#378-76

# INSTITUTE FOR RESEARCH ON POVERTY DISCUSSION PAPERS

## HOW MUCH DOES UNEMPLOYMENT INSURANCE INCREASE THE UNEMPLOYMENT RATE AND REDUCE WORK, EARNINGS, AND EFFICIENCY

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ERRATA



Abstract page, line 21: For 0.24 percentage points at the lower bound, and by 0.96 percentage points at the upper bound read from 4 to 16 percent.

Page 3, line 18: For I-UI tax rate read 1-UI tax rate

Page 17, last paragraph, line 1: For function read fraction

Page 35, footnote 19: For WV read WU

# Abstract

In this paper we present estimates of the effects of Unemployment Insurance on labor supply, earnings, and the unemployment rate in 1972. These are the questions we address: If there were no Unemployment Insurance program, how many more hours would people work? How much more would they earn? How much lower would the unemployment rate be? How much more efficient would our economy be?

We develop two models of the labor supply impact of UI. The assumptions of Model I lead to the conclusion that most UI beneficiaries experience both wage and income effects, but that some--those who had exhausted their UI eligibility--would only experience an income effect. The assumptions of Model 2 lead to the conclusion that UI exerts only an income effect. In the important special cases where UI has only an income effect, the size of the UI marginal tax rate does not affect the labor supply of UI beneficiaries. We argue that empirical implementation of the two models yields upper and lower bounds of the impact of UI.

Our estimates indicate that the aggregate loss of labor supply due to UI ranged between 0.3 and 1.0 billion hours, or between 0.21 and 0.72 percent of total hours worked. The corresponding loss of earnings was between 0.95 and 3.05 billion dollars, or between 0.15 and 0.48 percent of total earnings. The eradication of UI would decrease the unemployment rate by 0.24 percentage points at the lower bound, and by 0.96 percentage points at the upper bound. Finally, the loss in economic efficiency attributable to UI is equal to less than one-tenth of one percent of total earnings. In our view these costs are no cause for alarm, and well worth the benefits they purchase--economic security in an uncertain, cyclical world.

# How Much Does Unemployment Insurance Raise The Unemployment Rate and Lower Earnings and Work Effort?

In several recent papers, Martin Feldstein argues that the unemployment insurance system creates serious work disincentives and inefficiencies [1973a; 1973b; 1974].[1] While he presents convincing evidence that the implicit marginal tax rates in the Unemployment Insurance (UI) program are high--certainly much higher than the conventional measures of earnings replacement ratios suggest--he does not attempt to ascertain how large the labor supply effects of these high marginal tax rates are. The impression given is that they are probably substantial. In this paper we present estimates of the effects of the unemployment insurance system on labor supply, earnings, and the unemployment rate in 1972. The questions we attempt to answer are: If there were no unemployment insurance program, how many more hours would people work? How much more would they earn? How much lower would the unemployment rate be? How much more efficient would our economy be? In addition, we show that in some very important special cases the size of the UI marginal tax rate does not affect the labor supply of UI beneficiaries.[2]

The paper is divided into four sections. In the first section we develop two models of the impact of unemployment insurance on work effort and argue that estimation of these models gives upper and lower bounds, respectively, of this impact. We also lay out a simulation methodology for estimating the labor supply effects of unemployment insurance. The second section describes the data source used in our study and the empirical implementation of the simulation methodology. In the third section we present the results. The fourth section is a brief summary and conclusion.

## 1. The Effect of Unemployment Insurance on Labor Supply

To derive empirical estimates of the effect of unemployment insurance on the unemployment rate and labor supply, a theoretical model of the effects of UI on labor supply is necessary. Unfortunately, the appropriate model to use is not clear-cut. At least two broad approaches are reasonable: the job-search human-capital model and the labor supply model. We work with the latter because the labor supply model is currently susceptible to empirical implementation while the job search model is not.[4] Even within a general labor supply framework, there exist many possible models to describe the effects of the UI system. We begin the discussion on a very general level, and then present two specific but quite different models of these effects.

Unemployment insurance reduces the labor supply of recipients, both by reducing the cost to them of being unemployed and by increasing their incomes.[3] In the absence of an unemployment insurance system, the cost to a worker of being unemployed for any length of time is equal to his potential earnings during that period of time. Since UI benefits replace a fraction of these foregone earnings, they reduce the cost of being unemployed by that fraction. This reduction in the cost of unemployment can be expected to lead to reductions in labor supply.

The higher a worker's income and the more assets he has, the better he is able to afford to be unemployed; the less effort he is likely to devote to searching for a job; and the more selective he is likely to be about the kind of job he will accept. UI benefits, obviously, increase beneficiaries' incomes. They can, in consequence, be expected to act as a work disincentive.

Both models assume that labor supply in the current year depends only upon current income and current prices, and that the individual becomes unemployed and eligible for UI at the beginning of the year.[5]

Model I

The first model further assumes that (1) all unemployment is voluntary (i.e., unemployed workers can return to work at their regular wage rate whenever they so choose), (2) the UI beneficiary decides at the beginning of the year how many weeks to work during the year, (3) workers can work neither more nor less than eight hours per day and not more than five days per week, and (4) the UI work test has no effect on work behavior.

Figure 1 measures weeks worked from right to left along the horizontal axis and total income along the vertical axis. To simplify the exposition we assume that the individual has no unearned (i.e., nonemployment) income. If there had been no UI system, his budget constraint, OW, would have a slope equal to (the negative of) his weekly earnings rate. If he were eligible for 26 weeks of UI benefits, his budget constraint would become OGHW. The slope of HW is equal to the slope of OW multiplied by (I - U I tax rate), while OG is equal to 26 times the weekly UI benefit. Thus, the UI system increases his nonemployment income by 26 times the weekly unemployment benefit (the UI guarantee) and decreases his net wage for the first 26 weeks of the year by the ratio of weekly unemployment benefits to after-tax weekly earnings (the UI tax rate).[6] Note that segment HG of the new budget constraint is parallel to OW. When entitlement to UI benefits expires--in this case, after 26 weeks--the cost of being unemployed is once again equal to the weekly earnings rate.

To calculate the effect of the UI program on labor supply in this model we must consider two cases.

The first case assumes that the observed labor supply of a UI beneficiary reflects some equilibrium position, B, along HW. The individual behaves as if his budget constraint were OG'W, where G' is equal to G multiplied by the ratio $\frac{52}{26}$. We will refer to OG' as the shadow guarantee. In the absence of UI, the person might have chosen point A. We calculate how much more each UI beneficiary would work ($H_A - H_B$) if he had OG' dollars less nonemployment income and a net weekly earnings rate given by the slope of OW rather than G'W.

