1. Big Picture

MD/Desenvolvimento Econômico II – 2025

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Hoje

1. What is development?
(Acemoglu, 2009)

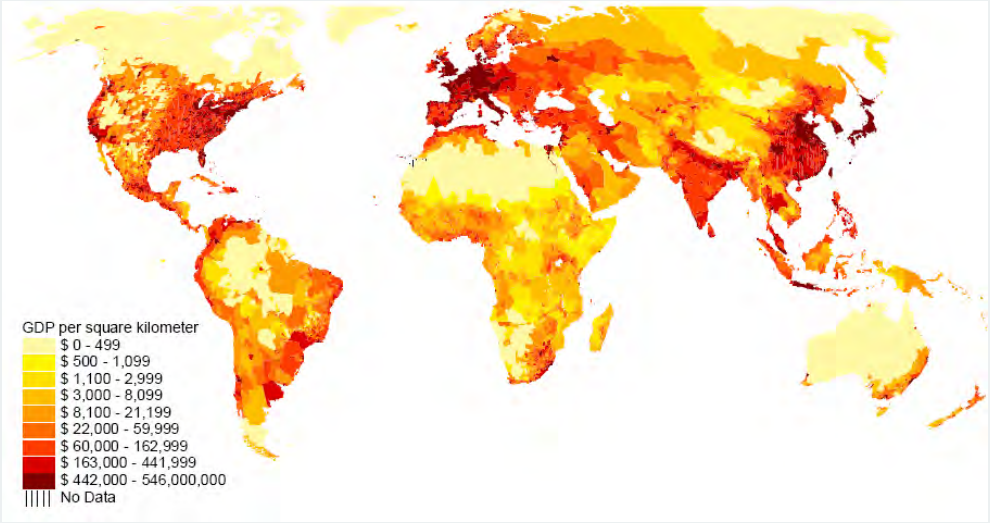
2. The “measure of our ignorance”
(Caselli, 2004)

3. Misallocation

4. Organização do curso

1/ What is development? (Acemoglu, 2009)

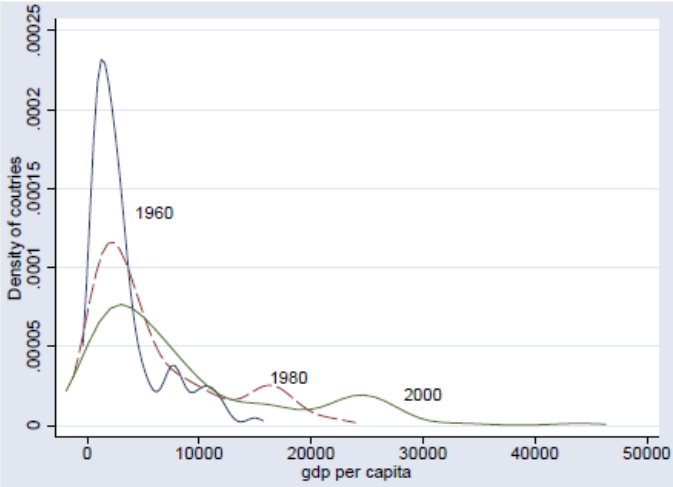
Income differences across countries in 1995



(Mellinger, Sachs, and Gallup, 1999)

Income differences across countries: trends

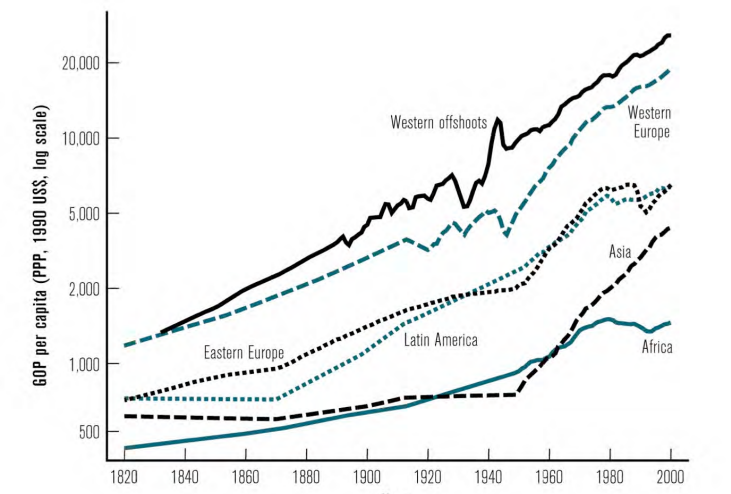
A diferença de PIB per capita entre países no mundo é enorme e vem aumentando desde a WWII.



