



An Accredited Institution of the University of Westminster (UK)

**MODULE**

# **Topics in Macroeconomics**

**WIUT**

**Date: January 8, 2018**

**Presenter: Dr. Bilol Buzurukov**

## **Module leader: Bilol Buzurukov**

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The module will be taught by a combination of lectures and tutorials.

- ❑ Lectures are aimed at introducing the theoretical part of the topic.
- ❑ Tutorials are designed to blend the theory and practice and provide students with real-life cases and examples.
- ❑ During tutorials the students will be analyzing the recent debate in academic literature on the topics concerned and discussing them with the tutors and peers.



**TW-1:** Introduction to growth theory;

**TW-2:** Solow Model of Economic Growth I;

**TW-3:** Solow Model of Economic Growth II;

**TW-4:** Exchange Rate Policy and its Impact on Trade;

**TW-5:** The Keynesian Cross Model, the Money Market and IS-LM Model;

**TW-6:** *Coursework Presentation Week;*

**TW-7:** Monetary Policy: Time Inconsistency and Credibility Problem;

**TW-8:** Aggregate Demand and Aggregate Supply: Business Cycles;

**TW-9:** The Goals of Stabilization Policy: Low Inflation and Low Unemployment;

**TW-10:** Government Debt and Budget Deficits;

**TW-11:** The Financial System: Opportunities and Dangers;

**TW-12:** *Revision Week.*

Upon completion of the module, successful students will be able to:

1. Critically evaluate recent developments in macroeconomic analysis;
2. Thoroughly appraise current economic developments in a variety of contemporary economies;
3. Critically analyze the quality of available economic data and the difficulties facing policy makers when interpreting this data;
4. Utilize and apply, with confidence, the standard algebraic and diagrammatic representations of relevant models.

## University Intranet System

- Lecture and Seminar slides posted weekly;
- Support materials, such as articles, case studies and data posted:
  - for classroom discussions;
  - for classroom analysis;
  - for classroom practices.

## Core Textbooks

- Sorensen & Whitta Jacobsen (2010), "Introducing Advanced Macroeconomics: Growth and Business Cycles", 2nd ed. McGraw-Hill Higher Education;
- Manfred Gartner (2016), "Macroeconomics", 5<sup>th</sup> ed. Pearson;
- Blanchard O., Amighini A. and Giavazzi F. (2017), "Macroeconomics: A European Perspective", 3<sup>rd</sup> ed. Pearson;
- Mankiw, G. (2013). Macroeconomics. 8th ed. Houndmills: Palgrave Macmillan;

## Optional Textbooks

- Gordon, R.J (2011), Macroeconomics, 12th edition, Harper Collins;
- Romer, D. (2011), Advanced Macroeconomics, 4th edition, McGraw-Hill Education;
- Stone, G. (2011), "CoreMacroeconomics", 2<sup>nd</sup> ed. Worth Publishers.

## Periodical references

- Academic Journal Articles and Reports: Journal of Economic Literature, American Economic Review, Economic Journal, Economic Policy, etc.



Assessment 1 – Coursework

40%

Assessment 2 – Final Exam

60%

# Guidelines for Assessment 1

Each team should consist of 5 students who belong to the same group. The students should set up their own teams based on mutual respect and understanding.

To accomplish the assignment the following 5 tasks should be completed

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- Interpret  
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## Introduction to Growth Theory

## How do we measure the prosperity of a country?

The average level of prosperity in a country can be measured by the country's **GDP** or **income per person**.



How do we measure the prosperity of a country?

What is the most commonly used proxy measuring the economic wellbeing of a country?

GDP per capita

Why is GDP per capita a flawed measure of economic well-being?

- GDP

- 

- 

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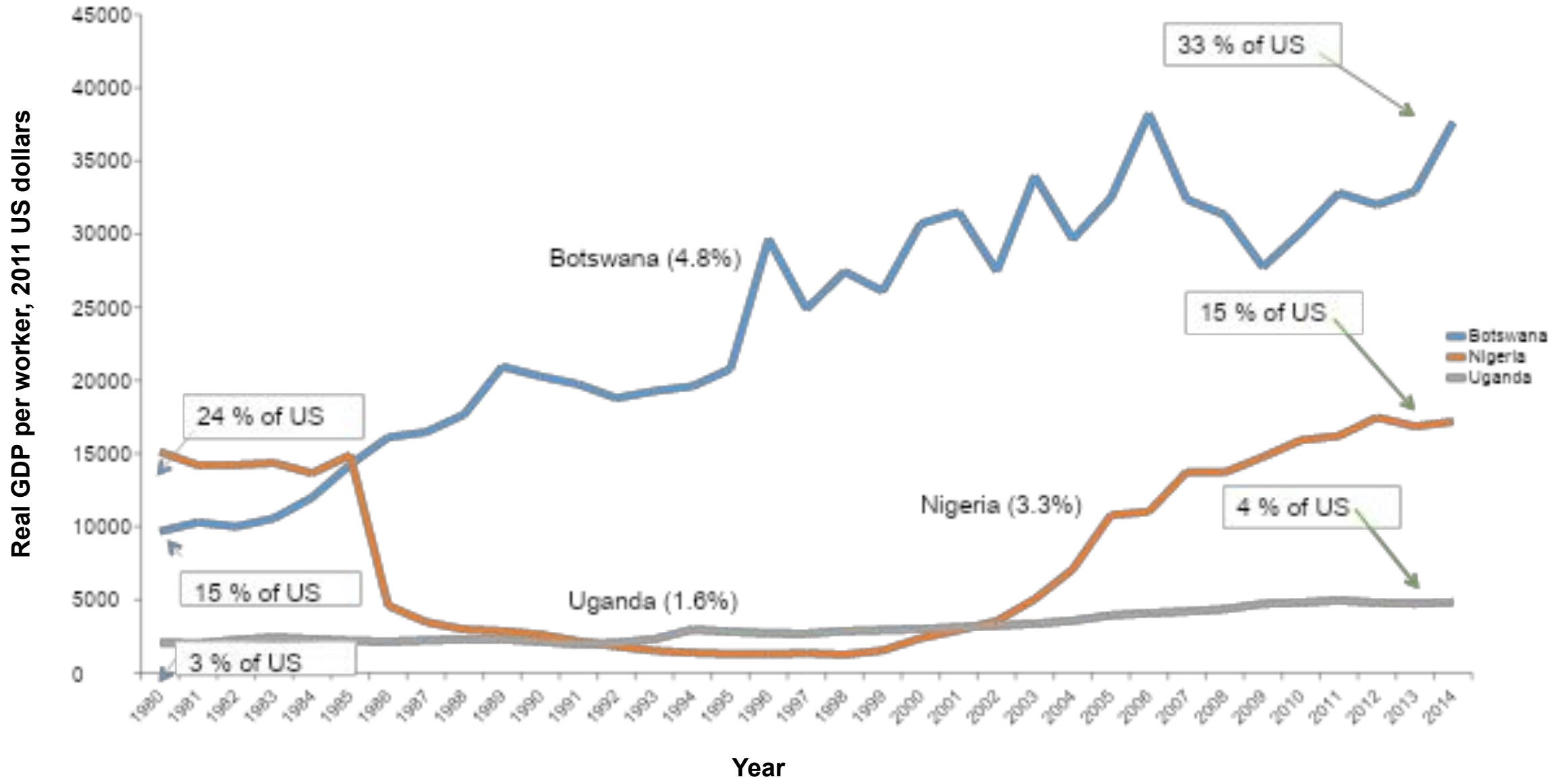
- GDP doesn't

- GDP isn't adjusted for environmental costs.

