Open Borders

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SED, July 2011

Development

"I do not see how one can look at figures like these without seeing them as representing *possibilities*. Is there some action a government of India could take that would lead the Indian economy to grow like Indonesia's or Egypt's? If so, *what*, exactly? If not, what is it about the 'nature of India' that makes it so? The consequences for human welfare involved in questions like these are simply staggering: Once one starts to think about them, it is hard to think about anything else." Lucas (1988)

Development

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Why not think about restrictions on migration?
The economy of Zimbabwe is a disaster.
Why worry about how to raise income in Zimbabwe?
Why not just let people move to better places?
It's true that the effect of open borders is only a level effect
(Lucas was excited about faster growth, continuing indefinitely)
Still, big level effects are worth thinking about
especially while we are trying to work out the answer to Lucas's question
We know how to open borders (ignoring politics ...)

The Economics of Immigration

A huge literature, addressing a limited set of questions

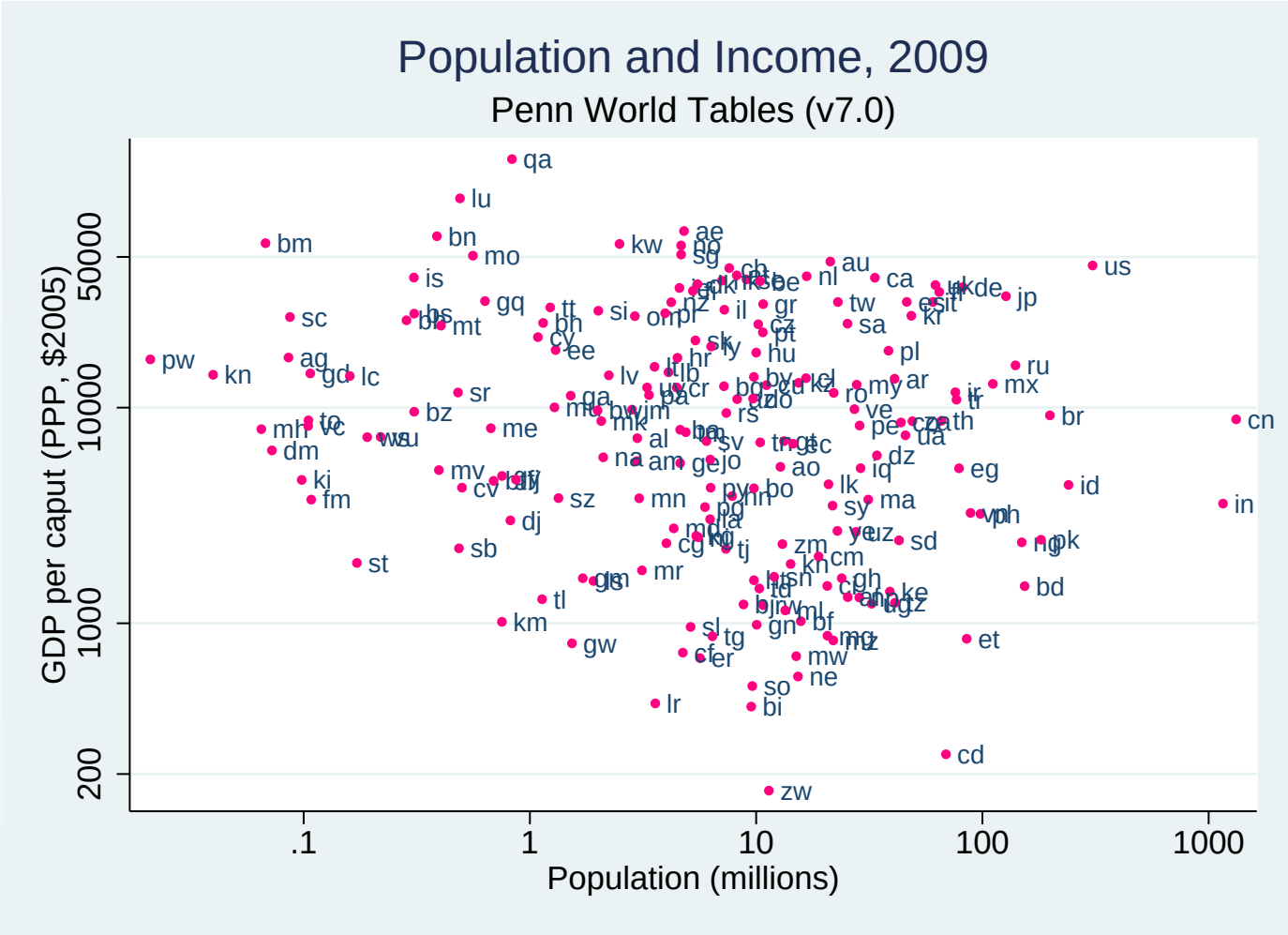
1. Assimilation
2. Selection
3. Effects on Wage Levels and Skill Premia in Host Countries

These questions are interesting

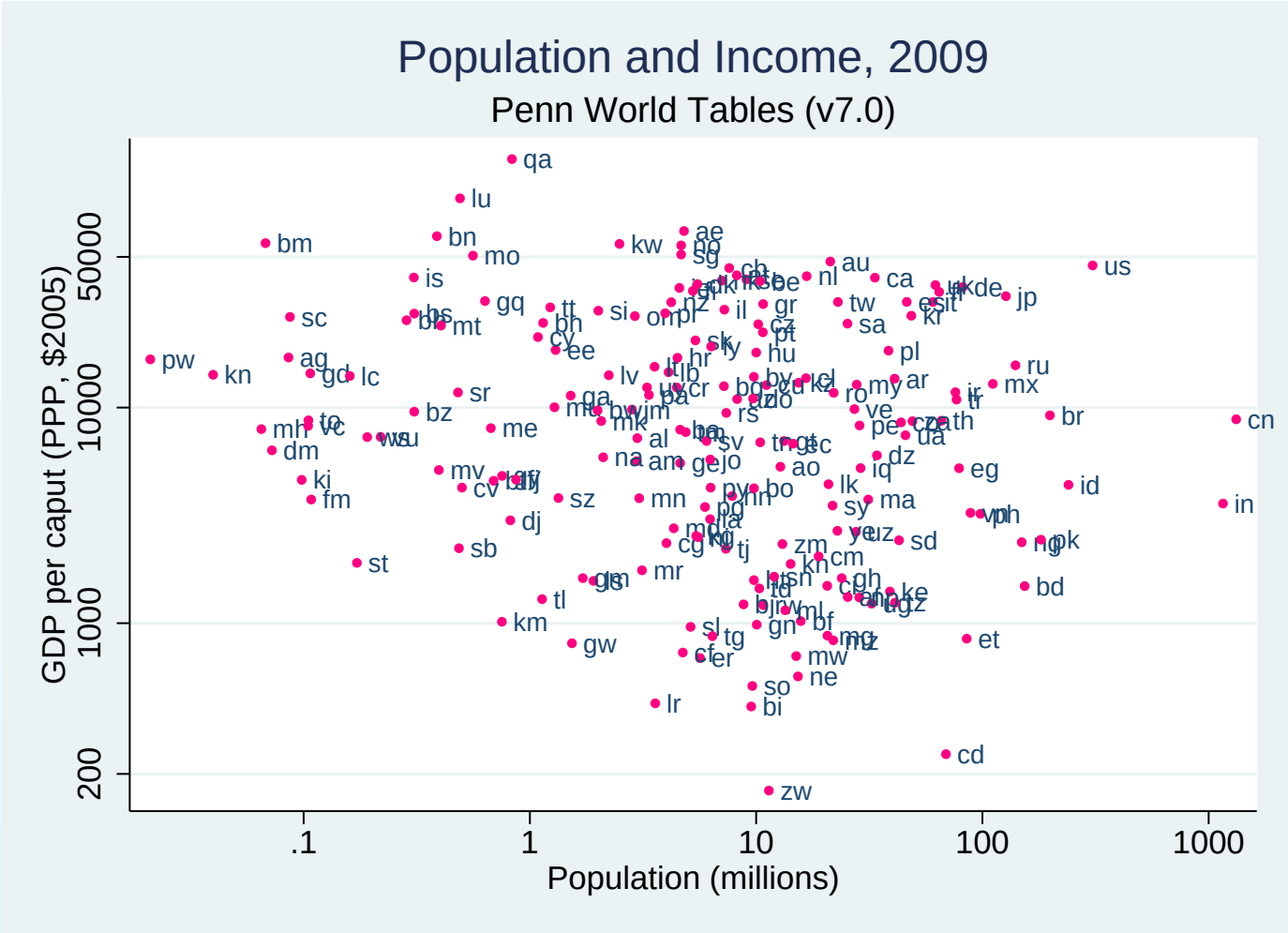
But the most interesting question is largely ignored:

Why not just let people choose where they want to live?