(Acemoglu, 2009)

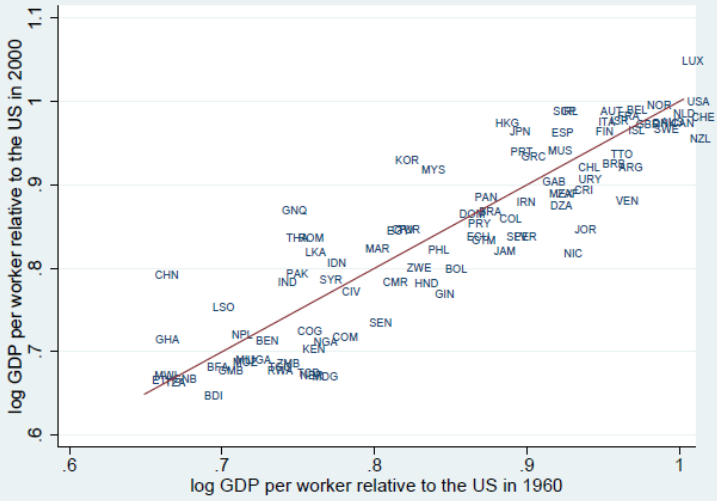
What is the origin of this gap? Is there convergence?

- This divergence may have originated centuries ago.
- There is no clear evidence of convergence across countries.



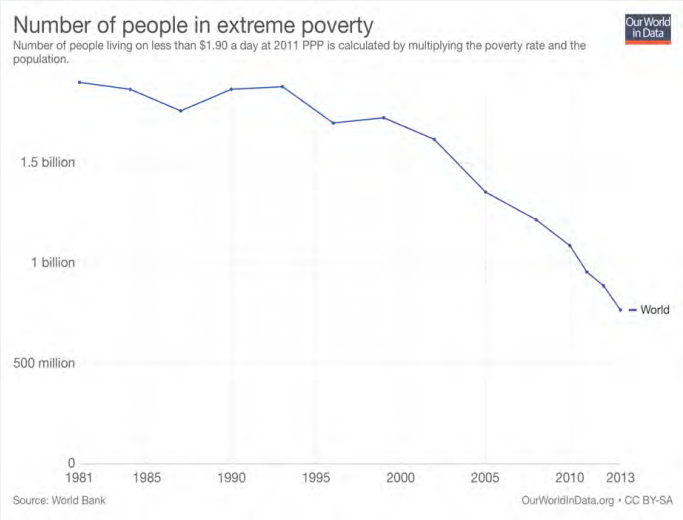
Persistency?

- The **ranking** of countries appears to be relatively **stable** over time.