The difference between $H_A$ and $H_B$ can be expressed as follows:

Let $LS_0$ = observed labor supply

$LS_{NUI}$ = labor supply in the absence of UI

b = the change in labor supply per dollar of nonemployment income (i.e., the nonemployment income coefficient derived from a cross-sectional labor supply function)

c = the change in labor supply per one percent change in the wage rate (i.e., the coefficient of the log of the wage rate, derived from a cross-sectional labor supply function)

NEY = nonemployment income

WR = hourly wage rate (before taxes)

G' = UI shadow guarantee = 52 times the weekly UI benefit

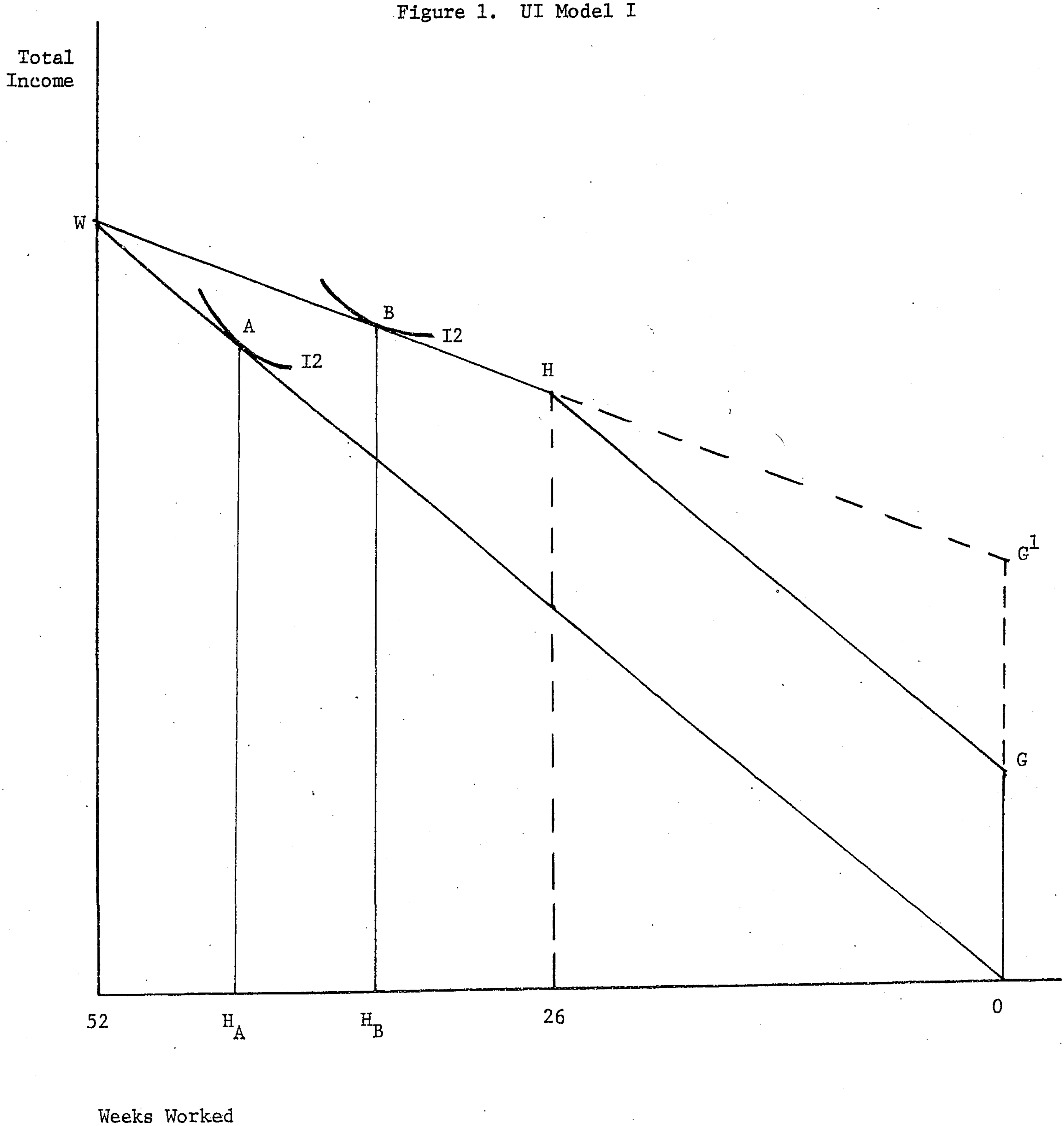
TR = UI tax rate.

Then, for a single individual,

$$LS_0 = a + b[NEY + G'] + c\ln[(1-TR)WR] \quad (1)$$

$$LS_{NUI} = a + b(NEY) + c\ln(WR). \quad (2)$$

Figure 1. UI Model I



The change in labor supply due to UI is therefore equal to

$$\Delta LS = -bG' + c\ell n \frac{1}{1-TR} . \quad (3)$$

The resultant change in annual earnings is

$$\Delta LS \cdot WR. \quad (4)$$

For a family with N members or potential members in the labor force, the change in the jth member's work effort is

$$\Delta LS_j = b_j(-G_j' - \sum_{i \neq j} UI_i + \sum_{i \neq j} \Delta LS_i \cdot WR_i) + c_j \ell n \frac{1}{1 - TR_j} \quad (5)$$

where $UI_i$ = unemployment insurance benefits of the ith member and $\Delta LS_i \cdot WR_i$ = change in earnings of the ith member due to UI benefits.[7] The N equations of the form shown in (5) are solved simultaneously.

The second case assumes that an individual's equilibrium is along GH. In this situation the UI system has only an income effect on labor supply--and only whenever an individual is out of work for more weeks than he is eligible for UI benefits. This result makes intuitive sense. Consider the individual who collects UI benefits for X weeks and does not work for X + Y weeks during the year. If he had decided to work another week during the year, his annual income would increase by the full value of his weekly earnings if he worked during a week he was ineligible for UI benefits. If he worked during a week that he was eligible for UI benefits, his annual income would increase by only his weekly earnings minus the decrease in his UI benefits. Given the choice (which the assumptions in Model 1 have given him), had he wanted to work another week, he would have worked during the time that he was not eligible for UI benefits --and the UI tax rate would have no effect on his labor supply decision.

This is an interesting and potentially important result. It means that the size of the implicit UI tax rate may be irrelevant to the labor supply choices of workers who work a very small portion of the year and/or are eligible for relatively few weeks of benefits. Such is the case for seasonal workers. Moreover, in this instance the guarantee in (3) or (5) would be equal to the weekly benefit times the number of weeks of UI eligibility rather than 52 times the weekly benefit. The shadow guarantee, OG', would be irrelevant to the labor supply decision. Therefore, G' would be equal to the number of eligible weeks rather than 52 times the weekly UI benefit. The last term in (3) or (5), $c_j \ln \frac{1}{1-TR_j}$, would also drop out of the equation.

It is very important, therefore, to ascertain whether an individual is out of work for more weeks than he is eligible for UI benefits. Unfortunately we have no data on how many weeks a particular individual is eligible to receive benefits. Eligibility depends upon previous weeks worked and/or previous earnings and is determined by a complicated formula which varies from state to state. In general, UI beneficiaries collect UI benefits for fewer weeks than they are eligible to receive them.

