

# Lecture 2: Growth

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# The Solow model

- Aggregate production function:  $Y = F(K,L)$
- Constant returns:  $F(cK,cL) = cF(K,L)$
- Substitute:  $c = 1/L$
- Get:  $f(K/L) = F(K/L, 1) = F(K,L)/L = y$ 
  - Output per worker,  $f' > 0$
  - Define  $k = K/L$
- Diminishing returns: ?
- Savings rate  $s$
- Depreciation rate  $m$
- Fixed labor supply

# Analysis of the model

- $dK/dt = sF(K,L) - mK$
- $dk/dt = d(K/L)/dt = sF(K,L)/L - mk$
- $(1/k)dk/dt = sf(k)/k - m$
- The long run growth rate is ?
- Is it reasonable to assume that the labor force is fixed?
- What is the long run growth rate?
- What is the relation between  $s$  or the population growth rate and the long run level of  $y$ ?

# Cross-country comparisons

- Suppose that two countries have the same  $f$ ,  $s$ ,  $m$ .
- Then the richer of these countries should be growing faster or slower than the poorer?
- Convergence
- Now suppose the more capital rich country has a lower savings rate?
  - Is this possible?
  - If it is possible which of them will be growing faster.
- Now suppose they had the same capital stock.
  - Which of them should be growing faster?
- Explaining differences in growth rates by a combination of current income/capital stock, savings, population growth, depreciation: conditional convergence.

# Generalizations

- Suppose you do not have to invest in your own country.
- Would you invest in a country with less capital or one with more capital?
- What would this do to convergence assuming capital is perfectly mobile?
- What would it do to conditional convergence?
  - Is it costly to be low saving country?

