Life-Cycle Wage Growth Across Countries

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Northwestern, 18 April 2016

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Lessons from U.S. Immigrants

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What We Do

Document new fact: experience-wage profiles in rich countries are
steeper than in poor countries

- $\sim$ twice as steep

- wages double in rich countries, increase by 50% in poor countries

- based on representative large-sample micro data from 17
  countries – better data than previous studies

Why Care?

- How life-cycle wage growth differs across countries may help us understand cross-country income differences

- Key for evaluating importance of cross-country differences in

  - human capital accumulation

    Manuelli-Seshadri, Klenow-RodriguezClare, Bils-Klenow, Caselli, ...

  - labor market frictions (job ladder) Burdett, Burdett-Mortensen, Jovanovic, ...

- Hope: use profiles to discipline theories, available from my website

- Illustration of finding's quantitative bite: development accounting

  - how much of income differences due to K and H?

  - current consensus: $K \& H$ account for $\sim 40\%$, TFP for $\sim 60\%$

  - same exercise but assuming profiles reflect "life-cycle H": increases contribution of $K \& H$ from $\sim 40\%$ to $\sim 60\%$

So what's the mechanism?

- Why are profiles flatter in poor countries?

    - human capital accumulation

    - labor market frictions (job ladder)

    - ...

- Provide two pieces of (tentative) evidence:

    1. from same data: additional moments (variance profiles etc)

    2. from alternative data: wage profiles of U.S. immigrants

- These point to theories of human capital accumulation

Data

Data

- Nationally representative surveys with detailed wage and hours data:
  - Australia, Bangladesh, Brazil, Canada, Chile, France, Germany, Guatemala, India, Indonesia, Jamaica, Mexico, Peru, South Korea, United Kingdom, United States, Uruguay, Vietnam

- Focus on core set of 8 countries with repeated cross-sections spanning 15+ years

- Limitation: very poorest countries not in sample.

Sample

- Focus on full time male wage earners
    - Income of self-employed is payment to labor income *and* capital income (Gollin, 2002); host of other measurement issues (Deaton, 1997); potential experience harder to interpret for female and part-time workers

- Wage = $\frac{\text{labor earnings}}{\text{hours}}$
    - Majority of countries: earnings last month & hours last week

- Later look at females, part time, self employed

Potential Experience

- Measure lifecycle using "potential experience"

- Definition

$$experience := \begin{cases} age - schooling - 6, & \text{if } schooling \geq 12 \\ age - 18, & \text{if } schooling < 12 \end{cases}$$
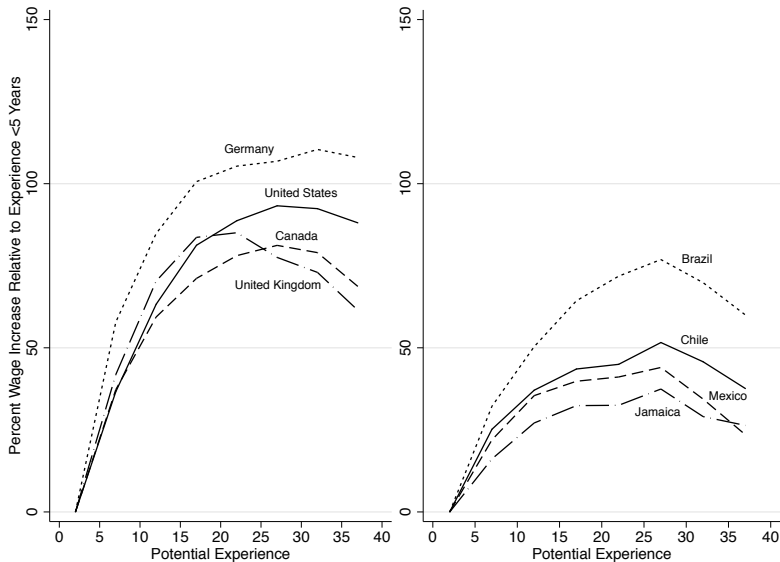
- That is, years since turned 18 or finished school

- Keep individuals with $0 \leq experience \leq 40$

Lifecycle Wage Growth

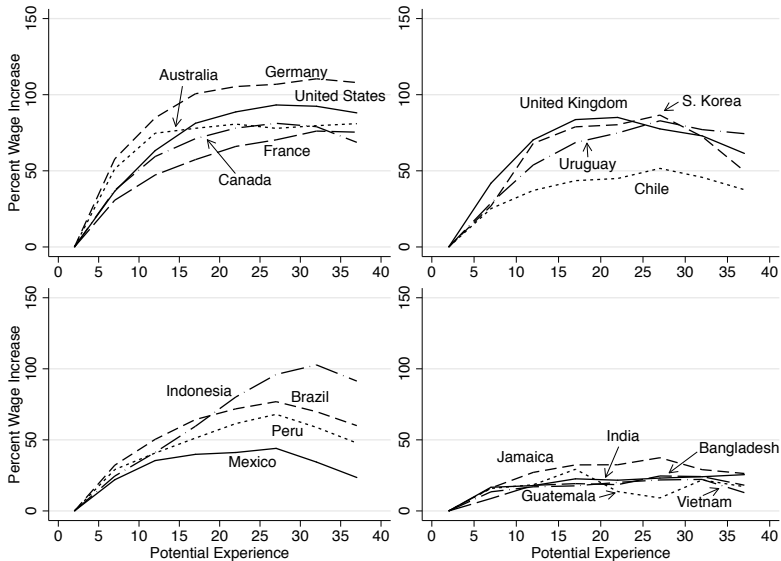## Simplest Measure of Lifecycle Wage Growth