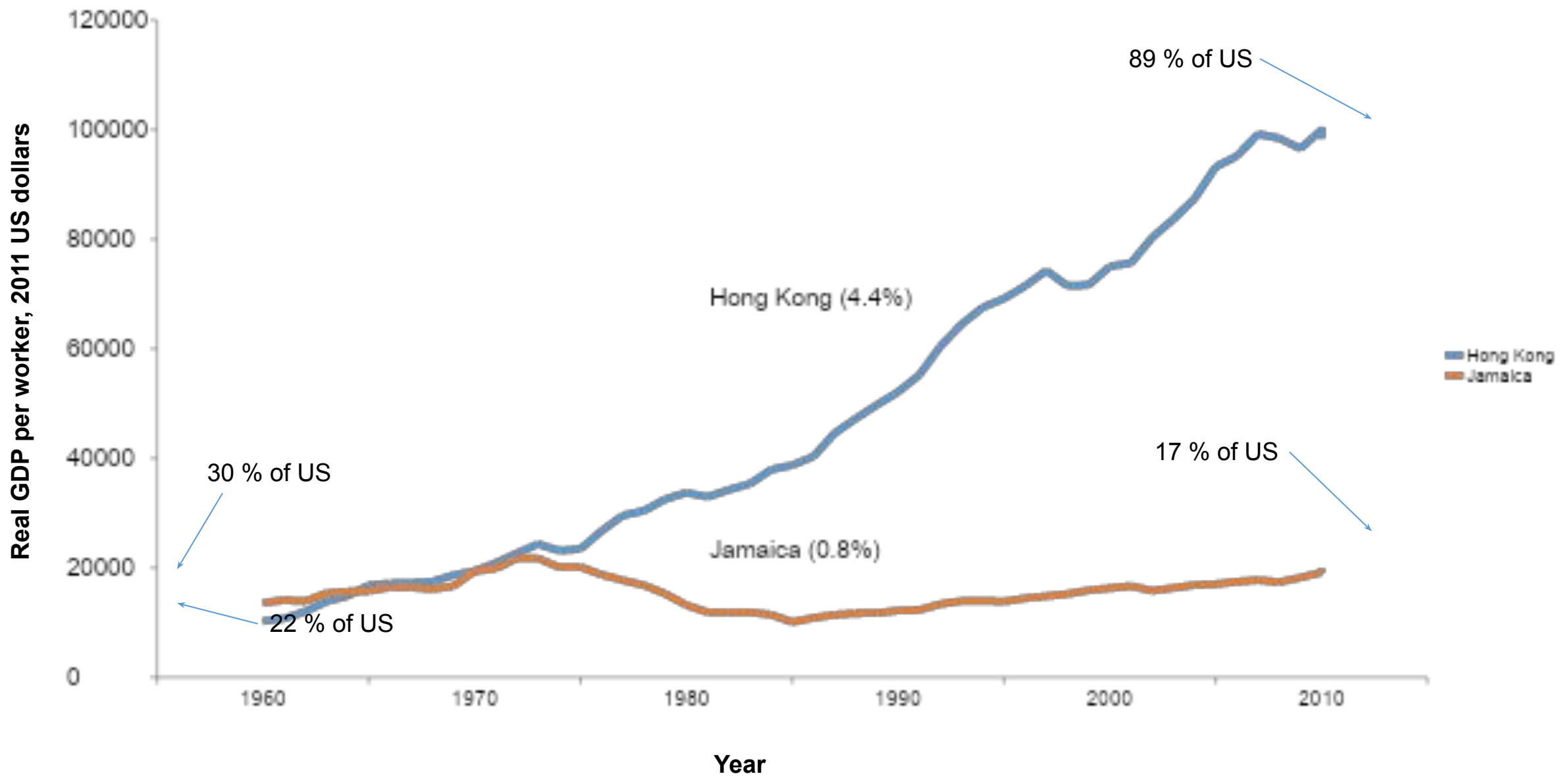
**“HOWEVER”**

GDP per capita is a good proxy  
measure for conducting  
cross-country comparative analysis  
of Economic Growth.

# The importance of growth in GDP per worker for the level of GDP per worker

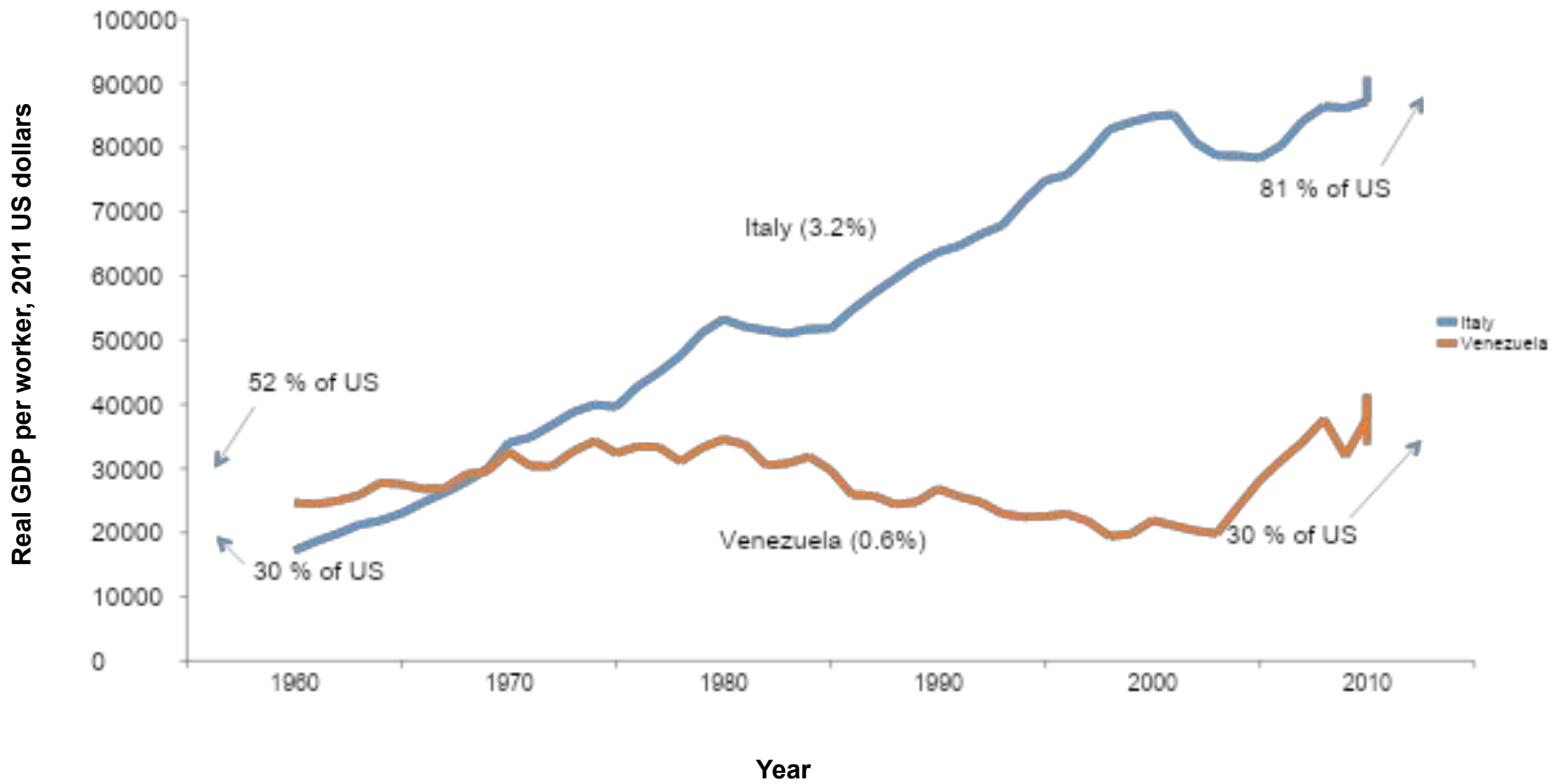


# The importance of growth in GDP per worker for the level of GDP per worker





# The importance of growth in GDP per worker for the level of GDP per worker



# Measuring the Wealth of a Nation

How do we compare the income per person across countries?

Solution:

exchange rate

RATHER

Draw

The conversion should reflect purchasing power.

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51.5

- Or does it mean that a 10% increase in Uzbek Sum relative to US dollar indicate that Uzbekistan became 10% richer than the United States?

# GDP PPP versus Nominal GDP

Take a basket of commodities, such as 1 kg sugar, wheat and rice etc.

## Nominal GDP

Uzbekistan's GDP  $\Rightarrow$  500,000 UzS.

Official exchange rate  $\Rightarrow$  1\$ = 2,000 UzS.

To calculate Nominal GDP:

Uzbekistan's GDP / Official exchange rate  
 $= 500,000 / 2,000 = 250$  \$

**Uzbekistan's Nominal GDP = 250 \$**

## GDP PPP

Uzbekistan p = 100,000 UzS.

United States p = 100 \$

So, 100 \$ = 100,000 UzS.  $\Rightarrow$  1 \$ = 1000 UzS.

PPP exchange rate is 1000 UzS. per 1 \$

To calculate GDP PPP:

GDP (in UzS) / PPP exchange rate for UzS  
 $= 500,000 / 1000 = 500$  \$

**Uzbekistan's GDP PPP = 500 \$**

# Measuring the Wealth of a Nation

...ing proxies:

Dividing the official GDP by the size of the official labor force can be a better proxy because the official labor force does not include those working in the informal sector.

GDP per worker

- a larger informal sector;
- more people living from non-marketed home production.

Thus, dividing official GDP to the entire population will probably underestimates the prosperity of less developed country compare to the developed one.

