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SOCIAL INSURANCE AND CONSUMPTION: AN EMPIRICAL INQUIRY

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ABSTRACT

The main stated purposes of social insurance programs have been the maintenance of consumption by people suffering from misfortunes, and the stabilization of employment. Despite this, most recent research on unemployment insurance (UI) and Old Age Insurance has focussed on secondary labor-market effects, with only a few studies looking at stabilization, and none considering effects on consumption. In this study we examine how UI will affect the consumption of recipients. For some individuals UI will help remove the constraints on consumption during periods of reduced income that arise from insufficient savings and imperfect capital markets, while for others the UI benefits merely augment the entire lifetime consumption stream. The model enables us to estimate what fractions of the population fall into these two categories. If individuals are also constrained in the allocation of their reduction consumption, consumption propensities out of UI will differ from those out of nonrecipients' income.

The model is tested on aggregate time-series data covering 41 comsumption categories for 1959-1978:II, and on over 14,000 individuals from the 1972-73 Consumer Expenditure Survey. In both data sets we find no more than half of UI benefits are consumed as if the recipients' consumption were constrained during times of unemployment. In both samples spending out of UI benefits is disproportionately on luxuries, though UI recipients spend greater shares of their income on necessities. The results imply that a large part of social insurance payments does not go to prevent serious imbalances in individuals' lifetime consumption profiles.

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I. Introduction

From its inception Social Security in the United States has had as its major purpose the maintenance of living standards among individuals hurt by social misfortunes beyond their control. For example, one early student of social insurance (Burns, 1933) noted, "Provision for those whose income has ceased because of unemployment will constitute a major problem of practical economics for years to come." In his message to Congress transmitting Social Security legislation, President Roosevelt stated, "The men, women and children of this Nation. . .want some safeguard against misfortune which cannot be wholly eliminated in this man-made world of ours." Indeed, the preamble to the bill that eventually became the Social Security Act stated it was designed "To alleviate the hazards of old age, unemployment."[1/] Since the enactment of the legislation this basic purpose of income maintenance has been acknowledged by both management and labor. In the case of unemployment insurance (UI), the National Association of Manufacturers claims UI has the "long-term purpose of stabilizing employment and lessening the hardship and insecurity caused by irregular business operations." The AFL claimed that, "Like a firm's replacement and depreciation fund, it [social insurance] provides, out of our past labors, the means to weather misfortune and to keep fit or to prepare ourselves for future work."[2/]

Despite this objective, the actual effects of social insurance on consumption have received no attention from economists during the recent upsurge of interest in this subject. In the area of unemployment insurance, most of the attention has focused on the secondary issue of the duration of workers' unemployment spells, with only a few studies even considering whether UI stabilizes employment.[3/] Most of the interest in old age insurance has been in its effects on retirement and on private saving and the rate of accumulation of physical capital[4/]. While these studies do have important implications for aggregate

consumption, they do not focus on the issue of the extent to which old age insurance is successful in alleviating hardship. Recent work on the effects of Disability Insurance too appears to be concerned only with the (indirect) labor-market effects of the program.[5/] The absence of recent interest does not mean that students of social insurance have ignored this basic issue. Since the 1950s the Department of Labor has conducted a number of budget studies (so-called benefit adequacy studies) designed to examine the spending patterns of recipients of unemployment insurance.[6/] None of these, though, has been couched in the framework of economic theory.

Our purpose here is to provide a basis, consistent with standard theories of consumption, for examining how unemployment insurance payments may affect both total consumption and its pattern. The centerpiece of the empirical work on several different data sets is an estimate of the extent to which these payments are adequate, in the sense that they are spent by recipients in a way that indicates the individual would otherwise suffer a substantial reduction in lifetime utility. Our analysis enables us to evaluate how closely the current system of unemployment insurance is targeted toward its original major goal. The method is directly applicable to evaluating the effects of Disability Insurance and Workers' Compensation in maintaining consumption, and can be applied mutatis mutandis to examining the effects of Old Age Insurance.

II. Motivation in Life-Cycle Theory

In this section we motivate the four sets of empirical work in this paper by considering how differences in spending propensities and patterns out of UI and other income might arise. Essentially the results hinge on the assumption that some unobserved fraction of UI recipients are constrained in their con-

sumption spending. This constraint may exist because the individuals have insufficient precautionary savings and cannot borrow at a sufficiently low interest rate to make it worthwhile for them to smoothe their consumption. Presumably such a situation is less likely to arise among workers who repeatedly experience temporary layoffs, which are expected and for which saving is provided. Thus seasonally unemployed workers, and persons in industries in which there are repeated and expected fluctuations in employment are less likely to be observed consuming as if their behavior was constrained by illiquidity.

A household that does not receive UI benefits will be assumed to spend according to the usual results of the permanent income theory:

$$C = a_1 YP \quad , \tag{1}$$

where C is consumption spending, YP is permanent non-UI income, and a_1 is a parameter. Similarly, a household that receives UI benefits but is not constrained by illiquidity will be assumed to spend according to:

$$C = a_1 [YP + UP] \quad , \tag{2}$$

where UP is permanent UI benefits. (As with other income, we assume that UP represents a flow of income that the household expects to receive each remaining year of its existence.)

A household that is constrained because of illiquidity is ipso facto consuming at a rate below that implied by an ex ante optimal lifetime consumption path. Had it expected the spell of unemployment, or were it able to borrow during that spell, its consumption would have been higher during the period of unemployment, and lower in at least some other periods. Therefore, it will not

merely spend a large fraction of each dollar of permanent (expected) UI benefits, nor will it treat transitory (unexpected) benefits as part of lifetime wealth and spend only a small fraction of them. Instead, it will spend each dollar of its income, both other income received during the period, and UI benefits. Its consumption can thus be described by:

$$C = Y + U = YP + YT + UP + UT \quad , \tag{3}$$

where Y is all other income, U are UI benefits, and the "T" denotes a transitory flow. In the empirical work in Sections III and IV we use aggregate data, and micro data on households, to infer the fraction of UI benefits paid, or UI recipient households, α, whose behavior can be characterized by (3) rather than (2). In a very real sense our estimates of α measure the extent to which unemployment insurance is achieving the major goal that lay behind the program at its inception.

