

STEG Lecture Series on Macro Development: Introduction

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The Big Question(s) in Macro Development

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Lucas has said that once you start thinking about these questions, it is hard to think about anything else in economics.

Importance of Data

You don't need systematic data to realize that there are large differences in living standards.

But you do need data if you want to try to study them systematically to understand them.

Minimal requirement is data that allows you to compare real living standards across countries and over time.

The Penn World Table (PWT) amounted to a revolutionary change in the widespread availability of the needed data with broad coverage in terms of countries and time period.

First release of the PWT was in the late 1970s.

Kravens, Heston and Summers (1978)

THE ECONOMIC JOURNAL

JUNE 1978

The Economic Journal, **88** (June 1978), 215-242
Printed in Great Britain

REAL GDP *PER CAPITA* FOR MORE THAN
ONE HUNDRED COUNTRIES*

The Big Challenge Faced by the PWT

There are many familiar challenges associated with measuring nominal GDP in a given country in a given time period.

And there are many familiar challenges associated with generating measures of real GDP for a given country over time.

But producing measures of real GDP across countries at a given point in time is particularly challenging.

“Traditional” strategy: Use exchange rates to convert nominal GDPs into a common currency and use this as a measure of relative living standards.

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 - “Advanced economy” items can be notoriously expensive in low income countries, potentially leading one to conclude that purchasing power is very low in poor countries.
 - ICP updates purchasing power comparisons every few years. 2005 revisions are widely believed to have erred in underestimating purchasing power in low income countries, and this was “undone” by the 2011 revisions. (See e.g., Deaton, AEJ Macro 2017). This has a large impact on the quantitative assessment of differences in living standards.

While the PWT was the trailblazer as a source for cross-country comparisons of real GDP, this data is available at various other sites.

Groningen Growth and Development Center (GGDC) maintains many series, including the Maddison Historical Statistics, the Ten-Sector Database, EU-KLEMS.

The Conference Board maintains the Total Economy Database (TED).

United Nations maintains the World Development Indicators. (WDI)

Living Standards and Productivity

- Income per capita is the most commonly used indicator of living standards.
- But in NIPA, $\text{Income} = \text{GDP}$, so income per capita is just GDP/capita .
- But much of the variation in GDP/capita is accounted for by GDP/worker .
 - Issue is extent to which workers per capita varies with income per capita.
 - While not insignificant, this effect tends to be second order.
- This allows one to focus on properties of production.

Organizing Our Thinking

Thanks to the people who developed the PWT, we can now measure differences in GDP/worker or GDP/capita for a large number of countries over a relatively long time period.

Relevant next question is how does the data guide us in deciding how best to frame the research agenda going forward.

This is what we turn to next....

Documenting the Facts About the Evolution of the Cross-Country Income/Productivity Distribution

Some Descriptive Papers on Cross-Country Income Dynamics

Mankiw, Romer and Weil (QJE 1992)

Parente and Prescott (Mpls Fed QR 1993)

Pritchett (JEP 1997)

McGrattan and Schmitz (Handbook of Macro 1999)

Hausmann, Pritchett, and Rodrik (JEG 2005)

Duarte and Restuccia (Richmond Fed QR 2006)

B. Jones and Olken (Restat 2008)

C. Jones (Handbook of Macroeconomics 2016)

The Great Divergence I

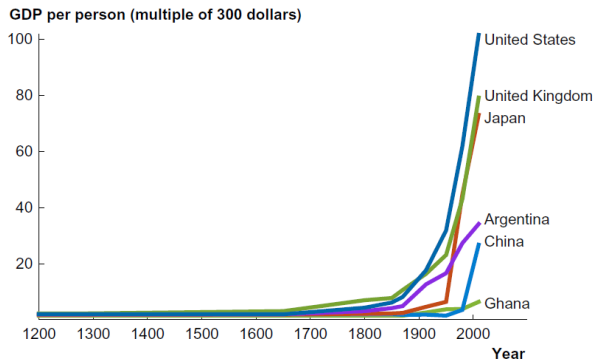
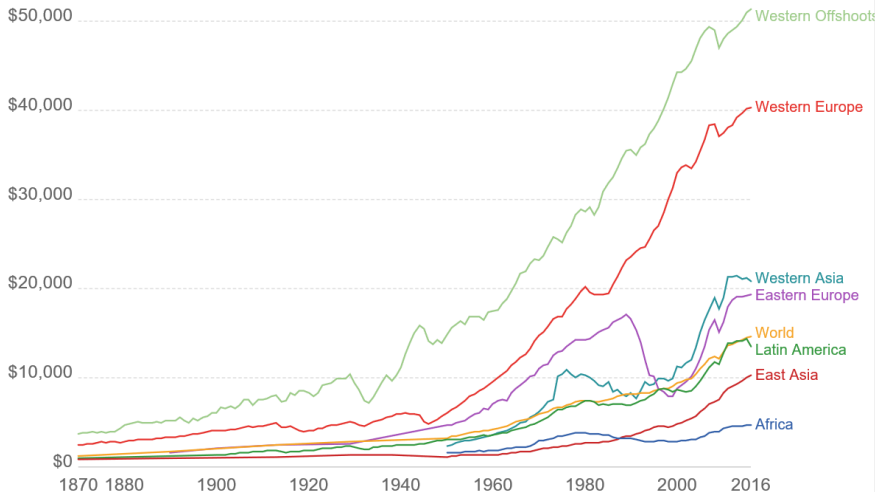