A good first approximation for our purposes is provided by the following rule: if the sum of weeks employed and weeks of UI benefits <u>collected</u> is less than 51, the individual is out of work for more weeks than he is eligible for UI benefits (51 rather than 52 weeks because in most states an individual must be unemployed for 1 week before he is entitled to collect UI benefits). In most cases this rule works. For example, the individual who collects 39 weeks of UI benefits--the maximum including extended benefits in 1972--and works only 5 weeks is out of work for more weeks than he is eligible for benefits. Similarly, the individual who is eligible for 39 weeks of benefits but collects only 6 weeks because he becomes reemployed and is employed for a total of 45 weeks is clearly eligible for more weeks of benefits than the weeks he is out of work. There are, however, some special cases where the rule does not work so well. Consider the individual who has two spells rather than one spell of unemployment during the year. Such an individual would have 2 waiting weeks rather than 1 before he was entitled to collect UI benefits. Perhaps even more serious is the case of an individual who quits a job and who lives in a state that permits job quitters to collect UI benefits only after an extended waiting period, sometimes as many as 8 weeks. In this case, the UI marginal tax rate could affect his labor supply even though he was out of work for more weeks than he was eligible for UI benefits.

In this paper we use 48 weeks as our rule rather than 51 weeks, to err on the side of underestimating the number of individuals unaffected by the UI marginal tax rate.

## Model 2

The assumptions in the second model are almost exactly the opposite of those in the first. It assumes that (1) the duration of unemployment at one's normal job is exogenous and known to the individual, (2) when he is working at his normal job the individual can work as many hours in excess of 40 as he chooses, (3) the individual is indifferent between overtime and nonovertime hours worked at the same wage rate, and (4) the UI work test is effective in forcing individuals to accept job offers at their normal wage rate and occupation.

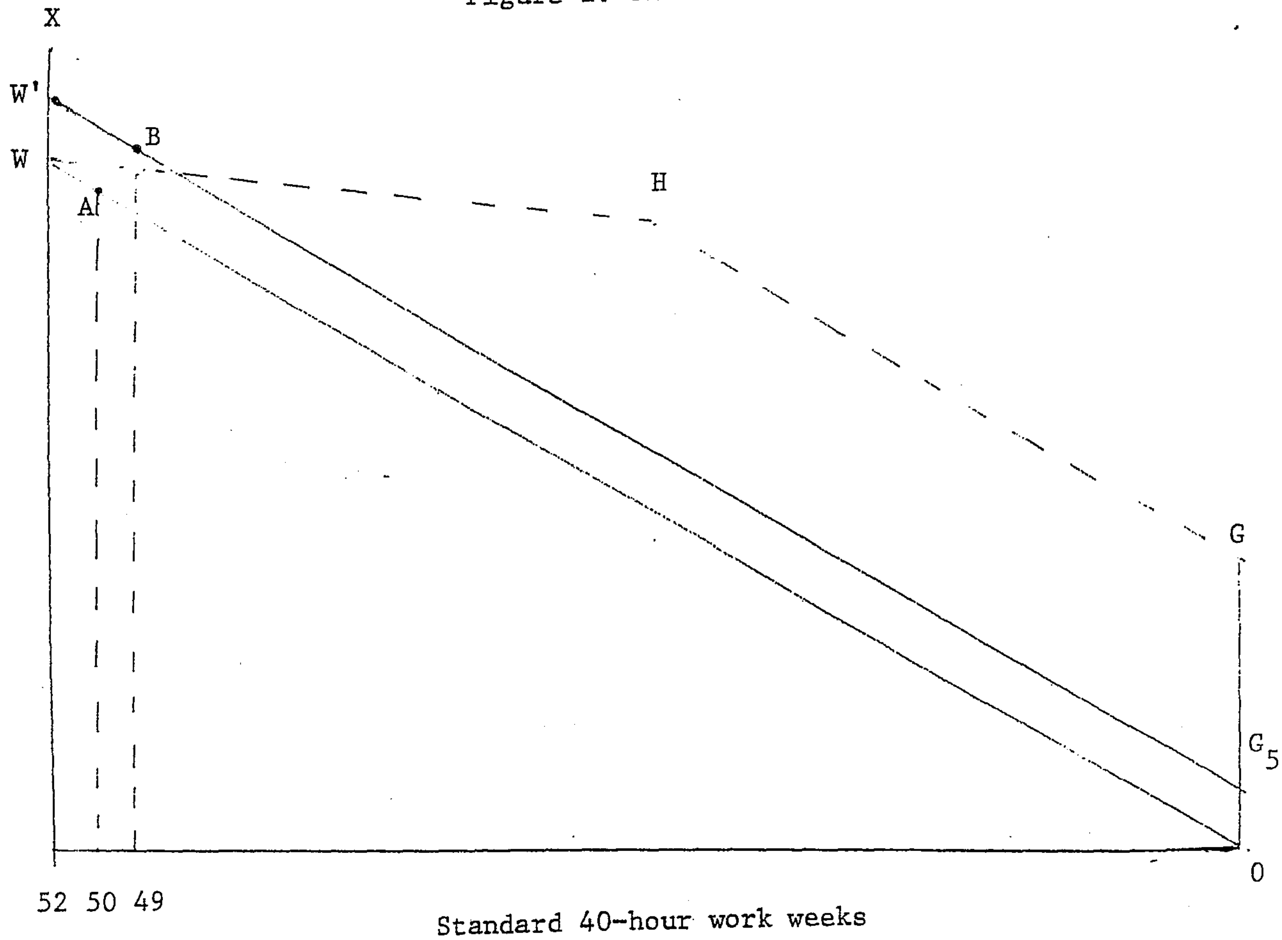
The implications of this model are illustrated in Figure 2, where standard 40-hour work weeks are measured from right to left along the horizontal axis. The budget constraint from Model 1, where it is impossible to work more than the standard work week, is shown as the dotted line, OGHW. Suppose that the individual experienced 5 weeks of involuntary unemployment. In the absence of UI his budget constraint would be OW. That is, he could make up for the involuntary weeks of unemployment by working more than 40 hours during the weeks that he was employed. Let us assume that his equilibrium is at A. He works the equivalent of 50 standard work weeks. Now suppose that there is a UI system. His budget constraint becomes $OG_5W'$, which is parallel to OW. The new equilibrium is at B. In the presence of UI, the individual works the equivalent of 49 standard work weeks.