- Group workers into 5-year experience bins (0-4, 5-9, etc)

- Compute average wages by bin relative to 0-4 bin

- Report simple averages across years of data

Core Countries

data available from http://www.princeton.edu/~moll/research.htm

All Countries

data available from `http://www.princeton.edu/~moll/research.htm`

Challenges with Simplest Measure

- No controls for schooling

- Age-cohort-time identification problem

Mincerian Measure of Lifecycle Wage Growth

- Consider individual i in cohort c at time t

- Estimate equations of the form:

$$\log w_{ict} = \alpha + g(s_{ict}) + f(x_{ict}) + \gamma_t + \psi_c + \varepsilon_{ict}$$

- w_{ict}: wages

- s_{ict}: schooling; x_{ict}: experience.

- γ_t: time effect, ψ_c: cohort effect

- Goal: estimate $f(\cdot)$ and assess how it varies across countries

Mincerian Measure of Lifecycle Wage Growth

- Assume $g(s) = \theta s$, but fully flexible $f(\cdot)$

$$\log w_{ict} = \alpha + \theta s_{ict} + \sum_{x \in X} \phi_x D^x_{ict} + \gamma_t + \psi_c + \varepsilon_{ict}$$
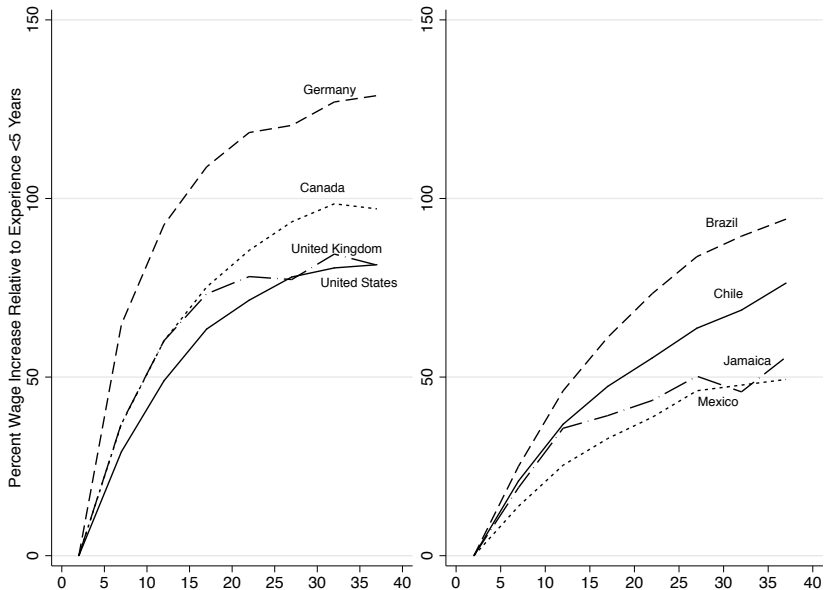
  where D^x_{ict} is a dummy for experience group
  $x \in X = \{5\text{-}9, 10\text{-}14, ...\}$

- Pointwise identification of $f(x)$ via the $\{\phi_x\}$

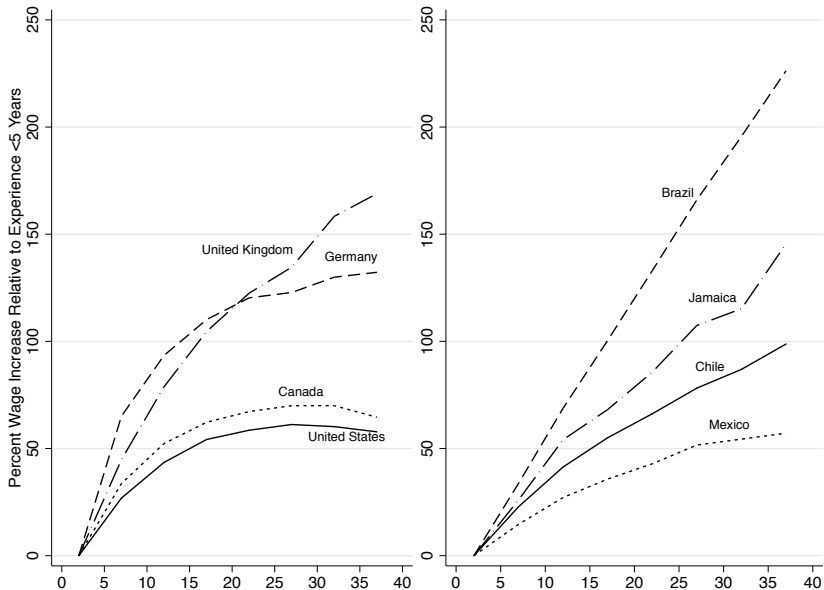- Cannot estimate as is, due to well-known collinearity problem