World Population, Labor Force and Wages

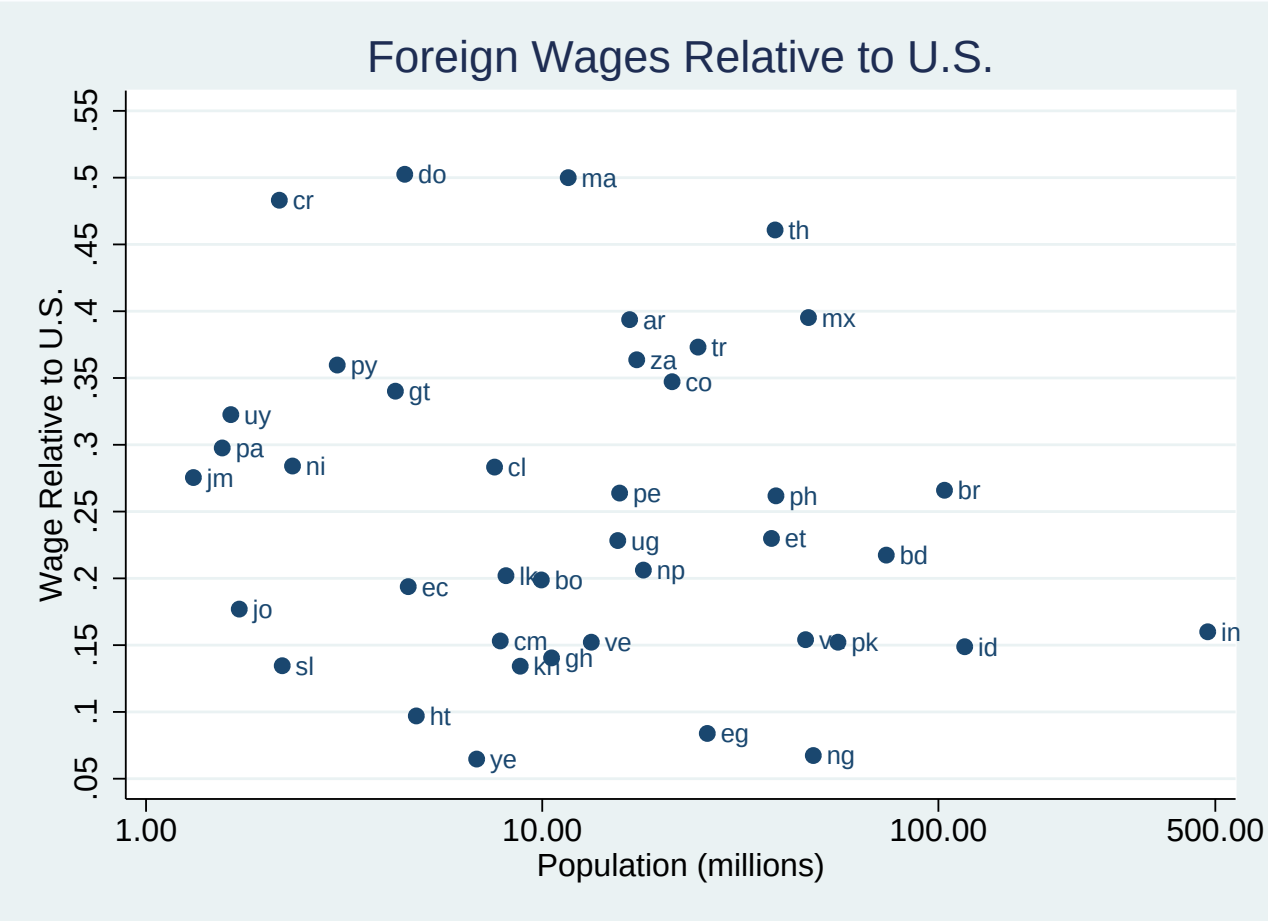


World Population, Labor Force and Wages



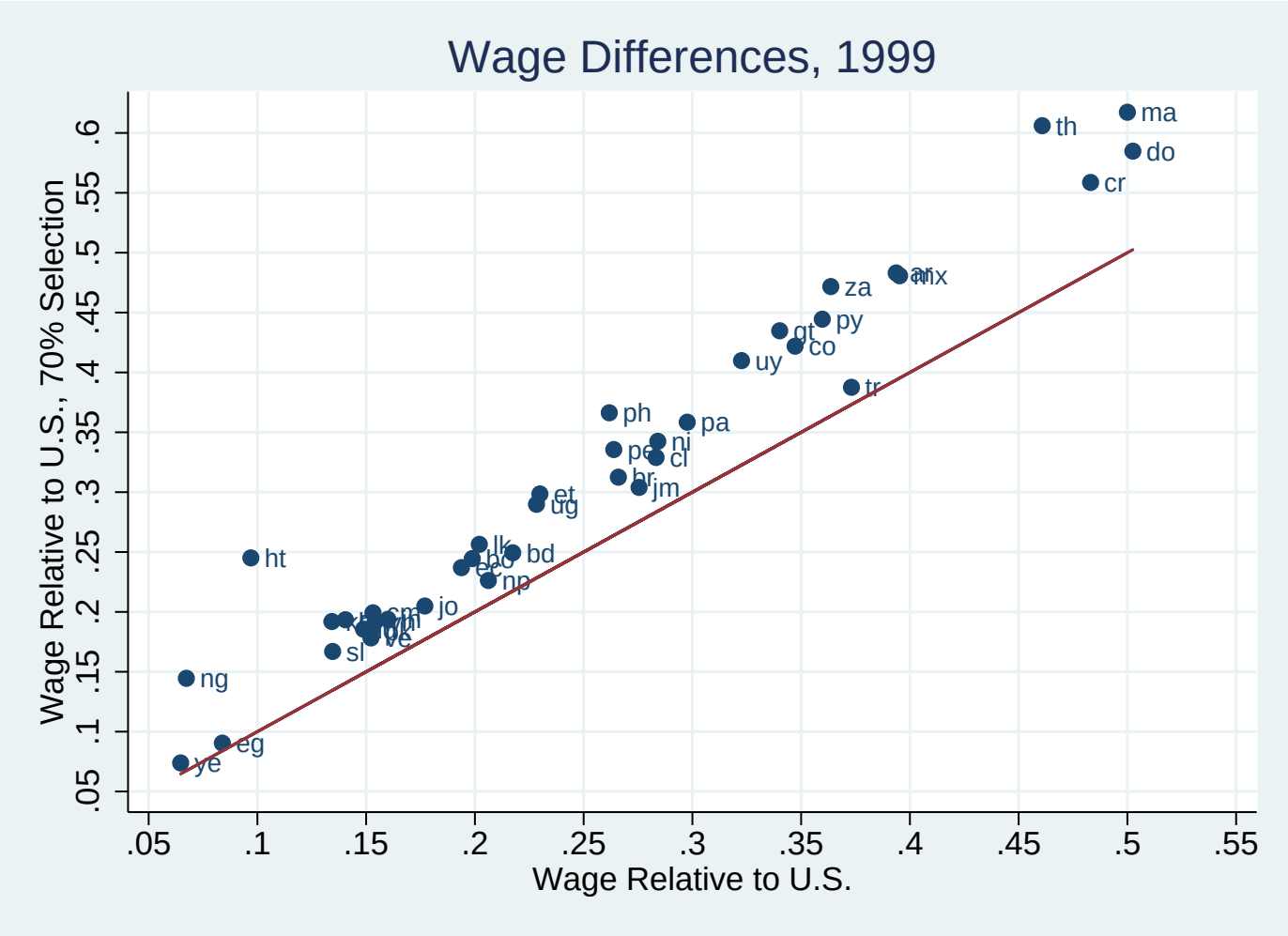
Big differences in GDP per person remain after adjusting for differences in physical and human capital endowments (“Levels Accounting”)