This discussion provides some insight into the justification for a system of UI benefits.[7/] For the household that is constrained lifetime utility is less than the lifetime utility of the unconstrained household with the same total income if there is decreasing marginal utility of consumption in any period. The loss occurs because the constrained household consumes "too little" during the constrained period and "too much" during the rest of its existence. In this view UI "tides it over" by enabling it, through a social mechanism, to smoothe consumption.

Consider a household that receives UI benefits. If it is constrained it will decrease its consumption below what it would otherwise consume. How will the decrease be distributed across commodities? If the household is rational and is

free to decrease consumption as it chooses, it will be observed consuming exactly the same bundle of goods as an unconstrained (or nonrecipient) household with the same tastes, whose total consumption is the same as its own (reduced) spending. Conversely, a small increase in U will be spent among different commodities in exactly the same proportions as would be a small increase in YP received by the unconstrained (or nonrecipient) household. Once we have adjusted for differences in income and in total MPC's out of UI and other income, we should expect to observe: 1) Average propensities to spend on different commodities should not differ among UI recipients and others; and 2) The marginal propensity to spend on the i'th commodity out of UI benefits should be equal to that out of other income (by nonrecipients). If we fail to observe these effects, we may infer that there are additional constraints that prevent the unemployment insurance recipient from allocating his (reduced) total spending in a way consistent with long-run utility maximization. In Section V we examine patterns of spending using both cross-section micro data and time-series aggregate data.

III. Time-Series Estimates of the Fraction Constrained

In this section we use aggregate data from the national accounts to estimate the fraction of UI benefits which are spent as in (3). Since these are aggregate data, and we do not know which individuals are receiving unemployment benefits and spending them as if they were constrained, we assume implicitly that each individual recieves the same fraction of his income in the form of UI benefits. To embody the permanent income hypothesis we need to derive measures of permanent UI benefits and permanent other income. In a pure version of the permanent in-

come hypothesis, only these measures will affect consumption. The data on income flows are from 1954:I through 1978:II; the series that form the basis for our estimates are U, government unemployment insurance benefits, and Y, disposable personal income less UI benefits, each deflated by the deflator for personal consumption expenditures.[8/]

To derive the appropriate "permanent" component of each of these series, univariate filters which efficiently utilize the systematic information contained in the past history of the series were identified and estimated using standard Box and Jenkins (1970) techniques. The preferred model for the UI benefits series is a simple second-order autoregressive model in the logarithm of UI benefits. That for disposable personal income net of UI benefits is also a second-order autogregressive model in the logarithm, but it, unlike the UI benefits model, contains a deterministic trend (that is, the net disposable personal income model is an autoregressive integrated process).[9/] The χ^2 tests of the autocorrelation functions for both models indicate that the hypothesis that the residuals generated by the models are "white noise" cannot be rejected at any reasonable significance levels.

Before discussing the estimating model that arises out of (1)-(3), we present for comparison purposes the estimates of a number of naive models of consumption spending out of UI benefits and other income. We measure C as personal consumption expenditures other than durables. (Rather than construct an ad hoc measure of the services of durables, we follow Hall, 1978, and test the model on all other consumption spending.) Each equation in Table 1 is estimated using a two-round procedure in which an autoregressive parameter, $\hat{\rho} = .834$, is estimated and used to difference the data. Comparing the first and second columns, or third and fourth,

Table 1. Parameter Estimates, Naive Models, Aggregate Consumption except Durables, 1954:I-1978:II, $\hat{\rho}$ = .834.[a]

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	56.45	56.33	69.76	68.61	50.18	50.06	48.73
	(6.01)	(6.09)	(5.34)	(5.44)	(6.41)	(6.35)	(6.61)
YP			.684	.676	.713	.714	.710
			(36.58)	(37.04)	(63.52)	(61.62)	(65.09)
UP			.684	1.918	.713	.570	1.421
			(36.58)	(4.38)	(63.52)	(1.97)	(4.03)
YT					.478	.485	.513
					(13.41)	(12.55)	(13.89)
UT					.478	.485	2.22
					(13.41)	(12.55)	(4.81)
Y	.704	.698					
	(52.35)	(51.17)					
U	.704	1.555					
	(52.35)	(3.54)					
- 2 Log λ	329.44	333.24	263.24	271.12	366.94	367.20	381.14

[a] t-statistics in parentheses.

we see the surprising result that UI benefits, either actual or permanent, appear to increase consumption spending more than one dollar for each dollar of benefits.[10/] This likely reflects the dissaving that occurs in recessions, when UI benefit payments are transitorily higher. The equation in the fifth column suggests that transitory flows of UI and other income do affect consumption, while the estimates in column (7) indicate that UI benefits, both permanent and transitory, lead to greater consumption spending than do flows of other income. Interestingly, while spending out of permanent Y exceeds that out of transitory Y, the opposite is true for UI benefits. Since our discussion implied that, if people are constrained in the capital market, they would spend disproportionately out of UI benefits, this naive model provides some initial support for the theory.

By weighting (1)-(3) appropriately, and assuming that their stochastic versions have the same error distributions, we can combine them to derive an estimating equation that includes α as a parameter. The behavior of a fraction 1-I of the population, where I is the ratio of insured unemployment to the civilian labor force, can be characterized by (1) with a constant term, a_0, appended to that equation. (This term is added because our time-series methods for decomposing Y and U into permanent and transitory components may not produce series that correspond perfectly to the theoretically correct ones.) Similarly, of the fraction I of the population that receives benefits, we assume a fraction $1-\alpha$ is not constrained and consumes according to (2) (also with a constant term, a_0, added).