# GDP per capita and per worker (2000)

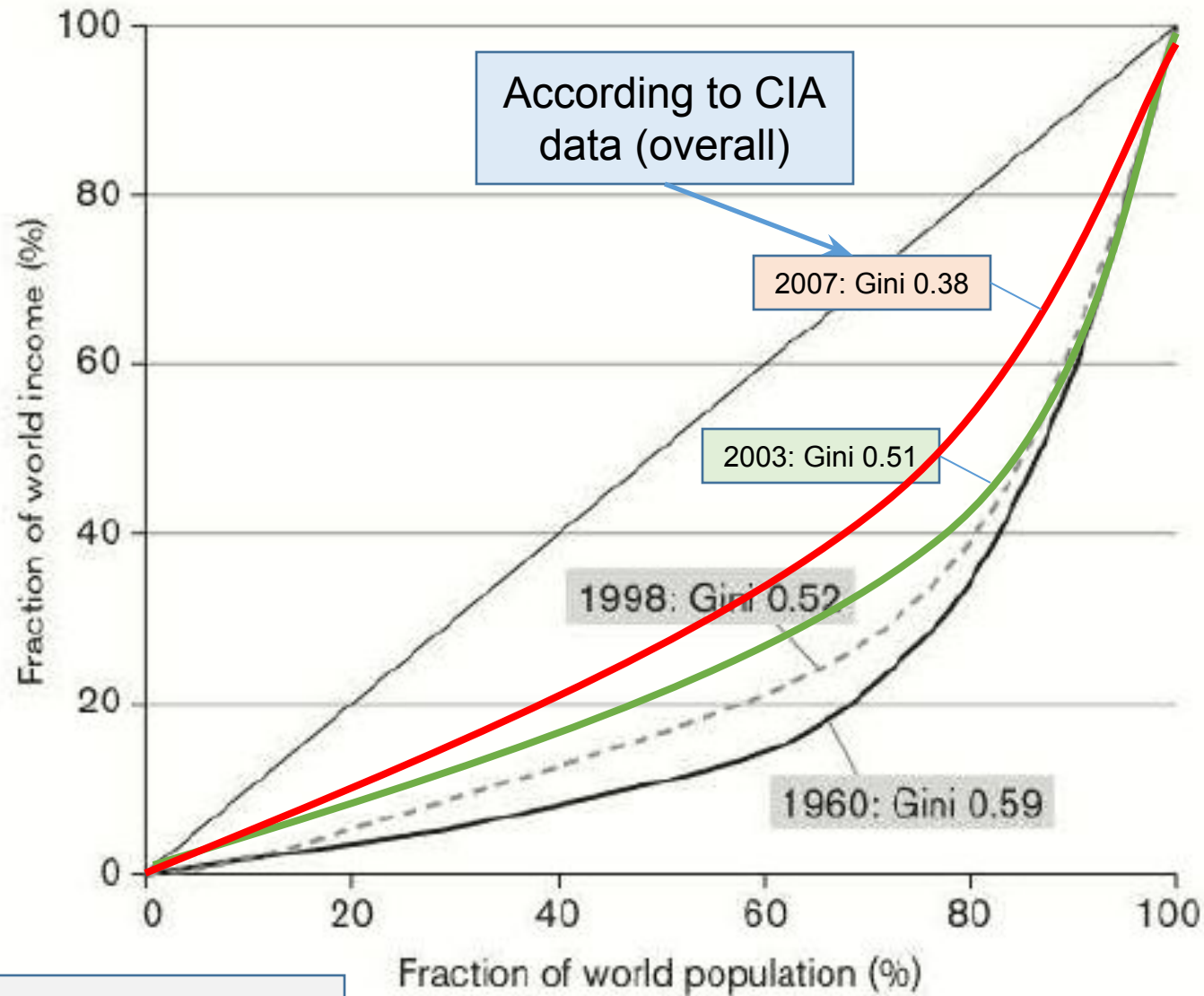
Country	Absolute, 2000 US dollars		Implicit participation rate <sup>1</sup>	Relative to US	
	GDP per capita	GDP per worker		GDP per capita	GDP per worker
<b>USA</b>	34365	67079	0.51	1.00	1.00
<b>Denmark</b>	27827	50448	0.55	0.81	0.75
<b>Japan</b>	23971	44563	0.54	0.70	0.66
<b>Netherlands</b>	26293	56691	0.46	0.77	0.85
<b>Belgium</b>	24662	59874	0.41	0.72	0.89
<b>Sweden</b>	25232	46544	0.54	0.73	0.69
<b>UK</b>	24666	49225	0.50	0.72	0.73
<b>Ireland</b>	24948	59103	0.42	0.73	0.88
<b>Egypt</b>	4536	11940	0.38	0.13	0.18
<b>Pakistan</b>	2477	6719	0.37	0.07	0.10

<sup>1</sup> Computed as GDP per capita divided by GDP per worker.

Source: Penn World Table 6.2.

The rich and the poor,  
the growing and the declining

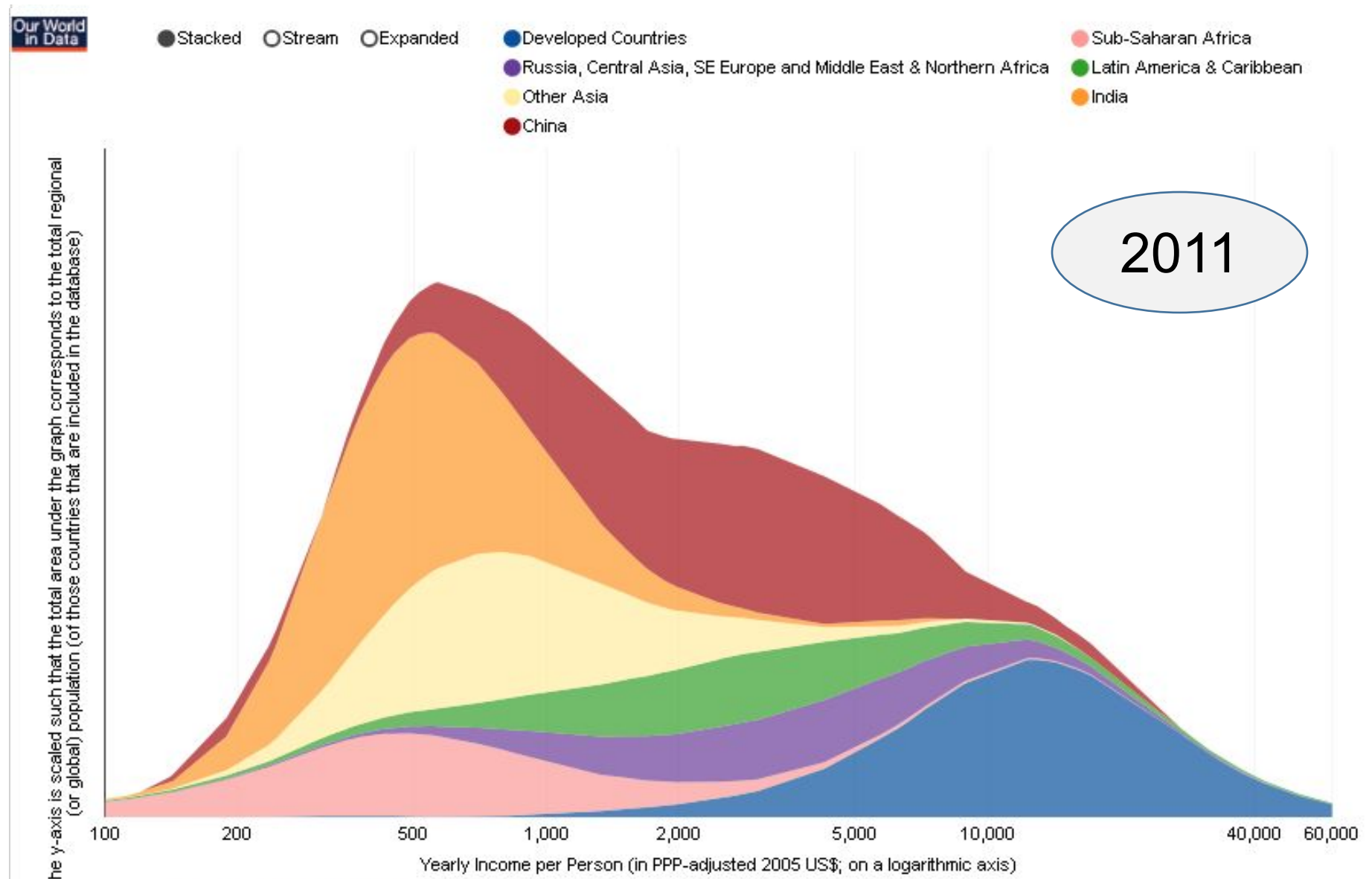
# The world income distribution



Source: Pen World Table 6.1-6.2

Some countries are rich and some are poor, the differences are enormous, and it has pretty much stayed like that in relative terms for a long time. However, there is some tendency **towards a more equal world income distribution** over the past three to four decades, **but not much at the very bottom.**

# Global Income Distribution





# 15 poorest nations

**Table 2.2: The world's prosperity 'Top 15' and 'Bottom 15', 1960 and 1998**

	Real GDP per worker relative to USA		Average annual growth rate 1960–1998		Real GDP per worker relative to USA		Average annual growth rate 1960–1998
	% 1960	% 1998			% 1960	% 1998	
Poorest in 1960	1960	1998	%	Poorest in 1998	1960	1998	%
Tanzania	2.3	1.6	0.9	Tanzania	2.3	1.6	0.9
Guinea-Bissau	2.6	2.3	1.5	Burundi	2.9	1.9	0.6
Malawi	2.8	3.0	2.0	Ethiopia	3.6	2.1	0.4
Burundi	2.9	1.9	0.6	Guinea-Bissau	2.6	2.3	1.5
Republic of Congo	3.6	6.1	3.2	Rwanda	5.5	2.7	0.0
Ethiopia	3.6	2.1	0.4	<u>Niger</u>	9.1	2.8	-1.2
Uganda	3.7	3.1	1.3	Malawi	2.8	3.0	2.0
Burkina Faso	4.2	3.2	1.1	<u>Mali</u>	9.1	3.0	-1.1
<u>Lesotho</u>	4.2	5.3	2.4	Uganda	3.7	3.1	1.3
<u>China</u>	4.3	8.9	3.8	<u>Madagascar</u>	8.0	3.1	-0.7
Nepal	5.2	5.4	1.9	Burkina Faso	4.2	3.2	1.1
Rwanda	5.5	2.7	0.0	Mozambique	8.6	3.4	-0.6
Gambia	5.6	3.8	0.8	<u>Central African Republic</u>	11.9	3.4	-1.4
Kenya	5.8	4.2	1.0	<u>Nigeria</u>	7.9	3.5	-0.3
<u>Romania</u>	6.0	14.6	4.1	Gambia	5.6	3.8	0.8

# 15 richest nations

**Table 2.2: The world's prosperity 'Top 15' and 'Bottom 15', 1960 and 1998**

	Real GDP per worker relative to USA		Average annual growth rate 1960–1998		Real GDP per worker relative to USA		Average annual growth rate 1960–1998
	% 1960	% 1998			% 1960	% 1998	
Richest in 1960	1960	1998		Richest in 1998	1960	1998	
Switzerland	105.8	75.5	0.9	Luxembourg	91.5	153.0	3.2
<u>New Zealand</u>	101.8	61.5	0.5	USA	100.0	100.0	1.8
USA	100.0	100.0	1.8	<u>Ireland</u>	43.0	91.2	3.8
Canada	92.0	79.9	1.5	Norway	69.3	88.1	2.5
Luxembourg	91.5	153.0	3.2	Belgium	66.8	88.0	2.5
Australia	87.4	82.2	1.7	Italy	55.1	87.3	3.0
Netherlands	85.9	81.2	1.7	Australia	87.4	82.2	1.7
<u>Venezuela</u>	83.5	31.9	-0.7	Netherlands	85.9	81.2	1.7
Denmark	79.4	79.2	1.8	Canada	92.0	79.9	1.5
Sweden	76.7	70.0	1.6	Austria	50.4	79.3	3.0
Norway	69.3	88.1	2.5	<u>Hong Kong</u>	18.9	79.2	5.6
United Kingdom	69.0	70.9	1.9	Denmark	79.4	79.2	1.8
Iceland	68.8	70.3	1.9	France	59.8	77.6	2.5
Belgium	66.8	88.0	2.5	Switzerland	105.8	75.5	0.9
<u>Argentina</u>	61.8	45.6	1.0	Finland	54.1	73.2	2.6