# Convergence 1960-1995

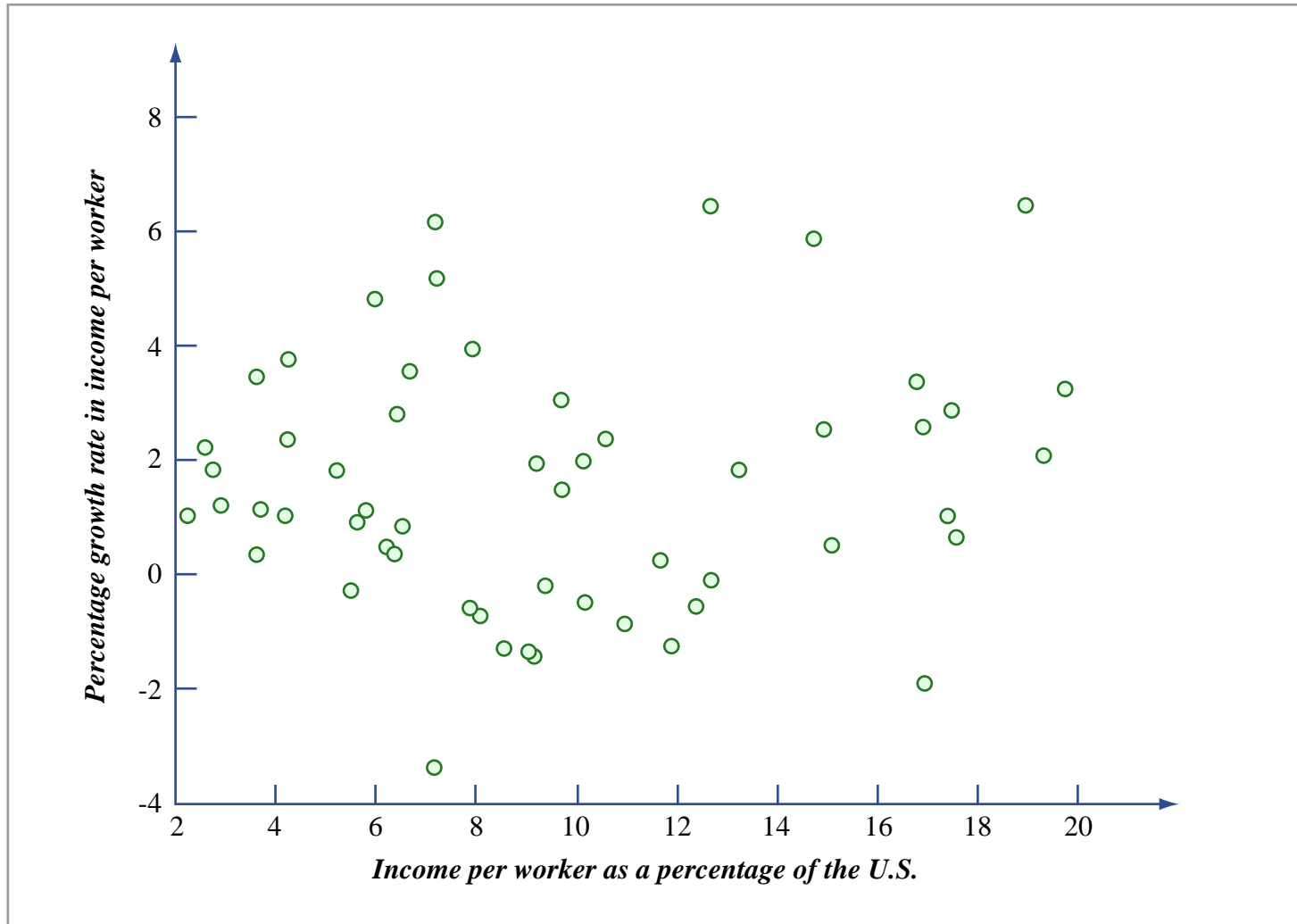


Figure by MIT OCW.

# Pritchett

- If you take the set of rich countries today we see evidence of convergence. Why is this potentially misleading?
- What is the challenge in documenting convergence?
- What are the ways Pritchett bound GDP in 1870?
- Using the lowest observed income anywhere
- Using “subsistence needs”
- Using child mortality rates.
- What does he do with the bound?
- Is there “Divergence Big Time”?

# Another Divergence?

- Lucas assumed  $Y = A\{(K)^{0.4}\}\{(L)^{0.6}\}$  which gives us that  $y = A(k)^{0.4}$
- From the maximization of profits under perfect capital markets, he derived:
  - $(0.4)A(k)^{-0.6} = r$ ,
  - Where  $r$  is the interest rate in the economy
- From this he derived the following
- $(y/y')\{A'/A\}^{(1/0.6)} = \{(r'/r)^{(0.4/0.6)}\}$
- Lucas argues because of human capital differences  $(A'/A) = (5)^{0.6}$
- $y/y' = 1/15$  average for 1965-1990. Therefore  $r = (3)^{(3/2)}r' = 5r'$ , approximately
- Why doesn't capital flow to India?

# Easterly

- What is the source of long run growth in the Solow Model?
- What does non-convergence say about technologies across countries?
- Does this necessarily mean the emphasis on more savings/investment is wrong?
- What is the Luddite fallacy?
- Is it really a fallacy?

# Conditional convergence

- Says that once we compare countries with the same savings rate, investment in human capital, etc. we do see the poorer countries catching up with the richer ones.
- Is this useful?
- Suggests that that it is not increasing returns but cross-country differences in parameters
- What are reasons why the savings rate may be low?
- What are reasons why there may not be investment in human capital?

# Basic explanations

1. The production function is different
  - Geography: how?
  - Physiology
  - Culture
2. Tastes are different
  - Culture
  - Physiology
3. Markets/Contract enforcement is different
  - Legal institutions
  - Political institutions
  - History
  - Demographics
4. Reputations/Expectations/attitudes are different
  - History

# Geography?

- Reversal of Fortune
- Urbanization rates
- Income comparisons in the 18<sup>th</sup> century.
- Good geography becomes bad geography
- How?
- Institutions: “good geography created bad institutions”

# Is it Institutions?

- Regress the GDP for country  $i$  today on some measure of how good it's institutions are while controlling for other characteristics for that country.
- $GDP_i = a + b * \text{good institutions}_i + X_i + \epsilon_i$
- Good institutions measured by expropriation risk
- Very good fit even without controlling for anything else?
- Problems?
- Reverse causality
- Common third cause

# “Instrumenting for Institutions”

- Conceptually: identifying a source of variation in institutions that has no direct effect
- **Distance from the equator** (Hall and Jones)
- They argue that distance to equator is correlated with "Western influence", which causes good institutions
- This is a difficult argument to make in light of the Belgian influence in the Congo, or the western influence in the Gold Coast during the era of slavery.
- A variant: **Colonialism**
- Problem: USA, Canada, etc.
- **Colonial origin (La Porta et al.):** Being a British colony was better because British institutions are better: “common law”,
- Counterexamples
- Other Problems

# Instrumenting using accidents of history

- The AJR story
- Institutions
- The role of settler mortality
- What else could it be?
- The ES story
- Inequality
- How does inequality affect long run outcomes?
- The role of geography
- The role of empty places

# Implications of AJR

- What they unambiguously show is that empty places that were colonized turned out better
- But what can we do about that?
- Their view: Good institutions are good.
- But how do you get good institutions?
- Why don't countries automatically gravitate towards good institutions?
- Can we do anything about it?