International Wage Differentials



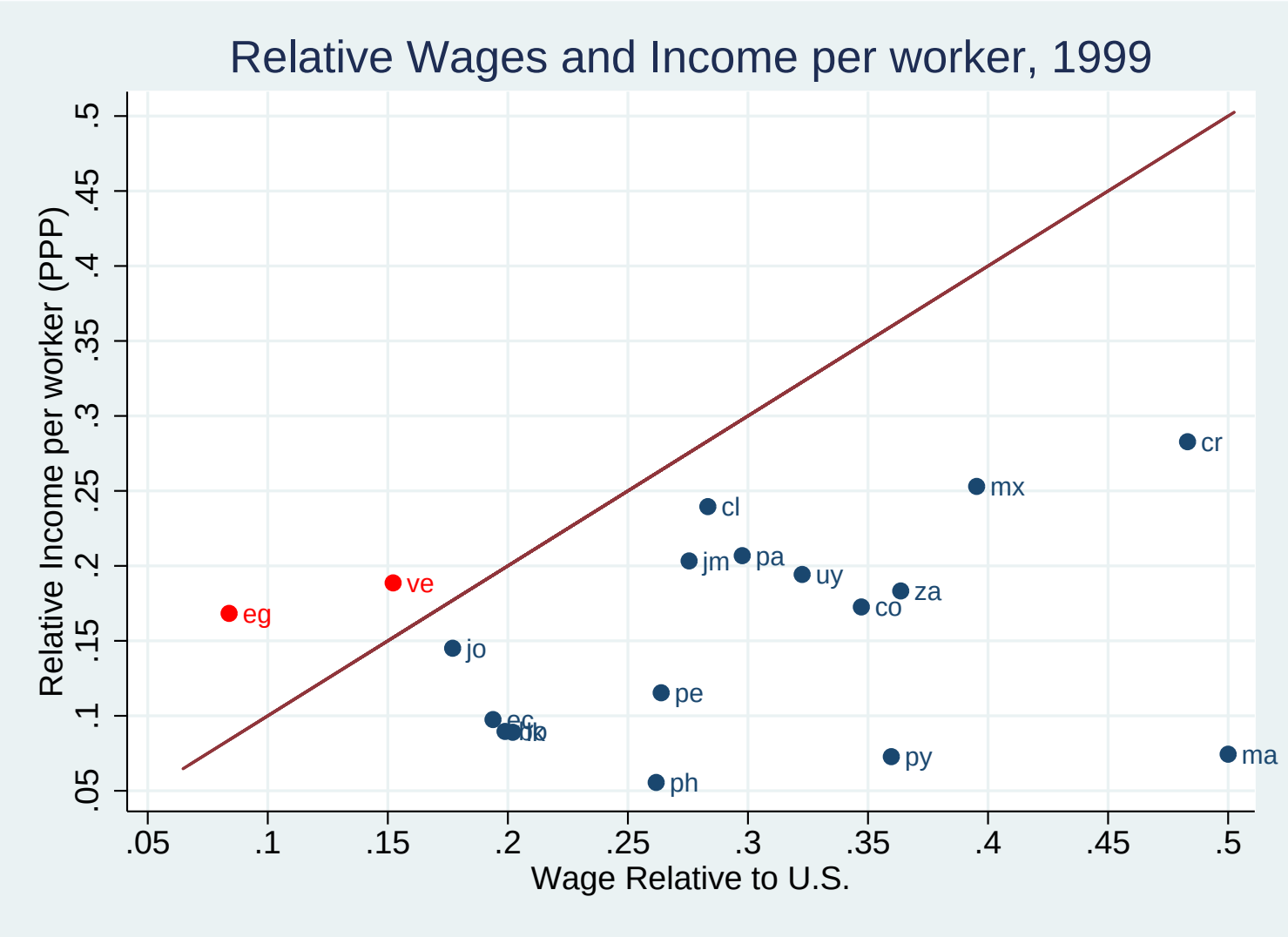
Clemens, M.A. and Montenegro, C.E. and Pritchett, L., “The place premium: wage differences for identical workers across the US border” (2008).
Foreign-born, foreign-educated workers in the U.S. Census compared with similar workers in 42 home countries

International Wage Differentials



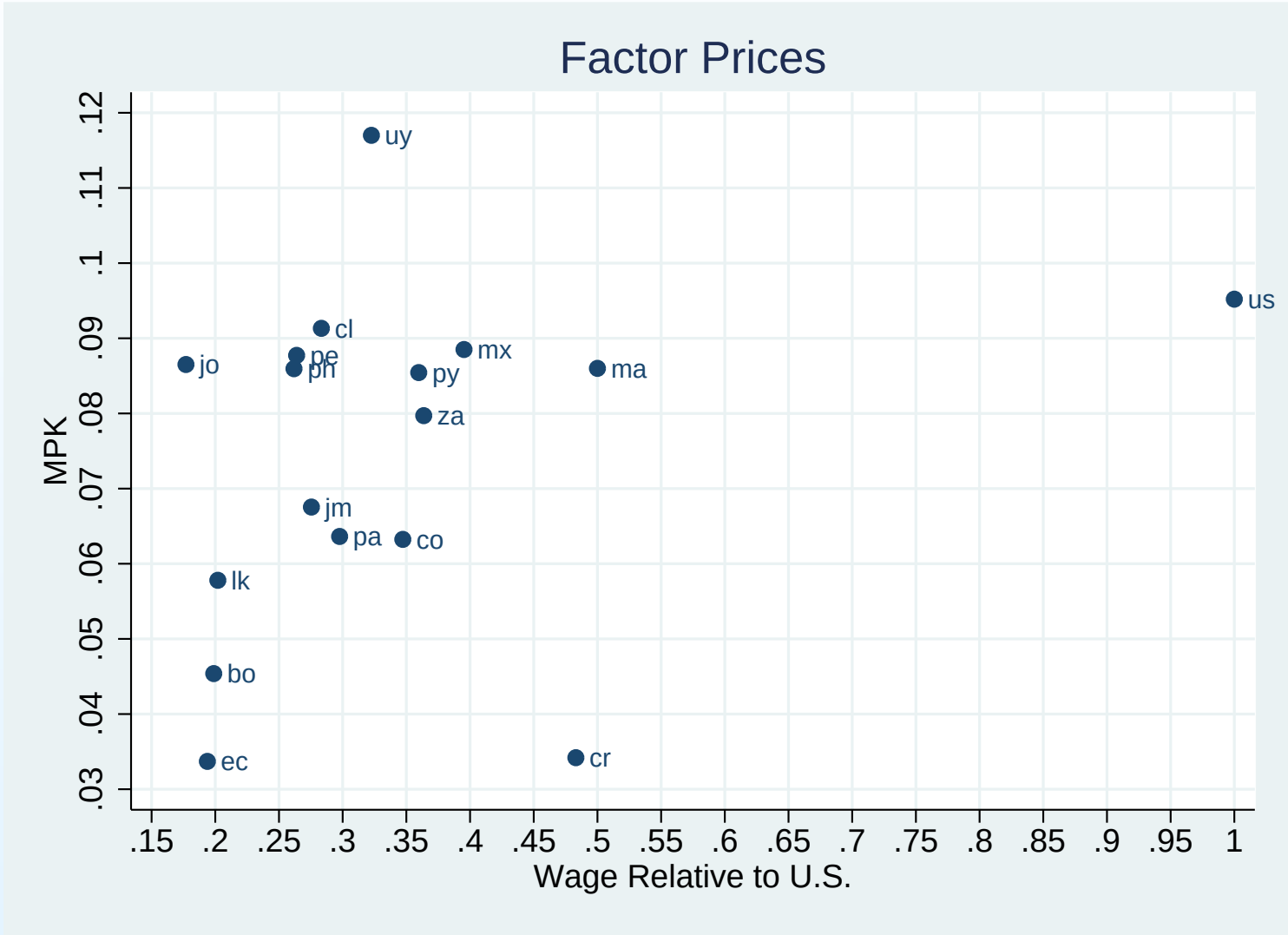
Selection: suppose migrants come from the 70th percentile in the home country with respect to the wage effects of unobservables (e.g. motivation)