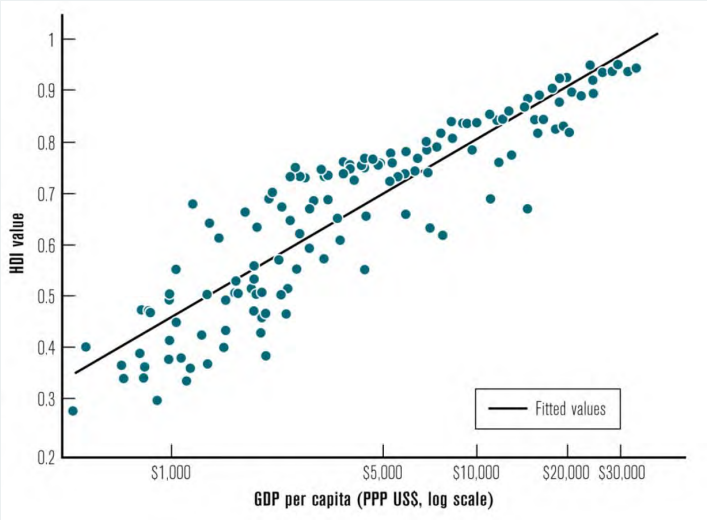
GDP is a limited measure of development

- Economic growth can, in itself, reduce extreme poverty

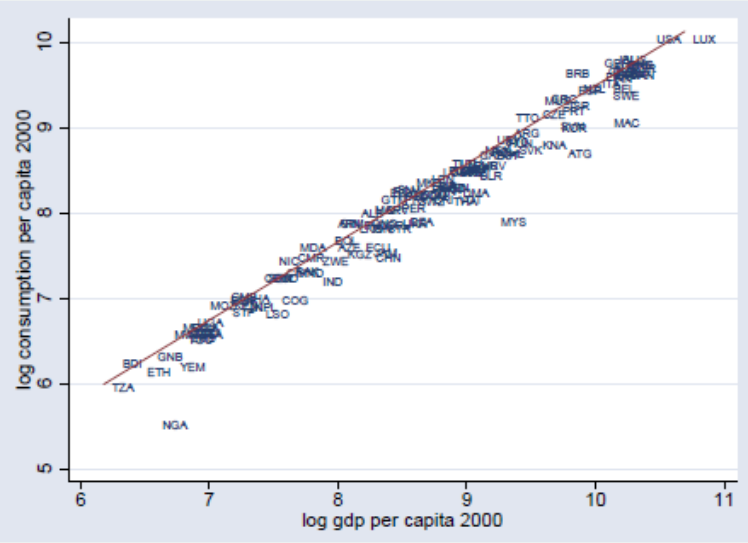


GDP per capita e HDI

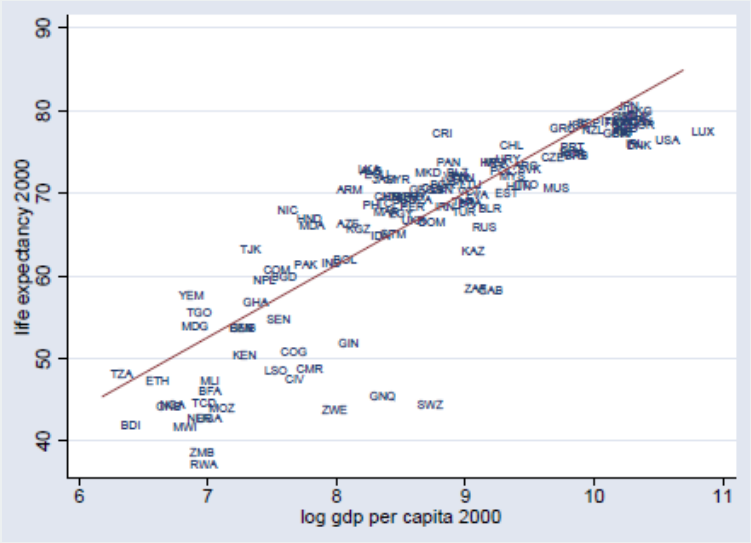
- GDP per capita is highly correlated with quality-of-life indicators



GDP and consumption per capita



GDP per capita and life expectancy



Income, although important, is not an end in itself. Income is a means to achieve a range of ends.

"The life of money-making is one undertaken under compulsion, and wealth is evidently not the good we are seeking; for it is merely useful and for the sake of something else."

– Aristotle, Nicomachean Ethics

But which ends?

“Development as Freedom” (Amartya Sen, 1999)

- Development in terms of “capabilities” (possibilidades)
- The central aspect of well-being is functioning:

the freedom of choice and control over one’s life

  - Freedom from hunger
  - Freedom from disease
  - Freedom from early death
  - Freedom from violence
  - Freedom from oppression
  - Freedom to choose your own path in life

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*“(...) the factors we have listed (innovation, economies of scale, education, capital accumulation, etc.) are not causes of growth; **they are growth.**.” (North and Thomas, 1973)*

Development Economics

The positive view: Lucas (1988)

"By the problem of economic development I mean simply the problem of accounting for the observed pattern, across countries and across time, in levels and rates of growth of per capita income."

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The normative view: Banerjee, Duflo e Olken (2009)

"This is the object of development economics:

- Why do poor countries stay poor?
- Why do poor people in poor countries have such short and hard lives?
- And, at least in our view, **what can be done about it**?"