Because our measure of C excludes durables, we cannot assume that constrained UI recipients spend each dollar of income on those other commodities included in measured C. We thus rewrite (3) as:

$$(3') \qquad C = a_1 a^*[Y + U] \quad ,$$

where a* is the inverse of the marginal propensity to spend on all items, including durables.[11/] Implicitly this respecification states that each extra dollar of income that the constrained household receives will be spent in the same proportions on durables and other goods, and that these households' MPC's on all goods will sum to one.[12/] Of the population of UI recipient households, we assume a fraction α behaves as if constrained; thus αI of the total population consumes according to (3').

Combining (1), (2) and (3') using the weights 1-I, $I(1-\alpha)$ and αI, we derive the estimating equation:

$$(4) \qquad C_t = a_0\{1-\alpha I_t\} + a_1\{YP_t[1-\alpha I_t + \alpha a^* I_t] + UP_t[1-\alpha + \alpha a^*] + a^*\alpha[YT_t + UT_t]\} \quad ,$$

where the subscript t is appended to each time series.[13/]

The parameters in (4), estimated by nonlinear least squares on the series that have been transformed using the parameter $\hat{\rho} = .834$, are presented in the first column of Table 2. Clearly, the most important finding is that $\hat{\alpha} = .599$. This indicates that a substantial fraction of UI recipients behave as if their borrowing is constrained. Further, the confidence interval around the estimate is fairly narrow. We may conclude that the aggregate evidence is fairly strong that a narrow majority of UI recipients "need" UI benefits, in the sense that their behavior shows they are unable to borrow to maintain their consumption at the levels that would keep them on an optimal consumption path over their lifetimes. For a rather large group, though, the benefits are spent like other income, suggesting the recipients' consumption is not constrained by illiquidity.

Table 2. Parameter Estimates, Equations (4) and (4'), Aggregated Data, 1954-1978[a]

	(4)	(4')
Constant	50.28 (6.39)	49.76 (6.44)
a_1	.712 (63.47)	.714 (64.63)
α	.599 (9.14)	
α_1		1.265 (2.80)
α_2		-.814 (-2.17)
$\hat{\rho}$	.834	.834
$-2\log\lambda$	366.74	375.34

[a] t-statistics in parentheses

As we noted in justifying the introduction of a_0, and as implied by the not insubstantial coefficients on YT in Table 1, our predictors of YP and UP may not fully reflect the theoretical concepts of permanent flows of income. To the extent that this is the case, our estimate of a_1 will be biased down. More important, because we implicitly estimate α as a weighted average of one and $\hat{a}_1$, this bias means that $\hat{\alpha} > \alpha$. Thus .599 should be viewed as an upper bound on the fraction of benefits that are spent as if their recipients' consumption was constrained.

Although (4) cannot be written as a nested version for any of the equations shown in Table 1 (because (4) includes the variable I_t), it is still worth examining how well it performs compared to the naive models. The log-likelihood function for (4), which estimates three parameters, is only slightly below that in column (6) of Table 1. (If a likelihood-ratio test were justified, we would find $\chi^2(1) = .46$.) However, the model in column (7), which estimates five parameters, performs far better than (4). (A likelihood-ratio test would yield $\chi^2(2) = 14.40$.) We may conclude that any failure of (4) to describe the data well does not arise because the complicated nonlinear specification is incorrect. Rather, it appears that the model cannot capture the apparent differences in spending propensities out of YT and UT, differences that we attribute to the conjunction of dissaving and transitorily high UI payments.

We can also examine whether the fraction of UI recipients who are constrained varies cyclically. On the one hand, this fraction may increase in recessions as people experience increased hardship when the duration of unemployment spells lengthens. On the other hand, it may decrease as the composition of UI recipients tilts toward the more-skilled, more middle-income worker (see Hamermesh, 1977), for whom cyclical unemployment is something expected and saved for.

To examine these possibilities, write:

$$(4') \qquad \alpha = \exp(\alpha_1 + \alpha_2 UR)/[1 + \exp(\alpha_1 + \alpha_2 UR)] \quad ,$$

where the α_i are parameters to be estimated, and UR is the prime-age male unemployment rate. Estimates of (4) in which α is specified as in (4') are shown in the second column of Table 2. Both the $\hat{\alpha}_i$ are significantly different from zero; $\hat{\alpha}_2 < 0$ implies that the borrowing constraint facing UI recipients becomes less important as labor-market conditions worsen. While this result could lead one to conclude that the unemployed are better prepared for cyclical unemployment than for any random shocks that occur outside of cyclical movements, we should remember that the fraction of UI beneficiaries who exhaust benefits increases in recessions. Since these persons are implicitly excluded from (2) and (3), $\hat{\alpha}_2$ is biased down if exhaustees of benefits are more likely to be constrained than are current UI recipients.

IV. Estimates from the 1972-73 Consumer Expenditure Survey

Our estimates pool the 1972 and 1973 panels of the Consumer Expenditure Survey (CES). The only difficulty with this data source is that just one year's data on income are available for each household; there is no overlap between households in the two years sampled. This means that we cannot construct a measure of permanent income. Instead, we examine the potential biases this failure may induce into our estimates, and the estimates are evaluated accordingly.[14/]

In selecting a subsample from the CES we disqualified all households that: 1) Were in the survey for only part of the sample year; 2) Either refused to report their incomes, or reported incomes incompletely; 3) Had a household head who was self-employed; 4) Had a head at least seventy years old; 5) Provided no

information on the head's marital status; or 6) Provided no information on the employment status of the head or spouse. Finally, to remove possible bias due to errors in reported income the sample was truncated to exclude all households that reported negative net income or net income greater than $50,000 in the survey year. One household that listed UI as $22,184 was also deleted. (These final disqualifications removed only .5 percent of the sample.) This left us with a sample of 655 UI recipient households and 13,646 other households.

