INTERTEMPORAL LABOR SUPPLY AND HUMAN CAPITAL ACCUMULATION

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Intertemporal elasticity of substitution in labor supply

- This has long been an area of study, see Lucas and Rapping 1969
- Studies using micropanel data in structural models include MaCurdy 1981, Browning, Deaton, and Irish 1985, and Altonji 1986.
- Are unable to solve a puzzle: although wages grow throughout the life cycle, hours worked do not
  - Why don't workers work less when young and wages are low and more when they are old and wages are high?

Human capital

- The answer: wages are determined by human capital which grows with work experience
- Workers face competing motivations: wages grow through the life cycle, but returns to human capital decrease
  - The result is a relatively flat labor supply (see next slide)
- Previous research which does not account for human capital thus underestimates the elasticity of labor supply
- Our model will correct this

Life cycle path

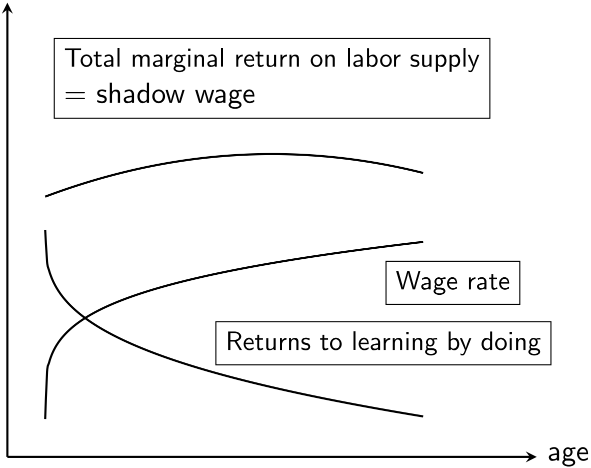

Figure: OPTIMAL LIFE CYCLE LABOR SUPPLY

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Agent's problem

Agents maximize their discounted expected life-cycle utility through the working horizon T:

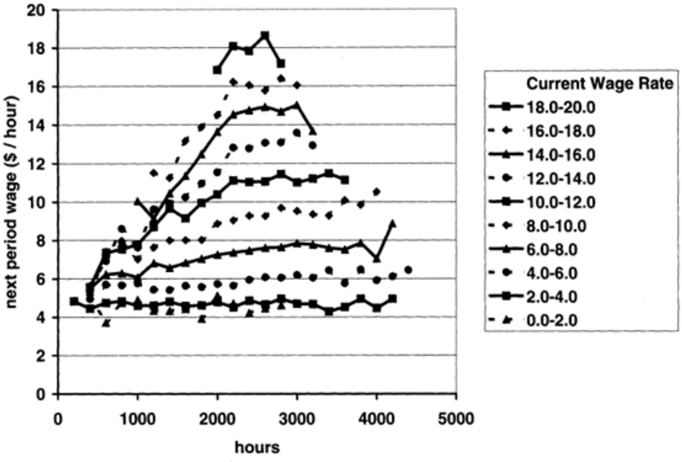
$$E_t \sum_{\tau=t}^{T} \beta^{\tau} [u(C_\tau, \tau) - v(h_\tau \epsilon_{2,\tau})] \tag{1}$$

subject to their intertemporal budget constraint:

$$A_{t+1} = (1+r)A_t + W_{t,s} h_t - C_t \tag{2}$$

Equations (1) and equations (2) characterize the problem we want to examine.

The human capital production function



NOTE: Only plot cells with at least 20 observations.

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Problem before shocks

Next period human capital before shocks are realized is:

$$\tilde{K}_{t+1} = g(h_t, K_t, t)$$

So we can rewrite the value function as:

$$V_{t,s}(A_t, \tilde{K}_t, \epsilon_{1,t}, \epsilon_{2,t}) = \max_{C_t, h_t}(u(C_t, t) - v(h_t, \epsilon_{2,t}) \\ + \beta E_t V_{t+1,s+1}(A_{t+1}, \tilde{K}_{t+1}, \epsilon_{1,t+1}, \epsilon_{2,t+1})$$

Emax function

Defining the emax function as:

$$V^E_{t+1,s+1}(A_{t+1}, \tilde{K}_{t+1}) = E_t V_{t+1,s+1}(A_{t+1}, \tilde{K}_{t+1}, \epsilon_{1,t+1}, \epsilon_{2,t+1}) \tag{3}$$

We can write the agent's problem before shocks are realized as:

$$V_{t,s}(A_t, \tilde{K}_t, \epsilon_{1,t}, \epsilon_{2,t}) = \\ \max_{C_t,h_t}[u(C_t, t) - v(h_t, \epsilon_{2,t}) + \beta V^E_{t+1,s+1}(A_{t+1}, \tilde{K}_{t+1})]$$