2/ The “measure of our ignorance” (Caselli, 2004)

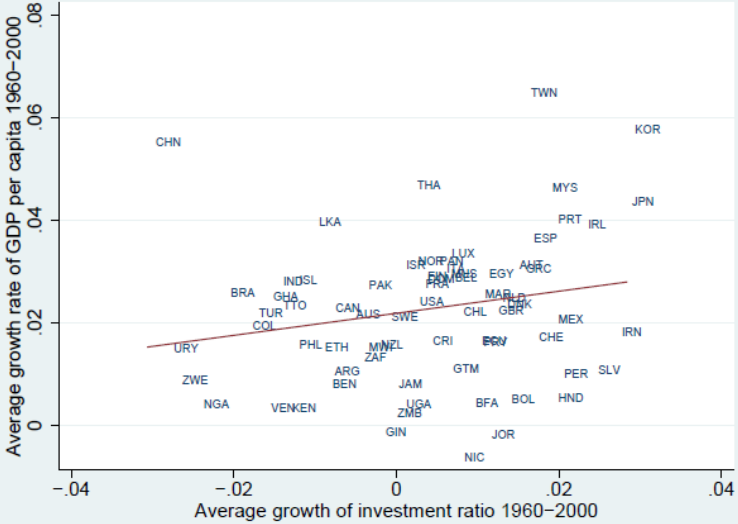
What do we know?

- **Where do we start?**

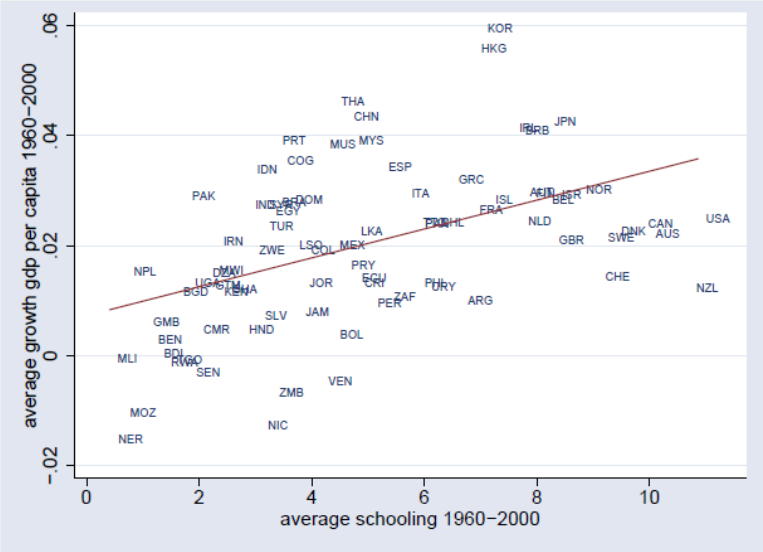
What do we know?

- **Where do we start?**
- How much do **capital** and **labor** explain income gaps?
    - These are the main inputs of any production function

Is it all about investment/capital?



Is it all about human capital?



The “measure of our ignorance” (Caselli, 2004)

“How much of the cross-country income variance can be attributed to differences in (physical and human) **capital**, and how much to differences in the **efficiency** [TFP] with which capital is used?”

- **Development accounting**:

$$\text{Income} = F\left(\text{Factors},\ \text{Efficiency}\right)$$

1. Choose a functional form $F()$
2. Accurately measure Income and Factors (country-level data).

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- **Efficiency is backed out as a residual**, and it can be though as a “**measure of our ignorance**”.

Benchmark model (Hall and Jones, QJE 1999)

- National production function

$$Y = AK^{\alpha} (Lh)^{1-\alpha} \tag{1}$$

  - where K is capital,
  - Lh is "quality adjusted" workforce – workers L multiplied by average human capital h,
  - α is a constant
  - and A represents the TFP, or the residual.

Benchmark model (Hall and Jones, QJE 1999)

- Perpetual inventory equation:

$$K_t = I_t + \delta K_{t-1}$$

  where δ is the depreciation rate.

