.09	0.23	0.10	0.25
4	0.07	0.27	0.07	0.29	0.08	0.31
5	0.05	0.31	0.06	0.33	0.07	0.36
6	0.07	0.36	0.06	0.37	0.07	0.40
	$160 Benefit					
1	0.04	0.04	0.05	0.05	0.05	0.05
2	0.09	0.13	0.10	0.14	0.12	0.16
3	0.08	0.20	0.08	0.21	0.09	0.24
4	0.07	0.25	0.08	0.27	0.09	0.31
5	0.06	0.29	0.07	0.32	0.07	0.36
6	0.07	0.34	0.06	0.36	0.08	0.41

Table 14: Simulated Unemployment Durations—White Female

Month	Control		Wage Subsidy		Search Bonus	
	Rehire Probability	Cumulative Probability	Rehire Probability	Cumulative Probability	Rehire Probability	Cumulative Probability
	$80 Benefit					
1	0.09	0.09	0.12	0.12	0.10	0.10
2	0.17	0.25	0.21	0.30	0.21	0.29
3	0.15	0.37	0.18	0.43	0.17	0.41
4	0.11	0.44	0.12	0.50	0.12	0.48
5	0.09	0.49	0.11	0.56	0.10	0.53
6	0.11	0.55	0.11	0.60	0.11	0.58
	$120 Benefit					
1	0.08	0.08	0.10	0.10	0.10	0.10
2	0.16	0.23	0.19	0.27	0.20	0.28
3	0.14	0.34	0.17	0.40	0.16	0.40
4	0.11	0.41	0.13	0.47	0.13	0.48
5	0.09	0.47	0.12	0.54	0.11	0.53
6	0.12	0.53	0.11	0.59	0.12	0.59
	$160 Benefit					
1	0.08	0.08	0.09	0.09	0.09	0.09
2	0.14	0.21	0.17	0.25	0.20	0.27
3	0.13	0.31	0.15	0.37	0.15	0.30
4	0.11	0.39	0.14	0.45	0.14	0.47
5	0.09	0.45	0.13	0.52	0.13	0.54
6	0.12	0.51	0.12	0.58	0.13	0.60

Table 15: Simulated Unemployment Durations—White Male

Month	Control		Wage Subsidy		Search Bonus	
	Rehire Probability	Cumulative Probability	Rehire Probability	Cumulative Probability	Rehire Probability	Cumulative Probability
	$80 Benefit					
1	0.10	0.10	0.11	0.11	0.11	0.11
2	0.19	0.27	0.20	0.28	0.23	0.31
3	0.17	0.39	0.18	0.41	0.18	0.43
4	0.12	0.42	0.12	0.48	0.13	0.50
5	0.10	0.52	0.11	0.54	0.11	0.56
6	0.13	0.58	0.10	0.58	0.11	0.61
	$120 Benefit					
1	0.09	0.09	0.10	0.10	0.10	0.10
2	0.17	0.25	0.18	0.26	0.22	0.30
3	0.15	0.37	0.16	0.38	0.17	0.42
4	0.12	0.44	0.13	0.46	0.14	0.50
5	0.10	0.50	0.11	0.52	0.12	0.56
6	0.13	0.56	0.11	0.57	0.13	0.61
	$160 Benefit					
1	0.08	0.08	0.09	0.09	0.10	0.10
2	0.16	0.23	0.16	0.24	0.21	0.28
3	0.14	0.34	0.15	0.35	0.16	0.40
4	0.13	0.43	0.13	0.44	0.15	0.49
5	0.10	0.48	0.12	0.50	0.13	0.56
6	0.13	0.55	0.11	0.56	0.14	0.62

white males.

The costs of either program are straightforward to compute. One calculates the percentage of workers hired within the first three months (approximately eleven weeks) of the initial UI claim date, multiplied by the takeup rate, to determined the probability of collecting the subsidy or bonus. To compute the cost of UI benefits paid under each program, we have calculated the expected number of months unemployed (up to a maximum of six months) and multiplied this number by the assumed UI benefit level. Last, to the extent that these programs reduce unemployment, they will increase tax revenues through payroll taxes and state and federal income taxes. We have no data on marginal tax rates for subjects in the Illinois experiment, so, to

Table 16: Cost–Benefit Analysis—Black Female

	Control	Wage Subsidy	Search Bonus
		$80 Benefit	
UI Benefits	1584	1491	1530
Subsidy/Bonus	—	52	75
Tax Collections	503	509	477
Net Cost	1082	1034	1128
Savings	—	47	-47
		$120 Benefit	
UI Benefits	2419	2285	2307
Subsidy/Bonus	—	45	70
Tax Collections	510	518	479
Net Cost	1909	1811	1898
Savings	—	98	11
		$160 Benefit	
UI Benefits	3277	3104	3087
Subsidy/Bonus	—	38	65
Tax Collections	516	527	481
Net Cost	2761	2615	2672
Savings	—	146	89

be on the conservative side, we have assumed a marginal tax rate of 10 percent. For each simulation we have computed the expected gross earnings, conditional on months employed, and applied the tax rate to this quantity. Net costs over a six month period are equal to UI benefits paid plus subsidy or bonus costs, less tax collections. The savings (which may be negative) resulting from each program are calculated relative to the current system (control group). The results of these simulations are presented in Tables 13a–d.

Though in most of the cases both programs result in net savings, the savings are far from uniform. The $500 search bonus is very cost effective at higher benefit levels, especially for white males (where average savings of $167 per claimant were found). On the other hand, at lower benefit levels the search bonus can actually end up losing money, as in the case of female workers (with the bonus costing between $47 and $69 more per claimant than the current system).

