Discussion:

How Life Expectancy at Birth Affects Schooling Investment and Lifetime Earnings: Evidence from Cross-Country Household Surveys

by Mohammad Mainul Hoque, Iowa State University;
Elizabeth M. King, World Bank;
Claudio E. Montenegro, World Bank and University of Chile;
Peter F. Orazem, Iowa State University

Discussant:

Oleksandr Zhylyevskyy, Iowa State University

Annual Meeting of the Southern Economic Association 2014

Atlanta, GA

November 24, 2014

Summary

Background:

- Life expectancy significantly increased during the last century
- Longer life should lead to more human capital investment

The authors provide a theoretical model, based on Heckman (1976), to analyze effects of changes in life expectancy on human capital investment, lifetime human capital production, and lifetime earnings

Data for empirical analysis come from the World Bank's *International Income Distribution Database*—a harmonized collection of 199 household surveys conducted in 115 countries between 1970 and 2012, and from U.N. Population database and Gapminder

Unit of observation: a birth cohort in a country (total: 4,900 cohort obs.), often also disaggregated by gender and residence (urban vs. rural)

Main finding: an increase in life expectancy by 1 year leads to:

- 0.11 additional years of schooling
- 1% gain in lifetime earnings

Evaluation

The paper is interesting and addresses an important topic

The introduction, including the literature review, is very well written. The other sections are also well written, but some minor editing could improve the exposition, especially in Appendix A

It is helpful that a theoretical model is provided. However, the model and solution approach (pp. 5–9) are borrowed from Appendix AI of Heckman (1976). It may be useful to clarify the specific theoretical contribution of the paper

The amount of performed empirical analyses, including robustness checks, is impressive. The empirical results comprise the main contribution of the paper to the literature

The results are potentially policy relevant. Including a discussion of policy relevance would be a valuable addition to the paper

Substantive Comments I

It does not seem accurate to refer to *T* as "life expectancy." *T* is "age-at-death" (i.e., the length of life). The model treats *T* as a **known** quantity at birth. But in reality, the length of life is a **random variable** at birth. Consider a different modeling approach:

T is a random variable, $T \sim F$, with mean value *ET*

Here, *ET* is life expectancy. Alternatively, see Cervellati and Sunde (2013), who also treat the length of life as a random variable

"Comparative dynamics" exercises take a partial equilibrium "stance," which is quite restrictive. More specifically, you treat many components of the model as exogenously given and **fixed**. However, in a less restrictive setting it could be that an increase in the length of life (*T*) affects the interest rate (*r*), price of human capital (*R*), price of education goods (*P*), or even the time preference parameter (ρ)

Note: you seem to allude to this limitation (in the case of *R*) in footnote 6

Substantive Comments II

The focus of empirical analysis is only on individuals (between 25 and 60 years old) who are **working**. Could a change in life expectancy affect ***who*** chooses to work? Could sample selection along these lines bias your results?

In Appendix C, you allude to the possibility that some (omitted) variable—other than life expectancy—may be the one actually driving changes in schooling and lifetime earnings (as examples, you consider average temperature and precipitation at the time of birth). If life expectancy is correlated with such omitted, relevant variable, then the estimated coefficients on life expectancy could not be interpreted causally. I suggest you consider giving this discussion a more prominent place in the main paper body

Other Comments and Suggestions I

Consider revising the 2nd sentence in Section II "Theoretical Framework": "The model relaxes…" It currently reads *as if* you relaxed Ben-Porath's assumption that labor supply is endogenous, for example. You likely meant to say something else

Some issues to address regarding the theoretical model (pp. 5–7):

- *L(t)* was never separately defined (as time spent in leisure), but *X(t)* got defined twice
- Clarify that at each instant, the individual has an endowment of 1 unit of time
- Why is the price of education and consumption goods the same (*P*)? Should this price depend on time? Heckman (1976) allows for different prices and time dependence
- Eq. (5) defines instantaneous utility (utility flow), rather than lifetime utility
- Perhaps instead of "discounted lifetime expected utility" you could simply say "lifetime utility." "Lifetime" already presumes you are discounting utility flows. "Expected" is superfluous since there is no uncertainty (random shocks) in the model
- *r* was never separately defined (as the risk-free return on accumulated assets)
- There are no credit constraints in the model. Thus, a "no Ponzi scheme" condition should be specified to prevent the individual from accumulating infinite negative wealth
- Is the goods' price *P* also a function of time, i.e., *P(t)*? Compare Eq. (3) with Eq. (7)
- Can you drop *H(t)* from both sides of Eq. (9) or do you worry about the case *H(t)* = 0?
- The derivation of Eq. (12) needs to be better explained