The thousands of consumption categories in the CES were combined into 31 commodities; where possible, durable goods purchases were separated from charges for past purchases. In-kind consumption was added to cash expenditures in the appropriate categories and also to after-tax income. Beyond that we used the BLS categories for reporting results from this survey (BLS, 1977). The sum of spending in the 31 categories is used as our total consumption measure, C. Because some durable goods purchases are included, this variable is really a spending rather than a consumption measure. In addition to our failure to observe permanent income, this is another reason to expect the estimated MPC's to fall below what is usually produced in time-series studies.[15/]

Two income variables are used in our estimates. The first is reported receipts of government unemployment insurance, including regular state UI, extended benefits, UCFE and UCX. Net other income, Y, was calculated as gross income including nonpurchased consumption, minus personal taxes, retirement and other deductions, and UI. Essentially our dichotomy breaks total spendable income into UI and other net income.

Because there are likely to be substantial differences among the households in their propensities to spend, both in total and on different commodities, we control for a number of household characteristics. Factors included are:

1) Dummy variables for location, one for households in SMSAs with population over 400,000, the other for households in other SMSAs; 2) A dummy variable if the head of household is white; 3) A dummy variable equalling one for households in which the head is less than 25 years old, and another equalling one if the household head is over 55; and 4) Variables measuring the number of persons in the household, the number of children less than six years old, and the number of children ages 6-17.

As in Section III, we first consider estimates of some naive models, variants of:

$$C = b_0 + b_1 Y(1-D) + b_2 Y \cdot D + b_3 U \cdot D \quad , \tag{5}$$

where the b_i are parameters to be estimated, and D is a dummy variable equalling one if the household receives UI benefits. The OLS estimates of (5) on the 14,301 households in the 1972-73 CES are presented in Table 3. The first equation is (5) as listed above. The effects of the eight demographic variables are as expected and consistent with prior research.[16/] Because of the inclusion of transitory income in our measure Y, the estimated propensities to spend out of Y fall far short of those estimated in studies that include measures of permanent income. We find consistently that only 56 cents of each extra dollar of non-UI income is spent. (The average propensity to spend is a quite reasonable .9.) However, as in the time-series data, the MPC out of UI benefits exceeds that out of other income, suggesting at least some UI recipients may be constrained in their spending.

The second equation in each set in Table 3 constrains $\hat{b}_2 = \hat{b}_3$. It allows the test of the hypothesis that spending propensities out of UI and other income by recipients are equal. The t-statistic for the imposition of this constraint

Table 3. Estimates of (5) with Various Constraints on Income Terms, 1972-73 CES Data.

	Other Income (Nonrecipients)	Other Income (Recipients)	UI	R^2
All Persons	.5590	.5359	.6687	.551
	(97.51)	(30.36)	(4.20)	
	.5587	.5442	.5442	.551
	(97.67)	(38.48)	(38.48)	
	.5586	.5586	.5586	.551
	(97.68)	(97.68)	(97.68)	
UI Recipients		.5512	.7459	.523
		(19.26)	(4.49)	
		.5501	.5501	.522
		(19.22)	(19.22)	

is .79. We then estimated the third equation, in which we specified that $b_1 = b_2 = b_3$, given $b_2 = b_3$. Not surprisingly, given the relatively small number of households that receive UI income, the estimated coefficient is quite close to that produced for b_1 in the first version of this equation. The t-statistic on this constraint is 1.10, again not significantly different from zero. The hypothesis that the three spending propensities are the same cannot be rejected, though the t's are nearly one for both constraints.

The impression given by our results for the entire sample is corroborated by estimates based only on the households that received UI benefits. The coefficients in these equations on the two income variables are presented in the bottom part of Table 3. As in the complete sample, there is a greater response of consumption to UI benefits than to other income.

We can use these estimates to make inferences about α. First, add the vector of demographic variables and their coefficients, βX, to each of (1)-(3). As in Section III we let (1) (with this modification) represent the behavior of nonrecipients; (2) represent that of unconstrained recipients, a fraction $1-\alpha$; and (3) capture behavior of the fraction α of UI recipient households whose spending is constrained. Then combining these three, we get:

$$(6) \qquad C = \beta X + a_1 YP(1-D) + [a_1(1-\alpha)+\alpha][YP+UP]\cdot D + \alpha[YT+UT]D \quad .$$

The absence of longitudinal information on each household's income prevents us even from forming proxy measures of these theoretically correct income variables. Moreover, in general there is no way of linking the estimates of b_1, b_2 and b_3 to the parameter α in (6). Under two polar cases, though, $\hat{b}_3$ can be used to produce an estimate, though likely a biased one, of α:

Case I: All UI income is treated as transitory, so that UP $\equiv$ 0. In that case $E(\hat{b}_3) \lesseqgtr \alpha$ as $r(YT \cdot D, U \cdot D) \gtreqless 0$, i.e., as the correlation between transitory other income and UI benefits is negative or positive among the UI recipient households.[17/] It is likely that this correlation is negative: Households receiving larger than average UI are likely those that have suffered a transitory earnings loss. This means that $\hat{b}_3$ overestimates α; any calculation based on $\hat{b}_3$ and on the assumption that all UI benefits are transitory should be viewed as an upper bound on the fraction of households that are constrained.

Case II: All UI income is treated as permanent. In this case $\hat{b}_3$ is an estimate of $a_1(1-\alpha) + \alpha$. It may be biased for two reasons: 1) If $(Y \cdot D, UP \cdot D) \neq 0$. However, since the discussion in footnote 17, and the previous literature, suggest this correlation is small, it is unlikely the bias arising from this source will be very great. 2) If $E(\hat{b}_1) \neq a_1$. In fact, for the reasons we discussed earlier, $\hat{b}_1$ is likely to be an underestimate of a_1. Calculating $\hat{\alpha}$ as $(\hat{b}_3-\hat{b}_1)/(1-\hat{b}_1)$ thus produces an overestimate of α. We may be sure that, whatever the mix of permanent and transitory income in UI benefits in this sample, the highest estimate of α that we produce is itself an overestimate of the true α, so that we provide an upper bound on the true fraction of households whose consumption is constrained.

