14.771: Investing in Human Capital–Theory

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The standard Neo-Classical Model: Barro-Becker preference

- How are human capital investment decisions made?
- Does the fact that the decisions are made within families contribute to the persistence of poverty? of inequality?
- What is the role for public policy?
- Most development economics used for a long time the "poor but efficient" framework (Schultz).
- Parents treat investment in human capital (of themselves and their children) as economic decisions, with costs and returns.
- We will write down a version of such a standard model and use it to guide our review of the empirical literature
- Then we will examine what happens when we relax some assumptions.

A model (Banerjee, 2004)

- **Production Technology:** Consider a world where there is only one non-storable final good produced with two types of human inputs—skill (H) and unskilled labor (L):

$$y = f(H, L), f_H > 0, f_L > 0, f_{HH} < 0, f_{LL} < 0$$

- **Labor Supply:** Each person in the economy is assumed to own one unit of unskilled labor and certain number of units of skill. Labor has no disutility.
- **The Life Cycle**: Three period lives. In the first all they do is acquire skills. The second period is when people work, earn an income, have one child. In the third they are retired but still consume.
- **Markets:** The price of labor at time t is w_t^L and that of skill w_t^H.

- **Human Capital:** Human capital is produced using a combination of human capital and unskilled labor. The cost of acquiring h units of human capital is $\gamma s(h, h^-)$ units of human capital and $(1-\gamma)s(h, h^-)$ units of unskilled labor, where $0 \leq \gamma \leq 1$ and h^- is the level of human capital of the parent of the person who is acquiring the human capital. We assume that $\frac{\partial s}{\partial h} > 0$, $\frac{\partial^2 s}{\partial h^2} > 0$, $\frac{\partial s}{\partial h^-} < 0, \frac{\partial^2 s}{\partial h^{-2}} > 0$. $\frac{dS(h)}{dh} > 0$ where $S(h) = s(h, h)$
- Also assume $s_{12} = 0$
- The cost of education is therefore $(\gamma w_t^H + (1-\gamma) w_t^L) s(h_{t+1}, h_t)$.

General Preferences

- Utility comes from material and symbolic outcomes : $U_t^P = mU_t^M + sU_t^S$
- Material consumption: $U_t^M(c_t, p_{t+1})$: c_t (while working), p_{t+1} (in retirement), both in terms of the final good.
- Symbolic consumption: pride in own, education, children who are well-educated or rich, or go to an expensive school.

$$U_t^S(h_t, h_{t+1}, c_{t+1}, (\gamma w^H + (1-\gamma)w^L)s(h_{t+1}, h_t))).$$

- Family level outcomes: $U_t^C = \sum_{s=1}^{\infty} \delta_s U_{t+s}^P + \sum_{s=1}^{\infty} \tilde{\delta}_s U_{t+s}^C$
- total utility $U_t = U_t^P + cU_c^C$

The neo-classical model

- "Barro" preferences: $c = 1, \delta_1 = \tilde{\delta}_1 = \delta$ and all the other δ's are 0.
- Impose in addition No symbolic consumption: $s = 0$ and $m = 1$.
- Therefore preferences: $U_t = \sum_{s=0}^{\infty} \delta_s U_{t+s}^M$
- Perfect credit markets: anyone can borrow or lend at gross rate r_t.
- No contracting between generations: parents chose their own consumption while middle age and old and the investment in the human capital of their child
- Both credits and loans can be bequeathed
- Budget constraints, at all t

$$\omega_{t+1} = r_t(\omega_t - c_t - p_t + w_t^L + h_t w_t^H - \phi(h_{t+1}, h_t))$$

where ω_t is starting wealth of the t^{th} generation and $\phi(h_t, h_{t+1}) = (\gamma w_t^H + (1-\gamma) w_t^L) s(h_{t+1}, h_t)$ is the cost of investment in the next generation's human capital (in units of the good).

Analyzing the neo-classical model

- Solving this problem is a standard dynamic programming problem (no worry for first years who have not seen it).
  - Two Euler equations with respect to c and p
  - Marginal product of investment in h_{t+1} is equal to marginal cost
- The chosen level of h is only determined by this last equation:

$$(\gamma w_t^H + (1-\gamma) w_t^L) s_1(h_{t+1}, h_t) =$$
$$\frac{1}{r_t}[w_{t+1}^H - (\gamma w_{t+1}^H + (1-\gamma) w_{t+1}^L) s_2(h_{t+2}, h_{t+1})].$$

- This captures the idea that the parent can borrow to invest in his child and also borrow against his human capital earnings: It is therefore a comparison of current investment with current returns.
- As a result the key short-run predictions of this model are striking:

  No parental preference effect

  No income effect

Steady State Predictions

- Steady state= all quantities are constant over time (an approximation of the "long run").
- In steady state $r = \frac{1}{\delta}$
- The steady state level of human capital satisfies:

$$s_1(h,h) + \delta s_2(h,h) = \delta \frac{1}{\gamma + (1-\gamma) w^L / w^H}$$

- No Inequality (as long as $s_{12} = 0$) : all families will converge to the same level of human capital no matter where they start with (in fact in one generation since every one will pick the same h_{t+1}).
- Unique steady state (no long run effect of a large shock to human capital)

Analyzing policy

- Policy instruments:
  - education subsidy: if family spends E, expenditure is $e_0 + e_1 E$
  - tax: $T = \tau_0 + \tau_1 h_t w_t$
- Steady state becomes:

$$s_1(h,h) + \delta s_2(h,h) = \delta \frac{(1-\tau_1)/(1-e_1)}{\gamma + (1-\gamma) w^L / w^H}$$

- Lump sum taxes and subsidies have no effect.
- Proportional taxes and subsidies have the predicted effects: $\tau_1 = e_1$ is optimal and in the absence of other reasons to tax, laissez faire is the best. Education subsidy may be a good way to counteract a tax on human capital that is there for some other reason.
- An increase in e_0 financed by an increase in τ_1 clearly reduces educational investment.
- Higher returns to human capital mean more investment.

Summary

- The Barro-Becker word is a wonderful one!
- There is no inequality in steady state
- Wealth, income, even preferences don't matter in the short run
- What determines investment in education in this world?
- Why might education be different in different countries?
- The best education policy is no education policy
- Note that here there may be scope to improve the production function of education
- For a long time development economists had no interest in the economics of education (unlike WB economists) and to some extent many still hold this view.
- DISCUSSION

References I

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