

Human Capital and Development Accounting: New Evidence from Immigrant Earnings

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The Question

Variation in per capita income across countries: **factor 30**

How much is due to **human capital**?

How to measure a country's **human capital stock**?

The easy part: **years of schooling**

- Mincer approach: $h = \exp(\phi s)$
- Klenow and Rodriguez-Clare (1997); Hall and Jones (1999)

The hard part: “**school quality**”

Measuring “School Quality”

GE approach

- calibrate a model of human capital production
- Erosa, Koreshkova, and Restuccia (2010); Córdoba and Ripoll (2013); Manuelli and Seshadri (2014)
- controversial: the human capital production function

Immigrant earnings approach

- Hendricks (2002); Schoellman (2012)
- controversial: migrant selection

We propose a third approach.

Our Approach

Observe wages of U.S. immigrants **pre** and **post** migration

Migrant wage gains measure cross-country wage gaps:

- pre-migration wage: $w_c h$
- post-migration wage: $w_{US} h$
- ratio: w_{US}/w_c
measures the contribution of factors **other than** h to the gap in output per worker

Data: New Immigrant Survey

Main Result

Focus on income gap between U.S. and countries with less than $1/4$ of U.S. gdp per worker.

63% of this gap is due to human capital.

Previous results:

Approach	Fraction due to h
Mincer	$\approx 20\%$
Immigrants	$\approx 30\%$
This paper	63%
h production function	20 – 80%

A new approach for measuring country human capital stocks

No need to estimate h production functions

Our approach yields estimates of **migrant selection**

- migrants from low income countries earn about 4 times more than average non-migrants
- migrants from rich countries earn roughly the same as non-migrants

Our approach yields measures of **human capital by schooling**

- relative human capital varies about uniformly across school levels
- implications for multi-skill models (Jones, 2011)

- ① One skill accounting framework
- ② Data: NIS
- ③ Results
 - ① Levels accounting
 - ② Migrant selection
 - ③ Robustness and complications
- ④ Multiple skill types

One Skill Model

One Skill Model

Aggregate production function:

$$Y_c = K_c^\alpha (A_c h_c L_c)^{1-\alpha} \quad (1)$$

Equivalently:

$$y_c = \underbrace{A_c (k_c/y_c)^{\alpha/(1-\alpha)}}_{z_c} h_c \quad (2)$$

z_c : joint contribution of TFP and capital.

Assumptions

- ① Workers are paid their marginal products:

$$w_c = \partial y_c / \partial h_c = (1 - \alpha) z_c \quad (3)$$

- ② The labor share does not vary across countries (Gollin, 2002).
- ③ There is one type of labor (we relax this later).

Accounting Implications

Output gap between rich and poor countries:

$$\frac{y_{US}}{y_c} = \frac{z_{US}}{z_c} \frac{h_{US}}{h_c} \quad (4)$$

In logs:

$$\Delta y_c = \Delta z_c + \Delta h_c \quad (5)$$

with $\Delta y_c = \ln(y_{US}/y_c)$.

Share of the output gap due to human capital:

$$share_{h,c} = \Delta h_c / \Delta y_c \quad (6)$$

Measuring h Gaps

We observe wages of U.S. immigrants

- ① post migration: $\omega_{US,c} = w_{US} h_c \alpha_c$
- ② pre migration: $\omega_{c,c} = w_c h_c \alpha_c$

α_c : migrant selection

- the h gap between immigrants and non-migrants

Measuring h Gaps

The main idea:

The ratio of post to pre migration wages measures z_{US}/z_c .

$$\frac{w_{US} h_c \alpha_c}{w_c h_c \alpha_c} = \frac{w_{US}}{w_c} = \text{migrant wage gain} \quad (7)$$

$$= \frac{z_{US}}{z_c} = \text{contribution of } z \quad (8)$$

Human capital ratio:

$$\frac{h_{US}}{h_c} = \frac{y_{US}}{y_c} \frac{w_c}{w_{US}}$$

We discuss complications later (skill transferability, ...)

