

STEG Virtual Course on “Data in Macro Development”

Lecture 3: Human capital data
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Human Capital

Stock of productivity-enhancing attributes embedded in people

- ▷ Multi-dimensional stock:
 - ▷ Knowledge, skills, habits, health, ...
- ▷ Produced by investments:
 - ▷ Education, training, practice, exercise, ...

Motivation: Development Accounting

Recent research: human capital accounts for 50–60 percent of cross-country differences:

- ▷ Deductive approach Hendricks and Schoellman (2018)
- ▷ Constructive approach:
 - ▷ Years of schooling: 19% Hall and Jones (1999)
 - ▷ + quality of schooling: 38% Schoellman (2012)
 - ▷ + experience: 56% Lagakos et al. (2018)
 - ▷ + health: 59% Weil (2007)

Potential questions

Are these results causal?

If human capital is so important, why don't people invest more?

What policies would remediate these gaps?

Are health differences really quantitatively so small?

Are there also large human capital gaps across workers in different regions, firms, or sectors?

Goal: overview sources of microdata with human capital measures

Divide lecture in two pieces

① Measures widely available in standard data

- ▶ Population census, LSMS, labor force survey, firm/establishment survey, ...
- ▶ Why? Interested in intersection of human capital w/ other topics; large, representative data; comparability

② Measures available in specialty data

- ▶ PISA achievement test score data, DHS health data, WBES training data
- ▶ Why? Prioritize best data on particular topic (student achievement, health, firm investments in workers)

Standard Data, Standard Measures

Standard Data

Some measures or proxies of human capital are widely available

- ▷ Earnings
- ▷ Demographics (particularly age)
- ▷ Education
- ▷ Occupation
- ▷ Data: [Censuses](#); [LSMS](#); [Labour Force Surveys](#); Gottlieb et al. (2024).

Three approaches to use this standard data to quantify human capital

Approach 1: Measure Human Capital Using Wages

Under two strong assumptions, wages measure human capital Bils and Klenow (2000)

- 1 Perfect substitution among labor types (scalar human capital, efficiency units)
- 2 Competitive labor markets

Measurement

$$w_{i,c} = MPL_{i,c} = \omega_c h_i$$

- ▷ ω_c is the price or wage per unit of labor (per efficiency unit)
- ▷ h_i is the quantity of human capital
- ▷ Relative wages = relative human capital

Practical Implementation

Ideally, construct hourly wages for all workers

- ▶ Divide earnings by appropriate measure of hours worked
- ▶ Include self-employed, with caution

Caution: this is a blunt tool

- ▶ Strong assumptions rule out a lot of interesting economics
- ▶ Often limited scope for further progress

Only approach that claims to measure total human capital

Approach 2: Education and (Potential) Experience

Most widely used proxies for human capital Mincer (1974)

Education: years in school or degree attainment

- ▶ Educational systems have many details; look for ISCED mappings
- ▶ Crosswalks particularly challenging; defer to Minnesota Population Center (2020)

Potential experience: transformation of age & education

- ▶ Age - Age at labor market entry
- ▶ Age - years of schooling - 6
- ▶ Lagakos et al. (2018)

Weighting Education and Experience

Internal weights: Mincer wage regression

$$\log(w_i) = \beta_0 + \beta_1 s_i + \beta_2 e_i + \beta_3 e_i^2 + \varepsilon_i$$

$$\log(h_i^o) = \hat{\beta}_1 s_i + \hat{\beta}_2 e_i + \hat{\beta}_3 e_i^2$$

- ▶ Sample size permitting: nonlinear schooling, quartic in experience Lemieux (2006)

External weights

- ▶ 10 percent per year of schooling Banerjee and Duflo (2005), Caselli (2016)
- ▶ Lower returns to experience in developing countries (Lagakos et al., 2018), Jedwab et al. (2023)

Measures observable human capital

Approach 3: Occupations, Tasks, and Skills

Worker's occupation conveys information about them

- ▶ Lawyers vs. cooks vs. heavy truck drivers

Decompose results by occupation categories

- ▶ Managers, production/non-production, farmers, elementary occupations

Use data on occupational characteristics

- ▶ Tasks workers do (routine vs. nonroutine, cognitive vs. manual) Autor et al. (2003)
- ▶ Skills valued or required for a job Schoellman (2010)

Implementation

Key object: mapping from occupations to skill-intensity (or task- or tool-intensity)

Obvious approach: use O*NET

- ▶ Enormous, rich database of occupational characteristics (tasks, skills, activities, context, ...)
- ▶ Challenge 1: **overwhelming information**
- ▶ Challenge 2: **crosswalks**
- ▶ Challenge 3: comparability of occupations & skills
 - ▶ Return to this in specialty data

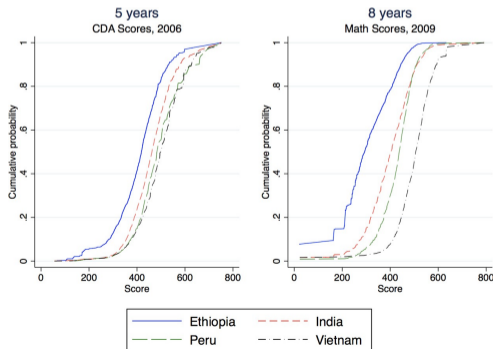
Specialty Data

Early Childhood

Recent literature: important role for early childhood investments Currie and Almond (2011),
Attanasio et al. (2022)

- ▶ Possibly larger than the role for school & adult investments Heckman (2006)

Data reveal large cross-country differences in test scores before school starts Singh (2020)