Fig. 21 The great divergence. *Note:* The graph shows GDP per person for various countries. The units are in multiples of 300 dollars and therefore correspond roughly to the ratio between a country's per capita income and the income in the poorest country in the world. Source: Bolt, J., van Zanden, J.L. 2014. *The Maddison Project: collaborative research on historical national accounts*. *Econ. Hist. Rev.* 67 (3), 627–651.

The Great Divergence II

GDP per capita

GDP per capita adjusted for price changes over time (inflation) and price differences between countries – it is measured in international-\$ in 2011 prices.



Source: Maddison Project Database (2018)

Levels vs Growth Rates I

Release of the PWT coincided with the emergence of endogenous growth theory.

Hallmark of endogenous growth theory was that country specific policies affect the (permanent) growth rate.

Hallmark of exogenous growth models is that policies have level effects, not growth effects.

It is challenging to get large level effects in these models.

Viewing large cross-country disparities in living standards through the lens of endogenous growth theories suggested an easy answer: if bad policies lowered growth rates permanently, over time we would see large differences in living standards.

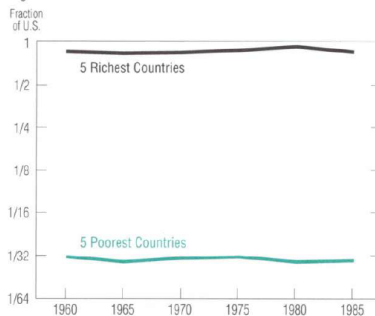
This is consistent with the view that divergence is a fundamental feature of the data

Parente and Prescott #1

Chart 1

Wide and Steady Wealth Disparity

Average Per-Capita GDP Relative to U.S. Level
for the 5 Richest and Poorest Countries in the 102-Country Data Set
During 1960–85



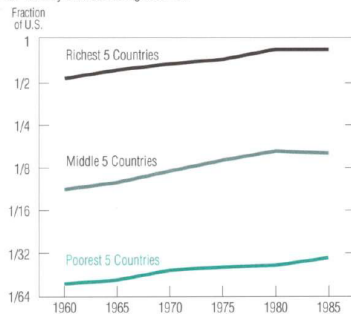
Source of basic data: Summers and Heston 1991

Parente and Prescott #2



Widespread Upward Shift

Average Real GDP Relative to 1985 U.S. Level for Selected Wealth Groups
in the 102-Country Data Set During 1960–85



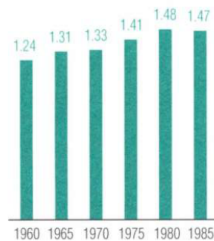
Source of basic data: Summers and Heston 1991

Parente and Prescott #3

The Standard Deviation Measure of Wealth Disparity

Based on the Distribution of Relative Per-Capita GDP

Chart 2 In All 102 Countries: Increasing?



Parente and Prescott #4

Chart 3 In Western Europe: Decreasing?

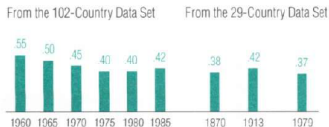
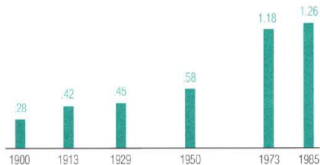


Chart 4 In Southeastern Asia: Definitely Increasing



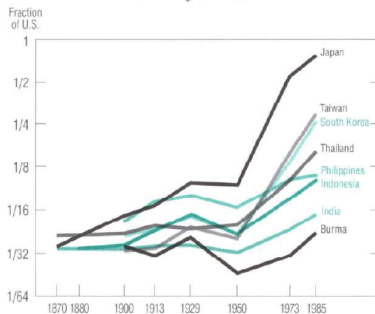
Source of basic data: Summers and Heston 1991, Maddison 1991,
De Long 1988, Van der Eng 1992

Parente and Prescott #5

Chart 5

Dramatic Divergence in Southeastern Asia

Per-Capita GDP Relative to 1985 U.S. Level
for 8 Southeastern Asian Countries During 1870–1985