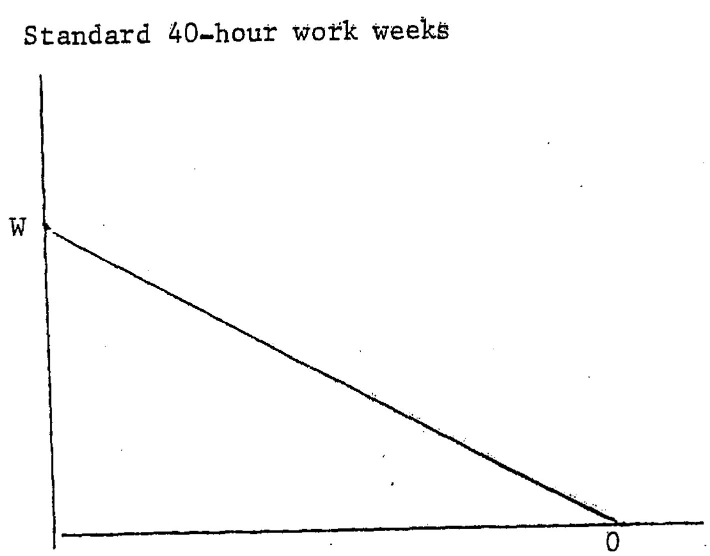
With this model the UI system has only an income effect. There is no substitution effect because the relevant marginal choice--whether to work more than the standard 40-hour work week during the period of employment--is not affected by the UI system. While nothing in the model precludes the availability of a temporary job at less than his normal pay during his period of unemployment, the net wage rate on all such jobs will be dominated by the net wage rate of overtime work, for the former is subject to the UI tax rate while the latter is not. The guarantee is simply equal to the number of weeks UI is collected times the weekly UI benefit. Thus the change in labor supply due to UI is

$$\Delta LS = b_j\ (-G_j - \sum_{i \neq j} UI_i + \Delta \sum_{i \neq j} LS_i WR_i) \qquad (5')$$

where $G_j$ = the weekly benefit times the number of weeks the beneficiary collected UI = observed UI benefits.

Figure 2. UI Model 2



The assumptions in the second model are not so unrealistic as they first might appear to be. The model is very applicable to individuals who are temporarily laid off. According to estimates developed by Feldstein [1975, p. 732], about 60 percent of job losses can be classified as temporary layoffs. For such individuals, the duration of unemployment at one's normal job is exogenous. The model is also applicable to individuals with very good job prospects. If an individual is recalled to his previous employment or if he gets another job offer that is equivalent to his previous employment, the costs of refusing employment are extremely high; namely, the individual may lose the previously held job for good and he is certain to lose entitlement to UI benefits. Individuals may not be able to work as many hours in excess of 40 on their normal jobs as they would want. However, if temporary employment at jobs that pay less than their normal wage rate is available when they are unemployed, such jobs are also likely to be available when they are employed. Thus, as long as we assume that individuals are indifferent between moonlighting and working during the weeks that they are unemployed on their primary job, the UI system will have only an income effect on labor supply.[8]

Realism of the Models

For at least five reasons, the first model and the corresponding simulation procedure will overestimate how much more UI beneficiaries would work in the absence of UI. First, not all unemployment is voluntary. At least some and perhaps most beneficiaries would not be able to find jobs--particularly jobs at their normal pay--during the period in which they received UI benefits if there were no UI program. Thus at least some and perhaps most beneficiaries would not have worked any more if there had been no UI system.

Second, both economic theory and considerable empirical evidence suggest that consumption in any given year depends more upon permanent income than upon income during that year. Because the increase in expected lifetime or permanent income resulting from the receipt of UI benefits will in most circumstances be very small, our assumption that current year labor supply depends only upon current year income will lead to an overestimate of the labor supply effects of UI.[9]

On the other hand, rather than having an income effect on labor supply, the UI system might have a "financial pressure" effect. In the absence of a UI system, unemployed workers who have few or no liquid assets and have either no access to credit or a strong aversion to borrowing would be impelled by short-run financial pressure to accept almost any job. Because UI benefits frequently constitute an appreciable increase in income during unemployment, they enable such persons to remain unemployed longer by reducing what might otherwise be unbearable financial pressure. To the extent that the UI system reduces work effort through this short-run easing of financial pressure rather than produces the more conventional income effect, our assumption that current year labor supply depends upon current rather than permanent income will not be so unrealistic. That is, within a labor supply framework this financial pressure effect is akin to an income effect for individuals with time horizons of only one year.

Third, in the absence of a UI program, some individuals would save more on their own to protect themselves against unemployment. To the extent that UI benefits simply displace private savings there will be no income or financial pressure effect from UI benefits.

Fourth, while we assume that the UI work test is completely ineffective, this is not the case in reality. While an individual might wish to work several weeks less than he otherwise would because of the availability of UI benefits, the work test might prevent him from doing so. The fact that 25 per 1000 UI claimants in 1971 were denied benefits because they either left their previous job voluntarily or refused to search for a new one suggests that the work test is not completely ineffective.[10] In terms of Figure 1, the existence of the work test may mean that the recipient actually works some value between $H_A$ and $H_B$, not his preference of $H_B$. In this case we would again overestimate the effect of the UI system because our estimate of its effect is equal to the full difference between $H_A$ and $H_B$.

Finally, there are at least two potential work incentive effects of the UI system that our models fail to capture. First, UI may induce workers who become unemployed and might otherwise withdraw completely from the labor force to remain in the market. The line between unemployment and labor force withdrawal is a narrow one for many secondary and older workers. Inability to find jobs leads many such marginal workers to leave the labor force. For some of these marginal workers, the receipt of UI benefits on condition that they remain in the labor force will be sufficient enticement to continue searching for employment--with the result that some of those thus enticed will find suitable jobs and become reemployed.

Second, if workers in seasonal industries are eligible for UI benefits and if wage rates paid by seasonal firms are not reduced by the full amount of the UI benefits to their employees when they are not working, seasonal jobs are more financially rewarding as a result of the UI system than they would otherwise be. This increase in the reward for seasonal employment will attract non-labor-force participants into the seasonal labor force--a work incentive effect.[11]

Our models and simulation procedure fail to measure the increases in labor supply which result from these work incentive effects. Indeed, they actually calculate a decrease in labor supply for those whose labor supply increased by virtue of UI.

On the other hand, there are two reasons why estimates based on Model 1 will be too low. The UI system leads to only a temporary reduction in wage rates. But the parameters of the labor supply function used in our simulation were estimated from cross-sectional data. Thus, the coefficients reflect the effect on labor supply of permanent differences in wage rates. Our assumption that current year labor supply depends only upon current year prices allows us to use these estimates. But a temporary reduction in the net wage rate is equivalent to putting leisure on sale. Consequently, individuals are likely to buy more leisure (work less) during the current year than they would in response to a permanent reduction in their wage rate.

In addition, we assume that the individual is choosing between UI benefits and a job at his normal wage. But in some cases individuals may be choosing between UI benefits and a <u>temporary</u> job. If the wage rate on the temporary job is lower than his normal wage rate, we will underestimate the UI tax rate and thereby underestimate the reduction in labor supply induced by the UI system.

On balance, we believe that the five factors which lead to an overestimate are more serious than the two factors which lead to an underestimate of the labor supply effect of the UI system. As a consequence, we believe that the estimate derived from Model 1 is an upper bound estimate of the effect of UI on labor supply. Our assumption that all unemployment is voluntary, whereas in fact at least some and perhaps most unemployment is involuntary, is in our judgment by far the most serious bias.