# World growth 'bottom 10' and 'top 10' 1965-2003

Growth Disasters	Average growth rate of GDP per worker 1965-2003	Real GDP per worker relative to USA		Growth Miracles	Average growth rate of GDP per worker 1965-2003	Real GDP per worker relative to USA	
		%	%			%	%

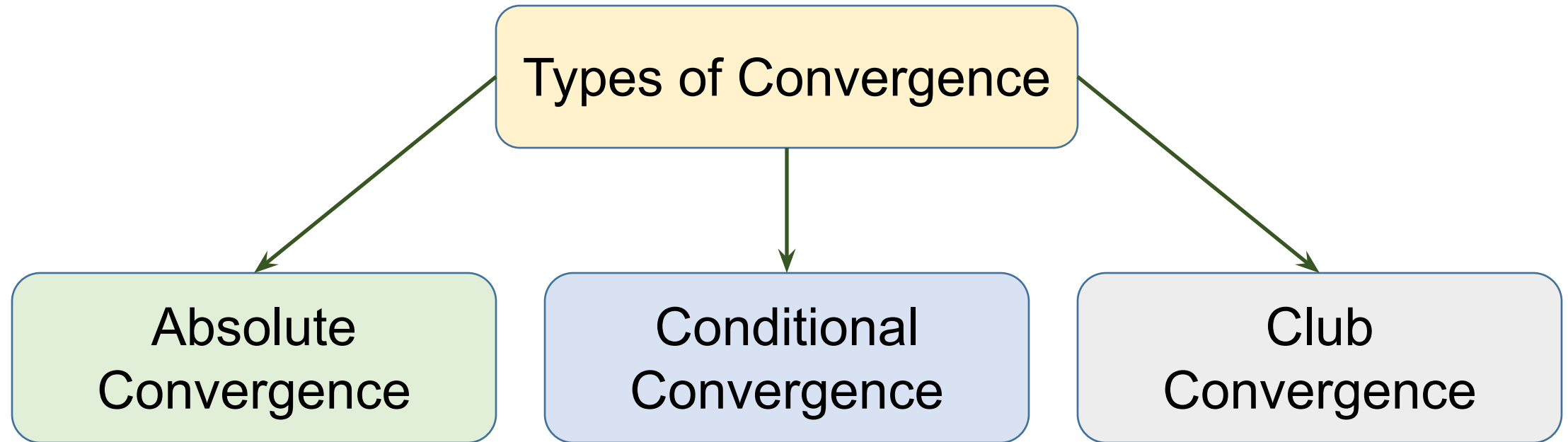
Growth rates vary substantially between countries, and by the process of growing or declining quickly, a country can move from being relatively poor to being relatively rich, or from being relatively rich to being relatively poor.

Chad	-0.5	6.3	2.9	Ireland	3.7	44	97.1
Zambia	-0.4	6.9	3.3	Romania	3.6	8.7	18.5
Peru	-0.3	33.9	16.3	Hong Kong	3.5	37.1	75.2
Jamaica	-0.3	27.3	13.3	Japan	3.2	37	66.4

What do you think?

What are the main reasons for some sub-Saharan and Middle East countries not being able to grow over time?

An interesting idea in economics would, if it were true, imply that poverty should disappear by itself.

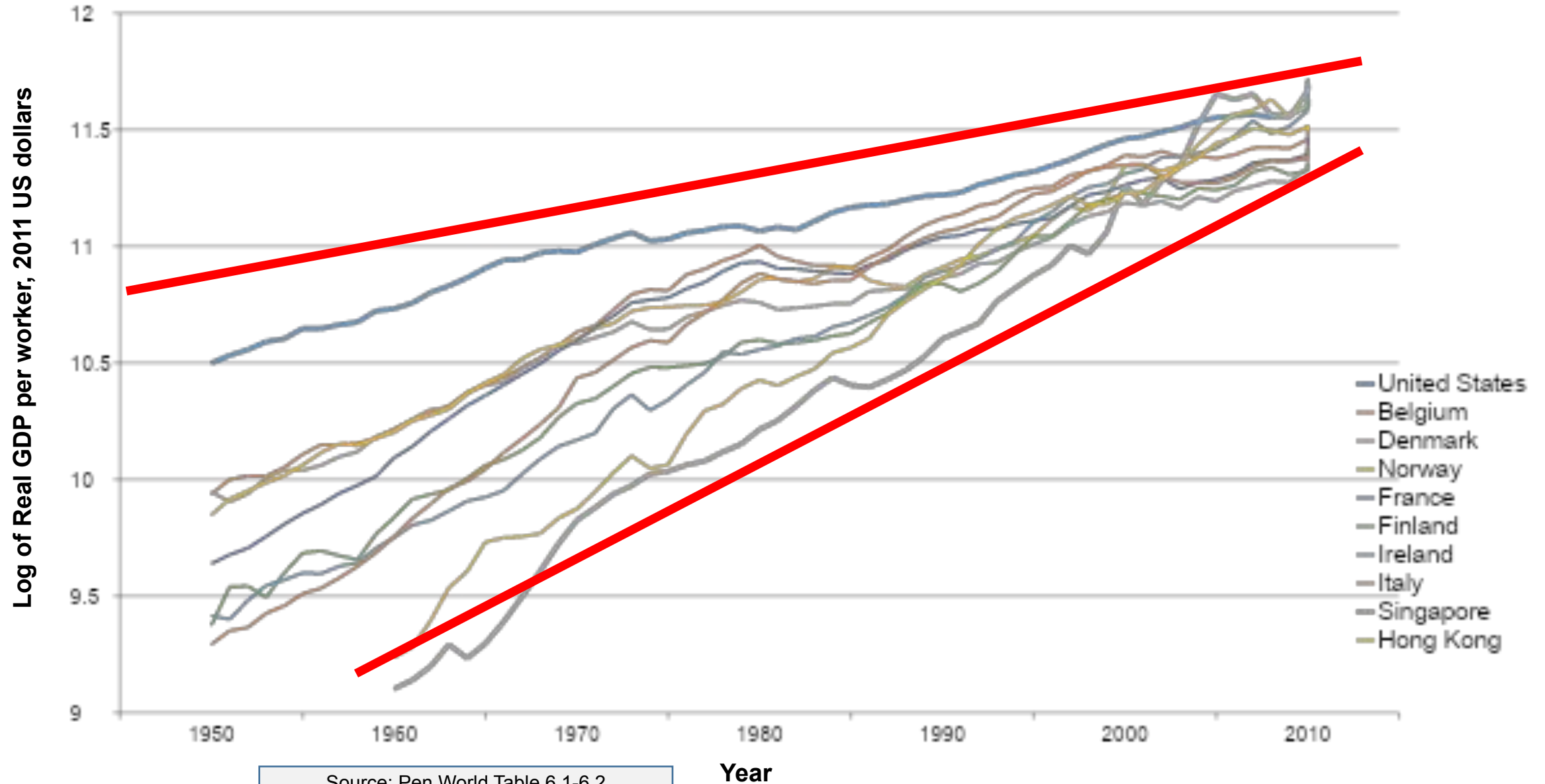


**Hypothesis:** In the long run GDP per worker (or per capita) converges to one and the same growth path in all countries, so that all countries converge on the same level of income per worker.

**William J. Baumol (1986)** tested this hypothesis for the period of 100 year.

According to him, the figures revealed fascinating possibilities that the differences with respect to output and income per person between the countries of the world automatically vanish in the long run.

# Convergence of GDP per worker



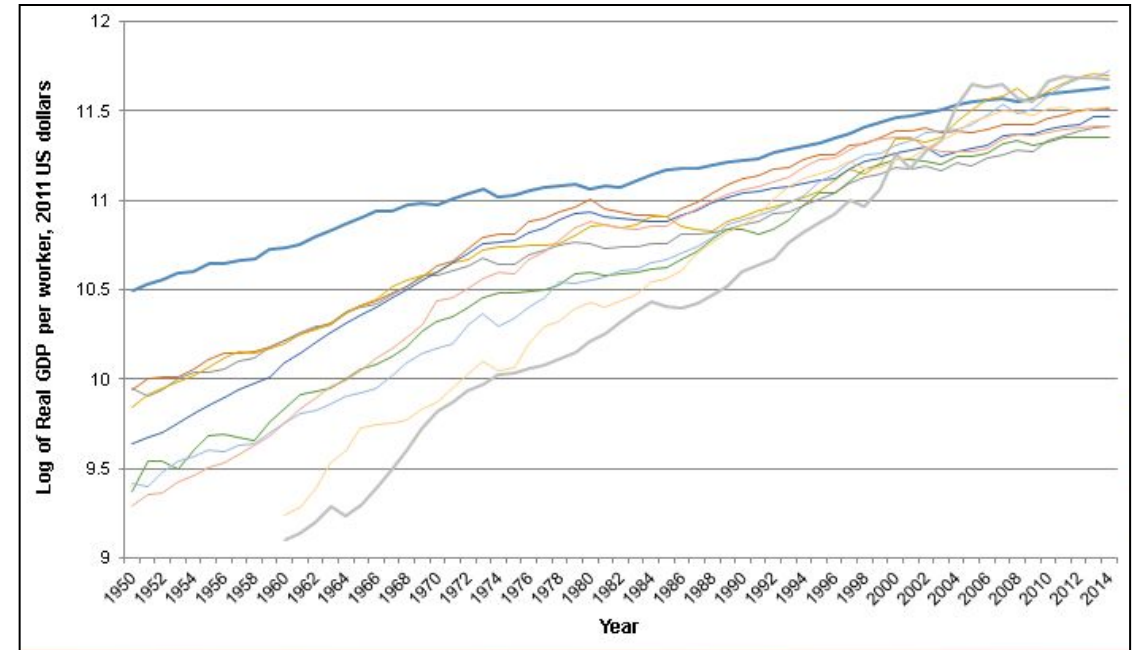
Source: Pen World Table 6.1-6.2

As you witnessed from the graph, if the poverty disappears by itself, doesn't it make foreign aid less necessary for poor countries?