Source of basic data: Van der Eng 1992

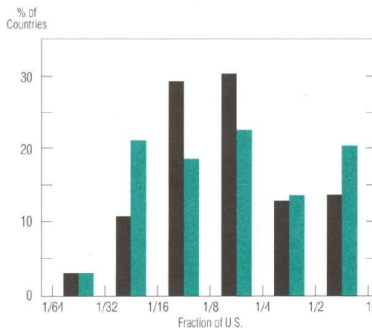
Parente and Prescott #6

Chart 6

A Change in the Distribution of Wealth

Per-Capita GDP Relative to U.S. Level in the 102-Country Data Set

During 1960 ■ and 1985 ■



Source of basic data : Summers and Heston (1991)

Parente and Prescott #7

Development Miracles and Disasters

Countries in the 102-Country Data Set With Largest Changes
in Relative Wealth During 1960–85 (Expressed as Factor Changes)

Increases		Decreases	
Country	Factor Change	Country	Factor Change
Saudi Arabia	3.32	Zambia	2.63
Lesotho	3.19	Mozambique	2.63
Taiwan	2.60	Madagascar	2.50
Hong Kong	2.59	Angola	2.38
South Korea	2.40	Chad	2.13
Egypt	2.38	Liberia	2.04
Congo	2.18	Ghana	2.00
Japan	2.10	Zaire	1.96
Singapore	2.09	Nicaragua	1.85
Syria	1.89	Afghanistan	1.75

Source of basic data: Summers and Heston 1991

Duarte and Restuccia #1

Table 4 Mobility Matrix—Relative Output per Worker

		$t + 20$				
		0-0.075	0.075-0.15	0.15-0.3	0.3-0.6	0.6-1.2
t	0-0.075	0.86	0.11	0.03	0	0
	0.075-0.15	0.38	0.46	0.11	0.05	0
	0.15-0.30	0.01	0.15	0.57	0.26	0.01
	0.3-0.6	0	0.02	0.22	0.48	0.28
	0.6-1.2	0	0	0	0.10	0.90

Table 5 Mobility Matrix by Quintile

		$t + 20$				
		Q1	Q2	Q3	Q4	Q5
t	Q1	0.78	0.21	0.01	0	0
	Q2	0.22	0.64	0.11	0.03	0
	Q3	0	0.14	0.62	0.24	0
	Q4	0	0.02	0.24	0.58	0.16
	Q5	0	0	0	0.16	0.84

Notes: Quintile i (Q_i) includes countries within the $20 \times (i - 1)$ and $20 \times i$ percent of the distribution of relative output per worker.

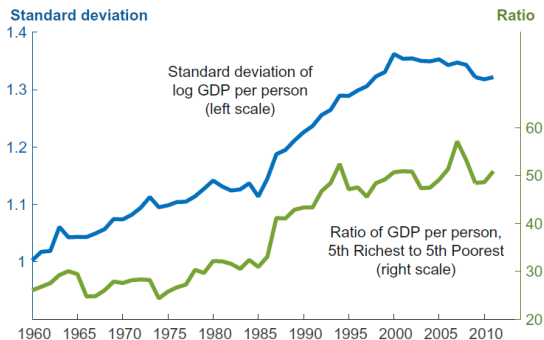
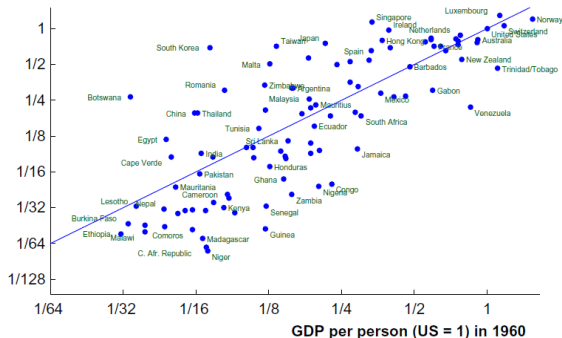


Fig. 27 Divergence since 1960. Source: *The Penn World Tables 8.0*, calculated across a stable sample of 100 countries.

GDP per person (US = 1) in 2011

Fig. 24 GDP per person, 1960 and 2011. Source: *The Penn World Tables 8.0*.

Growth rate, 1960 – 2011

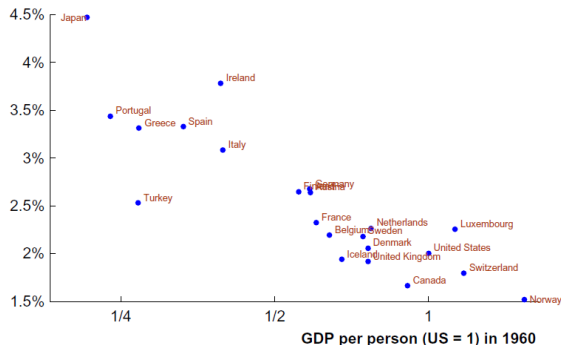


Fig. 25 Convergence in the OECD. Source: *The Penn World Tables 8.0*. Countries in the OECD as of 1970 are shown.