Mincerian Measure of Lifecycle Wage Growth

1. Time/cohort controls a la Hall (1968), Deaton (1997)

    - Focus on core countries, which have repeated cross sections spanning 15+ years

    - Assume that all growth is due either to time or cohort effects

2. New approach based on Heckman, Lochner and Taber (1998)

    - Assume no wage gains due to experience in final working years

    - Consistent with models of lifecycle *H* accumulation or search

Deaton-Hall Profiles: All Growth Due to Time

Deaton-Hall Profiles: All Growth Due to Cohort
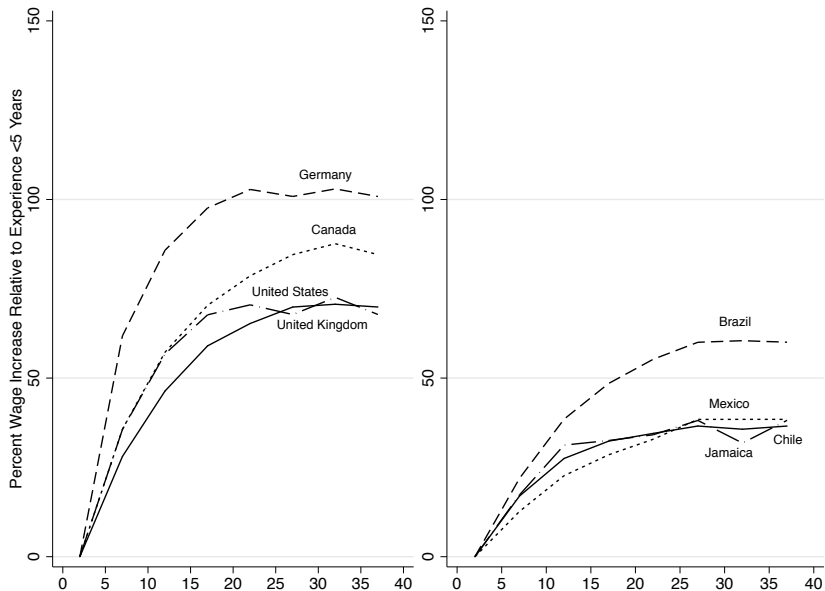
Limitations of Deaton-Hall Approach

- Just guessing about relative roles of cohort and time

- Same roles of cohort and time in all countries?
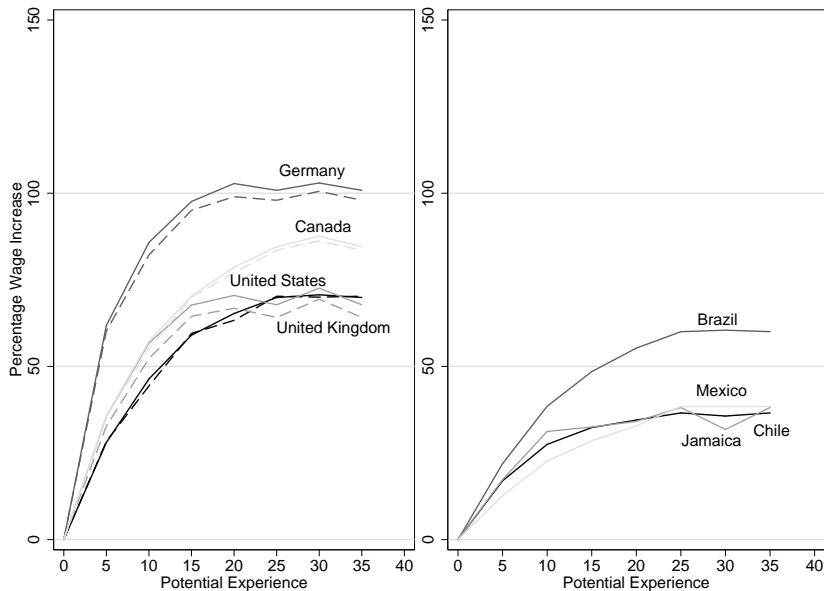
- Hard to imagine world without strong time effects

Heckman-Lochner-Taber (HLT) Approach

- Assume no wage gains due to experience in last working years (e.g. 35-40 or 30-40 years of potential experience)

- With this assumption, and using repeated cross sections, can identify experience effects from cohort and time

- Intuition: follow different cohorts over time; wage growth from years 1999 to 2000 identified from oldest cohort's wage growth
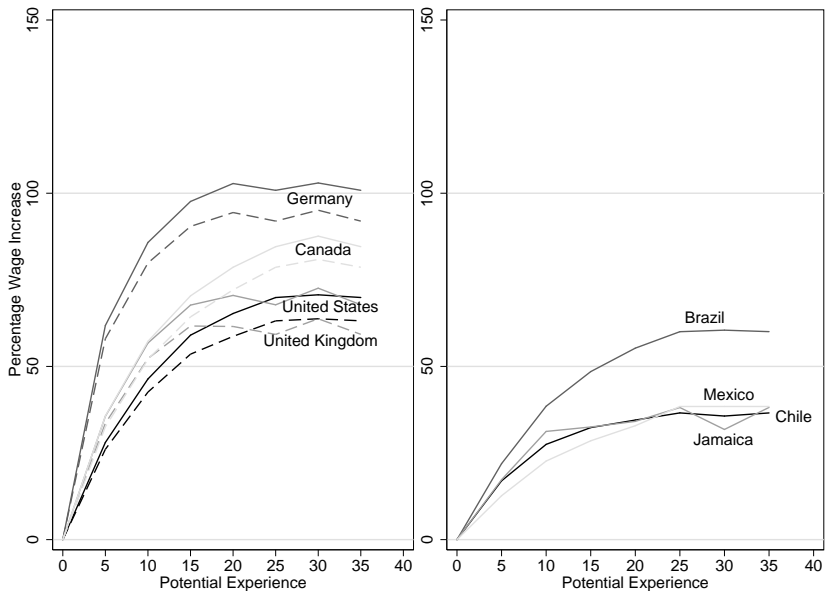
Heckman-Lochner-Taber (HLT) Profiles
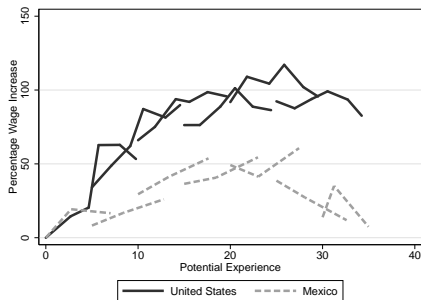
HLT Profiles: Robustness to Age Heaping

