Lecture Notes 7: Social Insurance

reference: Hubbard, Skinner and Zeldes, 'Precautionary Saving and Social Insurance,' *JPE* 1995.

Hubbard, Skinner and Zeldes explain low levels of savings among the lowest income quintile in the US as a rational savings response to the presence of asset-tested social insurance programs like AFDC, Medicaid and food stamps.

Previous studies had attributed it to differences in time preference parameters. HSZ argue that we don't need to rely on preference arguments to explain this behavior within the standard life cycle model if we account for the dynamic relationship between means-tested programs and earnings risk.

Consider the implications of the standard life-cycle model of savings and consumption. If we have two families who begin with 0 assets, and the first family's earnings are $a > 1$ times the second's, then the life-cycle model with no uncertainty (or uncertainty under which each possible income realization for the high income family is a times that for the low) and CRRA preferences implies that the savings of the high income family should always be a times that of the low.

The 1984 US Distribution of Wealth/Income by Age

HSZ use data from the 1984 wave of the Panel Study of Income Dynamics (PSID) to study wealth by lifetime income groups at different ages.

Wealth is measured as assets (stocks, bonds, checking accounts & other financial, real estate equity and vehicles) minus liabilities like home mortgages and personal debts. It includes IRAs but not pensions or social security.

Education is employed as a proxy for lifetime earnings. The sample is divided into those with no high school diplomas (< HS, 28%), high school diploma through some college (HS, 52%) and college graduates (CG, 20%).

HSZ construct a measure of average permanent income (in 1984 $s) for each of the three groups. This is the 'constant flow of real consumption the average life cycle household could afford given the after-tax earnings, Social Security payments, and pensions between ages 21 and 85'. Average PI for the < HS group is $17,241, for the HS group it's $22,244 and for CG it's $32,062.

Figure 1 shows scatter plots of wealth divided by permanent income for ages 20-80+ in the 1984 PSID. Quantile regressions that estimate the 20th, 40th, 60th & 80th percentiles of wealth holdings as cubic functions of age are represented. Note that these are cross-sectional earnings profiles.

We see that over the life cycle many < HS households had little wealth. 50-59 is generally the peak of the wealth profile, and even at this point the 40th percentile of the <HS distribution has < $20,000. The HS group shows more of the hump-shaped pattern in wealth predicted by the life cycle model, and the CG group's behavior is most consistent with the life cycle model.

Table 1 reports median wealth by income, age and education, and reveals similar patterns.

Why the lower saving rate among lower earners? HSZ analyze 4 explanations:

(1) <u>Bequest motives</u> The argument: Higher-earnings households may save more because they plan bequests. Those with lower earnings are more likely to find the bequest motive inoperative;

they would like negative bequests from their likely higher-earning children, but are at a corner.

HSZ respond: For low lifetime earners, savings is well below even levels predicted by the life cycle model absent bequests.

(2) Social Security, private pension & other transfers' offset rate
The argument: eg Social Security is a larger proportion of earnings for low-income workers, so they don't need to save as high a proportion of earnings during the working life as high-earners to maintain a similar consumption stream in retirement.

HSZ respond: Higher-income households are more likely to receive private pensions, which would decrease relative non-pension savings incentives, and CG's should save less relative to income early on due to their more steeply sloped earnings path.

(3) Variation in rates of time preference The argument: Lawrance (1991) finds, based on food cons'n data from the 1970s-80s PSID, that CGs' food consumption paths grew faster than those of HS grads, implying a lower rate of time preference for CGs.

HSZ respond: Dynan (1993) has shown that in Lawrance's cross-sectional PSID data there was a rapid rise in the income of CGS relative to HS grads. She finds little difference in food consumption patterns after accounting for income changes.

Additionally, economists prefer to avoid preference-driven explanations for differences in behavior where possible.

(4) Asset-tested social insurance

This is the explanation investigated by HSZ.

Model

The consumer's problem

$$\max_{\{C_t\}_{t=1}^{T}} E_t \sum_{s=t}^{T} \frac{D_s U(C_s)}{(1+d)^{s-t}} \tag{1.1}$$

such that

$$A_s = A_{s-1}(1+r) + E_s + TR_s - M_s - C_s \tag{1.2}$$

plus the constraint forbidding net borrowing

$$A_s \geq 0 \quad \forall s. \tag{1.3}$$

Dummy variable D_s indicates whether the parent is alive at time s. (It's 1 when alive.) The model thus takes account of longevity risk.

The family begins period *s* with savings plus accumulated interest $A_s(1+r)$. It receives exogenous income E_s, makes exogenously determined medical expenditures M_s and receives government transfers TR_s.

Transfers depend on assets, earnings and medical expenses, and are determined by the government to be

$$TR_s = \max\{0, (\overline{C} + M_s) - [A_{s-1}(1+r) + E_s]\}. \tag{1.4}$$

$\overline{C}$ is the minimum level of consumption guaranteed by the government, or the consumption floor.