Consider the implication of the unconstrained estimates of b_1 and b_3 in the first row of Table 3, .669 and .559, for the estimation of α under the two polar assumptions discussed above (that UI benefits are either all transitory income or all permanent income). As the top row of Table 4 shows, under Case I the implied $\hat{\alpha}$ = .669; under Case II the estimate is $\hat{\alpha}$ = .249. Though the confidence intervals around these estimates are fairly wide, the point estimates themselves do bracket the $\hat{\alpha}$ estimated from time-series data.[18/] Given our inability to determine the fraction of benefits that is viewed as permanent, it is difficult

Table 4. Implied $\hat{\alpha}$ From OLS Equations, and 90 Percent Confidence Intervals, 1972-73 CES Data

Assumption	UP ≡ 0	UT ≡ 0
	Based on All Persons	
$\hat{\alpha}$	.669	.249
	(408, .930)	(-.341, .839)
	Based on UI Recipients (Indirect Estimates)	
$\hat{\alpha}$	.746	.434
	(.473, 1.019)	(-.156, 1.024)
	Based on UI Recipients (Direct Estimates)	
$\hat{\alpha}$	.746	.434
	(.411, .925)	(.063, .897)

to narrow the range of estimates. Nonetheless, in the time series decomposition of U, we found that 95 percent of benefits could be viewed as permanent. Also, Warden (1967) showed that at least one-third of benefits accrue to seasonally unemployed workers. These considerations, and the recognition that the $\hat{\alpha}$ are probably biased up, suggest the true α is less than one-half. Hence, as in the time series, the estimates imply that a large fraction of UI recipient households do not use benefits to replace lost consumption that represents hardship.

Alternative estimates of α can be derived using the $\hat{b}_2$ and $\hat{b}_3$ from the fourth row of Table 3, estimates based only on UI recipients. Assuming $a_1 = \hat{b}_2$, we find in the second row of Table 4 estimates that are slightly higher than those based on $\hat{b}_1$ and $\hat{b}_3$ estimated over the entire sample. (The range of the two estimates is, though, nearly centered on the $\hat{\alpha} = .599$ we estimated in Section III.)

Because of the linear specification of (5) the confidence intervals around the implied $\hat{\alpha}$ can include points outside the zero-one range. To restrict the $\hat{\alpha}$ to lie in the [0,1] interval, (5) was reestimated using logistic specifications of α under the two alternative assumptions, $UP \equiv 0$ and $UT \equiv 0$.[19/] The $\hat{\alpha}$ from this specification are, of course, the same as those calculated from OLS estimates of (5). The confidence intervals around the $\hat{\alpha}$, presented in Table 4, are still quite wide. From these and the other cross-section estimates we can conclude that, though it appears that around half of the households spend as if UI benefits are not needed to maintain consumption, our estimates of this fraction are not too precise.

V. Patterns of Spending Across Commodities

To examine whether UI recipients are able to optimize within the constraint implied by reduced spending, we first examine the relation between income elasticities and the spending shares allocated by UI recipients and others. The income elasticities are based on estimates from the CES of:

$$(7) \qquad C_i = b_{i0} + b_{i1}\, Y(1-D) + b_{i2} Y \cdot D + b_{i3}\, U \cdot D, \quad i=1,\ldots,31,$$

where C_i is spending on the i'th consumption category, and the b_i are parameters characterizing spending on items in that category. As in the estimates for total spending, each equation describing spending on particular commodity groups contains the eight control variables we discussed earlier.

The OLS estimates of (7) over the sample of 14,301 households were, not surprisingly, quite variable. Nonetheless, $\hat{b}_{i3} > 0$ for 29 commodity groups, and significantly so for 17 of these. We calculate income elasticities at the means of consumption and income for nonrecipients, using the estimates of $\hat{b}_{i1}$. These elasticities are presented in the first column of Table 5. The aggregation of the thousands of individual commodities into 31 groups still leaves room for substantial diversity: The income elasticities range from -.07 to 1.59. The only difficulty is that the share-weighted average of these elasticities is .73, substantially below the value of unity that is consistent with the theory of consumption. The low value undoubtedly results from our inability to measure permanent incomes.

A proper test for differences in spending patterns between UI recipients and others requires that their spending be adjusted to reflect differences in incomes. If UI recipients' total incomes are below those of nonrecipients, comparison of spending shares would give a biased result, for the UI recipients' spending will

Table 5. Income Elasticities, Adjusted Consumption Shares and MPCs Out of Y and U, 1972-73 CES Data.

Commodity Group	$\partial \ell nC_i / \partial \ell nY$ (1)	Adjusted Consumption Shares UI Recipients (2)	Adjusted Consumption Shares Others (3)	$\hat{b}_{i1}$ (4)	$\hat{b}_{i3}$ (5)
Food Consumed at Home	.240	.1643	.1536	.0331	.0310
Food Consumed Away from Home	.820	.0410	.0425	.0313	.0269
Alcohol	.815	.0113	.0089	.0065	.0215
Tobacco	.030	.0196	.0148	.0004	.0119
Rent	-.066	.0770	.0651	-.0039	.0317
Spending on Owner-Occupied Housing	.967	.0748	.0821	.0713	.0938
Utilities	.361	.0457	.0449	.0146	.0178
Telephone	.427	.0189	.0193	.0074	.0090
Domestic Service	1.587	.0071	.0091	.0130	.0131
Other Household Expenditures	.972	.0034	.0037	.0033	.0290
Home Furnishings	.777	.0480	.0492	.0344	.0184
Cleaning	.541	.0094	.0090	.0044	.0079
Clothing, Male	.901	.0233	.0208	.0169	.0204
Clothing, Female and Infant	.798	.0313	.0319	.0229	.0165
Shoes	.585	.0101	.0093	.0049	.0014
Clothing Services	.549	.0029	.0032	.0016	-.0013
Owned Vehicles	.632	.0965	.0923	.0494	.0001
Other Transportation	.456	.0060	.0057	.0024	.0113
Vehicle Operations	.449	.1069	.0898	.0362	.0158
Health	.414	.0597	.0548	.0203	-.0156
Personal Care	.694	.0109	.0111	.0069	.0104
Vacations	1.282	.0347	.0398	.0459	.0039
Admissions	1.279	.0092	.0086	.0100	.0115
Television, Radio, etc.	.550	.0163	.0155	.0077	.0197
Photography	.860	.0337	.0035	.0028	.0010
Other Recreation	1.016	.0057	.0063	.0059	.0030
Reading	.804	.0051	.0055	.0040	.0128
Education	.752	.0098	.0161	.0109	.0023
Miscellaneous	.897	.0091	.0089	.0072	.0092
Personal Insurance	1.117	.0237	.0273	.0275	.0318
Gifts	1.353	.0411	.0492	.0598	.0926

be disproportionately on income-inelastic items. To circumvent this problem, we present in column (2) of Table 5 consumption shares for UI recipients adjusted to the same income as underlies the calculations of spending shares of nonrecipients in column (3).[20/]