Other Comments and Suggestions II

Some issues in the model [continued]:

- The assumption of non-satiation, referenced on p. 7, was never specified
- Is *H(T)* missing from the specification of the terminal condition for human capital? If not, it may help to elaborate on why the two terminal conditions, Eq. (13) and Eq. (14), differ in form. *H(T)* is likely not needed in Eq. (13) because Eq. (21) implies that *H(T)* > 0
- On p. 8 you say that the price of purchased educational inputs increases as the individual ages. I thought this price has a fixed value *P* and does not change with time
- It is best to show the properties of *I(t)*, as claimed on p. 9, formally

Some of the proposition proofs need more rigor. E.g., in Proposition 2, you want to first **formally** show that $D_1 < 0$

The proof of Proposition 4 (pp. 39–40) can be shortened. You keep reproducing the same exact notation with few changes at each step

Is there evidence to support the assumption that the rate of human capital depreciation, σ, is constant throughout life? Could σ be systematically higher at old age?

Other Comments and Suggestions III

The time pattern of years in school in Figure 1 is quite interesting, especially the decline for cohorts born during the Great Depression/global recession in the 1930s. A brief comment along these lines in the text may be helpful

It may help to provide a more detailed explanation on p. 16 of the terms $\theta_{Sct} * t$ and $\theta_{Yct} * t$ in Eqs. (23) and (24). Is the goal here to capture some country-specific trends?

It may be helpful to briefly comment in the text on the specific features of the data and your estimation approach that enable separate identification of cohort effects vs. age effects on log earnings

The reported R^2's in many regressions seem very high, especially in Table 3. Can you explain this outcome and comment on it in the text?

Can you provide standard errors for the estimates in Table 6?

Minor Issues I

Consider dropping page number “0” on the title page

Consider adding which of the authors is the corresponding author on the title page

p. 3: insert missing “(“ before Cervellati

p. 4: life time earnings → lifetime earnings; expecatncy → expectancy; elaborates the data → elaborates on the data; robustness test → robustness tests; and draw some → and draws some

p. 5: interest earning → interest earnings

Consider fixing punctuation in displayed equations. Typically, commas and full stops are inserted immediately after equations rather than after equation numbers on the margin

p. 6: which a priced at P → which are priced at P

Minor Issues II

p. 9: the sentence “So, the lifetime…” is confusing

p. 38: I am confused by the two equations at the bottom. Could you simply reproduce Eq. (20) instead?

p. 39: In the equation for *V*, should the last sub-integral term be *RH(t)* or *RIH(t)*?

p. 40, 3rd line from the bottom: (*T*) = 0, you probably meant *D*(*T*) here

p. 41: $\frac{d\lambda(0)}{dT} > 0 \rightarrow \frac{d\lambda(0)}{dT} < 0$ [as implied by Proposition 5]

p. 11: it may be helpful to mention that Eq. (24) is derived from Eq. (15)

p. 28: duplicate records for Weil (2007) in the bibliography

p. 30: High Inocme → High Income

p. 30: Swap the vertical axes in “Middle East & North Africa” figure

Minor Issues III

p. 16: a_j is missing in Eq. (24)

Fix section numbers. You have Section V “Empirical specification” (p. 16) and also Section V “Results” (p. 18)

p. 19, 3rd line from the top: I don’t understand the sentence

p. 19: “and Earning” → “and Earnings” (a similar problem shows up multiple times elsewhere)

p. 19: “Figure three”: did you intend to reference Table 3 instead?

p. 37, in the notes to Table 6: “diving” → “dividing”

p. 20: earning function are → earnings function estimates are

p. 44: 1% raise in income → 1% increase in income

p. 46: 1st sentence in “Life expectancy beyond infancy” is unclear