The second model and its corresponding simulation are likely to lead to an underestimate of the effect of the UI system on labor supply. Duration of unemployment is not completely exogenous for many unemployed individuals. It depends to some extent on how hard an individual searches for employment and what kind of job he will accept. On the other hand, the estimate may be too high for some of the same reasons that the first model leads to an overestimate: (1) the income effect estimate may be too high both because labor supply depends upon permanent rather than temporary income and because UI displaces private savings, and (2) while the UI system induces some beneficiaries to work more than they would in the absence of UI, we simulate the effect of UI on such beneficiaries as if UI had decreased their labor supply. On balance we feel that the treatment of unemployment duration as totally exogenous is more serious than these factors which lead to an overestimate. Consequently, we believe that the estimate derived from Model 2 is a lower bound estimate of the effect of UI on work effort.

## 2. Implementing the Simulation

To implement the simulation described above, we need to substitute numerical values for b, c, WR, G, and TR in equations (3) and (5).[12]

The methods used to obtain the proper values are outlined in this section. We also describe the data to which the simulation is applied and some other technical aspects of the study.

Data Source. The March 1973 Current Population Survey (CPS) provides the sample for this study. The CPS questions approximately 47,000 households, comprising about 200,000 persons, each month to determine the prevailing level of employment and unemployment, and to collect other labor market and general demographic information. In March, data concerning each household member's annual earnings, total weeks employed and unemployed, and the amount of UI received in the preceding calendar year are collected. Considerable other socioeconomic information on each person is also gathered at this time. Observations of this sample and predictions based upon it are inflated to national levels using sample weights provided in the data file.

Payments from UI are generally underreported in the CPS. To remedy this problem, which would lead to downwardly biased results, we inflate all reported UI payments by the appropriate correction factor for 1972, 1.494 [Smeeding 1975].

We have used a subsample of the CPS that excludes all households with heads under age 20, all persons under age 20 or in school, and members of the armed forces. We lack values of b and c for these groups (see Garfinkel and Masters [Forthcoming] for discussion of why such estimates could not be obtained); thus, we cannot treat the effects of UI on teenage work effort. Our subsample contains 81,649 persons, including 2659 recipients of UI.

## Income and Wage Rate Coefficients

The estimates of b and c for all groups above are taken from Garfinkel and Masters [Forthcoming]. The data source for that study was the Survey of

Economic Opportunity. Labor supply functions were estimated for twenty different age, sex, and marital status groups from regressions of the following kind:

$$LS = a + bNEY + c\ln WR + dZ$$

where Z = a vector of demographic variables and the other variables are defined as in section 1. The income and wage rate coefficients used in the simulation are presented in Appendix Table A.1. For a detailed discussion of the methodology used to obtain these estimates and a comparison of these estimates to others in the literature, see Garfinkel and Masters [Forthcoming].

Estimating the Wage Rate

The CPS does not provide data on individual wage rates, but only reports yearly earnings, total weeks worked (with a set of dummy categories),[13] and whether the job was full or part time. Hence, we must impute wage rates as best as possible, given the CPS data. For persons reporting full-time work for 50-52 or 48-49 weeks, the wage is set equal to reported earnings divided by 2000 (1940). For all others, a wage is imputed based on wage regressions for persons with similar demographic characteristics[14] who worked full time for 48-52 weeks.

Deriving the Guarantee and Tax Rate

Typically, a recipient's weekly UI benefit is a stated function (usually .5) of his average gross weekly earnings in the period preceding unemployment. However, the payment cannot exceed an established maximum nor be less than a statutory minimum. The fraction and the constraining maximum and minimum vary from state to state.

To estimate the benefit, we first estimate weekly earnings, WK, by multiplying the imputed wage by 40 if the recipient reports full-time work when employed, and by 20 if he reports part-time work. The result is then multiplied by the fraction appropriate for his state of residence and constrained to fall within the state's lower and upper limits.[15] This benefit, WB, is multiplied by 52 to obtain the shadow guarantee.

From the recipient's viewpoint, UI taxes earnings at a rate equal to WB divided by average <u>net</u> weekly earnings. Assuming as a rough approximation that the marginal tax rate on earnings faced by workers is 20 percent[16] we set

$$TR = \frac{WB}{.8WK} \text{ for all recipients.} \qquad (6)$$

<u>Constraining the Predicted Change in Work Effort</u>

Solutions of (3) and (5) sometimes predict that the elimination of UI would produce decreases in a particular individual's labor supply that exceed the observed number of work hours.[17] We do not allow the predicted reduction to exceed the observed level of work effort.

<u>Computing the Unemployment Rate</u>

The official unemployment rate is defined as the number of persons in the labor force without work during a week divided by the total size of the labor force during that week. Our simulation, however, is based on annual data. We therefore define the annual unemployment rate as the sum of all persons' weeks of unemployment divided by this same sum plus the sum of all persons' weeks of work. To understand how we compute these values, it is useful to focus on an individual's own unemployment rate both with and without UI. The national rate follows directly.

Consider a member of the labor force who, given the existence of UI, is observed to have worked WW weeks in 1972 and to have been unemployed for WU weeks.[18] Following the definition of our simulation, his personal rate of unemployment is WU/(WU+WW). (If this person looked unsuccessfully for work for part of the year and then dropped out of the labor market, WW would be zero; this will not distort the calculations.) Suppose the simulation predicts that the removal of UI will <u>increase</u> labor supply by L hours. Dividing L by 40, if the worker reports regular full-time employment, or by 20, if he indicates he holds a part-time job, yields the number of weeks of additional work, WI. We assume the number of unemployed weeks falls to WU-WI and weeks employed rises to WW+WI. Hence, without UI, the person's yearly unemployment rate would be WU-WI/((WW+WI)+(WU-WI)) = (WU-WI)/(WW+WU).[19]

A <u>decrease</u>, WD, in the number of weeks of labor supply may also be predicted by the simulation. In this case, we assume the number of unemployed weeks declines by WD, and the number of weeks in the labor force falls by the same amount. Thus, the adjusted unemployment rate would be (WU-WD)/(WW-WU-WD).[20]

The national unemployment rate with UI is:

$$\frac{\Sigma WU_i}{\Sigma WU_i + \Sigma WW_i} \qquad i = 1 \ldots P.$$

And the jobless rate if UI were removed is:

$$\frac{\Sigma WU_i - \sum_{i, WU_i > 0} WI - \Sigma WD_i}{\Sigma WW_i + \Sigma WU_i - \Sigma_{WD_i} + \sum_{i: WU_i = 0} WI_i} \qquad i = 1 \ldots P.$$

Note that the estimated effect of UI on the unemployment rate derived from Model 2 will not be equivalent to the effect on the conventionally measured unemployment rate. The conventional unemployment rate is defined by the ratio of persons unemployed to persons in the labor force. Our unemployment rate is defined by the ratio of standard person-weeks unemployed to standard person-weeks in the labor force. (The standard week is either 40 or 20 hours, depending on the person's work pattern.) In Model 2, these two ratios will differ because we allow the individual to compensate for unemployment during one week by working overtime during another week. The overtime raises the number of standard weeks worked but does not alter the number of persons unemployed during other weeks. However, our measure more accurately reflects economic reality.[21]

Qualifications of the Methodology

Beyond the problems with our two models discussed above, there are several difficulties with the data which qualify the empirical findings. For example, they do not report weeks of eligibility for UI, which led us to use for Model 1 the rule-of-thumb described earlier. Wage rates and the actual weekly UI benefits must be imputed, which also introduces error. (Other similar problems have been discussed in the Notes.) In compensation we can perform the analysis on a large microdata set instead of on state-by-state or time series aggregates.