We classify the 31 commodities according to whether the adjusted share of spending by UI recipient households exceeds that of other households, and weight the income elasticities in column (1) by consumption shares in the population of other households. We find that the weighted average income elasticity is .39 for those commodities that form a larger share of the (adjusted) budgets of UI recipient households than they do in the budgets of nonrecipients. The weighted average for commodities that are consumed in greater proportions by households that do not receive UI is .97. Not only are about half of UI recipients constrained in their total consumption, as we saw in Sections III and IV; differences in spending patterns between them and others suggest there exist short-run rigidities that prevent at least some recipients from decreasing spending on necessities in as great a proportion as they would if they could allocate their (reduced) spending freely. UI recipients spend more on necessities, less on luxuries than do nonrecipient households with the same income.

The second hypothesis in Section II on spending patterns stated that, if recipients can reduce spending freely, additional dollars of UI benefits will be spent in the same way as otherwise identical nonrecipient households spend their additional non-UI income. To test this hypothesis we estimate:

$$(8) \qquad b^*_{i3} = \lambda_0 + \lambda_1 \hat{b}_{i1},$$

where $\hat{b}_{i1}$ are the estimates from (7). The b^*_{i3} are also from (7) but they have been adjusted: 1) To account for the small income differences between UI recipients

and others; and 2) To make their sum equal to that of the $\hat{b}_{i1}$. (Since we know $\hat{b}_3 > \hat{b}_1$, in (5), this second adjustment enables us to test the hypothesis that the individual spending propensities are equal.) The $\hat{b}_{i1}$ and $\hat{b}^*_{i3}$ are presented in columns (4) and (5) of Table 5.

If the adjusted MPC's are equal, we should observe $\hat{\lambda}_0 = 0$ and $\hat{\lambda}_1 = 1$. In fact, OLS estimates of (8) are:

$$\hat{\lambda}_0 = \underset{(1.02)}{.005} \quad ; \quad \hat{\lambda}_1 = \underset{(4.14)}{.738} \quad ; \quad R^2 = .37 \quad ,$$

where the t-statistic is in parentheses. We cannot reject the hypothesis that $\hat{\lambda}_1 = 1$ and $\hat{\lambda}_0 = 0$, though both are more than one standard error away from these figures. An additional piece of evidence from these data also shows no large differences between UI recipients and others in their spending patterns out of additional income. The weighted average of income elasticities of commodities for which $\hat{b}^*_{i3} > \hat{b}_{i1}$ is .70; that for commodities for which $\hat{b}^*_{i3} < \hat{b}_{i1}$ is .75.

Additional light on this phenomenon can be shed by an examination of the time-series data. We estimate:

$$(9) \qquad C_i = \beta_{i0} + \beta_{i1}YP + \beta_{i2}UP + \beta_{i3}(YT + UT) + \beta_{i4}P_i, \quad i=1,\ldots,41.$$

over the period 1959:I-1978:II using unpublished national accounts data covering consumer spending on 41 different products. The β_{ij} are parameters, and P_i is the implicit deflator for the i'th product. Equations (9) were first estimated by least squares, and the average value of the parameter describing a first-order autoregression of the residuals, $\hat{\rho}$, was then calculated. All the data were then transformed by differencing using this $\hat{\rho} = .713$, and the set of resulting equations was again estimated by ordinary least squares. Before considering the comparison of MPC's, it is worth noting that the equations on which they are based make sense.

In 30 out of 41, $\hat{\beta}_{i4} < 0$, and 13 of these 30 are significantly negative at the 90 percent level or better. None of the 11 positive coefficients is significantly different from zero.

Because we do not observe the behavior of UI recipients directly, we cannot compare their spending patterns to those of nonrecipients. However, we can estimate a version of (8) using the estimates of (9). The $\hat{\beta}_{i1}$ are presented in column (2) of Table 6. We define the weighted average:

$$\hat{\beta}_{i*} = w\hat{\beta}_{i2} + (1-w)\hat{\beta}_{i3} \quad ,$$

where w = .945, the fraction of variance in U accounted for by UP. We cannot make the first of the adjustments done above on the cross-section parameters $\hat{b}_{i3}$. Instead, we rely on the assumption that average incomes in the two groups differ only slightly. (For rough justification for this assumption, see footnote 20, and Hamermesh, 1977, Chapter 2.) We do, though, adjust the $\hat{\beta}_{i*}$ to equate their sum to that of the $\hat{\beta}_{i1}$, and list these in column (3) of Table 6.

For the time-series parameters the estimates of (8) are:

$$\underset{(-1.85)}{\hat{\lambda}_0 = -.018} \quad ; \quad \underset{(6.24)}{\hat{\lambda}_1 = 2.053} \quad ; \quad R^2 = .50 \quad .$$

$\hat{\lambda}_1$ is significantly different from one, and $\hat{\lambda}_0$ is significantly different from zero. This implies adjusted spending patterns out of UI benefits and YP are not equal. An examination of the income elasticities in column (1) of Table 6 illuminates this result. For those commodities for which the adjusted $\hat{\beta}_{i*} > \hat{\beta}_{i1}$, the share-weighted elasticity is 1.00; for the others, it is .57. Along with the finding in the cross-section data that UI recipients consume larger shares of income-inelastic commodities, these time-series results imply that some UI recipients are

Table 6. Income Elasticities and MPCs Out of YP and U, 1959:I-1978:II.

