# Human Capital and Development Accounting: New Evidence from Immigrant Earnings

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April 30, 2015

## Question

Variation in per capita income across countries: **factor 30**
How much is due to **human capital**?

## The Challenge

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

Observed wages confound skill prices and human capital: $\hat{w} = wh$

**Mincer approach** (Hall and Jones, 1999)

- observe years of schooling $s$

- $h = \exp\left(\phi s\right)$

- one concern: differences in "school **quality**"

**GE approach**

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

**Immigrant earnings** approach

- hold $w$ constant and vary $h$
- Hendricks (2002); Schoellman (2012)
- controversial: migrant selection

## Our Approach

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

Hold $h$ constant and vary $w$

- 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 1/10th of U.S. gdp per worker.

**40%** of this gap is due to human capital.

Previous results:

| Approach | Fraction due to $h$ |
|----------|---------------------|
| Mincer | 1/5 |
| Immigrants | 1/3 |
| This paper | 1/2.5 |
| $h$ production function | up to 1 |

## Contributions

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 3 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)

## One Skill Model

There is one type of labor (we relax this later): $L$

Aggregate production function:

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

Output gap between rich and poor countries:

$$\frac{y_{US}}{y_c} = \left(\frac{A_{US}}{A_c}\right)^{1/(1-\alpha)} \left[\frac{k_{US}/y_{US}}{k_c/y_c}\right]^{\alpha/(1-\alpha)} \frac{h_{US}}{h_c} \tag{2}$$

$h_{US}/h_c$ is the contribution of $h$ to output gaps

## Measurement

Assumption: the labor share does not vary across countries (Gollin, 2002).

Then: the output gap equals the gap in average wages

$$\frac{y_{US}}{y_c} = \frac{w_{US}}{w_c}\frac{h_{US}}{h_c} \tag{3}$$

$w = \partial Y/\partial(hL)$ is the unobserved skill price (marginal product of labor)

The fraction of the output gap due to $h$ is then

$$\ln\left(h_{US}/h_c\right)/\ln\left(y_{US}/y_c\right) = 1 - \ln\left(w_{US}/w_c\right)/\ln\left(y_{US}/y_c\right) \tag{4}$$

We measure $w_{US}/w_c$ as the ratio of post to pre-migration wages

## Data: New Immigrant Survey

Nationally representative sample of new permanent residents in 2003

Surveyed between June 2003 and June 2004

Sample size: about 12,000 adults

Information on:

1. Demographic characteristics (age, sex, education)

2. Visa status

3. Current employment in U.S. $\rightarrow w_{US}h$

4. Last job prior to migration $\rightarrow w_c h$

## Data Steps

1. $w_{c,t}$: wage on last pre-migration job (various currencies)

2. currency conversion: $w_{\$,t} = w_{c,t}x_{c,t}$ (dollar wage in $t$)

3. time shifting: $w_{\$,2003} = w_{\$,t} \times y_{US,2003}/y_{US,t}$

4. Wage gain: post-migration wage / $w_{\$,2003}$

Drop observations with ambiguous currencies (revaluations)

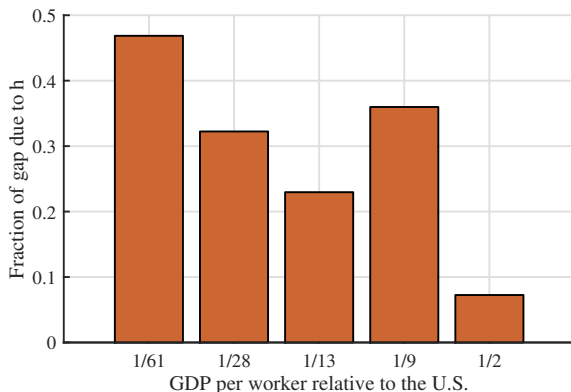Drop employment visa migrants (reasons below).

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

# Results
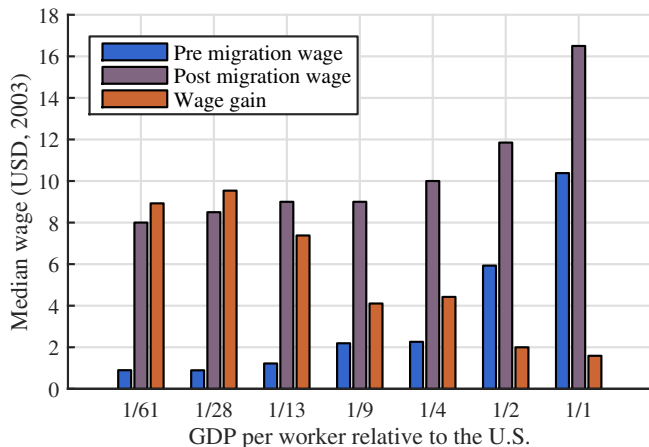


Wage gains for low income migrants: 8

# Fraction of Output Gap Due to $h$



Details: Distribution of Wage Gains, Distribution of Post-Migration Wages, Distribution of Pre-Migration Wages, Including Employment Visa Migrants

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## Robustness Checks

Exclude observations with

- high inflation

- unusual currencies.