# Implications of ES

- Inequality is bad
- How do you get inequality?
- By geography/demographics in the early years of colonization
- But also by policy acts (often as a side-effect..)
- Neither AJR nor ES rule out a role for policy.

# A role for policy?

- The Washington Consensus
  - Fiscal policy discipline:
    - Reasoning?
    - Examples?
    - Redirection of public spending toward education, health and infrastructure investment;
    - Reasoning?
    - Evidence?
  - Flattening the tax curve:
    - Reasoning?
    - Evidence?
  - Interest rates that are market determined
    - Reasoning?
    - Evidence

# The wash-list

- The Washington Consensus continued
  - Competitive exchange rates
  - Reasoning?
  - Evidence?
  - Trade liberalization
  - Reasoning?
  - Evidence?
  - Openness to foreign direct investment;
  - Reasoning?
  - Evidence

# The wash-list

- The Washington Consensus Continued
  - Property rights.
  - Reasoning?
  - Evidence?
  - Privatization of state enterprises;
  - Reasoning?
  - Evidence?
  - Deregulation
  - Reasoning?
  - Evidence

# Does policy matter?

- Not easy question.
  - Can you compare countries with different policies?
  - Can you compare countries before and after a policy change?
- Easterly and Levine ran a regression where they include the AJR measures of good institutions as well as 3 standard measures of bad policy:
  - Inflation, exchange rate overvaluation, closed-ness
  - Institutions remain significant, but the policies are not.
- Small policy mistakes do not matter a lot.
- Does not rule out the negative impact of really bad policies. We may know how to stop growth.
- But not how to make it happen
- Does this mean that there is no hope?

# Growth Instability

- Growth in LDCs collapsed in the 1970s
- Before that they were doing fine.
- The higher the settler-mortality the higher the possibility of a collapse
- Does this mean good institutions mediate crises better?
- Or that the lack of inherited social conflicts make it easier to negotiate problems?

# What role can aid play?

- Brings resources
  - The record?
- Brings/encourages new ideas
  - The record?
- Help implement better policies
  - The record?
- Help build institutions
  - The record?
- The overall record of aid

# Why has aid not worked better?

- Easterly's view
- Incentives of the aid givers
  - ?
  - ?
  - ?
- Incentives of the aid recipients
  - ?
  - ?
  - ?

# Why has aid not worked?

- It got stolen
  - It was meant to be stolen
  - The processes for monitoring its use were imperfect
- It got invested in the wrong things
  - It was meant to be invested in the wrong things
  - People do not know what the right things might be.

# How do we make it work better?

- Require a better justification of why particular options get chosen:
  - Makes sure that what gets chosen has a chance of working.
  - Makes clear what is not meant to work
  - Reduces theft

# What is a good justification?

- Theory is not enough
  - The problem is that the best theories are very vague: “big push”, “human capital”
  - The problem is how to educate eight-year olds who get no help at home, using teachers who do want to teach, and no electricity.
- Praxis is not enough
  - Innovation requires theory, experimentation.
- Good inputs are not enough
- Feel good not enough

# The experimental approach

- Know your problem well
- Build on existing strategies to come up with possible solutions
- Use theory to interrogate the plausibility of the solutions
- Come up a list of narrowly defined alternative strategies
- Experimentally evaluate them if they have not been evaluated.
- Scale up what succeeds.

# A data project

Based on work with Esther Duflo

# Data

- Bringing together data on the **very poor**, defined as those with consumption below \$1.08 a day at 1993 PPP.
- And the **poor** defined as those below \$2.16 a day at 1993 PPP
- From LSMS (World Bank) and Family Life Surveys (Rand)
- Plus Udaipur Rural survey (Banerjee-Deaton-Duflo) and Hyderabad Urban (Banerjee-Duflo-Glennester).

How do the poor spend their  
money?

