Human Capital Accumulation, Private Information, and Insurance

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Introduction

- Q: How does Human Capital (HC) accumulation interact with Insurance Markets?

- Human Capital delivers stochastic returns (e.g, Carneiro-Cuhna-Hansen-Heckman-Navarro-...).

  1. How incomplete insurance markets affect HC accumulation?
  2. Is there scope for public intervention? If yes, how?

- Focus on Insurance of HC risk (not on liquidity)
- Review of a selected literature;
- Discuss how answers depend on the nature of markets: exogenously vs endogenously incomplete markets.

Literature

- Exogenous Markets and Linear Taxes
  - Eaton & Rosen (1980), Hamilton (1987), Aiyagari (1995)
  - Anderberg & Andersson (2003) and Jacobs et al. (2010), Pavoni & Gottardi (2012), Gottardi et al. (2012)
- Endogenously Incomplete Markets and/or Optimal Taxation
  - da Costa & Maestri (2007), Anderberg (2009), Grochulski & Pirskorski (2006)
  - Kapicka (2006-2010-2012), Abraham et al. (2012)
  - Bovenberg & Jocobs (2005-2008), Bohaceck & Kapicka (2008), Findeisen & Sachs (2011)

The Working Model

Technology and Preferences

- Agents face idiosyncratic shocks (health/job/disability):

$$\tilde{\theta} \in \{\theta, 0\} \quad \text{where} \quad \theta > 0 \quad \text{with prob. } \pi.$$

- Agents live two periods;
- At $t = 0$ they invest in HC; in $t = 1$ they work
- Fixed inter-temporal transfer technology $1 \; \Rightarrow \; 1/q$
- Labor income is given by $y = w(h_0)\tilde{\theta} l_1$, with $w'(h_0) \geq 0$.

- Preferences over consumption, HC and labor (c_0, h_0, c_1, l_1) :

$$u(c_0 - h_0) + \beta \left[u(c_1) - v(l_1) \right].$$

$p = 1$ price of HC; u concave, v convex (strictly), v(0)=0.

Market Arrangements

Complete Markets (First Best)

Assume that all actions are public information

$$\max_{c_0, h_0, c(\theta), \underline{c}, l(\theta) \geq 0} u(c_0 - h_0) + \beta\pi\left[u(c(\theta)) - v\left(l(\theta)\right)\right] + \beta(1-\pi)u(\underline{c})$$

subject to

$$y_0 - c_0 + q\pi\left[w(h_0)\theta l(\theta) - c(\theta)\right] - q(1-\pi)\underline{c} \geq 0. \quad (\lambda)$$

1. Full-Insurance: $c(\theta) = \underline{c} = c_1^*$
2. Production efficiency: $\theta w(h_0^*)u'(c_1^*) = v'\left(l^*(\theta)\right), \; l(0) = 0$
3. Intertemporal efficiency: $qu'(c_0^* - h_0^*) = \beta u'(c_1^*) = q\lambda$
4. HC investment optimality:

$$\frac{1}{q} = \pi w'(h_0^*)\theta l^*(\theta).$$

Policy Concepts and Terminology

1. First-Best social returns can be compared to social returns in imperfect economies. Is it a useful concept?

2. First-Best social margins can be compared to social margins in imperfect economies; perhaps more useful.

3. For each economy, one can compare social margins vs private margins $\Rightarrow$ wedges.

4. In general, (linear) taxes differ from wedges.

   - They are the same only in concave economies

   - Wedges inform on 'third-best' linear taxes in non-concave economies (Ramsey)

Private Margins and Wedges

- Now we ask: is the agent at his/her private optimum?
- Private and social margins for savings coincide:

$$qu'(c_0^* - h_0^*) = \beta u'(c_1^*)$$

- As they do for labor supply:

$$\theta w(h_0^*) u'(c_1^*) = v'\left(l^*(\theta)\right), \quad l(0) = 0.$$

- Private margin for HC investment is also aligned to social margin:

$$\frac{1}{q} = \pi w'(h_0^*) \theta l^*(\theta)$$

$\Rightarrow$ With complete insurance markets all wedges are zero.
In this talk say: 'there is no scope for policy intervention'.

The Bond Economy

- Assume that y, $\tilde{\theta}$, l and period 1 consumption all unobservable
- Agents cannot be insured against shocks (self-insurance)

$$\max_{h_0,k_0,l} \quad u(y_0 - h_0 - qk_0) + \beta\pi\left[u(y + k_0) - v(l)\right] + \beta(1-\pi)u(k_0)$$

$$s.t. \qquad y = w(h_0)\theta l$$

- Optimal choice of k_0 (Euler Equation):

$$qu'(c_0 - h_0) = \beta\sum_{\theta}\pi_\theta u'(c(\theta))$$

- Labor supply:

$$\theta w(h_0)u'(c(\theta)) = v'\left(l(\theta)\right), \quad l(0) = 0.$$

Bond Economy II: Policy Predictions

- HC investment margin (HC is a 'bad' asset):

$$\frac{u'(c_0 - h_0)}{\beta u'(c(\theta))} = \pi(h_0) w'(h_0) \theta I(\theta) > \frac{1}{q}$$

- Note: uncertainty reduces the level of HC investment ($h_0 < h_0^*$) and tends to increase k_0 (precautionary savings).
- A tax on k_0 might increase h_0 as it would a HC subsidy

- In fact, there is again no scope for government intervention.
- All private and social margins coincide (constrained efficient): Exogenously incomplete markets & no pecuniary externalities.