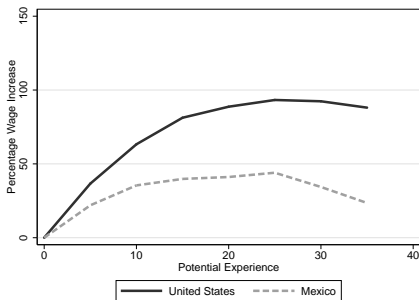# HLT Profiles: Robustness to Education Measurement

Selection?

- Concern:
    - in rich countries, less productive workers select out of wage employment as they age and/or...

    - ... in poor countries, less productive workers select into wage-employment as they age

- Examine using panel data from Mexico and U.S. (FLS and PSID)

(a) panel data   (b) cross section (from Fig 1)

Alternative Sample Restrictions & Experience Def.

Table 5: Robustness

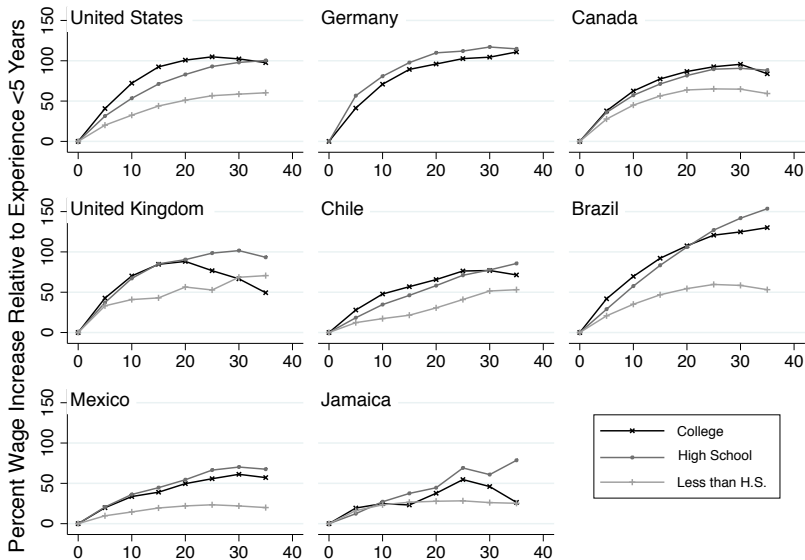Height at 20-24 Years Experience, HLT Profiles

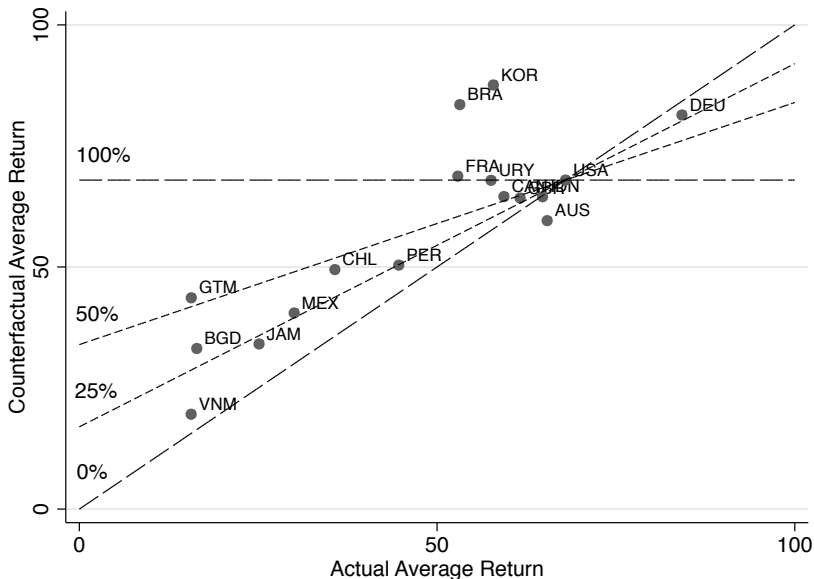|		Rich	Poor	Rich - Poor
(1)	Baseline	79.3	39.2	40.1**
(2)	Experience at 16	82.1	45.8	36.2**
(3)	Constructed experience	90	43.5	46.6**
(4)	Measurement error: age	76.5	39.2	37.3**
(5)	Measurement error: education	71.7	39.2	32.5**
(6)	Measurement error: age and education	71.2	39.2	32.0**
(7)	Include Self-Employed	80.3	36.6	43.6**
(8)	Include Public-Sector Employees	80.4	42.2	38.2**
(9)	Include women	70	29.1	41**
(10)	Constructed experience, men and women	76.6	25.5	51.1**
(11)	Include Part-Time (20+ hours)	83	38.2	44.8**
(12)	Include Part-Time (> 0 hours)	84.8	36.7	48.1**
(13)	Constructed experience, incl. Part-Time	100	42	58.0**