International Wage Differentials



relative income: $(\text{real GDP per worker}) \times (\text{labor share})$

Wages and the Marginal Product of Capital



MPK: Caselli and Feyrer, "The Marginal Product of Capital", *QJE* (2007)

Outline

1. Factor Price Equalization
2. Factor Price Equalization with Productivity Differences
3. Migration and Labor Supply: General Equilibrium Effects
4. Immigration and Wages
5. Dynamic Programming Model of Migration (sketch)
6. Labor Supply with Open Borders and Home Preferences
7. Magnitudes: Effective World Labor Supply
8. Magnitudes: Net Gains from Migration

Literature

Daniel Trefler, “International Factor Price Differences: Leontief was Right!”, *JPE* (1993)

Lutz Hendricks, “How Important Is Human Capital for Development? Evidence from Immigrant Earnings”, AER (2002)

Caselli and Feyrer, "The Marginal Product of Capital", *QJE* (2007)

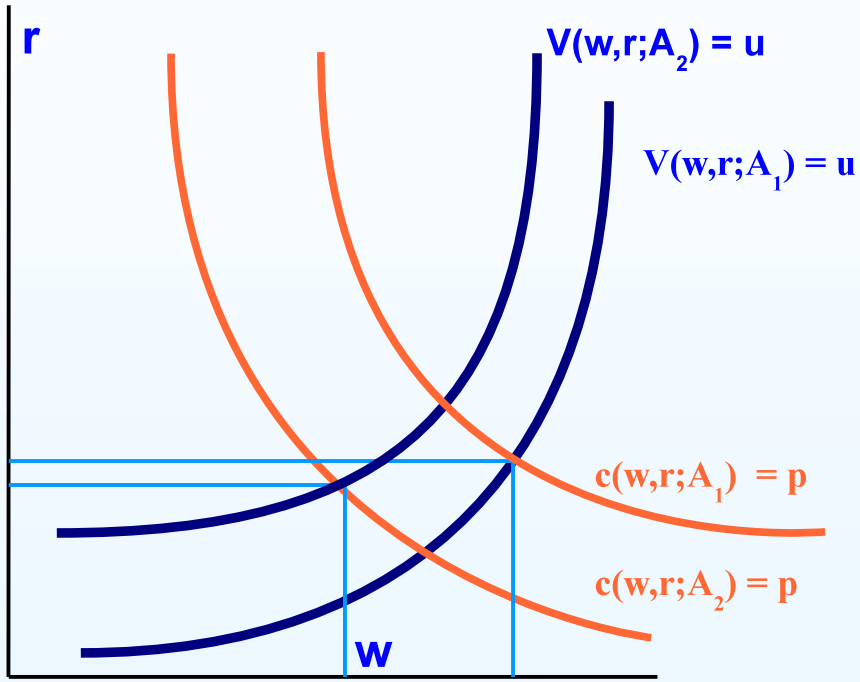
Klein and Ventura, “Productivity differences and the dynamic effects of labor movements”, *JME* (2009)

Gordon H. Hanson, "International Migration and Human Rights", NBER (2010).

Rebecca Lessem, “U.S.-Mexico Immigration: Effects of Wages And Border Enforcement,” jmp (2010)

John Kennan and James R. Walker, “The Effect of Expected Income on Individual Migration Decisions,” *ECMA* (2011)

Spatial Equilibrium: Rosen-Roback



Two locations

Amenities attract workers; also affect production costs

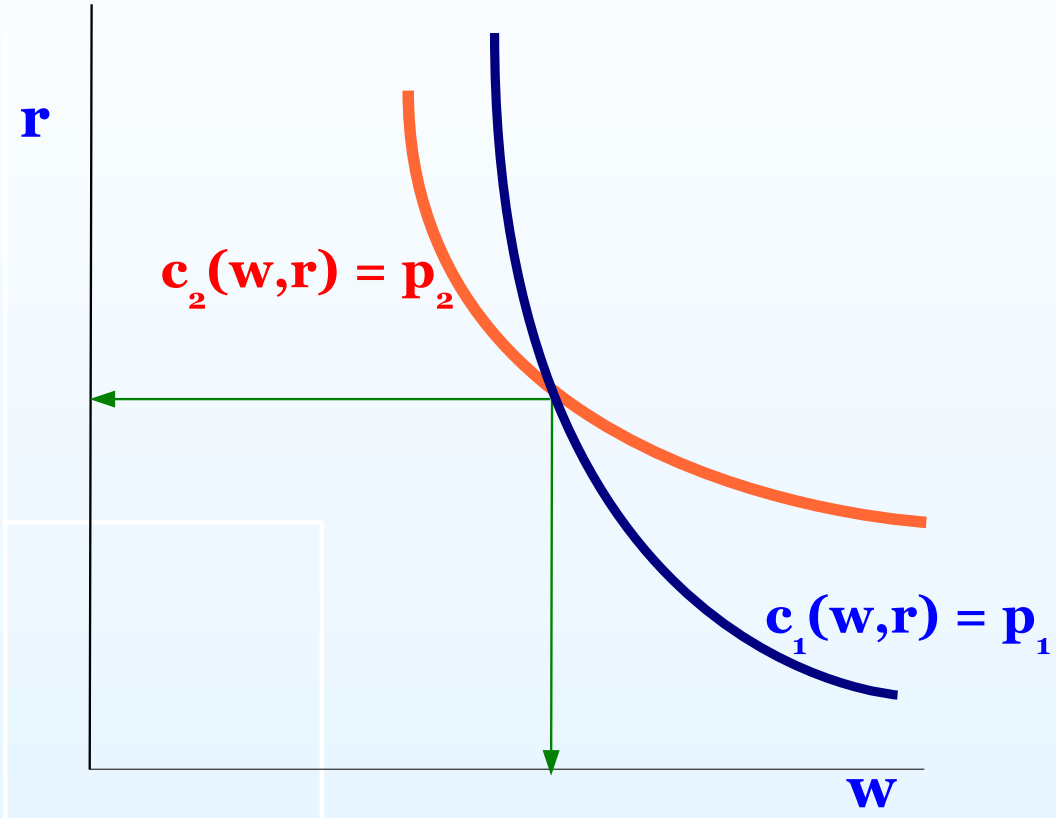
Workers like higher wages (w) and lower land rents (r)

Employers like lower wages and lower land rents

Equilibrium: workers and employers indifferent between (w_1, r_1) and (w_2, r_2)