- Initial capital stock

$$K_0 = I_0/(g + \delta)$$

  where g is the geometric growth rate for investment series

  - It aims to capture (as an underlying assumption) the capital stock in the s.s. of a Solow model.

The “measure of our ignorance” (Caselli, 2004)

- Human capital is calculated based on the average years of schooling in the population over 25 (s) translated into h:

$$\ln h = \phi(s) = \begin{cases} 0.134s & if\ s \leq 4 \\ 0.134 * 4 + 0.101 * (s-4) & , \ if\ s \in (4, 8] \\ 0.134 * 4 + 0.101 * 4 + 0.068 * (s-8) & if\ s > 8 \end{cases}$$

- *Rationale*: wage-schooling relationship is thought to be log-linear and returns to education are around 13.4% in Sub-Saharan Africa, 10.1% World average and 6.8% the OECD average.

Bringing the model to the data

- *Data*: Penn World Tables (PWT6) for capital, output and workers; and Barro and Lee (2001) for years of schooling. Data goes until mid-90s.

- Rewriting (1) in per worker terms:

$$y = Ak^{\alpha} (h)^{1-\alpha} \tag{2}$$

- Has data on y, k, h, so for each choice of α $(= 1/3)$ defines $y_{KH} \equiv k^{\alpha} h^{1-\alpha}$ and rewrite (2) as

$$y = A * y_{KH}.$$

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The thought exercise is:

"Suppose that all countries had the same level of efficiency: what would the world income distribution look like in that case, compared to the actual one?"

Measuring the model fitting

- Variance decomposition

$$success1 = \frac{\text{var}\left[log(y_{KH})\right]}{\text{var}\left[log(y)\right]}$$

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- 90th-to-10th percentile ratio

$$success2 = \frac{y_{KH}^{90} / y_{KH}^{10}}{y^{90} / y^{10}}$$

Measuring the model fitting

- Variance decomposition

$$success1 = \frac{\text{var}\left[log(y_{KH})\right]}{\text{var}\left[log(y)\right]}$$

- 90th-to-10th percentile ratio

$$success2 = \frac{y_{KH}^{90} / y_{KH}^{10}}{y^{90} / y^{10}}$$

Any bets?

The “measure of our ignorance”: Baseline Results

$\text{var}\left[log(y)\right]$	1.246
$\text{var}\left[log(y_{KH})\right]$	0.501
success1	**0.40**

y^{90}/y^{10}	20
y_{KH}^{90}/y_{KH}^{10}	7
success2	**0.35**

- The model perform worse within poorer sub-samples:
  - E.g., non-OECD or below the median.

Improving measurement of capital

Human capital:

- quality of schooling: school resources, test scores, and quality indicators;
- experience;
- health status of labor force;
  - "the bulk of the variance most likely remains unexplained."
- **Underlying assumption**: *private return to human capital accurately describes its social return* – $\phi(h)$ estimates reflect the private rates of return.

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Physical capital:

- Composition of the stock of equipment (unobserved quality)
  - Difficult to assess but potentially very important;

Sector composition of output

E.g., agriculture and manufacturing.

- Poor countries have 90% of workforce in agriculture while rich have 3%
- Factors may be used in sectors intrinsically less productive than others,
- Or even potentially different efficiency within sectors,

Sector composition of output

E.g., agriculture and manufacturing.

- Poor countries have 90% of workforce in agriculture while rich have 3%
- Factors may be used in sectors intrinsically less productive than others,
- Or even potentially different efficiency within sectors,
- Small variation in efficiency due to differences in sector composition
- *"Efficiency differences appear to be a **within industry phenomenon**".*
    - "Success" is less than 15% in agriculture!

