

# Health, Human Capital Formation and Knowledge Production

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# Overview

- Question: What is relationship between health and growth?
- Existing Literature: Health, proxied by height or life expectancy, increases growth. But result is controversial.
- This Paper: should also focus on *morbidity*, not just *mortality*

# Basic Story

- Lisa grows up malnourished, with parasites, or with infections
- Lisa therefore can't focus in class, doesn't study as much, skips high school, and won't increase human capital stock or create patents/innovations
- But hookworm won't kill Lisa. So life-expectancy measure used in prior work treats Lisa the same as health people
- Biases estimated impact of health and education on growth

## Basic Specification

- How does author try to capture the impact of *morbidity* orthogonal to *life-expectancy*?
- The author does not have a direct measure of *morbidity*
- Constructs a *mortality*-adjusted stock of human capital:

$$\int_{\text{age cohort}} \int_{\text{year}} F(\text{School Enrollment, Mortality}) d(\text{age cohort})d(\text{year})$$

- This is key innovation: “**morbidity**”-adjusted enrollment enters growth regressions more significantly than **standard variable**

# Roadmap

## My General Assessment:

- It is great that author is taking on big important topic
- Very generous interaction with literature
- Massive data project (20+ countries, 200 years) – lots of work

## My comments will cover three things:

- ① Better motivate and test that key innovation!
- ② Some specifics on results and specification
- ③ Some thoughts on the approach from a complete non-expert

# Motivate and test Morbidity-Adjusted Enrollment Variable

- Which countries, eras, and diseases are we worried about?
- In baseline specifications, where does your variable significantly outperform standard variables? Does it match with the above?
- Show us this matters for outcomes more direct than growth:
  - U.S. South around hookworm era
  - Construct your variable and standard variables
  - Can you better explain test scores or grades? IQ tests? Graduation rates?
- Can you get morbidity for some episode, just as motivation?

## Estimated Functional Form on Key Variable

- Above, I wrote  $F(\textit{Enrollment}, \textit{Mortality})$ , but really is  $F(\textit{Enrollment}, \textit{Health})$ , where:

$$\ln \textit{Health} = \Phi \ln (1 - \textit{mortality}_t^a)$$

- Calibrates  $\Phi$  by maximizing statistical significance of interaction of this and education for productivity growth
- How do you adjust all further inference?
- $\Phi$  ranges from 0 to 500, but  $\ln \textit{Health} \approx 0$  for  $\Phi > 50$
- Key variable, so more clarity would be useful

# What Countries or Episodes are Driving Results?

- All Results Equally Weighted
- Most Health Variation from Flu Pandemics and Wars
- No Country Fixed Effects – Within or Between?
- How Compare Results Quantitatively with Rest of Literature?  
Life-expectancy?
- Why estimated in 5- or 10-year differences? If channel is through innovation, etc., should take dramatically longer



## Miscellaneous (for author)

- R&D expenditures measured relative to GDP in nominal terms. Real R&D likely increasing significantly more?
- What is meant by TFP in PPP units? Why is PPP appropriate?
- Why are country labor shares averaged with U.S. labor share?
- Smoothed high-tech imports as measure of technology spillovers. How is this done historically?

# Is this about Growth or Health?

- If this is about degree to which prior estimates of growth elasticity of health or schooling are incorrect, then need to better interact with existing literature in results section
- But if this new measure really is the best new thing we've got (for this period), let's use it for more:
  - More on patenting, secondary attendance
  - Crime or voting or social outcome
  - Workforce
  - Happiness

How does it perform relative simply to life-expectancy?

- More abstract concerns about measure of “growth” in this context. See Jones and Klenow, 2012.

## For Policy, is Micro or Macro Variation Preferred

- Heckman, for instance, cares about pre-natal health among US poor. I think of this as idiosyncratic variation in health outcomes.
- Estimates in this paper come from common or macro variation in health outcomes – major disease waves, wars, etc.
- Seems like targeted policies for health to increase aggregates (like growth) should be motivated by studies estimated off this idiosyncratic variation.
- Policies to avoid a flu-pandemic (common variation) are obviously useful regardless of impact on growth

# To Conclude

- Big important topic
- Very extensive and massively data intensive work on growth, conditioning on all sorts of things I haven't mentioned
- Develops a new variable aimed at distinguishing morbidity from mortality for growth
- Next step: Focus on that contribution:
  - Exactly what does it get us?
  - Exactly what doesn't it get us?
  - Show us it works when we know it should and not otherwise
  - Then apply it elsewhere in your next papers!