Two orderings of (w, r): Two prices needed to get indifference

Factor Price Equalization



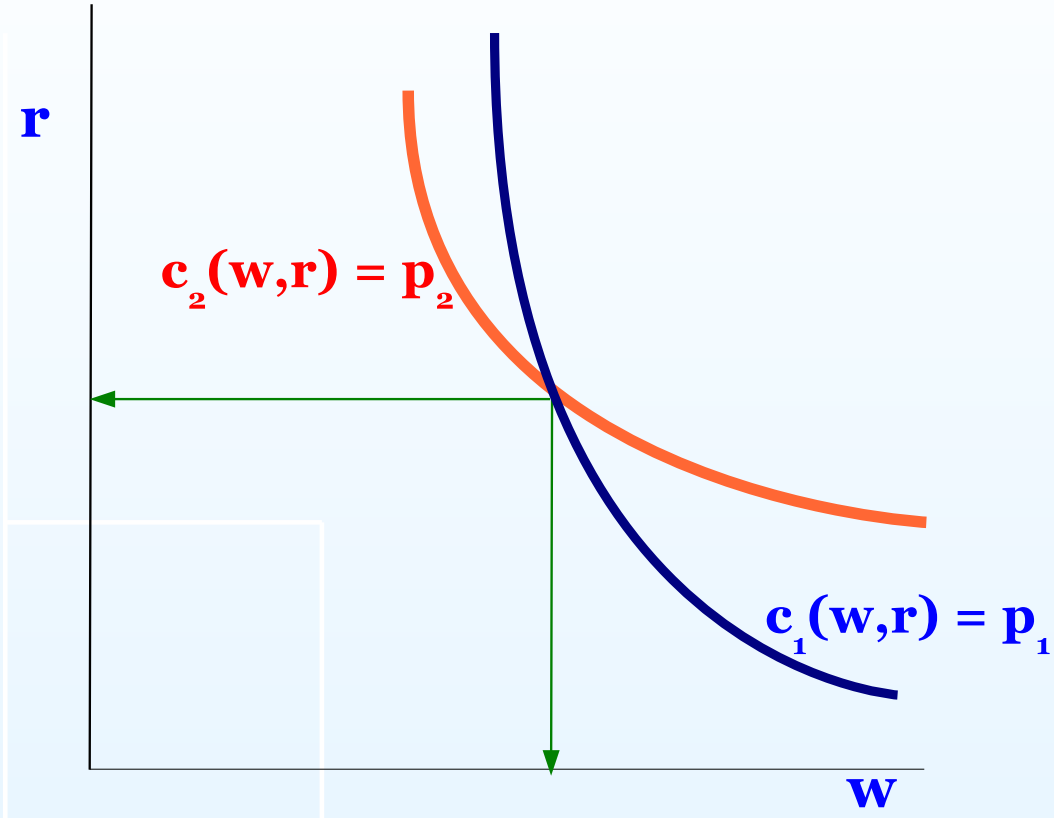
Two locations, Two products

Producers like lower wages (w) and lower capital prices (r)

Equilibrium: producers of each good indifferent between (w_1, r_1) and (w_2, r_2)

Two orderings of (w, r): Two prices needed to get indifference

Factor Price Equalization



Capital and Labor are immobile across countries, but factor prices are equal

- Beautiful but wrong: Why does it fail?

Factor Price Equalization with Productivity Differences

J countries, with different productivity levels.
Productivity differences are labor-augmenting (Harrod-neutral)
(equivalent to TFP differences in the *1-product* Cobb-Douglas case)
Production function for product s in country j

$$Q_s^j = F_s\left(K_s^j, a_j L_s^j\right)$$

a_j: efficiency units of labor per worker in country j (same for all s)
No mobility of capital or labor across countries
Cost function for product s in country j

$$c_s^j(v, w) = c_s^0\left(v, \frac{w}{a_j}\right)$$

where w is the wage per efficiency unit of labor, and v is the price of capital
c_s^0 is the unit cost function when labor is measured in efficiency units,
$Q_s = F_s(K_s, L_s)$.

Factor Price Equalization with Productivity Differences

Free trade in product markets, no transport costs

Zero-profit condition implies

$$p_s = c_s^0\left(v_j, \frac{w_j}{a_j}\right)$$

If two products r and s are produced in country j, then

$$\begin{aligned} c_r^0\left(v_j, \frac{w_j}{a_j}\right) &= p_r \\ c_s^0\left(v_j, \frac{w_j}{a_j}\right) &= p_s \end{aligned}$$

These equations determine the factor prices in country j.

If the marginal rates of technical substitution satisfy a single-crossing condition, the factor prices are uniquely determined

Factor Price Equalization with Productivity Differences

If country ℓ also produces these same two products,
the same equations determine factor prices in country ℓ (with a_ℓ in place of a_j)
This implies $v_j = v_\ell$, and

$$\frac{w_j}{a_j} = \frac{w_\ell}{a_\ell}$$

Thus

$$w_j = a_j w_0$$

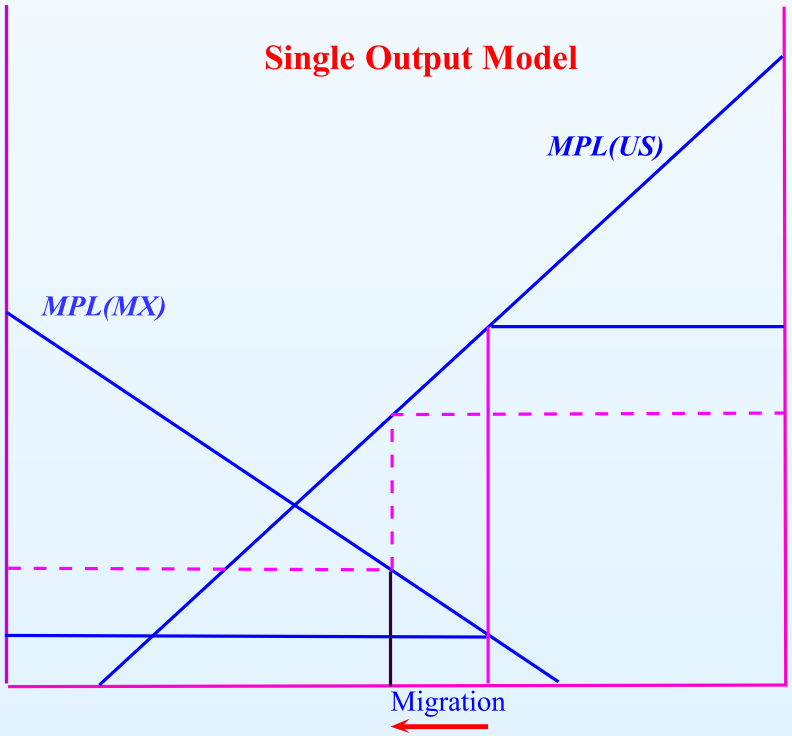
where w_0 is a reference wage level that can be normalized to 1.
In this model, migration has no effect on relative wages.
If 30 million workers move from Mexico to the U.S.,
it will still be true that the wage in the U.S. is 2.5 times the wage in Mexico.
But migration affects wage levels.

Implications

"the very large wage ratios we observe for many countries are sustained by policy barriers to movement" [Clemens et al, (2008)]

"In theory, moving labor from a poor to rich country ... lowers (raises) incomes for laborers in the receiving (sending) country" [Hanson (2010)]

Not in the HO model: removing the barriers has no effect on wage ratios; emigration does not raise wages



General Equilibrium

Given factor prices, goods prices are determined by the cost functions
Given goods prices, quantities are determined by preferences and total income (where income depends on factor prices)
Given goods quantities, and factor prices, producers choose factor quantities
Given factor demands, factor prices determined by market clearing
If the production function for each good is a CES, the price of good s is given by

$$p_s^{1-\sigma} = \alpha_s \left(\frac{v}{\alpha_s}\right)^{1-\sigma} + \beta_s \left(\frac{w}{\beta_s}\right)^{1-\sigma}$$

w is the wage in efficiency units, σ is the elasticity of substitution, $\alpha_s + \beta_s = 1$
If utility function is loglinear, with inelastic labor supply, quantities are given by

$$p_s Q_s = \theta_s \left(w\bar{L} + v\bar{K}\right)$$

$\bar{K}, \bar{L}$: total amounts of capital and labor (in efficiency units)

General Equilibrium: Factor Demands

Conditional factor demands given by cost function derivatives

$$\begin{aligned} K_s &= Q_s c_s^\sigma \left(\frac{v}{\alpha_s}\right)^{-\sigma} \\ L_s &= Q_s c_s^\sigma \left(\frac{w}{\beta_s}\right)^{-\sigma} \end{aligned}$$

Factor market clearing:

$$\sum_s Q_s c_s^\sigma \left(\frac{v}{\alpha_s}\right)^{-\sigma} = \bar{K}$$

Similar equation for labor (redundant by Walras Law).