Table 17: Cost–Benefit Analysis—Black Male

	Control	Wage Subsidy	Search Bonus
		$80 Benefit	
UI Benefits	1553	1520	1506
Subsidy/Bonus	—	53	82
Tax Collections	590	600	592
Net Cost	963	973	996
Savings	—	-10	-32
		$120 Benefit	
UI Benefits	2375	2327	2271
Subsidy/Bonus	—	46	77
Tax Collections	598	610	595
Net Cost	1777	1762	1752
Savings	—	14	24
		$160 Benefit	
UI Benefits	3221	3157	3039
Subsidy/Bonus	—	39	72
Tax Collections	606	620	597
Net Cost	2616	2577	2514
Savings	—	39	101

Table 18: Cost–Benefit Analysis—White Female

	Control	Wage Subsidy	Search Bonus
		$80 Benefit	
UI Benefits	1229	1187	1223
Subsidy/Bonus	—	82	132
Tax Collections	477	461	465
Net Cost	821	808	890
Savings	—	13	-69
		$120 Benefit	
UI Benefits	2008	1845	1850
Subsidy/Bonus	—	72	126
Tax Collections	488	475	468
Net Cost	1520	1442	1508
Savings	—	78	12
		$160 Benefit	
UI Benefits	2753	2538	2484
Subsidy/Bonus	—	62	119
Tax Collections	498	487	471
Net Cost	2255	2113	2132
Savings	—	141	22

The wage subsidy program, on the other hand, is most effective for female and minority workers, and typically fares better than the bonus at lower benefit levels. The program does not appear to be self-financing for white males, but otherwise it is cost effective.

7. Summary and Conclusions

Our analysis of the Illinois unemployment insurance experiments provides evidence that wage subsidies are a viable strategy for reducing unemployment. Our assessment differs from that of Woodbury and Spiegelman (1987) who argue that a search bonus program would be preferable. We do not dispute that search bonuses, which have received favorable notice, can also be effective in reducing unemployment, but only that the two programs serve different purposes and exhibit subtle differences in their consequences.

Table 19: Cost–Benefit Analysis—White Male

	Control	Wage Subsidy	Search Bonus
		$80 Benefit	
UI Benefits	1244	1219	1184
Subsidy/Bonus	—	84	143
Tax Collections	636	637	707
Net Cost	608	666	621
Savings	—	-58	-12
		$120 Benefit	
UI Benefits	1929	1891	1793
Subsidy/Bonus	—	74	136
Tax Collections	650	654	713
Net Cost	1279	1311	1217
Savings	—	-32	63
		$160 Benefit	
UI Benefits	2650	2598	2409
Subsidy/Bonus	—	64	130
Tax Collections	663	670	718
Net Cost	1998	1992	1821
Savings	—	-4	167

Search bonuses work primarily by increasing the intensity of search, rather than by modifying reservation wage levels or employer demand for labor. UI recipients are required by law to register with state employment agencies and to accept "suitable" employment, but close monitoring of these requirements is impossible. A search bonus is largely an incentive mechanism for persuading UI recipients to do what the law requires them to do anyway. It is, perhaps, an effective but unburdensome means for enforcing the law. However, it should be realized that search bonuses will largely be paid to workers who would find employment in the normal course of events, albeit after collecting less unemployment compensation than they currently do. It tends to assist those for whom more intensive search is effective, but who are discouraged from doing so under the current UI system.

Wage subsidies, on the other hand, will typically be refused by high wage workers who appear reluctant, for whatever reason, to identify themselves as beneficiaries of a government assistance program. For low wage workers, particularly those near the minimum wage level, who cannot find employment at *any* wage rate, a wage subsidy has distinct advantages over a search bonus. More generally, wage subsidies tend to be cost effective because they are paid only to those unemployed workers who use them as incentives for employers to hire them. If the subsidy does not assist the worker in finding a job, the worker won't utilize the subsidy and it won't be paid. It is true that a wage subsidy is less effective in promoting intensive job search, but that is not really the primary goal of a subsidy program.

We would like to argue that low participation rates, far from being a drawback of a subsidy program, are one of its primary advantages. Low participation rates make subsidy programs appear less effective in simple experimental comparisons, such as those reported in the Upjohn report, but our econometric estimates indicate that for participants the wage subsidy can be equally or more effective than the search bonus.

References

Burdett, Kenneth. "Unemployment Insurance Payments as a Search Subsidy: A Theoretical Analysis." *Economic Inquiry*, July 1979, *17*, 333–43.

Burtless, Gary. "Are Targeted Wage Subsidies Harmful? Evidence from a Wage Voucher Experiment" *Industrial and Labor Relations Review*, October, 1985, *39*, 105–14.

Kaldor, Nicholas. "Wage Subsidies as a Remedy for Unemployment." *Journal of Political Economy*, December 1936, *44*, 721–42.

Kesselman, Jonathan R. "Labor-Supply Effects of Income, Income-Work, and Wage Subsidies." *Journal of Human Resources*, Summer 1969, *4*, 275–92.

Kesselman, Jonathan R., Williamson, Samuel H., and Berndt, Ernst R. "Tax Credits for Employment Rather Than Investment." *American Economic Review*, June 1977, *67*, 339–349.

Pigou, A. C. *The Theory of Unemployment.* London: Macmillan, 1933.

Spence, A. Michael. *Market Signalling.* Cambridge: Harvard University Press, 1973.

Spiegelman, Robert G., and Woodbury, Stephen A. *The Illinois Unemployment Insurance Incentive Experiments.* Kalamazoo: W. E. Upjohn Institute for Employment Research, February 1987.

Woodbury, Stephen A., and Spiegelman, Robert G. "Bonuses to Workers and Employers to Reduce Unemployment." *American Economic Review*, September 1987, *77*, 513–30.