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NLSY79

1. Our data comes from the NLSY79
2. Advantage over the PSID, used by MaCurdy 1981 and others, is that we can directly use asset data
3. Focus on white males who are at least 20 years old and have some schooling

Mean wage profiles

Age	Hourly Wage	Hours	Total Wealth
20	5.785 (2763)	1531.7 (2837)	6334.8 (207)
21	5.998 (3220)	1578.6 (3348)	6178.5 (568)
22	6.697 (3396)	1725.7 (3536)	8933 (956)
23	7.12 (3420)	1866.7 (3557)	9163 (1361)
24	7.342 (3308)	1989.4 (3480)	2889.9 (1751)
25	7.99 (3187)	2042 (3360)	-9276.6 (1885)
26	9.294 (2987)	2101.6 (3160)	1205.6 (2189)
27	9.098 (2871)	2134.7 (3048)	4651.3 (2504)
28	10.1 (2785)	2182.1 (2976)	-29888 (2538)
29	9.426 (2499)	2200.7 (2670)	-37101 (2235)
30	12.36 (2028)	2224.3 (2188)	-25726 (1903)
31	15.24 (1649)	2243.9 (1785)	-12168 (1614)
32	13.6 (1206)	2238.1 (1307)	19201 (1313)
33	22.98 (851)	2253.1 (922)	27379 (1098)
34	11.39 (554)	2246.7 (608)	55264 (649)
35	11.57 (291)	2294.2 (325)	84001 (299)
36	10.01 (65)	2283.5 (71)	58172 (67)

NOTE: Sample sizes are in parentheses

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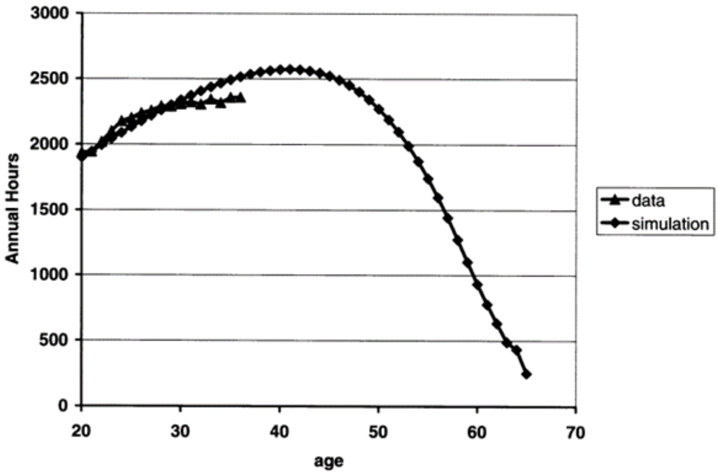
Intertemporal elasticities

- Estimate the interemporal elasticity of labor supply of 3.82, much closer to that from the macro literature (eg Eichenbaum, Hansen, and Singleton 1988)
- Estimate an i.e.s.-c of -1.354
- This contrasts with the common estimate of -1/3 (see Hubbard, Skinner, and Zeldes 1994)
- Ignoring human capital biases IEL downwards and explains the dissonance between micro- and macro-estimates

Model fit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Annual Hours
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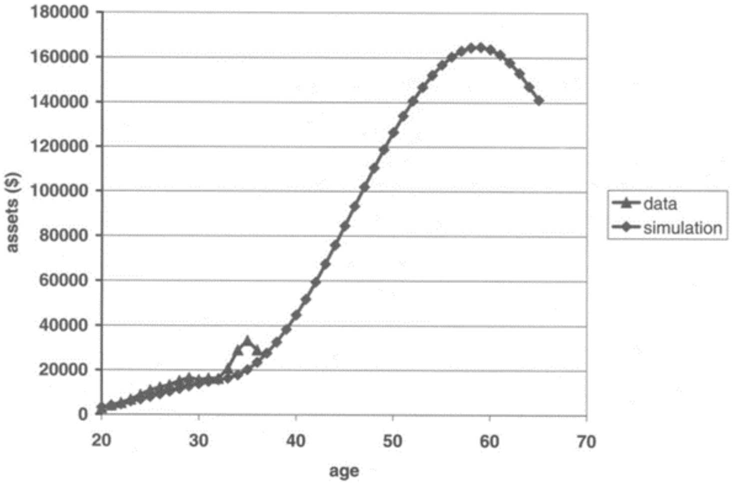
Model fit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