## 3. Results

In this section we present and interpret the estimates of the impact of UI on unemployment rates, hours worked, earnings, and welfare in the economy. Both the upper and lower estimates appear in all tables.

Table 1 contains estimates of the unemployment rate with and without the UI system, and the percentage of the observed unemployment rate that is attributable to this system. The upper bound estimates indicate that in the absence of UI, the total unemployment rate would have been 3.49 percent rather than 4.15 percent. About 16 percent of the observed rate is due to the work disincentives of UI. The lower bound results suggest, in contrast, that without UI the unemployment rate would fall only .15 percentage points, or to 4 percent. Our lower bound estimate is somewhat lower than the estimate of .2 to .3 that Marsten [1975] derived by comparing the unemployment duration of those covered by UI to those not covered by UI. Even our upper bound estimate is somewhat lower than Feldstein's guess that UI leads to three-fourths of a percentage point increase in the unemployment rate.

The economic costs of UI may be more accurately measured by the reduction in labor supply and earnings induced by UI benefits. In Table 2 we present estimates of these magnitudes. The effects of UI on hours worked and earnings are not negligible in absolute terms: total work effort declined by 0.3 to 1.0 billion hours. However, as a percentage of total hours worked in 1972, these losses are rather small--from two-tenths of one percent to seven-tenths of one percent. While many individuals may have read of or personally observed individual cases of extreme reductions in labor supply occasioned by receipt of UI payments, our results, which reflect average behavior, undercut those who attack the system for causing widespread large reductions in work effort.

Our simulations indicate that aggregate earnings in 1972 would have been between 0.9 and 3.05 billion dollars higher in the absence of the UI system. These figures indicate the value of goods and services not produced because of the work disincentives of UI. As a fraction of total earnings, these declines range from 0.15 percent to 0.48 percent.

Table 1

Unemployment Rates With and Without Unemployment Insurance in 1972

| | Unemployment Rate | | % of Total Unemployment Rate |
|---|---|---|---|
| | With UI | Without UI | Due to UI |
| Upper bound estimate | 4.15 | 3.49 | 16 |
| Lower bound estimate | 4.15 | 4.00 | 4 |

Table 2

Reduction in Hours Worked and Earnings Induced by Unemployment Insurance in 1972

| | Reduction in Hours Worked | | Reduction in Earnings | |
|---|---|---|---|---|
| | Billions of Hours | % of Total Hours | Billions of Dollars | % of Total Earnings |
| Upper bound estimates | 1.00 | .72 | 3.05 | .48 |
| Lower bound estimates | .30 | .21 | .95 | .15 |

(The percentage drop in earnings is less than the percentage drop in hours, which simply shows that UI disproportionately benefits those with below-average wages.)

The costs of UI may be viewed in a somewhat different way. Dividing the total decline in earnings by total UI benefits received tells us the average number of dollars of output lost for each dollar spent on UI. Total benefits received by our sample were $5.32 billion. Thus, the lower bound findings imply that each dollar of UI cost the economy 18 cents in foregone output. The upper bound figure is 57 cents.

Table 3 focuses on living units that receive UI and distinguishes between UI beneficiaries and other members of the beneficiaries' households. Because the equations of (5) are solved simultaneously, both the beneficiary and others would be expected to alter their work effort if UI did not exist. For convenience we label the beneficiaries' response the "direct" effects and the nonbeneficiaries' reactions the "indirect" effects.[22]

According to the upper bound simulation, beneficiaries would have worked nearly 19 percent more hours (on average, an extra 224 hours per year) and earned 13.5 percent more in the absence of UI. The indirect effects are small. Over 90 percent of the total impact of UI was in the form of direct effects. This is not surprising, given that in Model 1 beneficiaries will have a large income effect (since they face a large guarantee) and a tax rate greater than .6 in most cases, while nonbeneficiaries will have a small income effect and a tax rate of zero.

Lower bound results are quite different. Direct and indirect responses are roughly equal. This, too, follows from the nature of Model 2,

Table 3

Reduction in Work Hours and Earnings of Recipients of Unemployment Insurance and of Nonrecipients Living with a Recipient

| | Hours | | | Earnings | | |
|---|---|---|---|---|---|---|
| | Billions of Hours | % of Total Hours | % of Reduction | Billions of Dollars | % of Total Earnings | % of Reduction |
| Upper Bound | | | | | | |
| Recipients | .92 | 18.8 | 92 | 2.84 | 13.5 | 93 |
| Nonrecipients living with recipient | .08 | 2.3 | 8 | .21 | 1.5 | 7 |
| Total | 1.00 | 11.9 | 100 | 3.05 | 8.8 | 100 |
| Lower Bound | | | | | | |
| Recipients | .17 | 3.4 | 57 | .57 | 2.7 | 60 |
| Nonrecipients living with recipient | .13 | 3.6 | 43 | .38 | 2.7 | 40 |
| Total | .30 | 3.5 | 100 | .95 | 2.7 | 100 |

which assigns both the beneficiary and other family members in his household the same guarantee and a zero tax rate.

Even the reduction in earnings caused by the UI program is not an accurate measure of the economic cost of the UI program to the economy as a whole--it is too high, for the leisure consumed by UI beneficiaries is of some value to them. The most appropriate measure of the economic costs of UI to the economy as a whole is the welfare loss induced by the program. The welfare loss measures the cost that arises from the distortion in the relative prices of leisure and all other goods as a result of the UI program. Harberger [1964] has shown that, under suitable assumptions, the welfare cost of a tax on earnings is approximately $1/2(et^2wL)$, where e is the elasticity of labor supply (the substitution effect), t is the marginal tax rate, w is the pretax wage and L is the quantity of labor. Because persons affected by the UI tax also pay regular income and payroll taxes on their earnings, this formula must be modified. Assume, as was done in the simulation, that the regular marginal tax rate is .2. For most UI recipients, the UI tax rate is 50 percent of <u>gross</u> earnings. Hence, we assume that the marginal rate faced by recipients is .625 (.5/(1-.2)). The marginal welfare cost of UI is, therefore, $1/2e(wL)(.625^2-.2^2)$, where wL equals gross earnings of only those affected by the UI tax rate.

