College Enrollment, Parental Transfers, and Student Loans

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Motivation

Facts:

- Borrowing for college is increasing. Student loan debt is the second largest sector of household debt.
- Student loans non-repayment remains high. The non-repayment rate among 4 year college graduates at the first year after graduation is 27%.
- Parents not only pay for college expense, but also provide potential support when kids repay student loans (Lochner, Stinebrickner, and Suleymanoglu, 2015).

This paper:

- builds and estimates a dynamic life-cycle model with kids' educational borrowing, endogenous parental transfers, and detailed repayment plan.
- quantifies the effects of borrowing constraints and parental transfers on educational attainment.
- examines the effects of various education policy experiment, such as increasing borrowing limits, introducing the income-contingent repayment, tuition subsidies, especially for those with little or no parental resources.

Model

Time is finite and discrete. The basic unit is a family. A parent (p) and a youth (y) make joint decisions with one-side altruism and full commitment. The decision period begins when a youth graduates from high school. The family solves the following problem:

$$V_0(\Omega_0) = \max_{\Theta_0} E_0\{\sum_{t=0}^{T} \beta^t(u_t^p + \eta u_t^y) + \beta^{T+1}(V_{T+1}^p + \eta V_{T+1}^y)\}.$$

The set of state variables Ω_t differs in different periods. It includes parent's income, parent's asset, kid's human capital, kid's asset, labor supply in last period, and student loan balance.
Choice set Θ_t also differs in different periods. The choices made during lifetime includes whether go to college, what type of college to go to (2-year or 4-year), labor supply, assets accumulation, student loan borrowing and repayment, and parental transfer amount.

Model (cont.)

For example, the Bellman equation after the youth graduates from college is:

$$V_t(\Omega_t) = \max_{\Theta_t}\{u_t^p + \eta u_t^y + \beta EV_{t+1}(\Omega_{t+1}|\Omega_t, \Theta_t)\},$$

$$s.t. \quad c_t + x_{t+1}^y = (1+r_f)x_t^y + w_t h_t + b\cdot \mathbb{1}(h_t = 0) + T_t - R_t,$$

$$c_t^p + T_t + x_{t+1}^p = (1+r_f)x_t^p + I^P,$$

$$D_{t+1} = \begin{cases} (1+r_d)D_t - R_t, & \text{if} \quad R_t \in \{R_t^d, R_t^{for}\}; \\ (1+r_d)(1+\kappa)D_t - \alpha_d R_t^{def}, & \text{if} \quad R_t = R_t^{def}, \end{cases}$$

$$x_{t+1}^y \geq \min\{(1+r_f)x_{t+1}^y, 0\}, \text{ if} \quad R_t = R_t^{def},$$

$$x_{t+1}^y \geq -\bar{x}_t^y, \text{ if} \quad R_t \in \{R_t^d, R_t^{for}\},$$

$$x_{t+1}^p \geq -\bar{x}_t^p,$$

$$T_t \geq 0.$$

Data and Estimation

Data:
National Longitudinal Survey of Youth 1997-2013 (NLSY97). It is a panel data with detailed information on respondents' education, employment, asset, and parental transfers. After imposing sample restrictions, the final sample includes 1,602 individuals.

Estimation:

- The model is solved numerically using Fortran and MPI.
- The estimation of the model involves finding the optimal set of parameters to minimize the distance from moments generated by the model and the true data.
- In each iteration, it solves a finite dynamic programming problem with high dimensional continuous state variables and continuous choice variables.

Results:

- Find the optimal set of parameters with economics interpretation.
- Quantifies the effects of borrowing constraints, parental transfers, and student loans policy on educational attainment using the estimated parameters.