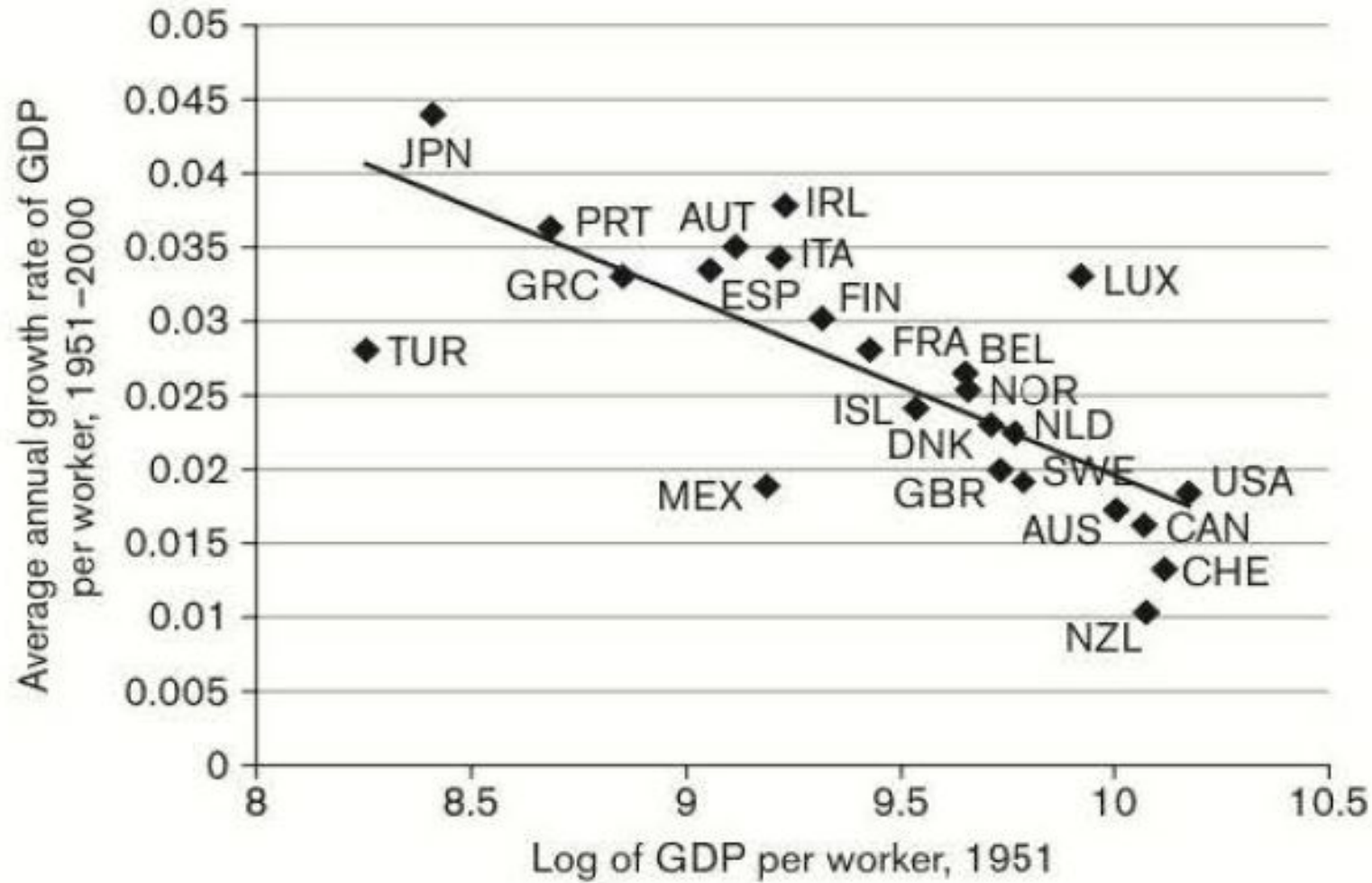
# Absolute Convergence

The hypothesis of absolute convergence implies that countries with relatively low levels of GDP per worker in an initial year will grow relatively fast after that initial year.



In other words, average growth in GDP per worker from year 0 to year  $T$ . say, should be negatively correlated with GDP per worker in year 0 .

# Average annual growth rate of GDP per worker against initial level of GDP per worker



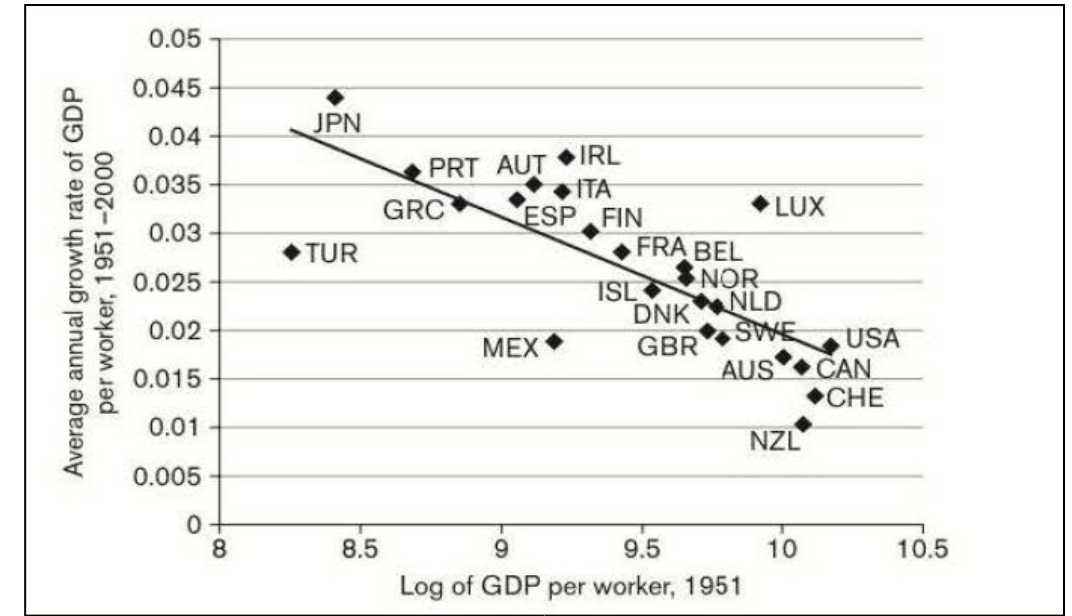
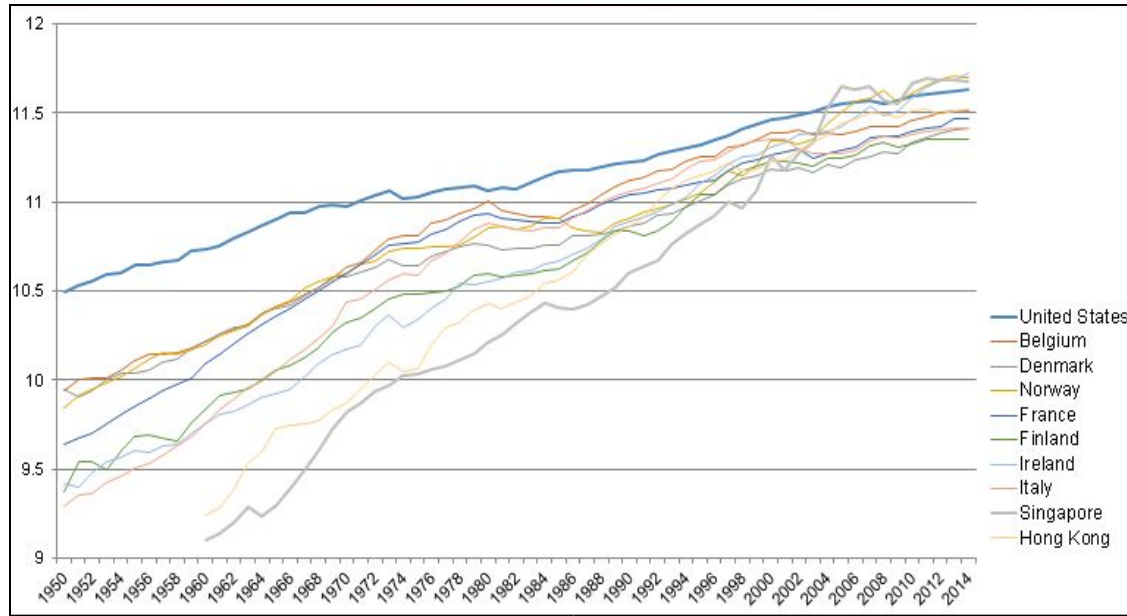
$$\frac{\ln y_T^i - \ln y_0^i}{T} \cong \beta_0 - \beta_1 \ln y_0^i$$

