# ECONOMIC GROWTH: FACTS AND ISSUES

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# FACT 1: PERSISTENT GDP PER CAPITA GROWTH IS A RECENT PHENOMENA

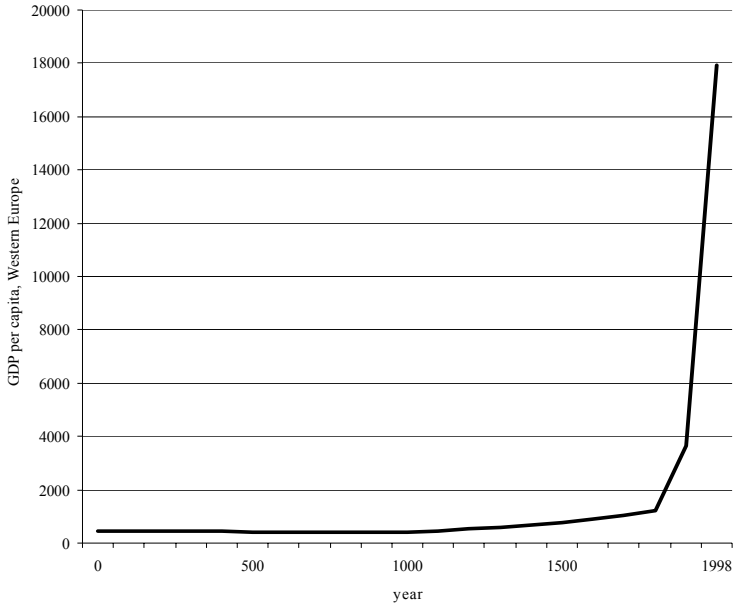



Figure 1: The Figure shows estimates of GDP per capita for Western Europe, Year 0-1998. Source: Maddison (2001): "The world economy - a millinnial perspective".

If we think of time passed since the emergence of modern man as 1 hour then much evidence suggest that Western Europe has been growing for about 10 seconds.

## SOME REMARKS AND INTERPRETATIONS

When we build models we usually have certain "facts" about the 20th Century in mind. E.g. the “Kaldorian facts" (constant factor shares, capital-output ratio etc)

Given the 20th century is very “special", we may wish to look at longer data sequences when developing theories

You can’t help feeling that someting unique happened at the turn of the 19th century. Theories abound; but we will not pursue them in this semester.(But we will in “Development Economics: Macro Aspects", next semester)

Nevertheless, when thinking about candidate "key" growth determiners this acceleration is worth bearing in mind

# FACT 2: PERSISTENT LONG RUN GROWTH DIFFERENCES

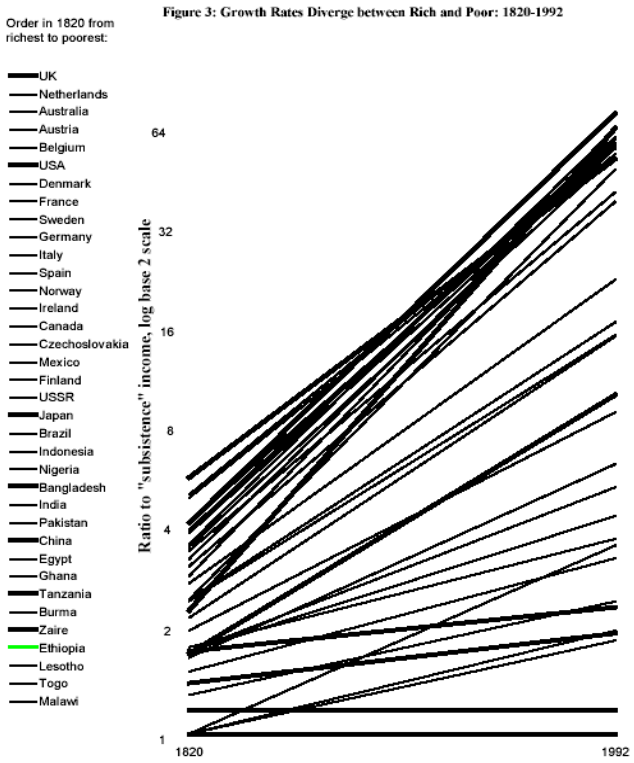



Figure 2: Source: Easterly and Levine, 2001.