Equilibrium Factor Price Ratio

The market-clearing equation for capital reduces to

$$\sum_s \theta_s \xi_s = \frac{v\bar{K}}{v\bar{K} + w\bar{L}}$$

ξ_s: capital share for good s:

$$\xi_s = \frac{vK_s}{vK_s + wL_s}$$

Weighted average of the capital shares matches the capital income share
ξ_s may be an increasing or decreasing function of the $\frac{v}{w}$ (depending on σ)
Cobb-Douglas case:

$$\sum_s \theta_s \alpha_s = \frac{v\bar{K}}{v\bar{K} + w\bar{L}}$$

capital share $\xi_s = \alpha_s$ (a technological parameter)

General Equilibrium: Consumer Prices

The price ratio between any two consumer goods is given by

$$\frac{p_s^{1-\sigma}}{p_t^{1-\sigma}} = \frac{\alpha_s^\sigma \left(\frac{v}{w}\right)^{1-\sigma} + \beta_s^\sigma}{\alpha_t^\sigma \left(\frac{v}{w}\right)^{1-\sigma} + \beta_t^\sigma}$$

In the limit, when σ approaches 1,

$$\log\left(\frac{p_s}{p_t}\right) = (\alpha_s - \alpha_t)\log\left(\frac{v}{w}\right)$$

An increase in the relative price of capital
implies an increase in the relative price of capital-intensive goods.

Immigration and Wages

The effective total supply of labor (aggregated over countries) is

$$\bar{L} = \sum_j a_j L_j$$

When workers move to a country with higher productivity,
the effective supply of labor increases, the capital labor ratio falls
If M_{jk} workers migrate from j to k,

$$\Delta \bar{L} = \sum_j \sum_k \left(a_k - a_j\right) M_{jk}$$

Cobb-Douglas: elasticity of $\frac{v}{w}$ with respect to the capital labor ratio is unity
The time it takes to earn one unit of good s is $\frac{p_s}{w}$, determined by

$$\log\left(\frac{p_s}{w}\right) = \alpha_s \log\left(\frac{v}{w}\right) - \alpha_s \log\left(\alpha_s\right) - \beta_s \log\left(\beta_s\right)$$

Immigration and Wages

A relaxation of immigration restrictions leads to a fall in the real wage
The wage effect is the same in all (both sending and receiving) countries
Factor price equalization holds both before and after the migration of labor,
but migration reduces the wage per efficiency unit
(and so reduces the wage of all non-migrants)
Migration reduces prices of labor-intensive relative to capital-intensive goods
but the real wage falls regardless of the composition of consumption
10% increase in $\bar{L}$ implies a 10% increase in the factor price ratio
So if the capital share for good s is $\alpha_s = \frac{1}{4}$,
the real wage falls by about 2.5% when measured in terms of good s.
When measured in terms of more labor-intensive goods, wage falls less
Migration increases the wages of (most) migrants

Long-Run Wage Effects

Migration increases the return on capital

Steady State

$$f'\left(k^*\right) = \rho + \delta$$

f': marginal product of capital

ρ: rate of time preference

δ: depreciation rate of capital

k^* :effective capital-labor ratio

Migration increases effective labor

Capital-labor ratio falls below k^*, MPK rises above $\rho + \delta$

Investment increases, effective capital-labor ratio returns to k^*

Real wage returns to original level

Winners and Losers

Stayers lose in the short run (no change in the long run)

Most migrants gain (all migrants gain in the long run)

Migration Decisions

Kennan-Walker (2011) [internal migration in the U.S.]

Rebecca Lessem (2011a,b) [MX-US; Puerto Rico-US]

Maximize PV of lifetime income

w_{ij} individual i's earnings in location j – local price of individual's skill bundle

Wage in current location is known

Wages in other locations can be learned only by moving there

$$w_{ij}(a) = X_i\beta + \mu_j + \upsilon_{ij} + G(X_i, a) + \varepsilon_{ij}(a) + \eta_i$$

$w_{ij}(a)$ Wage of individual i in location j at age a

μ_j Mean wages in location j (known)

υ_{ij} location match effect (permanent)

G age-earnings profile

η_i individual effect, fixed across locations (known to the individual)

ε_i transient effect, iid over time

Migration decisions depend only on μ and υ

Migration

Location choice

$$V(x,\zeta) = \max_j \left(v(x,j) + \zeta_j\right)$$

x: state vector (Includes home location, current and previous location, age)

ζ: payoff shock (preferences or moving costs)

Continuation value

$$v(x,j) = u(x,j) + \beta \sum_{x'} p(x'|x,j)\bar{v}(x')$$

Expected continuation value

$$\bar{v}(x) \quad = \quad E_\zeta V(x,\zeta)$$

Choice Probabilities

$$\rho(x,j) = \exp\left(v(x,j) - \bar{v}(x)\right)$$

State Variables and Flow Payoffs

Flow payoff

$$\tilde{u}_h(x,j) = u_h(x,j) + \zeta_{j,}$$

$u_h(x,j)$ payoffs associated with observable states

$$u_h(x,j) = \alpha_0 w\left(a,\ell^0,\omega\right) + \sum_{k=1}^{K} \alpha_k Y_k\left(\ell^0\right) + \alpha^H \chi\left(\ell^0 = h\right) - \Delta_\tau(x,j)$$

ζ_j a preference shock or a shock to the cost of moving
ω location match component of wages
α^H attachment to home location