$$\frac{\ln y_{00}^i - \ln y_{51}^i}{49} \cong 0.14 - 0.012 \ln y_0^i$$

**OLS results**  
 **$y = 0.14 - 0.012x$**   
 **$R^2 = 0.57$**   
 **$t = -5.37$**   
**standard error = 0.002**

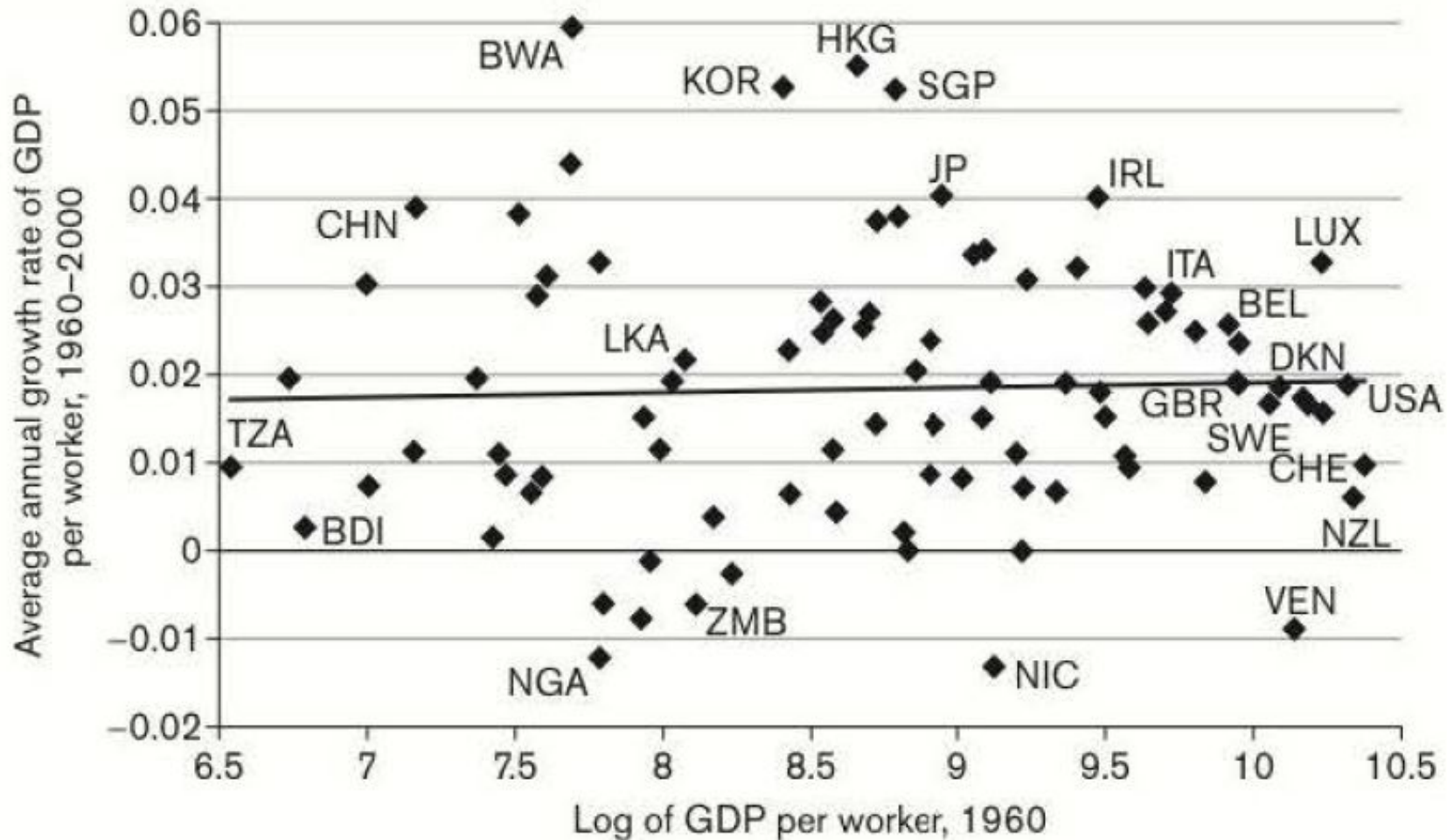
**Figure 2.4:** Average annual growth rate of GDP per worker against initial level of GDP per worker, 24 OECD countries<sup>1</sup>

# Support of Absolute Convergence



However, the results in these figures are bias due to “sample selection bias” problem.

# Results without “sample selection bias”



**Figure 2.5:** Average annual growth rate of GDP per worker against initial level of GDP per worker, 90 countries<sup>1</sup>

## Avoiding Biasness:

- More countries included;
- Countries with less than 2 mln people excluded;
- Countries with oil production share more than 30% of GDP dropped.

## OLS results

$$y = 0.013 - 0.0006x$$

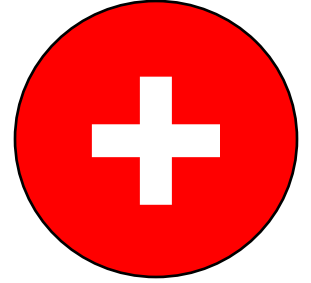
$$R^2 = 0.0013$$

$$t = 0.34$$

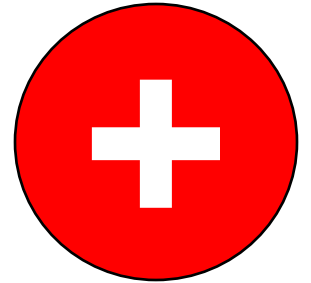
**SAD CONCLUSION:**  
*the hypothesis of absolute convergence does not hold*

# Structural Characteristics of Countries

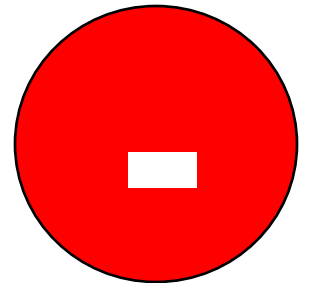
Countries with higher rates of saving and investment have higher rates of capital accumulation, and capital is productive. Thus, countries with higher savings rates tend to have higher GDP per worker;



Some countries spend a larger fraction of GDP on human capital, and education makes labor more productive. Thus, countries with higher investment rates in human capital tend to approach higher levels of GDP per worker;



Higher population growth means that a larger number of people will come to share the physical and human capital accumulated in the past. Thus, the growth of population tends to pull GDP per capita down.



# Conditional Convergence

**Hypothesis:** A country's income per worker converges to a country-specific long-run growth path which is given by the basic structural characteristics of the country. The further below its own long-run growth path a country starts, the faster it will grow. Income per worker therefore converges to the same level across countries conditional on the countries being structurally alike.

The hypothesis of conditional convergence does not imply that poverty would disappear by itself in the long run.

However, it does imply that if a poor country can manage somehow to achieve the same structural characteristics as rich countries, it will become as rich in due time.

# Modeling Conditional Convergence

$$\frac{\ln y_T^i - \ln y_0^i}{T} \cong \beta_0 - \beta_1 \ln y_0^i + \gamma(z^i)$$

Where:

$\mathbf{z}$  – a vector of variables capturing country-specific structural characteristics;  
 $\gamma$  – is a function expressing their influence.

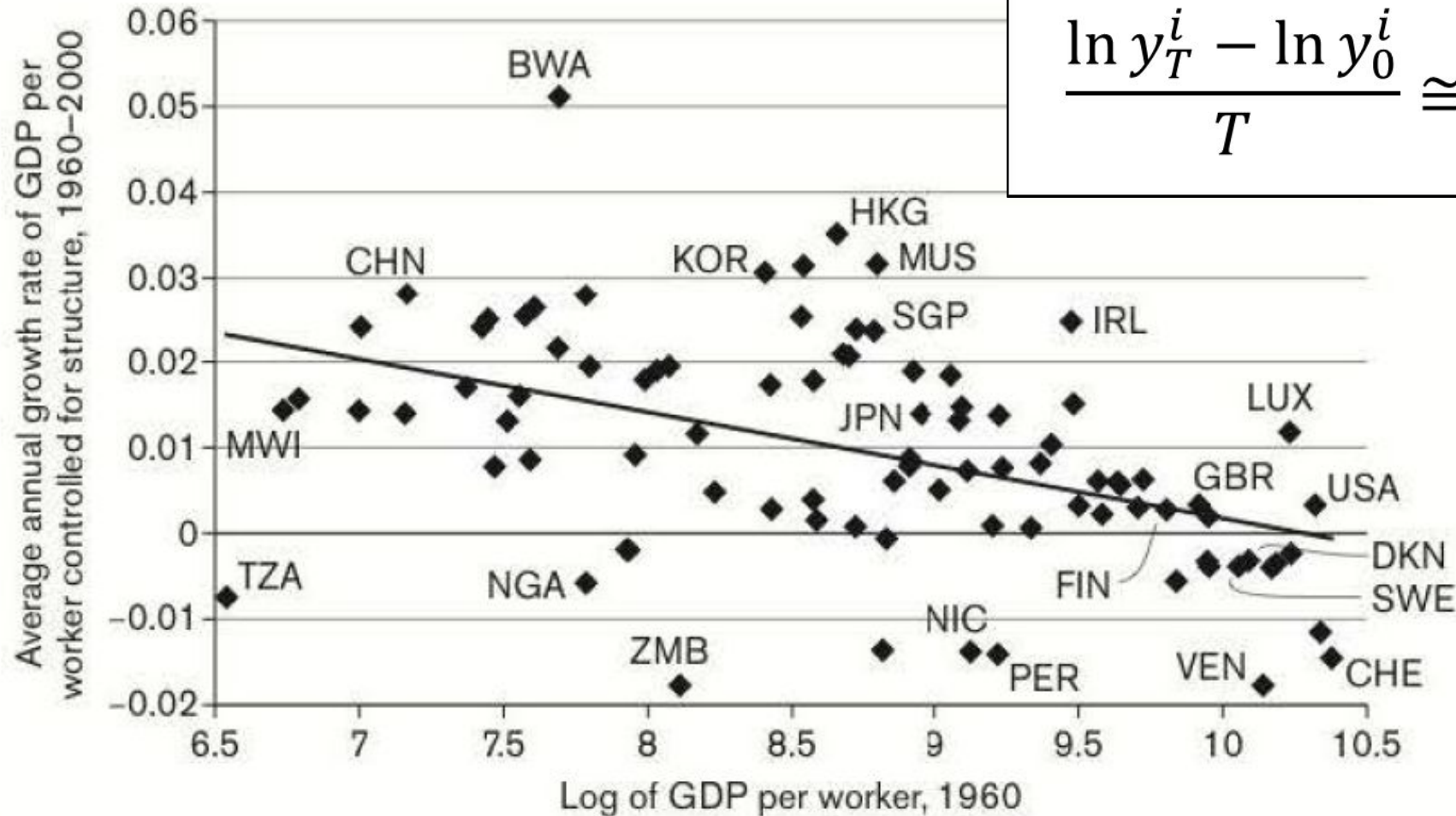
Controlling for the country specific characteristics