# Food?

- Are the very poor spending every marginal penny on they can on getting more food?
- The share of expenditure between 78% in Papua New Guinea and 50% in Mexico.
- Other large items include:
  - Tobacco/alcohol (up to 8%)
  - Festivals (up to 14% when asked in detail)
- They could easily eat more.
- Consistent with low estimates of the elasticity of demand for food: 2/3 by Deaton and Subramanian (DS) from India is high.

## How the poor spend their money

As a Share of Total Consumption

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	<u>Food</u>	<u>Alcohol/ Tobacco</u>	<u>Education</u>	<u>Health</u>
<b>Rural</b>				
Cote d'Ivoire	64.4%	2.7%	5.8%	2.2%
Guatemala	65.9%	0.4%	0.1%	0.3%
India - Udaipur	56.0%	5.0%	1.6%	5.1%
India - UP/Bihar	80.1%	3.1%	0.3%	5.2%
Indonesia	66.1%	6.0%	6.3%	1.3%
Mexico	49.6%	8.1%	6.9%	0.0%
Nicaragua	57.3%	0.1%	2.3%	4.1%
Pakistan	67.3%	3.1%	3.4%	3.4%
Panama	67.8%		2.5%	4.0%
Papua New Guinea	78.2%	4.1%	1.8%	0.3%
Peru	71.8%	1.0%	1.9%	0.4%
South Africa	71.5%	2.5%	0.8%	0.0%
Timor Leste	76.5%	0.0%	0.8%	0.9%

## How the poor spend their money

As a Share of Total Consumption

<b>Rural</b>	<u>Entertainment</u>	<u>Festivals</u>	<u>% HHs with any Festival Expenditure</u>
	Cote d'Ivoire		
Guatemala	0.0%	1.3%	59.9%
India - Udaipur		0.1%	7.7%
India - UP/Bihar	0.0%	14.1%	99.4%
Indonesia	0.1%	2.2%	
Mexico	0.0%	2.2%	80.3%
Nicaragua	0.7%	0.0%	2.7%
Pakistan	0.0%	0.0%	1.8%
Panama	0.3%	2.4%	64.8%
Papua New Guinea	0.6%	0.0%	0.0%
Peru	0.2%	1.5%	21.7%
South Africa	0.0%		
Timor Leste	0.1%	3.2%	90.3%
	0.0%	0.0%	49.0%

# Choice?

- Deaton and Subramanian also show that the poor spend 30% of their food budget on rice and wheat which cost between 70% and 100% more per calorie than other grains
- They also spend 7% on sugar (10% in Udaipur on sugar, salt and processed foods)
- They could buy almost 30% more calories without spending more.
- The very poor and the somewhat less poor spend about the same share on food.

# More (indirect) evidence on choice

- Why does the food share vary so much across countries?
- Is the PPP correction wrong
- Lower food share where the supply of non-traded non-food consumables (measured by the PPP correction) is better.
- Less is spent on festivals etc. where people have radios and TVs (negatively correlated with PPP correction).

# Are the poor eating enough?

- Deaton and Subramanian (1994) found that in India the bottom decile consumes 1400 calories a day compared to 2425 recommended for a sedentary man and 1875 for sedentary woman
- Food share is falling: 70% in 1983, 62% in 2000 in India
- Calorie consumption in India also falling over time.
- But so has the number of hours worked.
- Average BMI is 17.8 in Udaipur compared to a cut-off for under-nourished of 18.5 & 55% are anemic.
- High reported morbidity levels

What else could they do with  
their money?

# Ownership

- In the median country a majority of the rural poor own land.
- Other than that they own very little: in the Udaipur sample, 10% or less have a chair or a table
- In the median country less than 15% have a bicycle and less than 10% own a television.
- In Udaipur very few possible business assets: Less than 1% own a tractor, a bullock cart, a motorized cycle, a fan

## What do the poor own

Percent of Households with:

### Rural

	<u>Radio</u>	<u>Television</u>	<u>Bicycle</u>	<u>Land</u>
Cote d'Ivoire	43.3%	14.3%	34.4%	62.7%
Guatemala	58.5%	20.3%	23.1%	36.7%
India - Hyderabad				
India - Udaipur	11.4%	0.0%	13.5%	98.9%
India - UP/Bihar	28.3%	7.3%	65.8%	
Indonesia		26.5%		49.6%
Mexico			41.3%	4.0%
Nicaragua	59.3%	8.3%	11.1%	50.4%
Pakistan	23.1%		27.0%	30.4%
Panama	43.6%	3.3%	0.0%	85.1%
Papua New Guinea	18.0%	0.0%	5.3%	
Peru	73.3%	9.8%	9.8%	65.5%
South Africa	72.2%	7.2%	20.0%	1.4%
Tanzania		0.0%		92.3%
Timor Leste	14.3%	0.6%	0.9%	95.2%

# Savings

- They seem to have very little by way of savings: in the last year 37% of the very poor households the adults starved for an entire day.
- 45% cut the size of their meals
- Only 57% report that they have enough to eat throughout the year
- Those families that report missing meals are 0.23 standard deviations less well-being

How do the poor earn their  
money?