Moving Costs

Cost of moving to location $j \neq \ell^0$ in state x

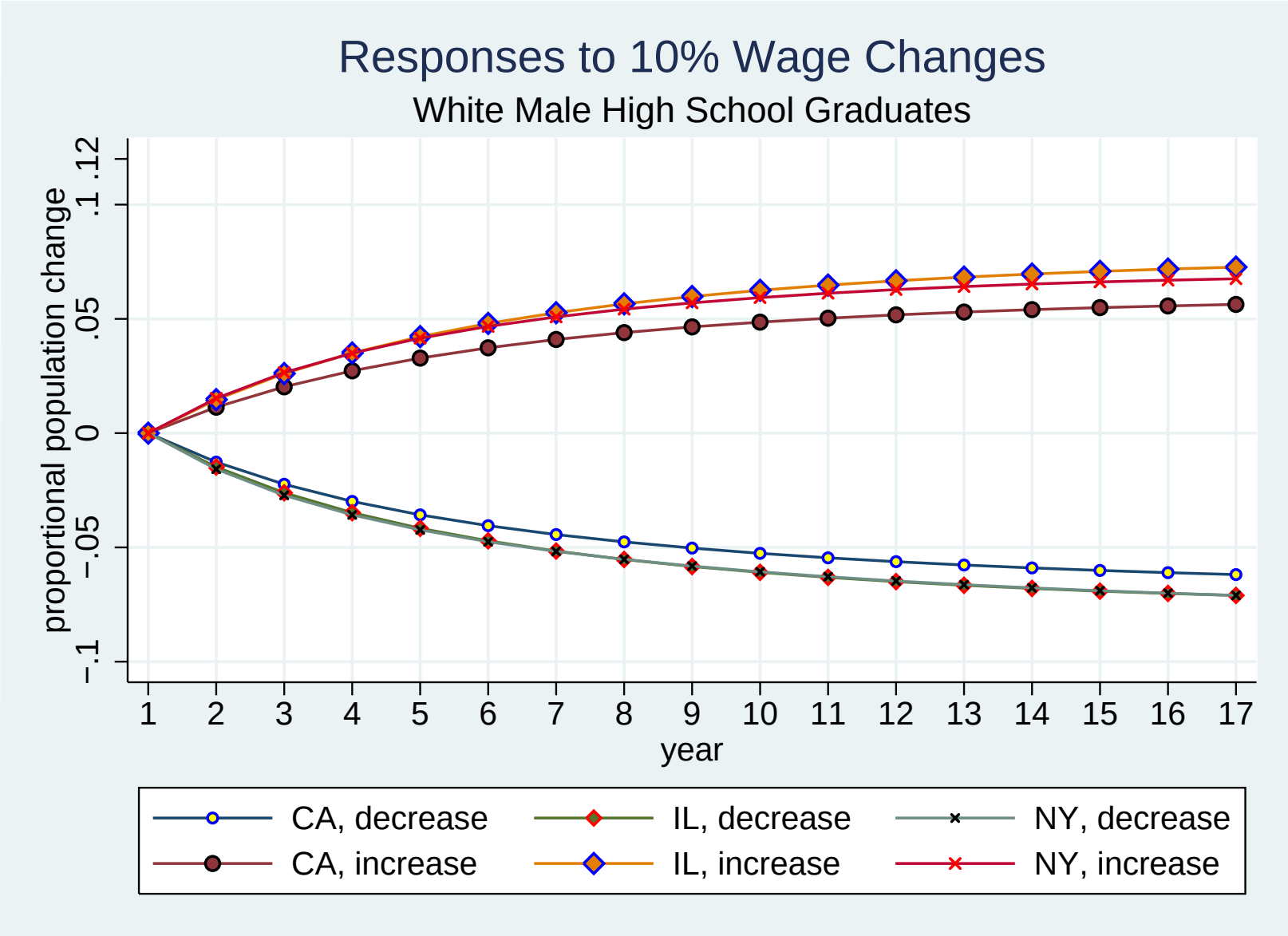
$$\Delta_\tau(x, j) = \gamma_{0\tau} + \gamma_1 D\left(\ell^0, j\right) - \gamma_2 \chi\left(j \in \mathbb{A}\left(\ell^0\right)\right) - \gamma_3 \chi\left(j = \ell^1\right) + \gamma_4 a - \gamma_5 n_j$$

$\gamma_{0\tau}$ base cost (disutility) of moving, for someone of "type" τ
$D\left(\ell^0, j\right)$ distance from ℓ^0 to j
γ_2 cheaper to move to an adjacent location
$\mathbb{A}\left(\ell^0\right)$ the set of locations adjacent to ℓ^0 (e.g. States that share a border)
γ_3 cheaper to move to a previous location
γ_4 moving cost rises with age
γ_5 cheaper to move to a large location (n_j is the population in location j)

How Big are the Moving Costs?

Most people don’t move (e.g. from Puerto Rico to the U.S.)
The gains from moving are very big
So moving costs must be huge
But ...
Some people do move (so the cost can’t be that big)
Many people move in the wrong direction
and many people return to a low-wage location (MX, PR)
after moving to a high-wage location (US)
A lot of migration has nothing to do with income (“payoff shocks”)
Moving costs are heterogeneous
Average cost for those who move is low
Cost of a forced move would be high

Geographical Labor Supply Elasticities



Labor Supply and Wages with Open Borders: Magnitudes

Simple Model

Proportion of people who do not move is equal to the relative wage
– the ratio of the home wage(w_0) to the highest wage elsewhere (w_1)

Derivation: Assume log utility. Stay if

$$\log(w_1) - \delta \leq \log(w_0)$$

δ: disutility of moving (attachment to home), randomly distributed over people
Assume the distribution of δ is the unit exponential: $\text{Prob}(\delta \geq x) = e^{-x}$
Then the probability of staying is

$$\text{Prob}\left(\delta \geq \log\left(\frac{w_1}{w_0}\right)\right) = e^{-\log\left(\frac{w_1}{w_0}\right)} = \frac{w_0}{w_1}$$

Examples: the wage in Puerto Rico is about $\frac{2}{3}$ of the U.S. wage (Clemens et al)
and the proportion who choose to stay in Puerto Rico is also about $\frac{2}{3}$ (Census)
10% increase in MX/U.S wage ratio decreases migration by 11.6% (Lessem)

World Labor Supply

Each person starts with $x \leq 1$ units of effective labor ($x = 1$ in the U.S.)
The proportion of stayers is x
average supply of effective labor after migration

$$x \times x + (1 - x) = 1 - x + x^2$$

The increase in effective labor per person is $1 - x + x^2 - x = (1 - x)^2$.
For Puerto Rico this gives $\frac{1}{9}$

Labor Supply Estimate

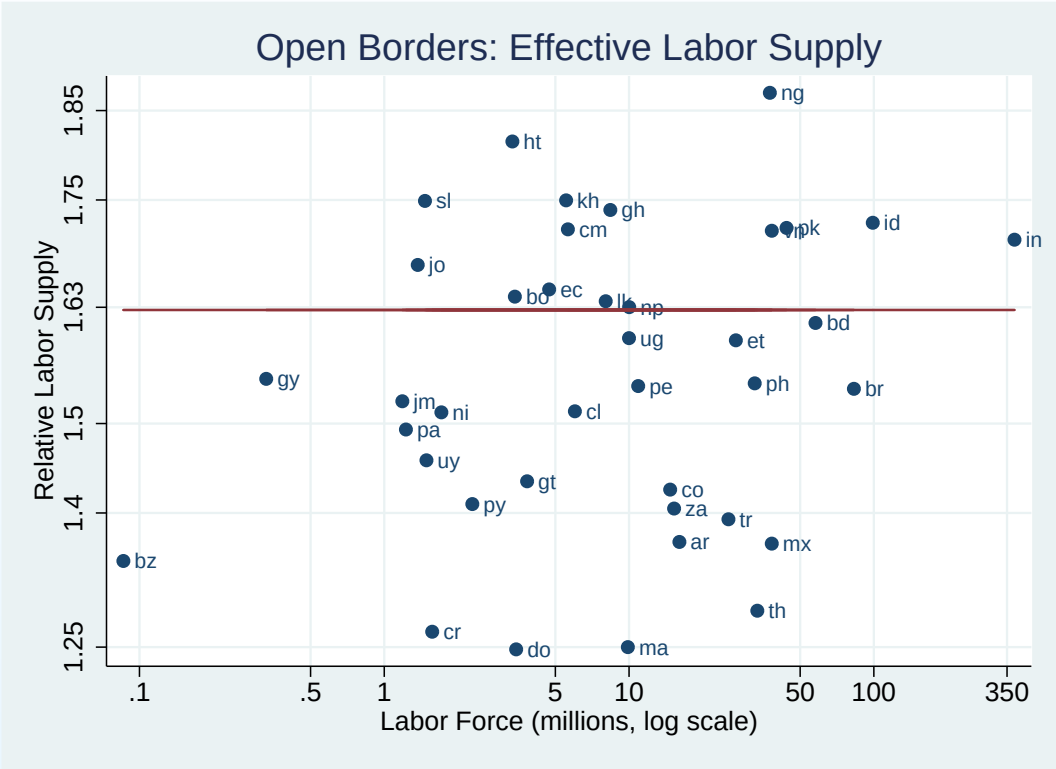
Clemens et al (2008): relative wages in 1999 for 42 developing countries

Effective Labor Supply

$$L(t) = \sum_j n_j(t)\, x_j(t) + \sum_j n_j(t)\, (1 - x_j(t))^2$$

n_j labor force in country j

Effective Labor Supply



$$\frac{L(t)}{L^0(t)} = 1 + \frac{\sum_j n_j(t)\left(1 - x_j(t)\right)^2}{\sum_j n_j(t)\, x_j(t)}$$

On average (42 countries), effective labor supply increases by **63**%

If capital share is $\frac{1}{4}$, real wage falls by about 15% (short run)

Net Gains from Migration

The net gain for the marginal migrant is zero

If the lowest migration cost is zero

then the first person who moves gains the full wage difference, $\frac{y_0}{x} - y_0$