Lifecycle Wage Growth Across Countries

- Punchline: less lifecycle wage growth in poor countries

- Results present multiple assumptions about role of cohort and time, numerous alternative sample restrictions

- Some modest role for interactions between schooling and experience

Interactions Between Schooling and Experience

Experience-Wage Profiles by Education Level

Accounting for Aggregate Experience-Wage Profiles

Distinguishing Between Mechanisms (new!)

Potential Mechanisms

1. human capital accumulation

2. search and matching/job ladder

3. long-term contracts with $w \neq MPL$

4. what else?

Large literature studies rel. importance of 1 to 3 in U.S./rich countries

Topel-Ward, Rubinstein-Weiss, Altonji-Smith-Vidangos, Bagger-Fontaine-PostelVinay-Robin, ...

▸ ASV

Moments we would like to look at

- search and matching/job ladder
  - data on job-to-job transitions

- long-term contracts
  - tenure profiles

- problem: both require panel data (or matched employer-employee data) which we don't have
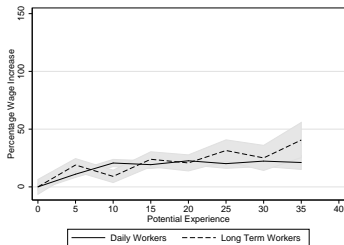
Moments we can look at

- profiles for particular groups of workers

    - workers with short-term contracts $\Rightarrow$ long-term contracts?

    - ...

- hours and earnings profiles

    - human capital, long-term contracts

- variance profiles

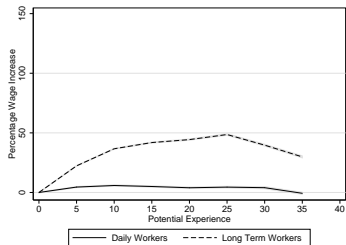   - human capital

Workers with Short-Term Contracts

- Long-term contracts $\Rightarrow$ flatter profiles in poor countries if

    - $w \neq MPL$ and wages front-loaded in poor countries

    - $w \neq MPL$ and wages back-loaded in rich countries

- a priori reason to be skeptical: median tenure in U.S. = 4.6 years (BLS)

- Nevertheless went through survey codebooks to identify workers for which long-term contracts, tenure concerns seem unlikely

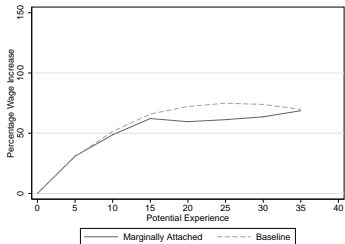# Workers with Short-Term Contracts

(a) India

(b) Mexico

(c) United States

Hours, Earnings and Variance Profiles

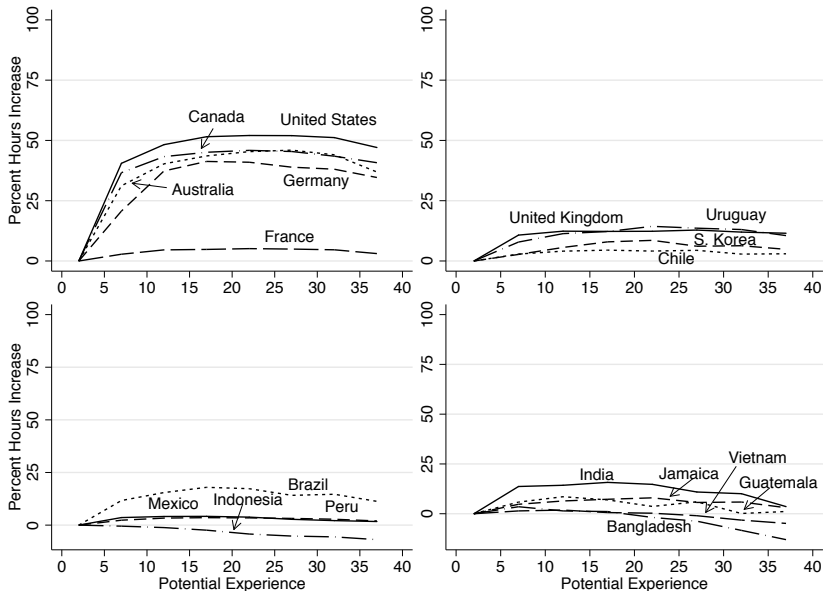Two predictions of simple human capital theories (Ben-Porath,...):