Non-neutral factors efficiency

Relaxing Cobb-Douglas specification with a CES functional form:

$$Y = \left[\alpha \left(\mathbf{A_k} K\right)^{\sigma} + (1-\alpha)\left(\mathbf{A_h} L h\right)^{\sigma}\right]^{1/\sigma}$$

- Parameters $\alpha \in (0,1)$ and $\sigma < 1$ are constant across countries
- σ captures L, K substitutability
- higher A_k means a country uses capital more efficiently

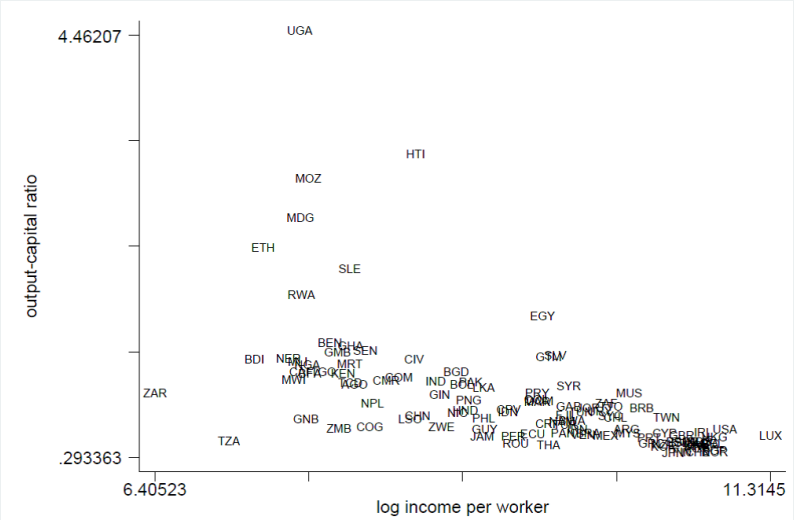
Now with two unknowns, we need two equations.

Assume that factor markets are everywhere competitive and use

$$w = \frac{\partial Y}{\partial h} \text{ and } r = \frac{\partial Y}{\partial k}$$

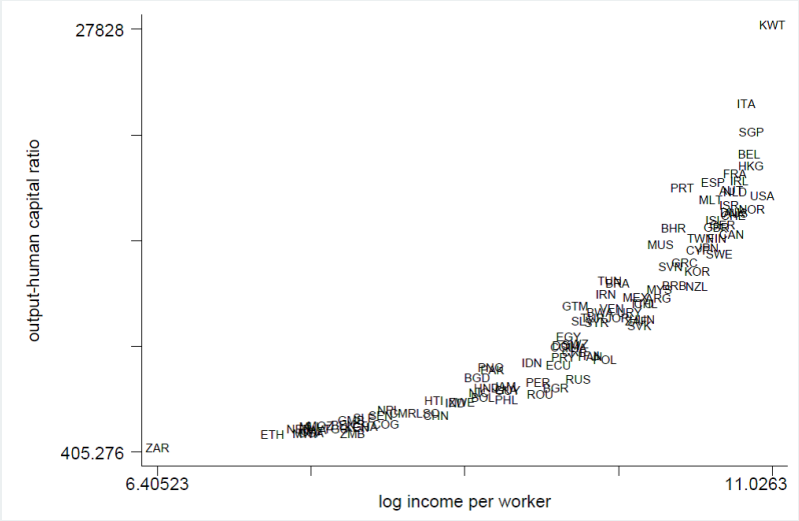
Non-neutral factors efficiency

Data says that poor countries use physical capital more efficiently than rich ones.



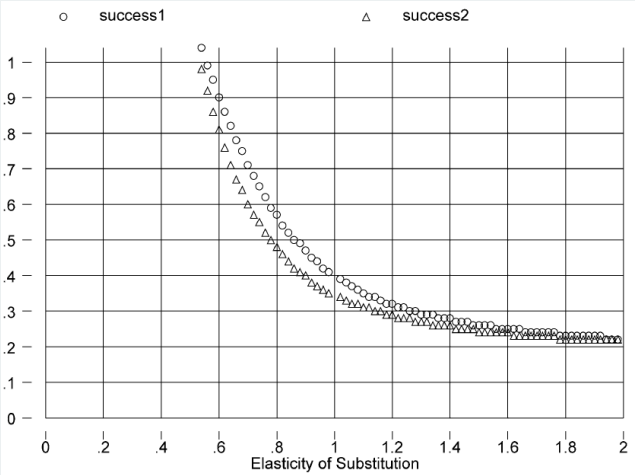
Non-neutral factors efficiency

Rich ones use human capital more efficiently.



Non-neutral factors efficiency

If σ is low enough, differences in factor endowments can explain the bulk of cross-country income variance.