For the average migrant, the gain is roughly the average of these: $\frac{1-x}{2x} y_0$

(not exact for the exponential cost distribution, but close enough)

The proportion of people who do not migrate is x

So the income gain for the average person is

$$\Delta y = (1-x)\,\frac{1-x}{2x} y_0 = \frac{(1-x)^2}{2x} y_0$$

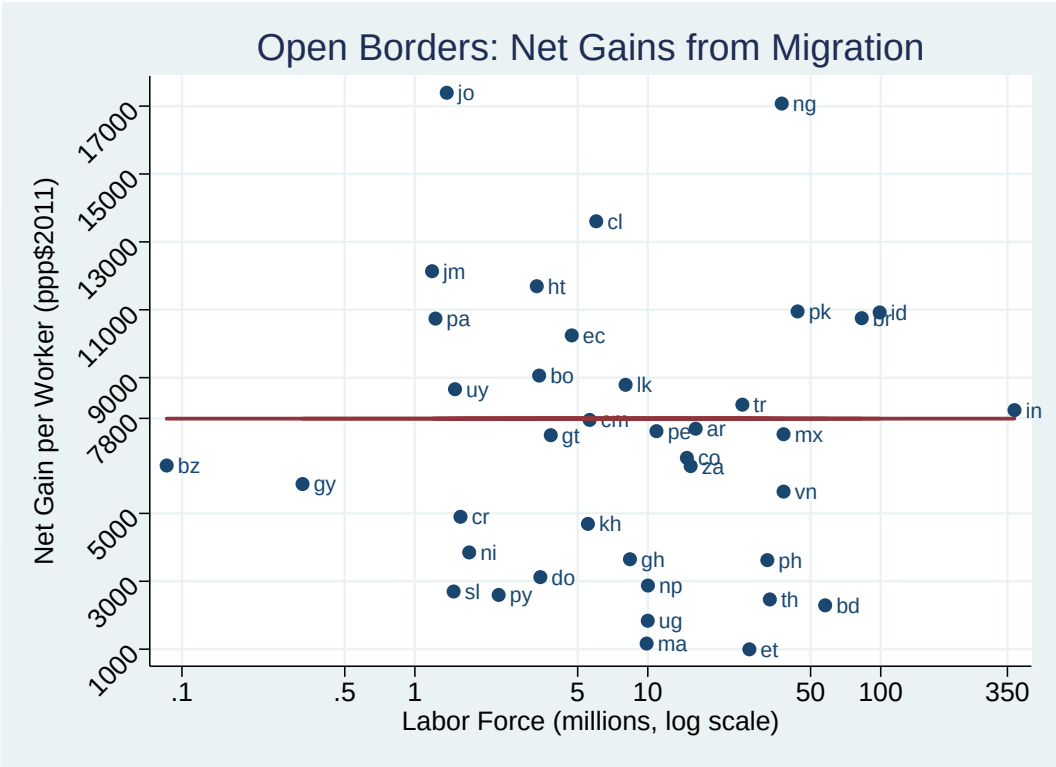
y_0: real income per worker (Penn World Tables 7.0; Bernanke-Gurkaynak)

Two countries may have the same x, different y_0

because differences in real GDP per worker confound productivity differences

with differences in human and physical capital stocks

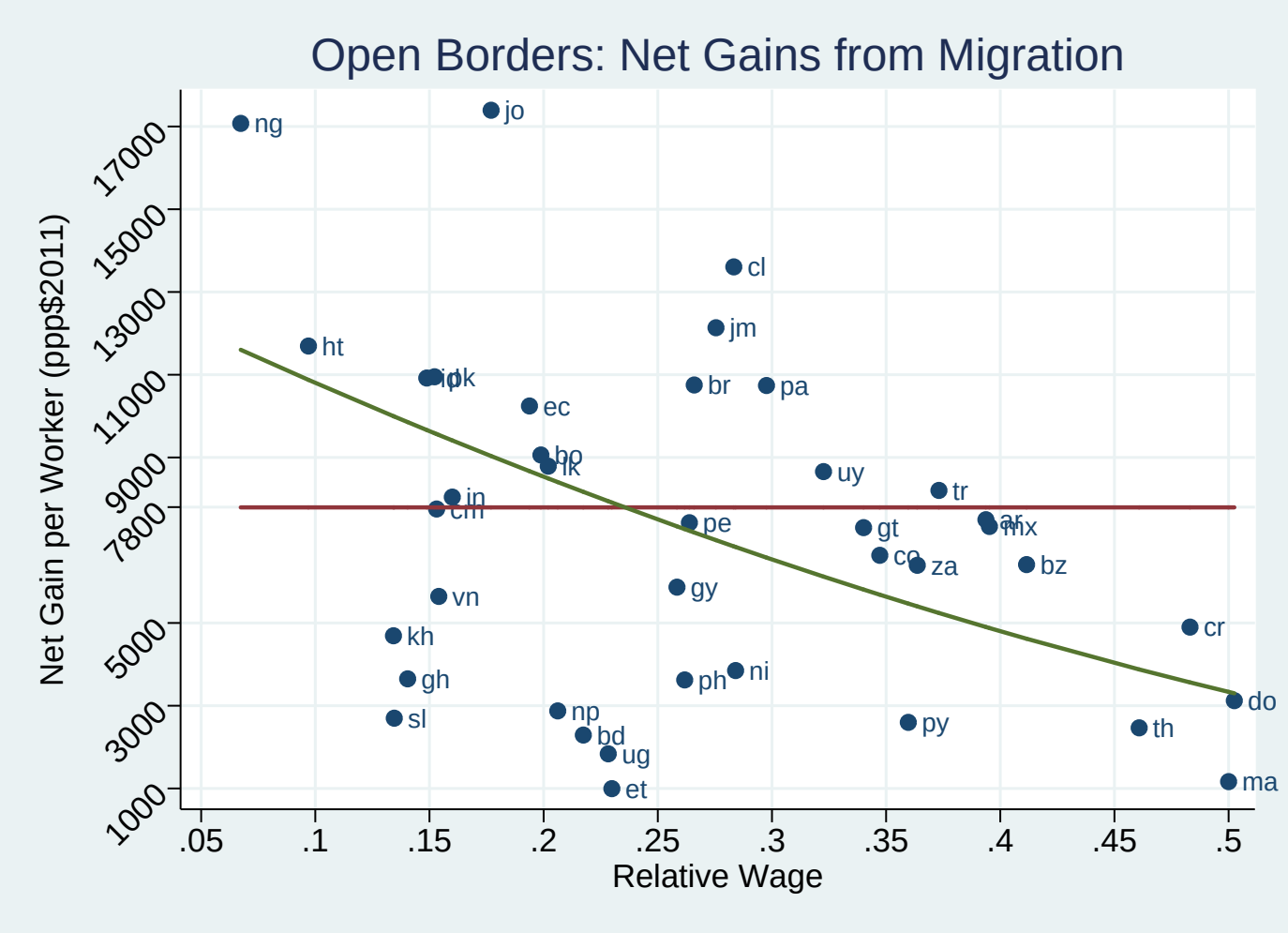
Net Gains from Migration



$$\Delta y = \frac{\sum_j n_j \frac{(1-x_j)^2}{2x_j} y_j}{\sum_j n_j}$$

y_j: (real GDP per worker) $\times$ (labor share)

Net Gains from Migration



(curve: predicted income per worker, based on relative wage)

Average gain (including stayers): about **$7,800** per worker per year

Conclusion

“there is popularity in the doctrine of a living wage; so we had better leave politicians to praise it and set ourselves to criticise it”
Quarterly Journal of Economics, ’97.

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Immigration is unpopular

- because immigrants don't vote

Economists should speak up

- We are enthusiastic about free trade
- If free movement of goods is important, then surely free movement of people is even more important

Open borders could yield huge welfare gains

- more than $7,000 a year for a randomly selected worker (including non-migrants)