1. time investment into *H* declines over life-cycle

   - if hours worked reflect time not investing

     - steep hours profiles in rich countries

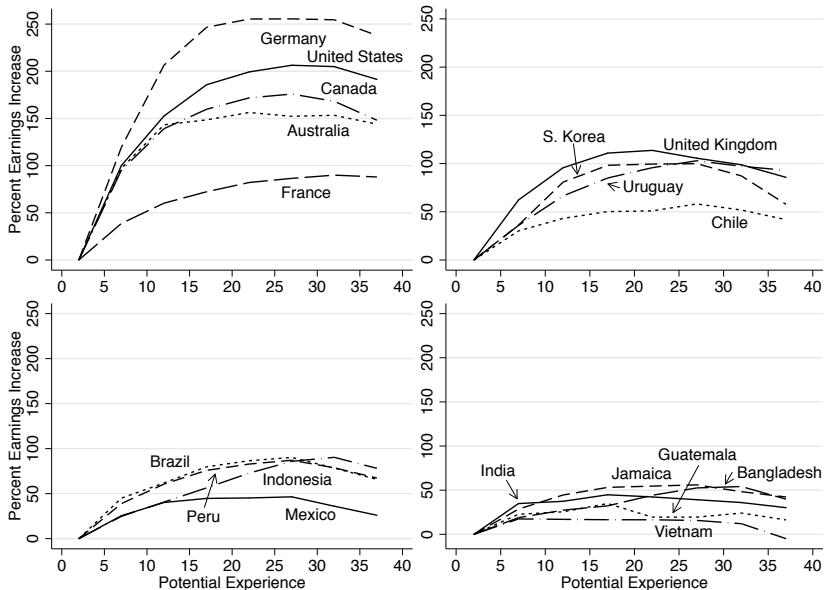   - flat hours profiles in poor countries

2. $Var(\log earnings)$ are *U*-shaped Mincer, Polachek, Rubinstein-Weiss

   - individuals differ in "learning ability"

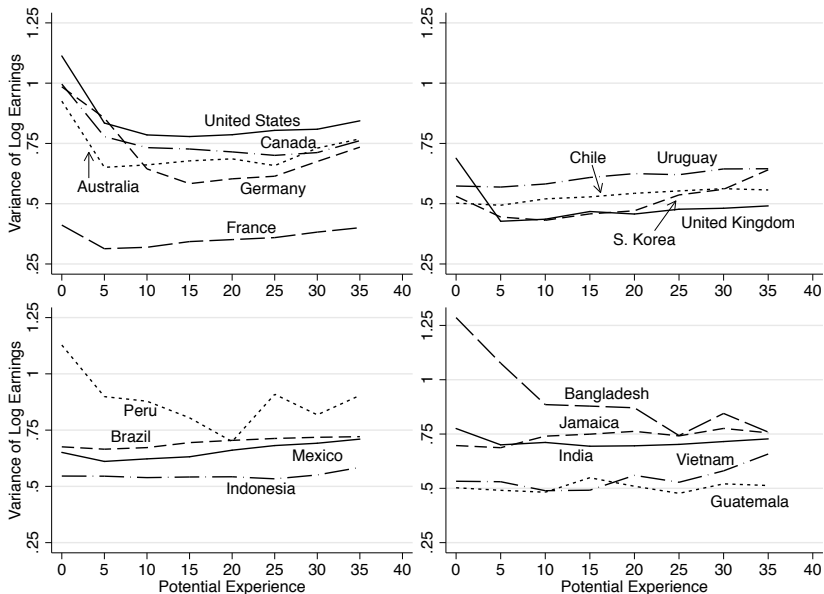   - steep profiles start below flat ones and cross ("overtaking age")

Lifecyle Hours Profiles

Lifecyle Earnings Profiles

Lifecyle Variance Profiles (within education groups)

Summary

Additional moments from our data

- not supportive of long-term contracts

- consistent with human capital theories, not definitive

- inconclusive about search and matching/job ladder

Next: bring another dataset to the table

Lessons from U.S. Immigrants

Returns to Experience for Immigrants

Study returns to experience for immigrants in the U.S.

- foreign experience, but also U.S.-acquired experience

Advantages:

- common labor market, institutions, data set

Challenges:

- immigrants may be selected, suffer skill loss

Three Main Findings

1. Return to foreign experience is much lower for poor country immigrants, similar to that for non-migrants

2. Return to U.S. experience is modestly lower

3. Return to U.S. experience for U.S.-educated immigrants is independent of birth country

Interpretation of Findings

Evidence leads us to a human capital interpretation:

- Less human capital formation through experience in poor countries

- Part of this effect is explained by the work environment

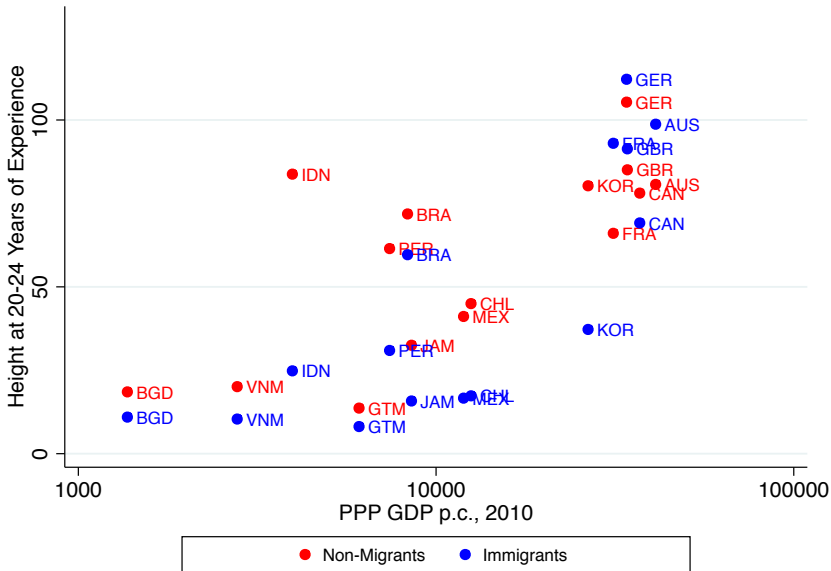- Part of this effect stems from school type/quality