## SOME REMARKS AND INTERPRETATIONS

Growth differences *persist* over long time intervals (50 years +)

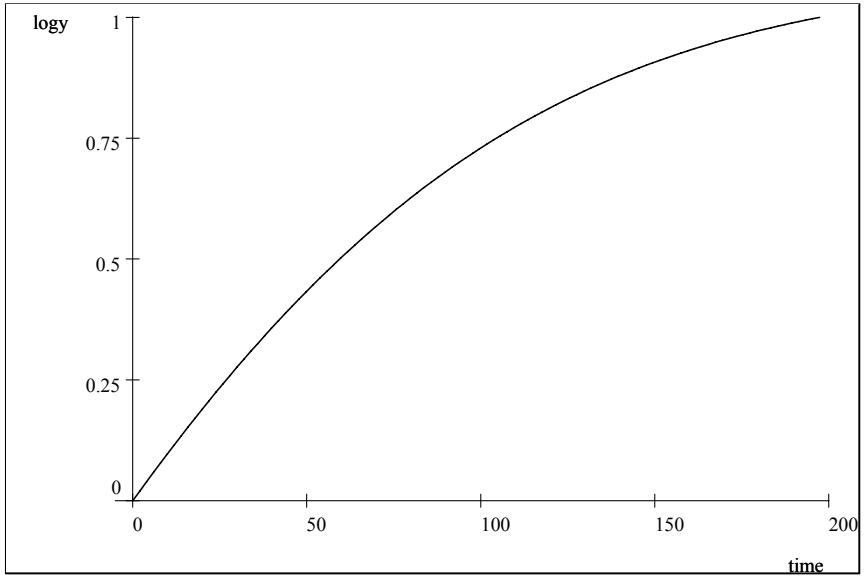
So are we to think about *perpetual* growth differences?

Suppose growth really is logistic:

$$\dot{y}(t) = \gamma y(t) \left(1 - \frac{y(t)}{\kappa}\right).$$

I put $\gamma = 0.015$, $y(0) = 1$ and $\kappa = 4$. This means that $y^*/y(0) = e^4 \approx 55$ – roughly the per capita difference between Denmark and Tanzania in 2000.

# SOME REMARKS AND INTERPRETATIONS




Logistic growth.

After 100 years things would look as if $\dot{y} = gy$ was a reasonable candidate for "the data generating process". **Bottom line:** We cannot tell whether these differences are perpetual or transitionary.

# FACT 3: PATTERNS OF GROWTH RATES: NO ABSOLUTE CONVERGENCE BUT "STRATIFICATION"

There is no simple *lineare* relationsship between growth rates and initial income levels - no absolute convergence. But there are "unconditional patterns".