- any U.S. education

- many years since last pre-migration job

## Potential Concerns

1. **Quality** of NIS wage data

   Checks to be completed

   - comparison with Census wages
   - comparison with source country non-migrant wages

2. Are wage gains = skill price gaps?

## Skill Transferability

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

- example: a law degree from India

Implication: wage gains understate skill price gaps

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

Suggestive evidence:

- wage gains are similar across education levels
- wage gains are larger for employment visas

## Selection on Wage Gains

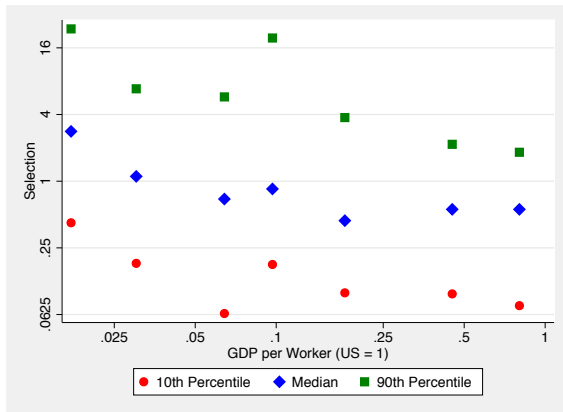Are migrants more likely to migrate when their home wages are low / their U.S. wages are high?

Suggestive evidence: differences between visa categories
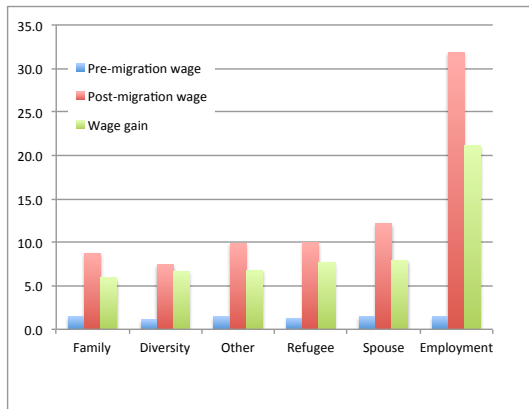
# Migrant Selection

A rough first pass:

Selection factor = [pre migration wage] / $[2/3y]$

## Migrant Selection

Migrants from low income countries are strongly selected

Selection is far from uniform across gdp levels

**Direct measures** of selection:

- average years of schooling of low income migrants: 14.5

- most common occupations: white collar

- almost no immigrants with agricultural jobs

## 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
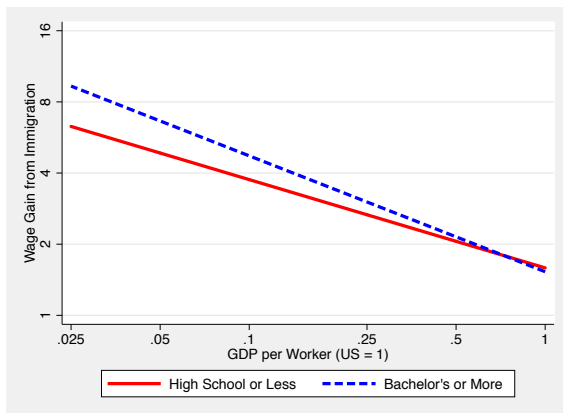- this drives down the wages of the majority of unskilled workers

Implications:

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

## Evidence

Migrant wage gains are slightly **larger** for skilled workers

Gap between skilled and unskilled wage gains is **largest** for low income countries

## An Interpretation

Roughly equal wage gains for skilled and unskilled workers

$\implies h_{skilled}/h_{unskilled}$ is roughly equal in rich / poor countries.

In that case, the one skill model correctly measures the role of $h$ regardless of the elasticity of substitution.