Early Childhood

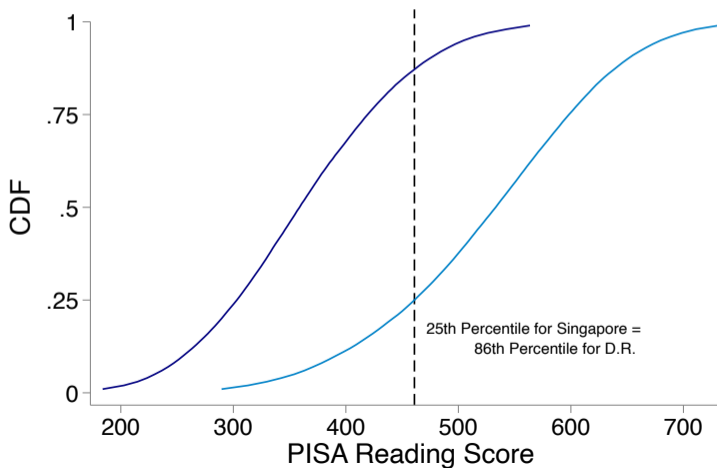
Challenges: no easily available data on early childhood investments & outcomes

- ▶ Excellent original data work (often paired w/ RCTs): [Attanasio](#), [Bernal](#), [Carneiro](#), [Meghir](#), ...
- ▶ Challenging econometric issues Cunha et al. (2010), Agostinelli and Wiswall (forthcoming)

Childhood Achievement Test Scores

Internationally Standardized Achievement Tests (ISAT) scores: large differences across countries

- ▷ 2018 PISA reading scores, top vs. lowest scoring country



Childhood Achievement Test Scores

Wealth of microdata:

- ▶ [OECD PISA](#), [IEA TIMSS/PIRLS](#), National data
- ▶ Factors & policies that affect achievement Hanushek and Woessmann (2011), Glewwe and Muralidharan (2016)

Overview

- ▶ Benefits: representative, comparable, rich covariates
- ▶ Challenges: need to read manuals carefully; achievement, not value added
 - ▶ Except: [Young Lives Study](#) Singh (2020)
 - ▶ See also: [LSAY](#) or [YITS](#), panels that follow PISA participants in Canada & Australia

Adult Skills

Track skills into adulthood

- ▶ [OECD PIAAC](#): literacy, numeracy, problem-solving tests + occupation tasks
- ▶ [World Bank STEP](#): literacy + occupation tasks

Strengths

- ▶ Data on skills (literacy skills in both surveys) Engbom et al. (2024)
- ▶ Country-specific data on occupation skill requirements Lewandowski et al. (2022); Caunedo et al. (2023); Bandiera et al. (2024)
 - ▶ See also: new surveys with O*NET-style measures outside the US Atencio et al. (2024)

Challenges

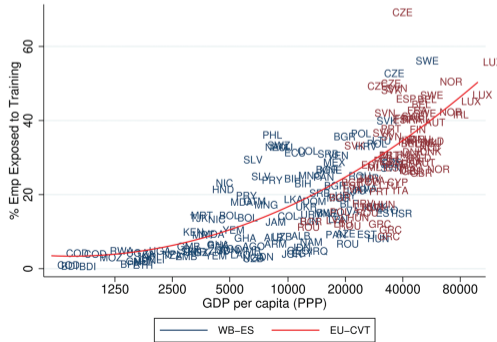
- ▶ Harmonizing PIAAC-STEP is not trivial
- ▶ STEP is urban-only, has high non-response, may need re-weighting

Training

Training: “any organized and structured learning activity outside the formal education system”

- ▶ World Bank Enterprise Survey, EU Continuing Vocational Training, EU Adult Education Survey
- ▶ Share of workers trained, formal vs. informal training, who provides/pays for training, ...
- ▶ Ma et al. (2024b), Ma et al. (2024a), Ma et al. (2024c)

Workers in developing countries receive less training Ma et al. (2024b)



Training

Strengths

- ▶ Possible to construct standardized measures of key training investments across countries
- ▶ Reveal consistent patterns of interest

Challenges

- ▶ Training data are not comprehensive
- ▶ Literature has not converged on theory
 - ▶ Specific vs. general human capital; frictional vs. frictionless labor markets; labor contracts

Health

Great starting point for health data

- ▶ Demographic and Health Surveys, available via [IPUMS Global Health](#)
- ▶ General health, health behaviors, healthcare, disease burden, ...

So far: little work in macro-development

- ▶ One example: Kim (2024)
- ▶ Multi-dimensional scope of the problem?
- ▶ Challenges of aggregation?

Migrants

Migrants carry their human capital to new countries

- ▶ Useful for disentangling human capital from other factors
 - ▶ Earnings, returns to schooling, occupation Hendricks and Schoellman (2018), Schoellman (2012), Martellini et al. (2024)
 - ▶ Parenting, culture De Philippis and Rossi (2020), Ek (2024)
- ▶ Leverage any data set with information on country of birth
 - ▶ [U.S. Census](#), [PISA](#), [New Immigrant Survey](#)

Challenges:

- ▶ Migrants are not randomly chosen (selection)
- ▶ Migrants' skills may not transfer (skill loss, discrimination)

Conclusion

Recent research finds large variation in human capital stocks

- ▶ Human capital is an important dimension for research in macro-development

Overviewed two main scenarios and the types of data and approaches that may be useful

- ① Your question limits the data you can use?
 - ▶ Use standard approaches that leverage common information: earnings, age, education, occupation
- ② You can freely choose the data?
 - ▶ Many exciting data sets with unique and interesting data to choose from and explore!

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