Calculating the modified formula for each of the twenty demographic groups distinguished in the simulation and summing, we find the upper bound welfare cost of UI to have been $448 million in 1972.[23] This cost is .07 percent of total earnings. The welfare cost of UI, which is the most meaningful measure of the program's true cost to the economy, is trivial.

## 4. Summary and Conclusion

No one expects the economic costs of the current system of UI to be zero. The real question is whether they are "too high." To address this issue fully, one must compare the costs to the benefits. Also, one would like to know if a different type of UI program than the one whose effects we estimated could give an equivalent level of benefits at lower cost. In this paper we have concentrated just on estimating the economic costs of the UI program as it existed in 1972.

To do so we developed two models of the labor supply impact of UI based on contrasting sets of assumptions. Model 1 indicated that most beneficiaries of UI would experience both wage and income effects, but that some--those who had exhausted their UI eligibility--would only experience an income effect. Model 2 concluded that UI only exerts an income effect. We argued that empirical implementation of the two models would yield upper and lower bounds of UI's impact.

To estimate the models, five parameters were needed. Two coefficients of the labor supply function were taken from another study. The weekly UI payment, the UI tax rate and the wage rate were imputed from the CPS data. We found that the aggregate loss of labor supply due to UI ranged between 0.3 and 1.0 billion hours (0.21 to 0.72 percent of total hours worked). The corresponding loss of earnings was between 0.95 and 3.05 billion dollars (0.15 to 0.48 percent). In the absence of UI the additional labor supply, had it been employed during the observed weeks of unemployment, would have lowered the unemployment rate by 4 to 16 percent. A dollar of UI benefits on average reduced earnings (output) by 18 to 57 cents. Finally, the welfare cost to the economy as a whole was equal to less than one-tenth of 1 percent of total earnings.

In our view these costs are no cause for alarm, and well worth the benefits they purchase--economic security in an uncertain, cyclical world. This is a value judgment, for we did not attempt to quantify the benefits (nor is it clear how to do so), and others may disagree on the issue. Still, estimates of the effects of UI on unemployment rates, labor supply, earnings and welfare loss are necessary ingredients to any evaluation of the UI system.

## Appendix

Table A.1

Income and Wage Coefficients Used in Simulation

| Group | Income Coefficient | Wage Coefficient |
|---|---|---|
| Males: | | |
| 25-54, married, healthy | -.0119 | 22 |
| 25-54, married, unhealthy | -.1206 | 167 |
| 55-62, married | -.0228 | 40 |
| 55-62, single | -.0469 | 104 |
| 63-64 | -.0183 | 206 |
| 65-72 | -.0896 | -82 |
| 73+ | -.0104 | 12 |
| 25-54, single | -.0309 | 100 |
| 20-24, married | -.028 | 8 |
| 20-24, single | -.012 | 413 |
| Females: | | |
| 25-54, married, not head | -.0298 | 298 |
| 25-54, head | -.1209 | 773 |
| 25-54, single | -.0871 | 513 |
| 55-64, married, not head | -.0273 | 245 |
| 55-64, single or head | -.205 | 363 |
| 65-72 | -.150 | 81 |
| 73+ | -.0048 | 24 |
| 20-24, married, no children | -.0316 | 781 |
| 20-24, married, children | -.051 | 287 |
| 20-24 other | 0 | 439 |

Table A.2

Fraction of Average Weekly Earnings Replaced by Unemployment Insurance, Maximum and Minimum Payments, by State or Groups of States, for 1972

| State or Group of States | Fraction | Maximum | Minimum |
|---|---|---|---|
| Maine-Vermont, N.H.-R.I. | .55 | $ 99 | $14 |
| Massachusetts | .5 | 125 | 12 |
| New York | .67 | 75 | 20 |
| New Jersey | .67 | 76 | 10 |
| Pennsylvania | .62 | 93 | 12 |
| Md.-Del.-Va. WV.* | .52 | 78 | 20 |
| Maryland2 | .54 | 78 | 10 |
| District of Columbia | .57 | 105 | 14 |
| Connecticut | .5 | 138 | 15 |
| Ohio | .5 | 87 | 13 |
| Indiana | .52 | 65 | 20 |
| Illinois | .65 | 97 | 10 |
| Michigan* | .63 | 92 | 18 |
| Wisconsin* | .5 | 88 | 22 |
| Michigan-Wisconsin * | .6 | 90 | 20 |
| Minnesota* | .5 | 64 | 15 |
| Minn.-Iowa-N.D.-S.D.-Kansas-Nebr.* | .55 | 68 | 16 |
| North Carolina | .75 | 60 | 12 |
| Georgia* | .52 | 55 | 12 |
| Georgia-South Carolina* | .51 | 59 | 12 |
| Florida | .5 | 64 | 10 |
| Kentucky-Tennessee | .54 | 68 | 14 |
| Alabama-Mississippi | .5 | 60 | 15 |
| Louisiana* | .65 | 70 | 10 |
| La.-Ark.-Okla.* | .55 | 70 | 16 |
| Texas | .52 | 63 | 15 |
| Colorado* | .6 | 86 | 14 |
| Co.-Mont.-Wyo-Idaho-Nev.-NM.-Utah* | .5 | 63 | 15 |
| Arizona | .52 | 60 | 10 |
| California | .54 | 75 | 25 |
| Washington* | .52 | 78 | 17 |
| Wash.-Ore.-Hawaii* | .55 | 78 | 20 |

Source: Joseph Hickey, "State Unemployment Insurance Laws--A Status Report," Monthly Labor Review, January 1973.

*For states that appear both by themselves and in a group, the CPS code for state of residence included the entire group, but another variable that identified a person's SMSA allowed us to determine his exact state of residence. For example, persons living in the Denver SMSA must live in Colorado, but if they do not live in this SMSA, the state codes do not tell us in which of the seven mountain states they reside.

Notes

[1]Feldstein argues that the program has undesirable distribution effects. As Stanley A. Horowitz [1976] notes, however, Feldstein's data on the distribution of benefits are not sufficient to derive conclusions about the distributional impact of the UI program. Data on the distribution of costs are also required. This paper is not concerned with the distributional effects of UI.

[2]Coincidentally these cases--seasonal workers and workers such as the auto workers who regularly get laid off--are the ones that Feldstein most frequently cites as examples of those who are strongly affected by the work disincentives of the UI system.

[3]Although this paper focuses exclusively on the work disincentive effects of the benefit side, the tax side of the UI system also affects work behavior. Assume that the ultimate incidence of the UI tax is on the worker. By reducing the wage, the UI tax reduces labor supply. On the other hand, by reducing income the UI tax serves to increase labor supply. Which effect dominates cannot be ascertained theoretically. The net effect of the benefit and tax sides, however, is almost certainly negative. Income effects from the tax and benefit side should pretty much cancel each other out, leaving the adverse substitution effects of both the benefit and tax sides.

[4]Parameters of the labor supply function have been estimated for a wide variety of demographic groups. Comparable parameters of the job search function have not been empirically estimated.