Note that the transfers imply a 100% rate of tax on all assets for program participants. (In reality, asset limits ranged between $1000 & $3000 in 1984.)

The 2 Period Certainty Case

Consider a 2 period model with no medical expenses or initial assets, and certainty in earnings and lifespan.

The citizen earns E_1 in period 1 and E_2 in 2.

She chooses savings $A_1 = E_1 - C_1$ in period 1.

Set $r = d = 0$. Assume that preferences are homothetic (CRRA).

Government consumption floor $\overline{C}$ is maintained through transfer

$$TR_t = \max\{0, \overline{C} - (A_t + E_t)\},$$

with $A_0 = 0$.

Let's look at the most interesting case, in which

$E_1 > \overline{C}$ and $E_2 < \overline{C}$.

Here the citizen is ineligible for the transfer program in the first period but eligible in the second.

Note that absent a government transfer program we would expect the individual to save in order to smooth consumption, yielding $C_1 = C_2$.

Period 2

Second period consumption is

$$C_2 = (E_1 - C_1) + E_2 + TR_2.$$

Substituting for the transfer, we have

$$C_2 = \max[\overline{C}, (E_1 - C_1)(1+r) + E_2]. \qquad (1.5)$$

Differentiating (1.5) wrt C_1,

$$\frac{dC_2}{dC_1} = \begin{cases} 0 & \text{if } TR_2 > 0 \\ -1 & \text{otherwise.} \end{cases}$$

Thus consuming \$1 less in period 1 yields \$1 more consumption in period 2 if not participating in the transfer program, but \$0 if participating.

Figure 2 shows indifference curves and budget constraints for families starting at incomes E_1^* and E_1^{**}.

Consumption path solution to the 2 period model: At earnings below the consumption floor, consumption is at floor $\overline{C}$. For wealth that is low but above $\overline{C}$ the rate of consumption out of earnings in period 1 is 1, and $C_1 = E_1$. At some critical level of E_1, consumption drops sharply. Here the consumption function reverts to the .5-sloped line through the origin, the household drops out of the program and $C_1 = C_2$, as it would without the transfer program.

Figure 2 demonstrates the result in this two period model for the **MPC**. At a lower level of E_1, the household consumes all E_1 and relies on the transfer in period 2. At higher E_1, the household decides to do without the transfer program in period 2 and saves in order to set $C_1 = C_2$. This implies a **negative MPC** from E_1^* to E_1^{**} in the figure.

The 2 Period Model with Uncertainty

Now think of E_2 as (earnings - M_2), so the uncertainty may be in earnings or medical costs.

Uncertainty: Pr(E_{2g}) = .5, where E_{2g} is the 'good' outcome, and Pr(E_{2b}) = .5, where E_{2b} is the 'bad' outcome.

Continue to assume $E_1 > \bar{C}$ and $E_{2b} < \bar{C}$. To consider the most interesting case, assume further that $E_1 + E_{2b} > 2\bar{C}$, so that the household could afford to save and meet the consumption floor in each period.

The household's problem is

$$\begin{aligned}\max_{C_1}\{U(C_1) + \tfrac{1}{2}U[(E_1 - C_1 + E_{2g})(1 - Q_{2g})\\ + \bar{C}Q_{2g}] + \tfrac{1}{2}U[(E_1 - C_1 + E_{2b})(1 - Q_{2b})\\ + \bar{C}Q_{2g}] + m_1(E_1 - C_1),\end{aligned}$$

subject to

$$Q_{2j} = \begin{cases} 1 \text{ where } C_1 > E_1 - \overline{C} + E_{2j} \\ 0 \text{ otherwise} \end{cases} \qquad (1.6)$$

for $j = b,g$, where Q_{2g} and Q_{2b} are indicators taking the value 1 when income transfers are received under the good and bad states, respectively.

m_1 is the shadow price of the borrowing constraint in period 1. Why impose this? Is it important?

The FOCs wrt C_1 imply

$$U'(C_1) = \tfrac{1}{2}[U'(C_{2g})(1-Q_{2g}) + U'(C_{2b})(1-Q_{2b})] + m_1. \qquad (1.7)$$

The condition for optimal C_1 weighs the benefits of consuming $1 in period 1 against the expected benefits of having $1 more in the future. In future states in which the household receives a transfer, a saved dollar is worthless in that it is taxed away by the transfer program.

Results: Equations (1.6) and (1.7), along with the Kuhn-Tucker conditions, have multiple solutions. HSZ show that high-earnings households are more likely to choose the solution with higher savings and lower probability of transfers. Again they find optimal consumption can decline with earnings.

*Finally, the transfer program affects the savings of those who, ex post, *never receive a transfer*.*

In the HSZ model, the transfer program discourages savings in two separate ways.

(a)The government transfer increases consumption in bad states of the world, decreasing the need for *precautionary savings.*

(b)The tax rate on assets when receiving transfers is 100%, which discourages savings in that $1 saved now becomes valueless to the household in the state of the world in which the household receives transfers.