Measuring Migrant Selection

$$\alpha_c = \frac{\text{median immigrant wage in } c}{\text{median non-migrant wage in } c} \quad (9)$$

Imputed home country wages:

$$\text{median wage in } c = [\text{median U.S. wage}] \times y_c / y_{US} \quad (10)$$

Data

Data: New Immigrant Survey

Nationally representative sample of new permanent residents in 2003

Surveyed between June 2003 and June 2004

Sample size: about 8,500 adults

Information on:

- 1 Demographic characteristics (age, sex, education)
- 2 Visa status
- 3 Current employment in U.S. $\rightarrow w_{USh}$
- 4 Last job prior to migration $\rightarrow w_ch$

- 1 Reported: wage on last pre-migration job in local currency year t .
- 2 Convert into year t PPP-adjusted wage (PWT PPP factors)
- 3 Time shift from year t to 2003 \rightarrow **pre-migration wage** using the wage change for natives with the same [birth year, sex, education]
- 4 **Wage gain** = post-migration wage / pre-migration wage

Drop observations with

- any U.S. schooling
- last non-U.S. job before 1983
- ambiguous currencies (revaluations)

The robustness analysis deals with other complications

Group countries into bins by $y_{c,2005}$ (confidentiality).

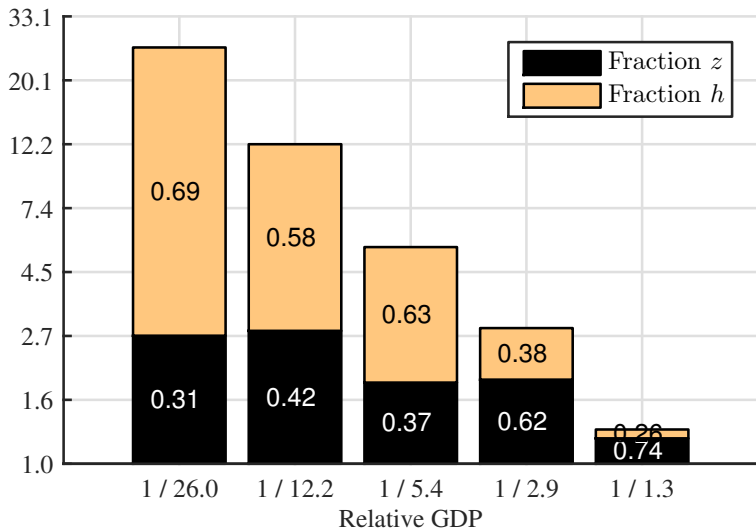
GDP Category	Most Sampled
$< 1/16$	Ethiopia, Nepal, Nigeria
$1/16 - 1/8$	India, Philippines, China
$1/8 - 1/4$	Dominican Republic, Ukraine, Bulgaria
$1/4 - 1/2$	Mexico, Poland, Russia
$> 1/2$	Canada, United Kingdom, Korea

For each group we compute:

- 1 median pre- and post-migration wage
- 2 wage gain = [median pre migration wage] / [median post-migration wage]
- 3 median GDP per worker relative to the U.S. (PPP adjusted)