Endogenous Insurance Markets

Observable HC

- y_0, y, h_0, savings, and consumption in period 1 are observable.
- $\tilde{\theta}$ and l are not.

$$\max \quad u(c_0 - h_0) + \beta\pi\left[u(c(\theta)) - v\left(l(\theta)\right)\right] + \beta(1-\pi)u(\underline{c})$$

subject to

$$y_0 - c_0 + q\pi\left[w(h_0)\theta l(\theta) - c(\theta)\right] - q(1-\pi)\underline{c} \geq 0; \quad (\lambda)$$

$$u(c(\theta)) - v\left(l(\theta)\right) \geq u(\underline{c}) \qquad (\mu)$$

- First-Best rule for HC investment

$$\pi w'(h_0)\theta l(\theta) = \frac{1}{q}.$$

Intuition of the First-Best rule for HC

- The social cost of investment is not distorted by incentives:

$$u'(c_0 - h_0) = \lambda$$

- The direct returns of h_0 are fully internalized by the insurer which gives in exchange an allocation: $q\lambda\pi w'(h_0)\theta I(\theta)$

- Social margin is not distorted by incentives: h_0 is 'neutral' to the ex-post incentives for the insurer.
  In general, the multiplicative-separable form $w(h_0)\theta$ matters.

Q: What does the first best rule mean for policy?

Private Margins

- Again, would a private agent be happy to remain with the stated allocation?

- Labor margin is alligned to social margin (no-distortion-at-the-top)

- Some private margins are distorted (Wedges)

1. Savings are discouraged (complement to shirking):

$$qu'(c_0 - h_0) < \beta \left[\pi u'(c(\theta)) + (1-\pi) u'(\underline{c}) \right]$$

2. Subsidize HC (complement to working):
   - Expected Return:

$$\pi w'(h_0) \theta l(\theta) = \frac{1}{q}$$

   - Risk-ajusted private cost:

$$\frac{u'(c_0 - h_0)}{\beta u'(c(\theta))} > \frac{1}{q}$$

Unobservable HC

- y_0, y, savings, and consumption in period 1 are observable.
- $\tilde{\theta}$ and h_0, l_1 are not observable.

$$\text{ax} \quad u(c_0 - h_0) + \beta\pi \left[u(c(\theta)) - v\left(\frac{y(\theta)}{w(h_0)\theta} \right) \right] + \beta(1-\pi)u(\underline{c})$$

subject to

$$y_0 - c_0 + q\pi \left[y(\theta) - c(\theta) \right] - q(1-\pi)\underline{c} \geq 0; \qquad (\lambda)$$

$$u(c_0 - h_0) + \beta\pi \left[u(c(\theta)) - v\left(\frac{y(\theta)}{w(h_0)\theta} \right) \right] + \beta(1-\pi)u(\underline{c}) \qquad (\mu)$$

$$\geq u(c_0) + \beta u(\underline{c})$$ under-invest and lie: $\hat{h}_0 = 0$ and $\hat{\theta} = 0$.

$$u'(c_0 - h_0) = \pi\beta u'(c(\theta)) w'(h_0)\theta l(\theta) \qquad \text{(slack)}$$

Results and Intuitions

- It is optimal to have HC paying a positive premium ('second best' h_0 is below first best rule)

$$\pi w'(h_0)\theta I(\theta) > \frac{1}{q}.$$

- In this problem, the cost of h_0 is affected by incentives:

$$u'(c_0 - h_0)(1+\mu) = \lambda$$

- h_0 is now reduced - $u(c_0 - h_0)$ hence increases - to discourage the agent to deviate: under-invest and lie.

Q: What about Private Margins?

1. HC private and social margin coincide by construction;
2. Savings are again discouraged:

$$qu'(c_0 - h_0) < \beta\left[\pi(h_0)u'(c(\theta)) + (1-\pi(h_0))u'(\underline{c})\right]$$

Summary

- Economies with different informational frictions:
  1. Complete insurance markets (First-Best);
  2. The Bond economy (self-insurance);
  3. Imperfect insurance with observable HC;
  4. Imperfect insurance with hidden HC investment.
- We focused on social margins compared to F-B and wedges
- In 2. social margins differ from that of 1. (F-B). But in both economies there is no case for policy intervention (wedges=0)
- In 3. & 4. savings are always discouraged while HC should be (weakly) subsidized (positive vs negative wedges).
- In 3. social returns follow a First-Best rule, while in 4. HC investment is below the First-Best rule (social margins are 'distorted' away from First-Best rules as HC investment interacts with incentive constraints).

Discussion

1. Allowing for endogenous capital returns: k_0 always follows first best rule
$$\frac{1}{q} = f'(k_0^*)$$

2. This talk was not on wether we should change existing policies:
   - We do not know what are the existing markets (empirical question)
   - Policy reforms are quantitative questions.

3. Heterogeneous returns: If type is partially known in advance by the agent and h_0 is observable, we have 'tagging' on an endogenous variable.

4. What about income taxation and HC? (endogenous weights)

5. What about hidden assets? (regressive taxation)