$$\frac{\ln y_T^i - \ln y_0^i}{T} \cong \beta_0 - \beta_1 \ln y_0^i + \beta_2 [\ln s^i - \ln(n^i + 0.075)]$$

Where:

$\mathbf{s}$  – the GDP share of gross investment in physical capital;  
 $\mathbf{n + 0.075}$  – the population growth rate.

# Graphical Representation



$$\frac{\ln y_T^i - \ln y_0^i}{T} \cong \beta_0 - \beta_1 \ln y_0^i + \gamma(z^i)$$

Based on theoretical and empirical work, most economists believe that if one puts the right structural characteristics into  $z$ , and does it in the right way (assuming the right  $x$ ), then indeed one will end up with a significant and positive estimate of the  $\beta_1$ .

**Figure 2.6:** Average annual growth rate of GDP per worker adjusted for structural characteristics against the initial level of GDP per worker, 90 countries<sup>1</sup>

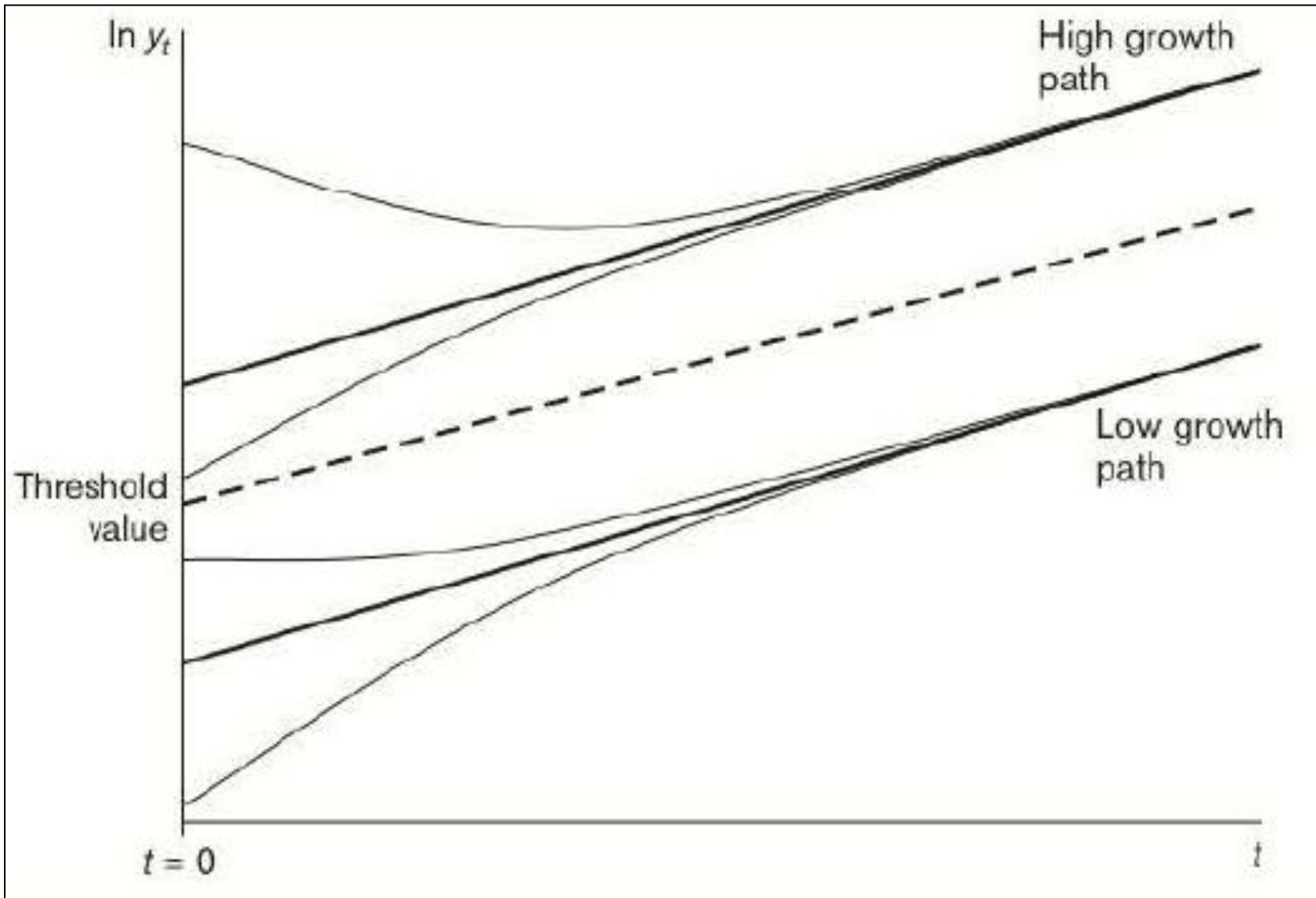



What is the role of foreign aid in conditional convergence?

## Hypothesis:

- *A country's income per worker converges to a long-run growth path that depends on the country's basic structural characteristics and on whether its initial GDP per capita is above or below a specific **threshold value**.*
- *The further below the relevant growth path a country starts out, the faster it will grow.*
- *Income per worker therefore converges to the same level across countries conditional on the countries being structurally alike and on the countries starting on the same side of their respective threshold values.*

# Club Convergence



 **What is the role of foreign aid in club convergence?**

**Convergence:** If one controls appropriately for structural differences between the countries of the world, a lower initial value of GDP per worker tends to be associated with a higher subsequent growth rate in GDP per worker. This accords with the idea that in the long run income and GDP per worker converge to a country-specific growth path which is given by the country's basic structural characteristics, and possibly also by its initial position.

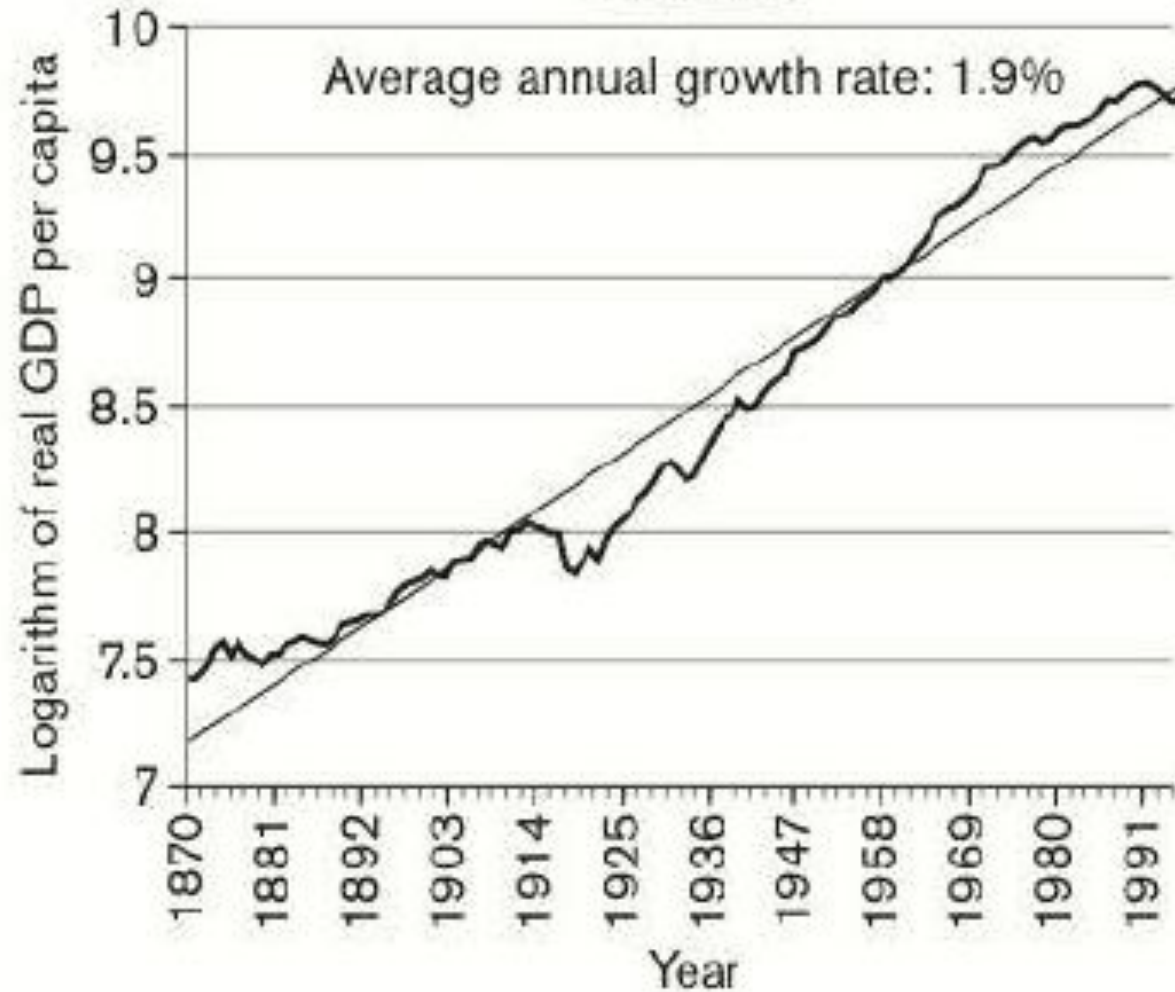
# Steady long-run growth

Over periods of more than 130 years, probably up to 200 years, many countries in Western Europe and North America have had relatively constant annual rates of growth in GDP per capita in the range 1.5-2 per cent.