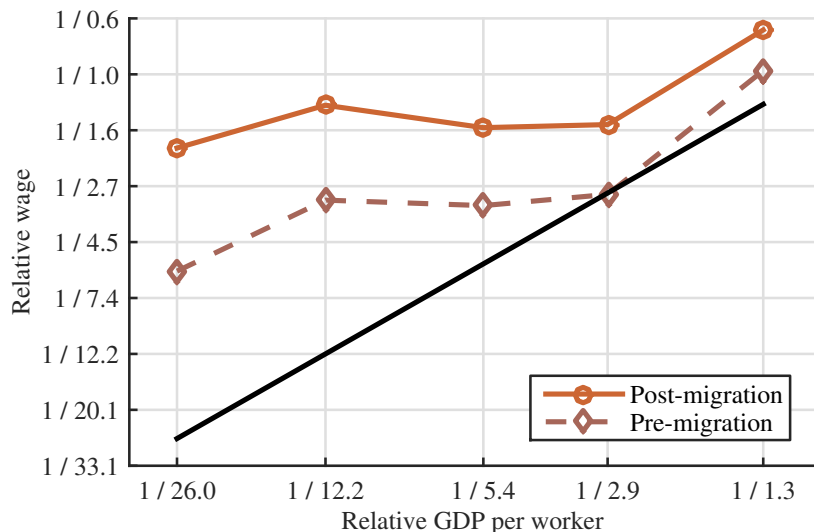
Results

Main Accounting Result



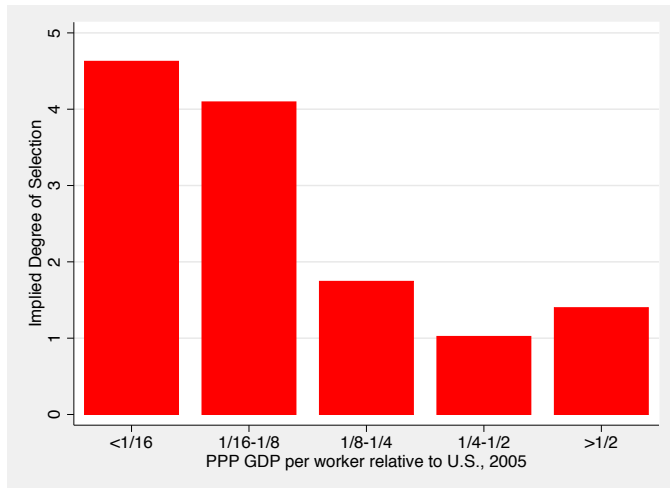
For low income countries: h accounts for 58 – 69% of Δy_c

Pre and Post Migration Wages



High pre-migration wage indicates strong migrant **selection**

Migrant Selection



Migrants from low income countries are strongly selected

Direct measures of selection for lowest y group:

Education:

- average years of schooling: 14.5 years
- 43% have BA degrees

Pre-migration occupations:

- majority white collar wage earners
- almost no immigrants with agricultural jobs

Potential Concerns

- ① Are migrant wage gains = skill price gaps?
 - ① skill transferability
 - ② selection on wage gains
- ② Robustness
- ③ Multiple skills
- ④ **Quality** of NIS wage data
 - Checks to be completed
 - comparison with Census wages
 - comparison with source country non-migrant wages

Do specialized skills have value in the U.S.?

- example: a law degree from India

If not: wage gains understate skill price gaps

- our results **overstate** the role of human capital

Evidence: **occupational downgrading**.

GDP category	Same Occ. (Narrow)	Same Occ. (Broad)	Median Wage Change
<1/16	6%	13%	-30%
1/16-1/8	26%	43%	-2%
1/8-1/4	10%	22%	-19%
1/4-1/2	9%	22%	-15%
>1/2	32%	48%	0%

Most low income migrants switch to lower paid occupations after migration.
Suggests that our results overstate the role of *h*.

Skill Transferability

Robustness Check	Human Capital Share	95% C.I.	Median Wage
Baseline	0.63	(0.55,0.71)	\$9.00
Skill Transfer: Mean Wage	0.49	(0.42,0.56)	\$15.59
Skill Transfer: Mean + 1 S.D. Wage	0.35	(0.27,0.42)	\$24.37
Skill Transfer: Mean + 2 S.D. Wage	0.20	(0.12,0.28)	\$40.73

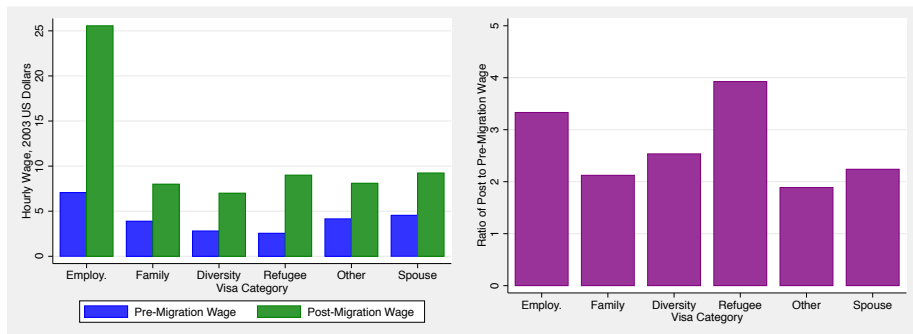
Thought experiment:

Assign each occupational downgrader the median US native wage of his/her pre-migration occupation.