In sum, the “measure of our ignorance” (Caselli, 2004)

- Do observed differences in the factors employed in production explain most of the cross-country variation in income?
  “No, way no.”

- Efficiency is at least as important as capital/factors in explaining income difference, even when considering:
  - improved measures of human capital (e.g., considering *quality* and *health*);
  - the age composition of the capital stock; and
  - sector composition of output – it’s not a matter of agriculture vs. non-agriculture.

- *“Efficiency differences appear to be a* ***within industry phenomenon.”***

3/ Misallocation

Resource misallocation

Big question: What are the underlying causes of these large TFP differences?

- Previous research has focused on differences in technology within representative firms across countries.
  - E.g., low tech. diffusion: Howitt (2000) and Klenow and Rodríguez-Clare (2005)
- Restuccia and Rogerson (RED, 2008) takes a different approach: misallocation of resources *across* firms *within* a country/sector
  - Model + calibration to the US.

Resource misallocation: example

McKinsey country and sector studies found large differences across firms *within* the same sector in many developing countries (South Korea, Brazil, Turkey, India).

Exemple,

- key factor behind low productivity in Brazil's retail sector is labor-market regulations driving up the cost of labor for supermarkets relative to informal retailers.
- Despite their low productivity, the lower labor cost faced by informal-sector retailers makes it possible for them to command a large share of the Brazilian retail sector.

Simple model of resource misallocation
Restuccia and Rogerson (RED, 2008)

- Many firms i using labor L_i to produce homogeneous good Y_i:

$$Y_i = A_i L_i^{\gamma}$$

  normalize output price to \$1 and assume that $0 < \gamma < 1$

- Say also that firms differ in their productivity A_i

$$L_i = \left(\frac{\gamma A_i}{w} \right)^{1/(1-\gamma)}$$

Adding misallocation to the model

- Say that for reasons other than productivity some firms are in a 'better position'
- Model this phenomenon as a tax on output that is **specific to each firm**
  - So firms are subject to output taxes τ_i (*note the subscript i*)

Adding misallocation to the model

- Say that for reasons other than productivity some firms are in a 'better position'
- Model this phenomenon as a tax on output that is **specific to each firm**
  - So firms are subject to output taxes τ_i (*note the subscript i*)
- Labor demand *with misallocation*:

$$L_i = \left(\frac{(1 - \tau_i)\gamma A_i}{w} \right)^{1/(1-\gamma)}$$

- So for a given level of productivity A_i, firms with higher τ_i hire fewer workers.
- As a result, in equilibrium, the marginal product of labor does not equalize across firms – inefficient equilibrium

Resource misallocation (Hsieh&Klenow, QJE 2009)

How important is this misallocation of production factors across productive/non-productive firms to aggregate TFP?

- **Exercise**: How much aggregate manufacturing output in China and India could increase if capital and labor were reallocated to equalize marginal products across plants within each sector to the extent observed in the US?
- How to quantify misallocation:
  1. Add distortions to a monopolistic competition model with heterogeneous firms (Melitz, 2003)
  2. Infer misallocation from measured gaps in marginal products *at the firm level*
  3. Hypothetical gains from reallocating capital and labor
     - eliminating distortions entirely
     - reducing distortions to US level

Measuring firm-level distortion

- HK uses manufacturing microdata from China, India, and US to compute these measures
- Infer distortions and productivity for each plant in each country-year

$$1 + \tau_{K_{si}} = \frac{\alpha_s}{1 - \alpha_s} \cdot \frac{wL_{si}}{RL_{si}}$$

$$A_{si} = \kappa_s \frac{(P_{si} Y_{si})^{\frac{\sigma}{\sigma - 1}}}{K_{si}^{\alpha_s} L_{si}^{1 - \alpha_s}}$$

  - where κ_s is a scalar absorbing industry terms
  - Set $1 - \alpha_s =$ labor share in sector s in the US 1997
  - Assign parameters for R and σ