	$\partial \ell nC_i/d\ell nYP$ (1)	$\hat{\beta}_{i1}$ (2)	Adjusted $\hat{\beta}_{i*}$ (3)
Nondurables			
Off-premise Food	.43	.071	-.062
Purchased Meals and Beverages	.54	.031	.030
Farm and Furnished Food	-.13	-.001	.001
Shoes and Other Footwear	.57	.008	-.005
Women's and Children's Clothes	.85	.040	.109
Men's and Boys' Clothes	.77	.019	.044
Gasoline and Oil	.90	.030	-.015
Fuel Oil and Coal	.39	.003	-.028
Tobacco Products	.24	.005	.032
Toilet Articles	1.00	.010	-.026
Semidurable Furnishings	1.09	.010	-.022
Cleaning Preparations	.79	.009	-.061
Drugs and Sundries	1.00	.011	.017
Nondurable Toys	1.19	.011	.014
Other Nondurables	.78	.012	-.065
Services			
Owner-Occupied Dwellings	1.09	.120	.362
Tenant-Occupied Dwellings	.94	.042	.068
Rental Value of Farmhouses	-.32	-.002	-.009
Other Housing	1.15	.006	.004
Electricity	1.22	.022	.080
Gas	.57	.005	.003
Water and Sanitation	.73	.004	.007
Telephone and Telegraph	1.61	.029	.093
Domestic Service	-.49	-.005	-.044
Other Household Operations	.84	.007	-.026
User-Operated Transportation	1.06	.030	.046
Transit Systems	-.35	-.002	.003
Other Local Purchased Transit	-.30	-.001	-.001
Railway (Intercity)	-.90	-.0004	-.002
Bus	.06	.0001	-.008
Airline	1.62	.006	-.007
Other Intercity Purchased Transit	1.45	.0003	-.002
Shoe Cleaning and Repair	-.62	-.0003	.001
Cleaning, Laundering, etc.	-.10	-.001	-.028
Barbershops, Beauty Parlors	-.13	-.001	-.034
Physicians' Services	.93	.022	.042
Dentists' Services	1.21	.010	.025
Other Medical Care	1.24	.054	.130
Financial Services Furnished "Free"	1.07	.021	.066
Spectator Sports Admissions	.87	.005	-.021
Other Services	.70	.061	-.011

constrained to reduce their spending disproportionately on luxury goods, and use UI benefits disproportionately to restore that spending.

Taken together the results in this section provide some evidence that there exists a constraint on the choices of how the roughly half of UI beneficiaries whose total spending is constrained can reduce their consumption. Those whose behavior is constrained by illiquidity suffer a utility loss both because they cannot smoothe consumption, and because the composition of their consumption bundle differs from what they would choose if not constrained. For these UI recipients additional benefits loosen the constraint on the composition of spending as well as that on total spending.

VI. Conclusions, Implications and New Directions

Our tests generally confirm the view that unemployment insurance payments are only partly used to "tide over" individuals suffering transitory losses of income. Much, perhaps half, of UI benefits appear to be spent as if the individuals were fully able to borrow or had sufficient savings to meet transitory losses of income without any disruption in their consumption spending. This inference is confirmed by the estimates of our model on the aggregate U.S. time-series data and on the microdata from the 1972-73 Consumer Expenditure Survey. Indeed, when one considers that the constrained unemployed worker may be able to substitute time-for goods-intensive commodities, our estimates may even overstate the extent to which UI benefits alleviate hardship in the form of consumption shortfalls that cannot be made up by borrowing or dissaving.[21/]

The evidence also suggests that UI benefits are spent disproportionately on items that are relatively income elastic and that UI recipients consume disproportionate amounts of income inelastic goods. This finding implies that some UI

recipients are constrained in that they reduce total consumption and must reduce spending on the most income-elastic commodities. UI benefits, by helping remove the borrowing constraint, help restore consumption of income-elastic items.

Our findings imply that about half of UI payments go to beneficiaries for whom the benefits are more than adequate, in the sense that their past savings and/or access to capital markets enable them to maintain their optimal lifetime consumption plans during times of transitory adversity. The other half of UI benefits, though, are essential to the recipients, in that they help overcome borrowing constraints that would otherwise force them to reduce even more their consumption during times of unemployment. To the extent that these individuals are still kept off their optimal consumption path, benefits may be said to be inadequate.

The estimates suggest that a large part of UI benefits do little to stabilize the economy, because people consume them as if they were fully expected. For half of UI recipients, increases in benefits are all consumed. For the other half transitory increases become part of permanent wealth and are consumed over the rest of the lifetime, while increases in benefits that are expected to be permanent are consumed like any other increase in permanent income. The main point is that much of the potential macro stabilizing effect of UI, the second goal claimed at its inception in the U.S., is dissipated because many recipients respond to the existence of UI payments by changing saving rather than consumption spending.

Our model and its empirical support imply that the presence of socially-provided unemployment benefits induces households to maintain lower liquid asset holdings than in the absence of this program. Presumably too, along with the portfolio shift of households toward more illiquid assets, there is

also a decline in precautionary saving as workers rely more on public UI benefits as a cushion for periods of unemployment. This suggests that UI benefits, like Old Age and Survivors' Insurance, have effects on the rate of investment in physical capital in the U.S.

Those who wish to modify social insurance programs are unlikely to be successful so long as they deal only with indirect or labor-market effects, for those who oppose changes can always claim the programs serve well their central goal of maintaining consumption. Our evidence suggests this claim is only partly correct. Further, our approach to the economics of social insurance is applicable to forms of social insurance other than UI, and work should be undertaken to examine how consumption behavior responds to changes in benefit payments for OASI, Disability Insurance and Aid to Families with Dependent Children. Studies that examine how these programs affect consumption are the only ones that can evaluate how well the programs accomplish their original purpose--overcoming economic hardship.