To see this:

$$y = A^{1/(1-\alpha)} (k/y)^{\alpha/(1-\alpha)} G\left(h_L L_L, h_H L_H\right)$$
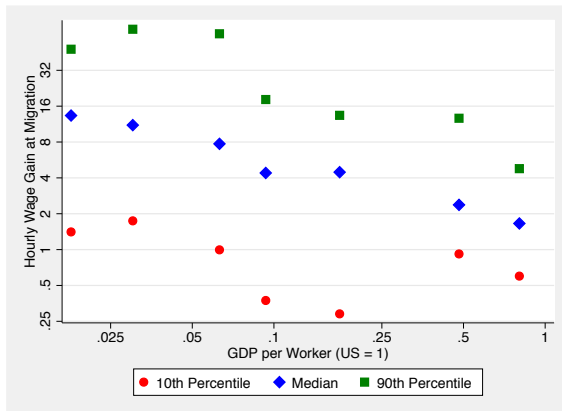
$$y = A^{1/(1-\alpha)} (k/y)^{\alpha/(1-\alpha)} h G\left(L_L, L_H\right)$$

Why does a high $L_H/L_L$ not drive down the skill premium?
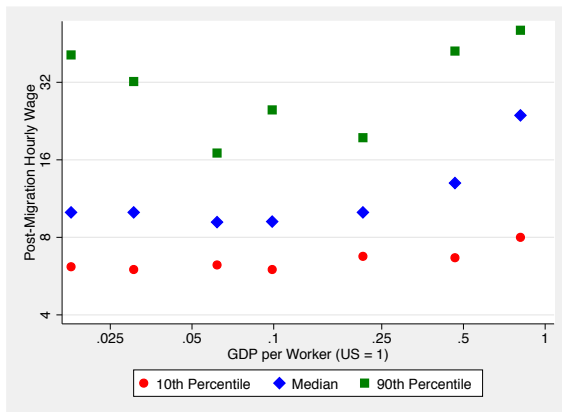
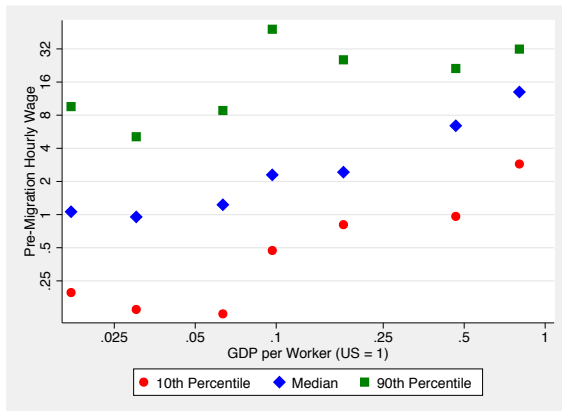- one answer: **skill-biased** differences in technology

Thank you

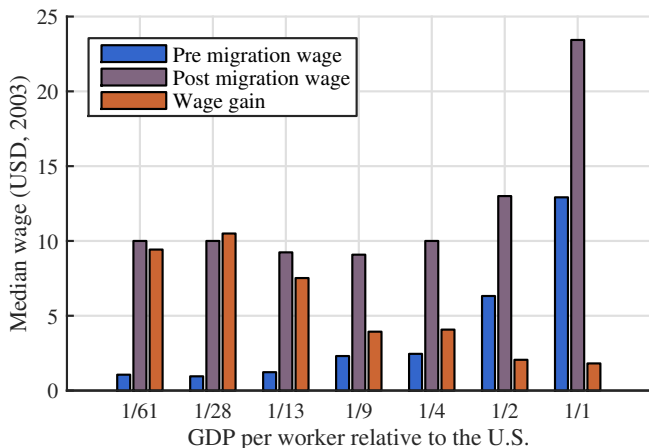**Detail Slides**

## Distribution of Wage Gains

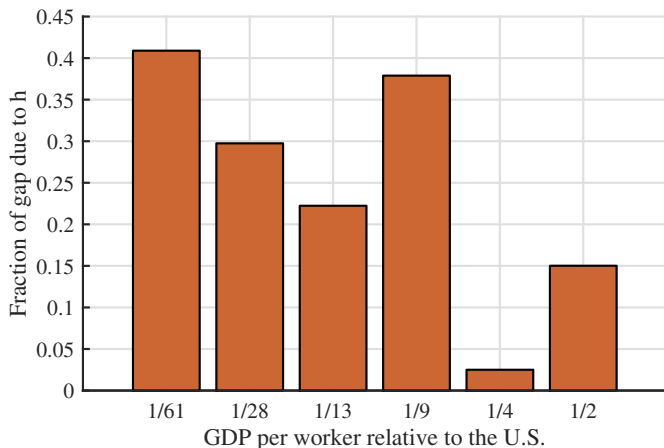# Distribution of Post-Migration Wages

## Distribution of Pre-Migration Wages

**Including Employment Visa Migrants**

## Including Employment Visa Migrants



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# References

Erosa, A., T. Koreshkova, and D. Restuccia (2010): "How important is human capital? a quantitative theory assessment of world income inequality," *The Review of Economic Studies*, 77(4), 1421–1449.

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Hall, R. E., and C. I. Jones (1999): "Why do some countries produce so much more output per worker than others?," *Quarterly Journal of Economics*, 114, 83–116.

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