Data

Data: 1980–2000 Census, 2005–12 ACS

- Immigrant: born outside the fifty states

- Restrictions: employed wage worker, 0–45 years experience

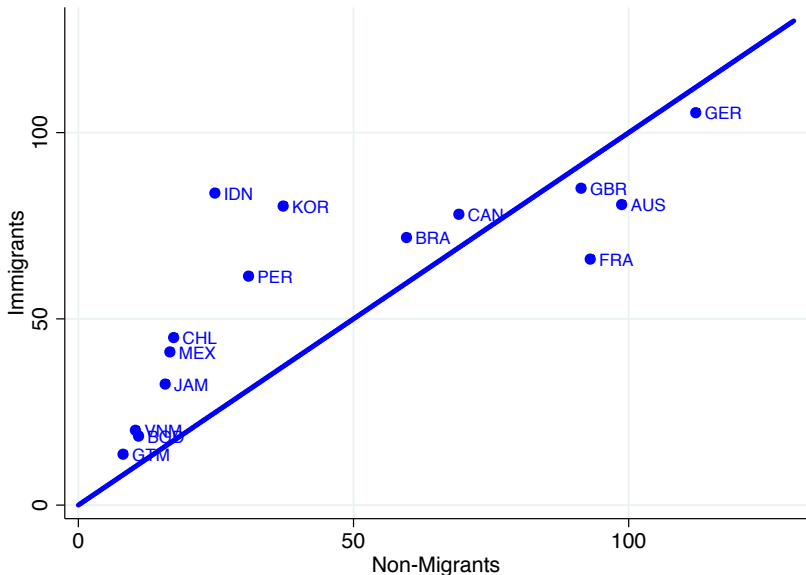- Positive income, valid responses to other key variables

Nice feature: extremely large sample

- 1.6 million immigrants, 120 birth countries

- 102 countries with $1000+$; 29 with $10,000+$

- Wide variety of controls

Fact 1: Returns Similar for Immigrants, Non-Migrants

Scatter plot with x-axis "PPP GDP p.c., 2010" (log scale from 1000 to 100000) and y-axis "Height at 20-24 Years of Experience" (0 to 100+). Legend: red dots = Non-Migrants, blue dots = Immigrants. Labeled points include GER, AUS, FRA, GBR, KOR, CAN, IDN, BRA, PER, CHL, MEX, JAM, PER, BGD, VNM, GTM.

Fact 1: Returns Similar for Immigrants, Non-Migrants
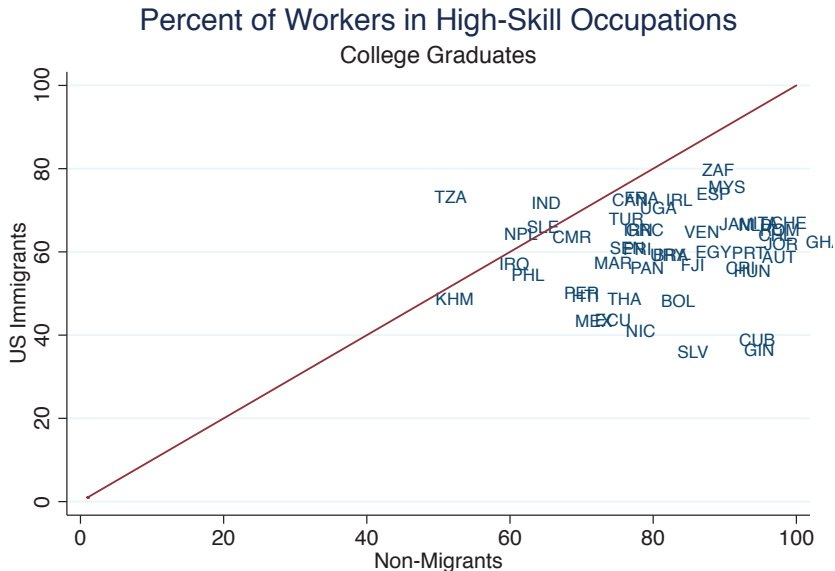
Implication of Fact 1

Simplest explanation:

- Less lifecycle human capital accumulated in poor countries.