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FOOTNOTES

1. Roosevelt's message was sent June 8, 1934. The original bill, 74th Congress, 1st Session, H.R. 4142, was submitted by Representative Lewis on January 17, 1935.

2. The NAM's statement is "Unemployment Compensation in a Free Economy," New York, National Association of Manufacturers, July 1952; that of the AFL is from Social Security Bulletins, No. 4, Washington, AFL, 1943.

3. A dozen studies completed through 1976 are summarized in Hamermesh (1977, Chapter 3), and at least a half dozen more have been completed since then. Only Brechling (1978), Feldstein (1978) and Halpin (1979) have examined how UI changes employment at the micro level, but a number of studies have considered its effects on macroeconomic stabilization (see Hamermesh, 1977, Chapter 4).

4. See Boskin (1977); and Feldstein (1974) and Munnell (1974). Apparently no studies have been made of the program's effects on savings rates using micro-economic data.

5. Siskind (1975) and Parsons (1980) demonstrate the disincentive effects of Disability Insurance on the labor-force participation of older results.

6. Becker (1961) analyzed the behavior of households surveyed by the Department of Labor in the studies of the 1950s. Recently, Burgess and Kingston (1978) have conducted a major benefit adequacy study using econometric techniques.

7. Baily (1977) justifies UI benefits in the context of optimal resource allocation by considering the program as an insurance mechanism that pools the risks of unemployment with its concomitant reduction in income. Flemming (1978) does consider how UI overcomes liquidity constraints, but only in the context of deriving an optimal replacement rate for the typical individual.

8. Since UI benefits are not taxed, subtracting them from disposable personal income does not induce errors in the data.

9. The Box-Jenkins estimation was performed using the program written by David Pack at the University of Wisconsin and Ohio State University and distributed by the Ohio State University.

The filter for UI is:

$$\log U_t = \underset{}{1.5592} \log U_{t-1} - \underset{(.0856)}{.5592} \log U_{t-2}; \qquad \chi^2(19) = 11.60,$$

and that for Y is:

$$\log Y_t = \underset{(.00137)}{.008096} + \underset{}{1.11836} \log Y_{t-1} - \underset{(.10125)}{.11836} \log Y_{t-2} \; ; \; \chi^2(18) = 14.58.$$

(Standard errors are listed in parentheses.)

10. Taylor (1971), the only available study to consider the effects of different income sources on aggregate savings or consumption, finds that transfer income is saved more than earned income, exactly opposite our findings on UI benefits. Taylor has no ready explanation for what he views as an anomaly, and, in any event, UI benefits are a relatively small part of the transfer income included in his study.

11. a^* is estimated as the inverse of .897 from the Cochrane-Orcutt estimate of: $CTOT = a_0' + \frac{1}{a^*} \cdot YP$, where CTOT is total personal consumption expenditures.

12. Estimates of the naive models and of the model involving α did not change qualitatively when durables were included in C.

13. (4) is not simply a weighted average of (1), (2) and (3'), because the Y and U series are aggregates rather than averages per household. Estimates of (4) using per-capita consumption and income flows differed only minutely from those presented in Table 2.

14. In Hamermesh (1980, Chapter 3) we do examine this model using a data set for which a permanent income measure can be constructed. The results are very similar to those presented here, though they are less robust because of the paucity of observations for which U>0. Indeed, the CES is the only data set that contains large numbers of UI recipient households, separate data on income by source, and complete, detailed information on spending by commodity.

15. The exact problem is encountered by Nicholson (1977) and Houthakker and Taylor (1970).

16. As a whole the control variables were highly significant, F(8,14,287) = 93.66. The coefficients (t-statistics) are: On the location variables, 603 (7.95) and 435 (5.26), on the race variable, 752 (7.21); on the age variables, -134 (1.13) and -1000 (12.86); on the household composition variables, 646 (15.33), -623 (9.18), and -384 (7.63). The constant is 1259 (8.97).

17. Essentially (5) includes YT(1-D) in Y(1-D) where (6) does not. Since U•D is uncorrelated with YT(1-D), this inclusion does not bias the estimate of α. However, (5) also constrains b_2 to be an average of the coefficient of YP•D in (6) and α. Because the coefficient of YP•D in (6) exceeds α, this means that variations in YT•D are given more positive weight in explaining variations in C than they should. (This assumes r(YP•D, YT•D)=0, which is true by construction; and that r(YP•D, U•D)=0. Since the correlation of Y and U was only -.04 for UI recipients and this negative correlation reflects the inclusion of YT in Y, our assumption that r(YP•D, U•D)=0 may be justified.) When YT is below its mean (is negative), some of the effect of decreased YT is mistakenly reflected in the estimates of (5) as a too-large explained decrease in consumption. If r(YT•D, U•D)< 0, U is above its mean at the same time YT•D is below its mean. Thus b_3•U•D must be more positive in (5) than it should be, if the regression plane is to pass through the means of all variables. Thus $\hat{b}_3 > \alpha$, and the estimated effect of U on consumption is upward biased.

18. The confidence interval around $\hat{\alpha}$ in Case II is derived using a first-order Taylor-series approximation to $(\hat{b}_3-\hat{b}_1)/(1-\hat{b}_1)$.

19. In Case I (5) is estimated (over UI recipient households only) under the assumption $b_1 \equiv 0$ and $b_3 = 1/(1+\exp(\gamma))$, where γ is to be estimated. In Case II it is estimated with $b_1 \equiv 0$ and $b_3 = b_2(1-1/(1+\exp(\delta))) + 1/(1+\exp(\delta))$, where δ is to be estimated.

20. Adjusted consumption of the i'th commodity is calculated as:

$$\hat{C}_i = \frac{[1+\epsilon_i P]}{1+\epsilon \hat{P}} \cdot C_i ,$$

21. Grossman (1973) uses data on spending patterns of employed and unemployed individuals to infer that the unemployed substitute time for goods in producing commodities. His results can also be used outside Becker's framework to infer that the unemployed consume disproportionate amounts of commodities that are relatively time intensive.