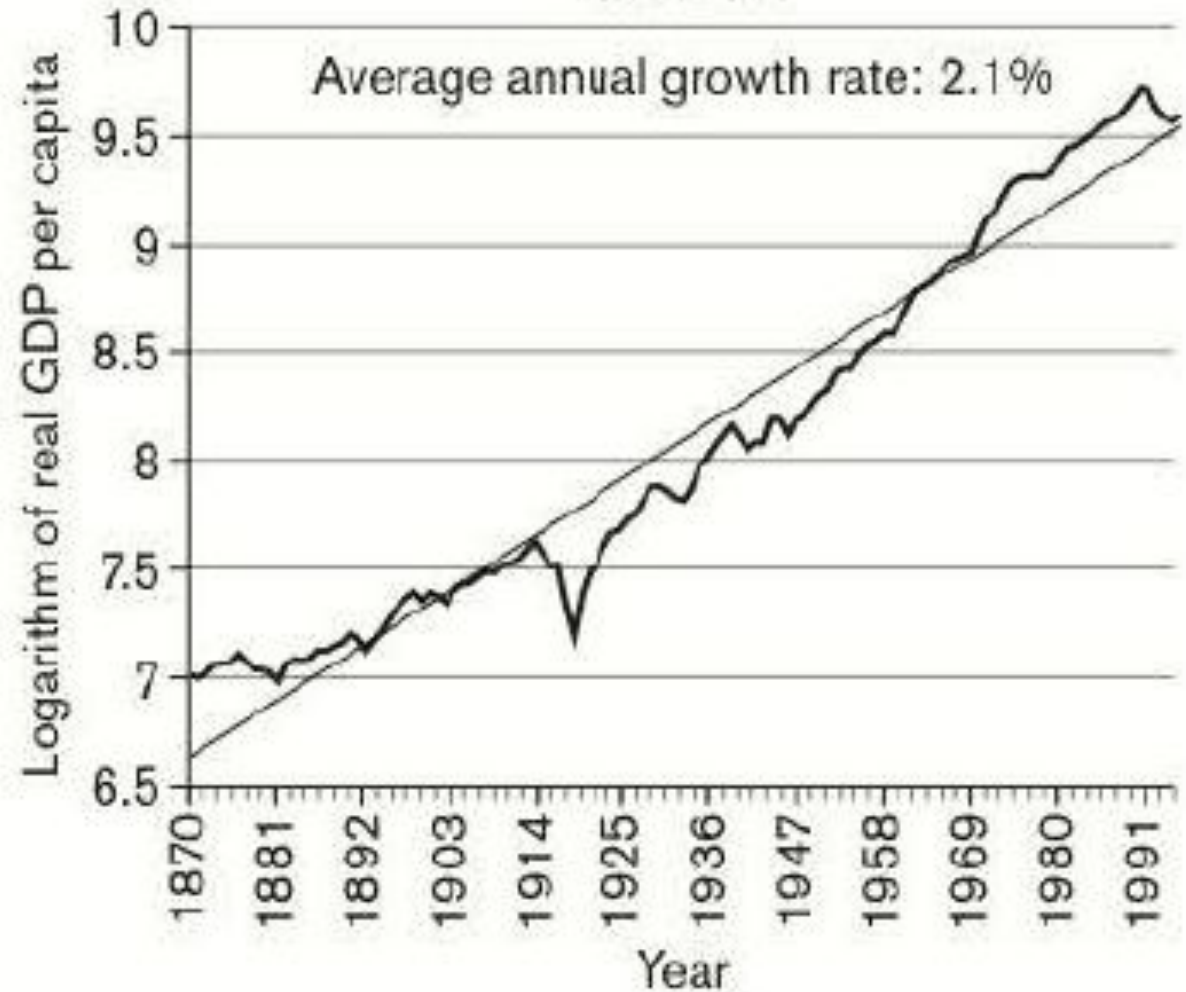
During the long periods of relatively constant growth rates in GDP per worker in the typical Western economy, labor's share of GDP has stayed relatively constant, and (hence) the average real wage of a worker has grown by approximately the same rate as GDP per worker.

# Steady long-run growth

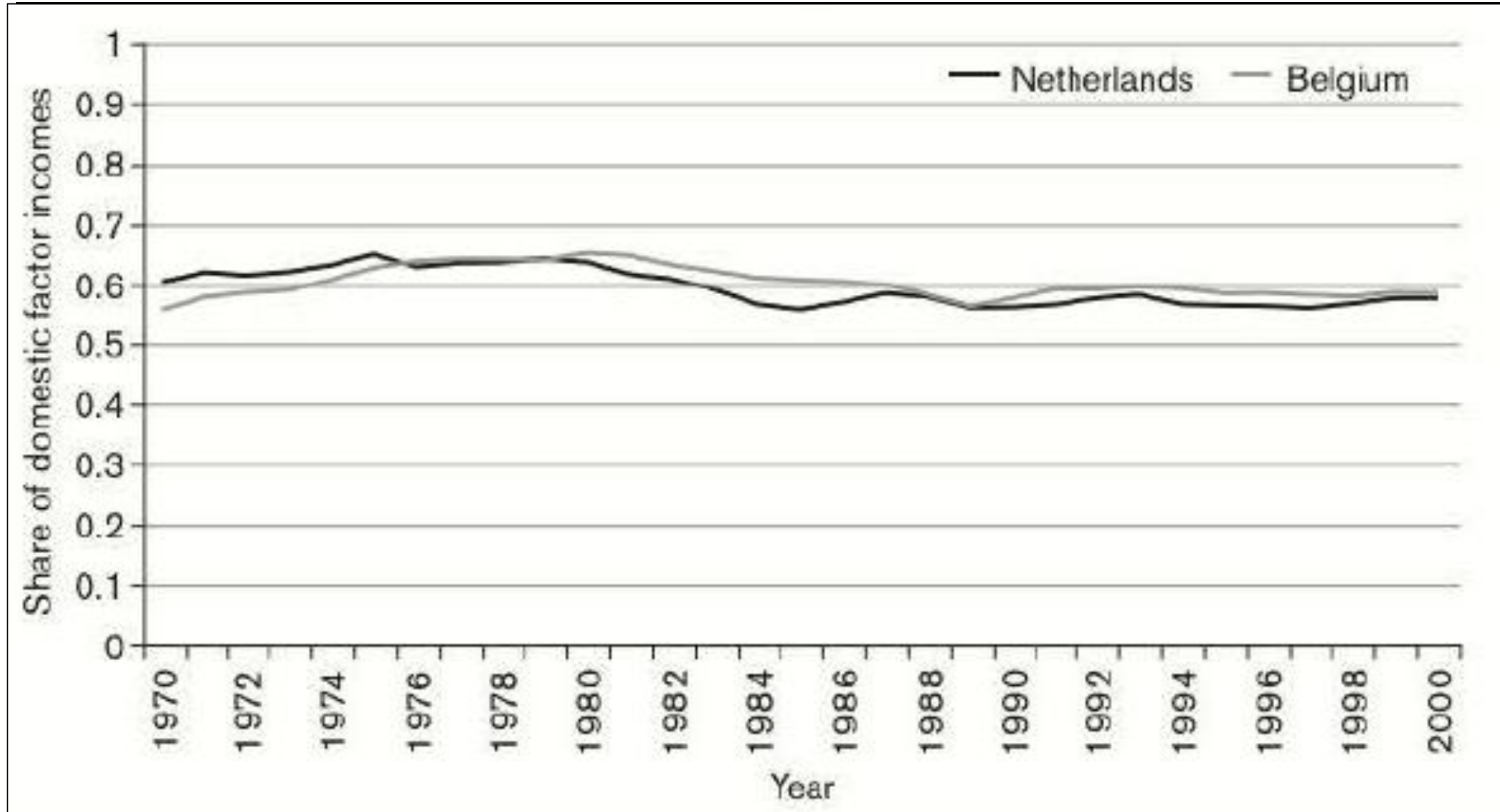
## Sweden



## Finland



# Steady long-run growth



The growth process follows a balanced growth path if GDP per worker, consumption per worker, the real wage rate, and the capital intensity all grow at one and the same constant rate,  $g$ , the labor force (population) grows at constant rate,  $n$ , GDP, consumption, and capital grow at the common rate,  $g + n$ , the capital-output ratio is constant, and the rate of return on capital is constant.



Sorensen & Whitta Jacobsen (2010), "Introducing Advanced Macroeconomics: Growth and Business Cycles", 2nd ed. McGraw-Hill Higher Education. p#29-54

*Thank  
you*