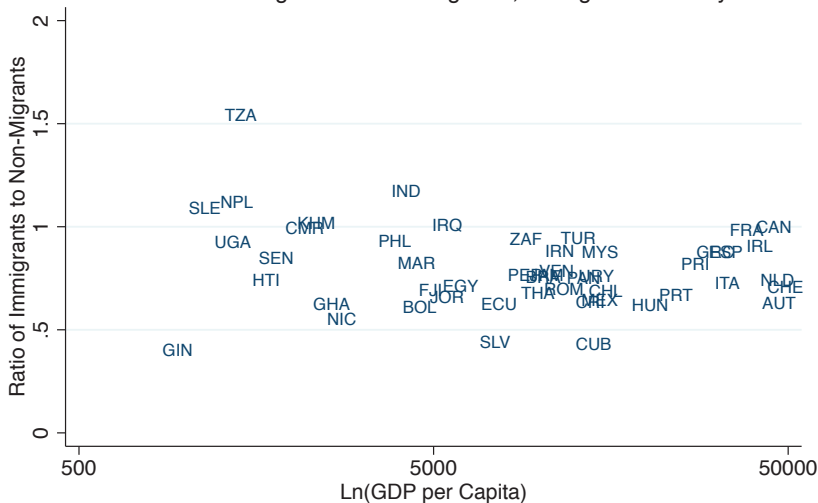Alternative explanation:

- Non-migrant returns are biased
  - Labor market frictions, implicit contracts, measurement error

- Returns for immigrants biased
  - Selection, skill transferability

- These biases affect only poor countries, negatively, by same magnitude
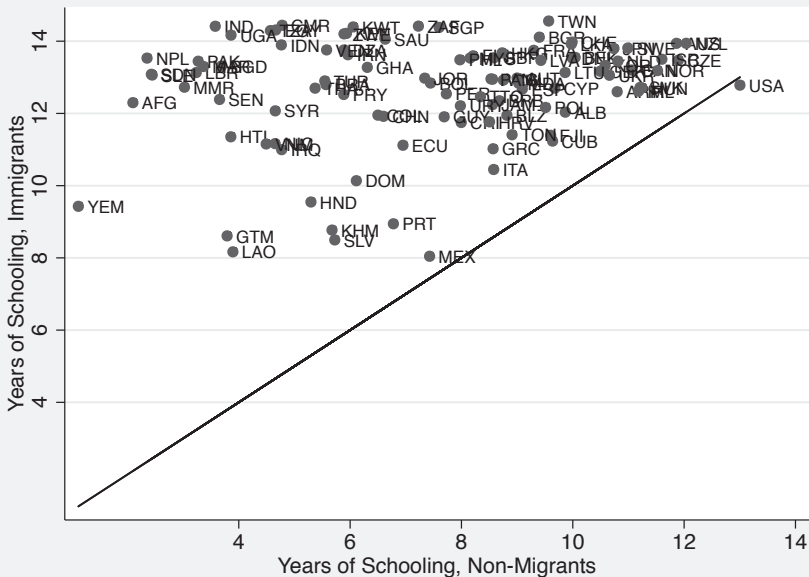
Fact 2: No Relation Between Income, "Skill Transfer"

Percent of Workers in High-Skill Occupations
College Graduates

Fact 2: No Relation Between Income, "Skill Transfer"

Percent of Workers in High-Skill Occupations
Ratio of Immigrants to Non-Migrants, College Grads Only

Fact 3: Schooling Selection Declines in Income

Development Accounting

Development Accounting

- So far, new fact: experience-wage profiles flatter in poor countries than rich countries

- Now: development accounting exercise
    - same as previous literature ...
    - except returns to experience vary across countries

- Conclusion: Importance of *H* now 60%, rather than 40%

Development Accounting

- Use same accounting method as Caselli (2005).

- Real GDP in a country

$$Y = K^{\alpha}(AH)^{1-\alpha}$$

- Assume $\alpha = 1/3$.

- Re-construct Caselli's $success_1$ measure:

$$Y_{KH} = K^{\alpha}H^{1-\alpha}$$

$$success_1 = \frac{\text{var}(\ln Y_{KH})}{\text{var}(\ln Y)}$$

Development Accounting

Human Capital Measure	Success$_1$	Slope(log(Y_{KH}),log(GDP))
Schooling	0.40	0.53
Experience	0.40	0.56
Schooling + Experience	0.63	0.65

▸ Cohort & Time Effects

Conclusion

- Less lifecycle wage growth in poor countries

- Some evidence in favor of human capital explanation

- Through lens of development accounting framework: H and K account for $\sim 60\%$ of income differences, not $\sim 40\%$

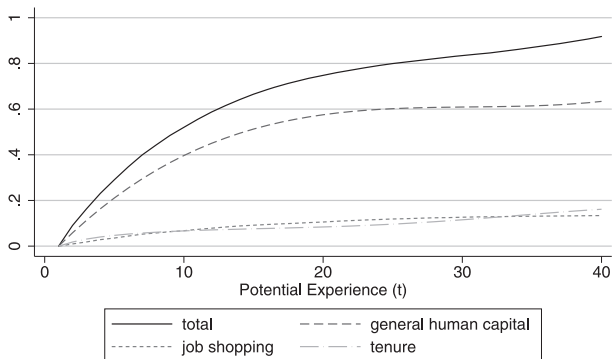- Priority for future work: panel data for poor countries

FIGURE 1.—Decomposing the experience profile of wages. Baseline model, full SRC sample. The figure displays the model's decomposition of wage growth over a career (or the experience profile of log wages) into the contributions of job shopping (the mean value of the job-specific wage component ν), the accumulation of tenure (the contribution of the mean value of tenure on the wage experience profile), and the accumulation of general human capital.