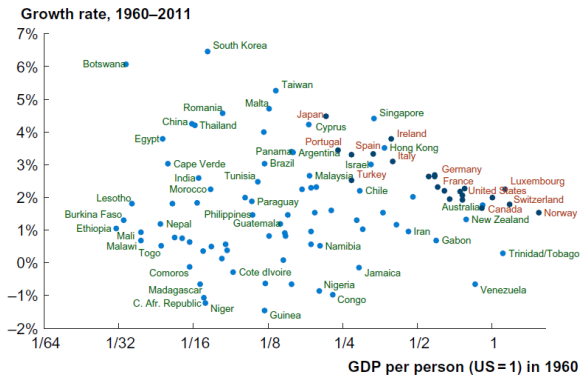


Fig. 26 The lack of convergence worldwide. Source: *The Penn World Tables 8.0*.

Putting It All Together

Two issues I want to emphasize:

- 1 Levels vs Growth Rates
- 2 Frontier Growth vs Catch-up Growth

Levels vs Growth Rates II

We do not see systematic ongoing spreading out of levels.

Instead we see approximately constant growth across the distribution in post 1950s.

Situation was a bit different pre 1950—different countries began the process of modern growth at different times.

All periods of sustained high growth were examples of catchup to the frontier, and growth decreased as distance to the frontier lessened, i.e., growth miracles represent transition dynamics associated with a change in the relative income distribution.

Changes in position in the relative income distribution reflect level effects, not growth effects.

A Basic Macroeconomic Framework for Organizing the Data

Each country is modeled as a one-sector growth model.

There is a world technology frontier described by \hat{A}_t .

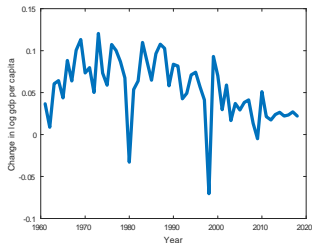
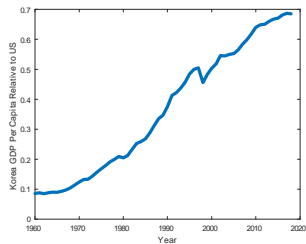
Each country has a parameter that indexes position relative to the frontier, $\tilde{A}_{it} \in [0, 1]$, so that TFP in country i at time t is given by $A_{it} = \tilde{A}_{it}\hat{A}_t$.

\hat{A}_t changes slowly; \tilde{A}_{it} can change rapidly due to changes in country specific policies/institutions.

Miracles and disasters reflect transition dynamics associated with large changes in \tilde{A}_{it} .

Key question is what factors influence \tilde{A}_{it} .

Case of South Korea



Frontier vs Catchup Growth

Endogenous growth theory is about the forces that determine the evolution of the technology frontier, what I called \hat{A}_{it} on the previous slide.

For a country close to the frontier, continued growth is only possible if the frontier moves, so country growth is constrained by frontier growth.

For countries far from the frontier, frontier growth is second order to their growth possibilities.

And for many if not most developing countries, it is reasonable to view the technology frontier as exogenous.

Another Great Divergence: Micro and Macro Development

The preceding discussion summarized a research effort over the last two decades that sought to use aggregate data to motivate an aggregate framework for thinking about cross country differences in living standards.

This framework is a variant of a one sector growth model, which is the benchmark aggregate model used in macroeconomics.

These aggregate frameworks did not reflect the rich set of factors that micro development researchers were highlighting as critical features of the economic context in less developed countries.

The result: the great divergence between micro and macro development research.

Frictions and Heterogeneity in Modern Macro

Major focus of macro over the last 20 years has been the development of models that incorporate rich specifications of heterogeneity and “frictions” that can simultaneously speak to aggregate outcomes while also addressing a rich set of cross-sectional facts.

These models present an opportunity for a unified analysis of micro and macro development within the same framework. Recent paper by Buera, Kaboski and Townsend is a great overview of this agenda.

STEG seeks to actively promote this agenda and further facilitate interaction between individuals across groups.

Progress will come from both bottom-up and top-down approaches.

Beyond the One Sector Model: The Role of STEG

One sector model is incredibly useful framework for organizing our thinking.

But it also has some limitations.

Viewed through the lens of a one sector model, development amounts to doing the same thing better and better over time, i.e., rich countries and poor countries do the same thing but rich countries are just better at it.

This is patently false as a descriptive matter.

Thinking seriously about how the structure of economic activity changes with development seems critical to developing a better understanding of what forces shape or prevent development.

This is exactly the work that STEG is seeking to promote and advance.