Household Debt Overhang and Human Capital Investment

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Motivation

- Human capital is insurmountable at the household from default (Hart and Moore, 1994).
- Different from labor supply, human capital investment allows households to generate incremental income after default by utilizing their acquired knowledge and skills.
- The preserved value of human capital investment after default thus makes it more resilient to ‘debt overhang’ compared to labor supply.

Key Takeaways

- Individual incentives to acquire labor skills is hump-shaped with respect to the level of household leverage
  - Decreasing marginal utility
  - At a high level of household, a larger fraction of its income accrues to creditors and its marginal level of consumption declines. In this case, the marginal utility of consumption rises and the benefit of increasing human capital in order to raise consumption grows.
  - Effort in skills acquisition is increasing in household leverage
  - Debt overhang
    - A transfer of wealth from households to lenders
    - Effort in skills acquisition is decreasing in household leverage
  - Labor supply exhibits a similar hump-shape with respect to household leverage – reflecting the interplay of decreasing marginal utility and debt overhang, yet with notable differences.
  - Labor supply generates transitory income, thus no additional benefits accrue to the household once it is used to pay creditors.
  - Compared to skills acquisition, labor supply faces greater wealth transfer from households to lenders, making it more susceptible to debt overhang.
  - This distinction results in an earlier and more pronounced decline in the supply of labor as households approach default – that is, labor supply begins to drop at a much lower level of household leverage, and it drops at a faster rate than skills acquisition.

- When skills depreciate quickly, that is, when the payoffs of skills acquisition are concentrated in the shorter term, leaving little value in the future – just like the case of transitory income from labor supply, the pattern of skills acquisition with household leverage converges to that of labor supply.
- In such a case, the two actions resemble each other in their low resilience to debt overhang.

- Importantly, labor supply and human capital investment are inter-temporally linked.
  - A ‘back-propagation’ effect: the sharp decay of labor supply feeds back into households’ skills acquisition.
  - Because skills acquisition increases households marginal productivity, this effort is only valuable if households anticipate supplying labor in the future.
  - As such, we find that when labor supply is expected to collapse at high levels of leverage, it brings down households’ incentive to acquire labor skills in the first place.

Model

- A household’s life-time utility from consumption, skills acquisition, and labor supply, {C(t), a(t), l(t)}, is given by
  \[ u^*(t) = \int_{0}^{\infty} e^{-\rho \tau} [\alpha C(\tau) - \beta a(\tau) + \gamma l(\tau)] d\tau \]

- Different from risk-neutral corporations (thanks to diversification), a typical household is assumed to be risk-averse. For tractability, we assume logarithmic consumption preferences and quadratic cost of skills acquisition and labor supply such that per-period utility is given by:
  \[ u(C, a, l) = \log C - \rho a - \frac{1}{2} \theta l^2 \]

- Denote \( K_t \geq 0 \) as the hourly labor income per period. The dynamics of \( K \) are given by the (controlled) geometric Brownian motion (GBM) process:
  \[ dK_t = \theta (a - \rho) K_t dt + \sigma dW_t \]

- The total wages \( W_t \) are the product of hourly income and the number of working hours:
  \[ W_t = K_t \]

- Initially, households have complete access to credit markets, and can borrow and save at the risk-free rate \( r > 0 \) in order to smooth consumption. Household savings \( S_t \), evolve according to:
  \[ dS_t = (r - \rho) S_t dt + \sigma dW_t \]

Data and Variable Construction

- The 1979 National Longitudinal Survey of Youths (NLSY79) and the restricted-use NLSY Geocode files
  - Tracts 12,685 American youth aged between 14-22 years old in 1979
    - Family background, education and employment history, job training information, household balanced sheet, and geographical information
  - Main sample: 50,897 observations on 6,729 respondents from the survey year of 1991 to 2014.
  - Training: whether an individual requested and participated in training that is paid by employer or government
  - Total leverage: ratio of total debt to total asset
    - Total debt: mortgage debt, auto loan, credit card debt, etc.
    - Total asset: market value of house and cars, amount of saving, amount of financial asset (e.g. stock, bonds), etc.
  - Control variables: age, gender, ethnic group, wage, family income, education, parent’s education, industry, occupation, region of residence

Empirical Results

- Figure 2: Skills acquisition and labor supply over leverage
- Figure 4: Humpshaped with respect to the degree of skills depreciation

Table 2: Baseline regressions of household leverage and labor skills acquisition

<table>
<thead>
<tr>
<th>Dep. Var.</th>
<th>Leverage</th>
<th>Leverage^2</th>
<th>Inter ln Leverage</th>
<th>Inter ln Leverage^2</th>
<th>Coeff.</th>
<th>Std. Error</th>
<th>t-stat</th>
<th>p-value</th>
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Table 3: Instrumental variable analysis

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