Selection on Wage Gains

Are migrants more likely to migrate when their home wages are low / their U.S. wages are high?

Suggestive evidence: differences between visa categories



Exclude observations with

- high inflation, unusual currencies.
- many years since last pre-migration job

Restrict observations to specific visa categories

In all cases, h accounts for 52% to 70% of y gaps (for countries with $y_c < 1/4 y_{us}$)

Two Skill Model

Jones (2011) argues that **imperfect substitution** of high and low skill workers **amplifies** the role of h .

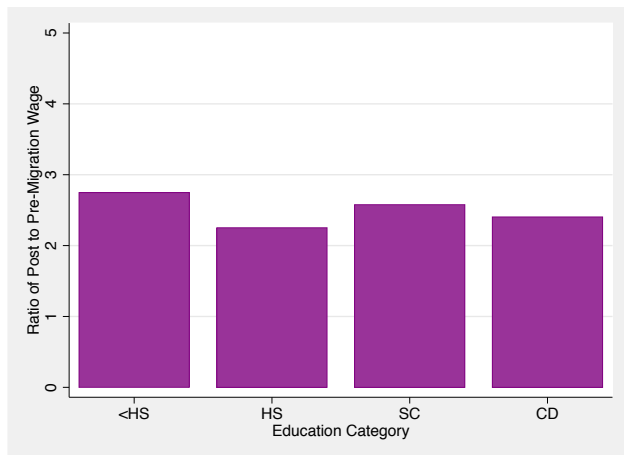
Intuition:

- skilled workers are scarce in low income countries
- this drives down the wages of the majority of unskilled workers

Implications:

- skill price gaps are small for skilled / large for unskilled workers
- especially for low income countries

Wage Gains By Education



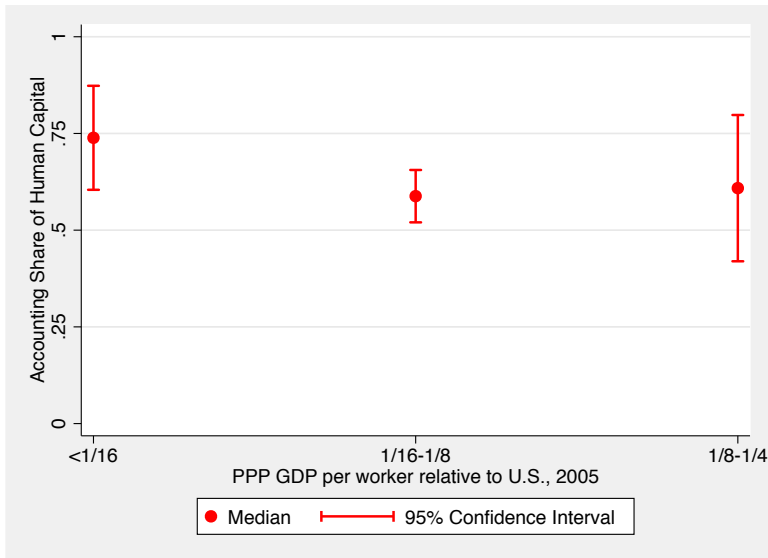
Countries with $y_c < 1/4 y_{US}$

Roughly equal wage gains for skilled and unskilled workers

Consistent with the efficiency units model (perfect substitution).

- ① Levels accounting with multiple skills.
- ② Bounding the roles of skill transferability / selection on wage gains.

Confidence Intervals



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