[5]All of our models assume that initial unemployment and UI eligibility are <u>for the most part</u> exogenous. To assume otherwise necessitates an explanation of why most people do not collect UI benefits. But to the extent that some individuals are able to choose unemployment and UI status--by entering seasonal industries, for example--our estimates of the effects of UI capture this effect. In estimating the effects of UI on labor supply we increase the labor supply of all UI beneficiaries as described in the text in order to obtain an estimate of how much UI beneficiaries would have worked in the absence of UI.

[6]Unemployment insurance benefits are not taxed.

[7] Note that to person j, person i's loss of UI exerts an income effect of size $-b_j \cdot UI_i$. Any change in earnings of other family members in response to the family's loss of UI also exerts an income effect on person j.

[8]This assumption breaks down for persons who experience extended periods of unemployment. For example, it is dubious that many workers would be indifferent between working 26 weeks for 80 hours per week or 52 standard 40-hour weeks.

[9]To workers who anticipate being regularly unemployed--seasonal workers are a prime example--UI payments could constitute an appreciable increase in their expected lifetime incomes. Moreover, there is some evidence to suggest that the labor supply behavior of secondary workers, particularly wives, is quite sensitive to temporary changes in income due to unemployment.

[10] For some evidence that the UI work test does in fact make some difference, see Holen and Horowitz [1974].

[11] Of course it will also attract individuals from the nonseasonal work force into seasonal employment--a disincentive effect. Which effect--disincentive or incentive--will predominate cannot be ascertained on an a priori basis. Note, however, that our model and simulation capture the disincentive effect and as noted in the text do even worse than failing to capture the incentive effect--that is, the model treats those affected by the incentive effect as if they were responding to a disincentive effect.

[12] Note that to solve (5) we need not observe the exact location of point B in Figures 1 and 2. Besides the five parameters listed in the text, all we need to know is whether the recipient is somewhere along GH or HW in Figure 1.

[13] The categories are 50-52, 48-49, 40-47, 27-39, 14-26, 1-13, and zero. Thus, except for the first two categories, it would be difficult to estimate accurately a person's wage by dividing earnings by hours worked in the year.

[14] We did not run separate wage regressions for all twenty subgroups specified in Appendix Table A.1 because for some of these subgroups very few persons worked full time for at least 48 weeks. Instead, eleven wage equations were estimated for the sample stratified along age, sex and marital status variables, and eight equations were estimated for the same sample stratified along age, sex and race (white or nonwhite) dimensions. The best fitting regression(s) for each of the twenty subgroups was then used to impute the wage. For example, for married males 25-54 we found that

the best predicting wage equations were those for white males age 20-63 and nonwhite males 20-63. That is, allowing full interaction by race (with a dummy for marital status) gave a better fit than running a regression for a sample of married males, and a dummy variable for race.

The specification for these equations was either

$$\ln WR = a + bDEM + cREG + dOCC + eIND + \varepsilon \text{ or}$$

$$\ln WR = a' + b'DEM + c'REG + \varepsilon'$$

where DEM is a vector of personal traits (age, education, race or marital status), REG is a vector of geographic variables, and OCC and IND are the person's occupation and industry of employment. If the person reported no occupation or industry, the second equation is used to impute his wage (this often occurs because many in the sample were not in the labor force in 1972). Otherwise, the first is used. We include occupation and industry variables because we wish to predict wages as accurately as possible, not to determine structural relationships.

15/The CPS often assigns the same numerical code to several less populous, neighboring states. The larger states are identified uniquely. When two or more states have the same code, the fraction and maximum and minimum are determined by taking a weighted average of the several separate values. The weights are proportional to expenditures on UI in each state in 1972. See Appendix Table A.2 for the full set of values used.

16/In most cases $\frac{WB}{WK} = .5$. Dividing .5 by .8 gives .625, which is quite close to Feldstein's estimates of the average UI tax rate for most demographic groups. Morevoer, as noted by Munts and Garfinkel [1974], the Feldstein estimates are somewhat too high for several reasons. For example, the value of foregone fringe benefits should be counted in the wage rate but is not by Feldstein.

[17]For example, the increased earnings of the husband in response to his loss of UI might lead the wife to work less. If she were not working to begin with, no reduction is possible.

[18]As noted in Smeeding [1975], the CPS does not indicate the exact number of weeks worked. Nor does it report the exact number of weeks unemployed (the categories are 0, 1-4, 5-10, 11-14, 15-26, 27-39, 40+). The data also include another set of categories for total weeks in the labor force, but again the precise value is not available. Because of this problem, one cannot compute exact unemployment rates. Our procedure was to first choose a set of values for weeks employed and weeks unemployed so that each separate value fell within its reported range, the sum fell within the reported range of weeks in the labor force, and the combination so chosen would maximize the person's annual rate of unemployment. Another consistent set of values was chosen that minimized the unemployment rate. An average of the two was also calculated for each person. Because the average individual unemployment rates yielded a national rate close to the reported one, we have only presented results based on these averages. Our calculated rate is 4.15 percent. The reported rate for persons over 20 in 1972 was 4.51 percent (computed from Ford [1976], Table B-23).

[19]If WI > WV, the expression is 0/(WW+WI).

[20]Persons who worked in 1972 and were never unemployed might also change their work effort if UI were eliminated (if other family members received UI). For these individuals the initial unemployment rate is 0/WW = 0. The removal of UI would change this to 0/(WW+WI) = 0 or

0/(WW-WD)= 0. The value of the fraction obviously does not change, but the change in total weeks in the labor force will affect the aggregate unemployment rate.

Finally, persons who are not members of the labor force might join it if UI were eliminated (to compensate for another family member's loss of UI). With UI, such persons have no impact on the national rate. But without UI, their WI's are added to the denominator of this rate. Because we assume that this increase in labor supply is fully absorbed by the economy, the number of weeks of unemployment does not rise.

[21]Recall that we assume the individual is indifferent between overtime and nonovertime hours at the same wage rate. If the individual expects to have the opportunity to earn a premium overtime wage rate once he becomes reemployed, he would prefer this to a temporary job during his unemployment spell. In this case our estimate of the effect of UI on the conventionally measured unemployment rate would be too high. UI would have no effect on this rate since the individual would not work during these weeks in any case. Alternatively, if the individual did not expect to have the opportunity to earn a premium overtime rate once he became reemployed, he might choose to take a temporary job. In this case our estimate of the effect of UI on the conventionally measured UI rate could be too low.

[22]These terms are oversimplified. After all, a recipient's net response reflects the impact of the guarantee and (for the upper bound) tax rate imposed by UI <u>plus</u> any additional earnings of nonrecipients who, on the one hand, would earn more to partially offset the loss of actual

UI payments but, on the other hand, would earn less to the extent the recipient works longer after losing his UI. The simultaneous solution we generate prevents any ready separation of direct and indirect responses.

[23] The result is an upper bound because it was computed under the assumption that all recipients faced the UI tax. Yet Model 1 shows that some recipients are not affected by the tax and Model 2 concludes that no recipient's behavior is altered by the tax.

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