Data

- **India**: Annual Survey of Industries (like PIA/IBGE in Brazil)
  - annual fiscal years 1987/88 – 1994/95
  - census of large manufacturing plants, sample of small plants
  - approx 40,000 plants per year, 400 industries (4 digits)
- **China**: Annual Surveys of Industrial Production
  - annual 1998 – 2005
  - census of large nonstate firms plus all state firms
  - grows to approx 200,000 firms in 2005, 400 industries (4 digit)
  - *Small firms underreported in Chinese data*
- **US**: Census of Manufactures plants
  - 1977, 1982, 1987, 1992, 1997
  - approx 160,000 plants per year, 400 industries (4-digit)

Results: Distribution of TFPQ ($= A_{si}$)

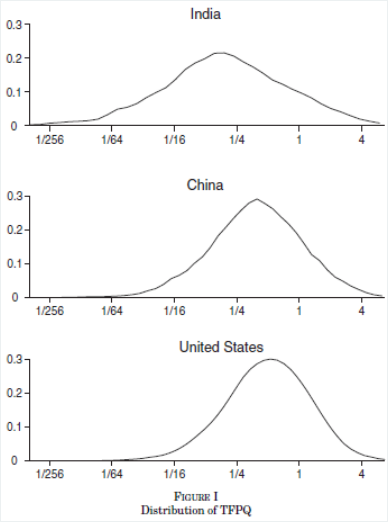


FIGURE I
Distribution of TFPQ

Greater dispersion of firm-level TFP in India and China than in the US

TFP gains from equalizing TFPR relative to US

TABLE VI

TFP GAINS FROM EQUALIZING TFPR RELATIVE TO 1997 U.S. GAINS

China	1998	2001	2005
%	50.5	37.0	30.5
India	1987	1991	1994
%	40.2	41.4	59.2

Notes. For each country-year, we calculated $Y_{\text{efficient}}/Y$ using $Y/Y_{\text{efficient}} = \prod_{s=1}^{S}\left[\sum_{i=1}^{M_s}\left(\frac{A_{si}}{A_s}\frac{\text{TFPR}_s}{\text{TFPR}_{si}}\right)^{\sigma-1}\right]^{\theta_s/(\sigma-1)}$ and $\text{TFPR}_{si} = \frac{P_{si}Y_{si}}{K_{si}^{\alpha_s}(w_{si}L_{si})^{1-\alpha_s}}$.

We then took the ratio of $Y_{\text{efficient}}/Y$ to the U.S. ratio in 1997, subtracted 1, and multiplied by 100 to yield the entries above.

Reallocation capital and labor to equalize marginal products to the extent observed in the US, manufacturing TFP gains are

- 30%–50% in China
- 40%–60% in India

4/ Organização do curso

Disclaimer

Este curso se inspira nos cursos ministrados pelos meus professores na LSE, coautores e colegas.
Erros e omissões são meus.

Desenvolvimento Econômico II

- O curso, assim como o campo, tem **ênfase empírica**, em particular *microeconomia aplicada*.
- Daremos ênfase na parte metodológica dos papers, mas não é um curso de métodos.
- O principal objetivo é apresentar o campo por tópicos e alguns pontos da fronteira

Qual o plano?

- Em cada tópico vamos nos concentrar **em um artigo a ser lido antes de cada aula**
- A idéia não é "ensinar" os artigos, mas discutí-los e tentar identificar seus componentes *academicamente* mais relevantes:
  - Qual a contribuição do paper?
  - É inovador? Por que?
  - Por que é citado?
  - Pontos positivos e limitações do artigo?
  - Como a pergunta foi implementada no *research design*?
- É relevante para o mundo real (além da academia)?

Mostrar tópicos no programa do curso e checar quem fez Dev I e causalidade de Rubin

Requerimento

- **Ler** os artigo principais **e pensar construtivamente**
- Leiam além da bibliografia e tragam material para aula!
- Vocês devem criar uma relação de amizade profunda com o **Google Scholar**

Sua formação de hoje em diante depende diretamente do quanto você lê!

Avaliação

30% 3 comentários

30% apresentação de artigo

40% projeto de pesquisa, entregue até dia **6/Jul**

[Abrir programa do curso]

Próximas aulas

Quinta:

- Poverty traps
  - Balboni, C., Bandiera, O., Burgess, R., Ghatak, M., Heil, A. (2022). *Why do people stay poor?* The Quarterly Journal of Economics.

Semana que vem:

- Potential outcomes framework and causality