# Little bit of everything

- In most countries a majority of household get income from self-employment (even in rural areas self-employment is both in agriculture and outside it and many do both)
- The next commonest occupation is wage work, including a lot of casual work. Many households do both.
- 20% of the households in rural Udaipur say agriculture is their main source of earnings. 75% say their main earnings come from wage work. Yet almost all of them own land and cultivate it.
- Another survey which identifies all the occupations the households are in (26 occupation, including sewing, gathering fuel) finds that each family has 3 working members and 7 occupations.

# How the poor earn their money: Occupation

Rural	Percent of	Median Ares	Percent of Households in which At Least One Member:	
	Households that own land	Of Land Owned	Is Self Employed In Agriculture	Other
Cote d'Ivoire	62.7%	300	37.2%	25.9%
Guatemala	36.7%	29	64.4%	22.6%
India - Udaipur	98.9%	60	98.4%	5.9%
India - UP/Bihar		40	72.1%	40.2%
Indonesia	49.6%	60	49.8%	36.6%
Mexico	4.0%		4.9%	20.4%
Nicaragua	50.4%	280	54.7%	11.6%
Pakistan	30.4%	162	72.1%	35.5%
Panama	85.1%	300	69.1%	17.7%
Peru	65.5%	150	71.7%	25.2%
South Africa	1.4%		0.0%	9.1%
Tanzania	92.3%	182		
Timor Leste	95.2%	100	78.5%	12.0%

# How the poor earn their money: Occupation

Percent of Households in which At Least One Member:		Percent of HHs
Works for a Wage or Salary in		That Receive Income
Agriculture	Other	From Multiple Sectors

## Rural

Cote d'Ivoire	52.4%	78.3%	72.1%
Guatemala	31.4%	86.4%	83.8%
India - Udaipur	8.5%	90.7%	94.0%
India - UP/Bihar	2.0%	18.9%	41.8%
Indonesia	31.1%	34.3%	50.4%
Mexico	2.8%	72.6%	13.2%
Nicaragua	0.3%	42.8%	18.4%
Pakistan	32.6%	50.8%	66.8%
Panama	0.0%	0.0%	19.2%
Peru			34.8%
South Africa	27.9%	26.6%	0.4%
Tanzania			
Timor Leste			10.4%

# Market for Insurance and the poor

Percent of Total Households with Insurance:

Any Type

Health

Life

## Rural

Cote d'Ivoire

Guatemala

India - Hyderabad

India - Udaipur

3.8%

India - UP/Bihar

9.2%

4.7%

3.8%

Indonesia

6.0%

3.9%

0.0%

Mexico

50.7%

Nicaragua

0.0%

5.5%

Pakistan

Panama

0.0%

0.0%

Papua New Guinea

Peru

5.6%

0.0%

South Africa

5.4%

Tanzania

Timor Leste

# The businesses the poor run

- Families often run multiple businesses
- Businesses are very small. Almost no outside labor
- In Hyderabad only 20% of businesses have their own premises and the commonest businesses assets are pushcarts, scales and tables.
- In Hyderabad the main businesses are tailoring, fruit/vegetable selling, general stores, telephone booths, selling milk, driving a small taxi: Skills?
- Is there anything to worry about?
- Some evidence of the wrong scale:
- Innumerable side by side identical businesses
- Stock-outs in phone cards (Kremer-Robinson)

# Migration

- In most countries in our sample long-term migration for work is rare
- Temporary migration on the other hand seems quite common. In 60% of the very poor households in Udaipur someone had migrated for work.
- Average duration of a completed episode is 40 days.
- Total time spent away in a year on average is 18 weeks.
- Yet for many of them it provides the majority of their income.

# Five puzzles about the poor

# Five things that stand out

1. Why are they not more specialized?
2. Why are so many of them entrepreneurs?
3. Why don't eat more?
4. Why don't they accumulate more wealth?
5. Why don't they migrate for longer?