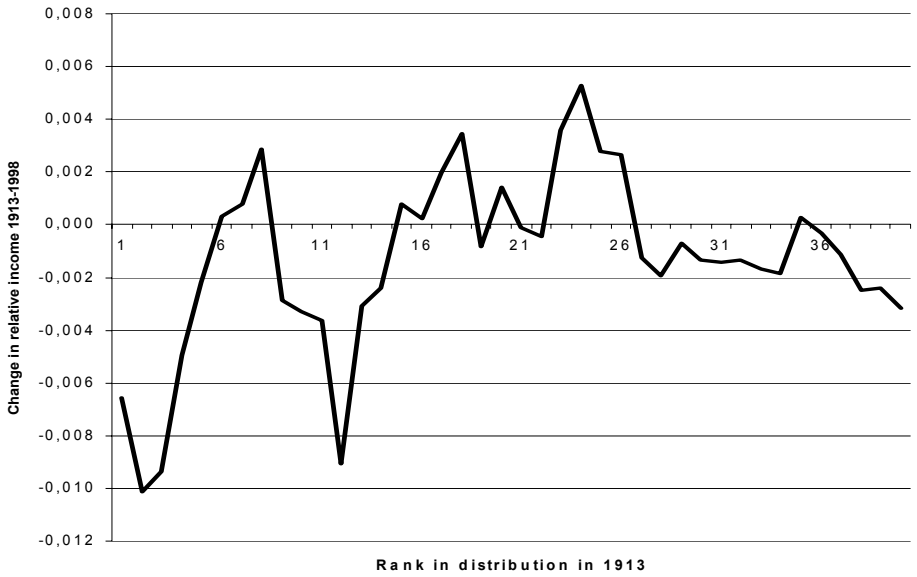



Figure 3: Data: Maddison (2001) and own calculations.

In more recent times a similar pattern (albeit perhaps more drammatic) emerges:

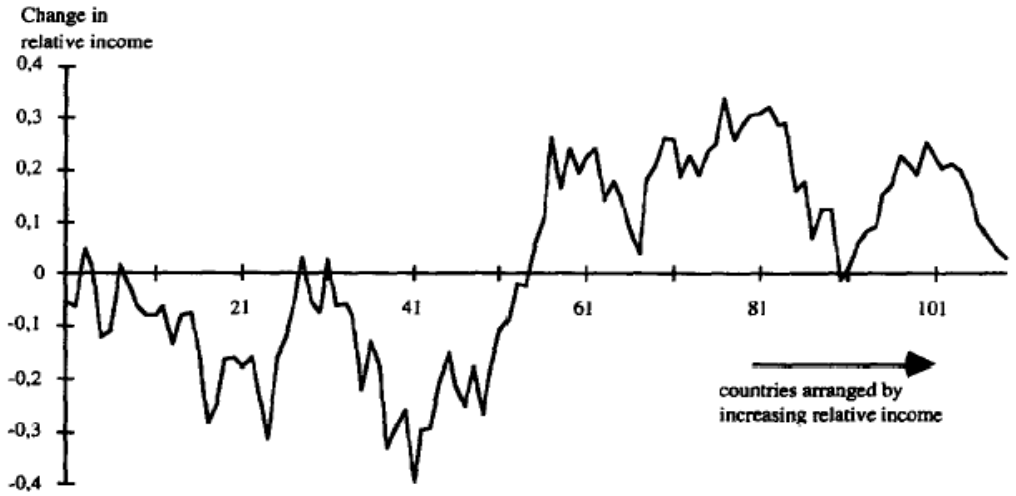



Fig. 8. Change in relative income, 1960–85 (ten-country moving average).

The first observation (on the left endpoint of the horizontal axis) is the average growth rate (in deviations from the sample mean) of the ten countries with the lowest levels of income per capita in 1960; the last observation corresponds to the ten richest countries at the beginning of the period.

Figure 4: Source: De La Fuente (1997).

## "STRATIFICATION" (Cont'nd).

Going back to the historical data set. A simple OLS regression of log GDP per capita in 1998 on log GDP per capita in 1913 and log GDP 1913 squared:

$$\ln y98 = \underset{13.3}{-23.6} + \underset{3.5}{7.6} \ln y13 - \underset{0.23}{0.43} (\ln y13)^2 ,$$

with $R^2 = 0.7$. Taken at face value this means that growth 1913-1998 was larges for a country with $y = 2152.5$; roughly the mean in the sample.

In itself, however, this merely suggests that "something" makes poor countries "different" from middle and high income countries (structurual charactaristics – *conditional* convergence, multiplicity ...)

# FACT 4: DIVERGENCE IN INCOME PER CAPITA OVER THE LONG RUN

*Figure 1*
**Simulation of Divergence of Per Capita GDP, 1870–1985**
*(showing only selected countries)*

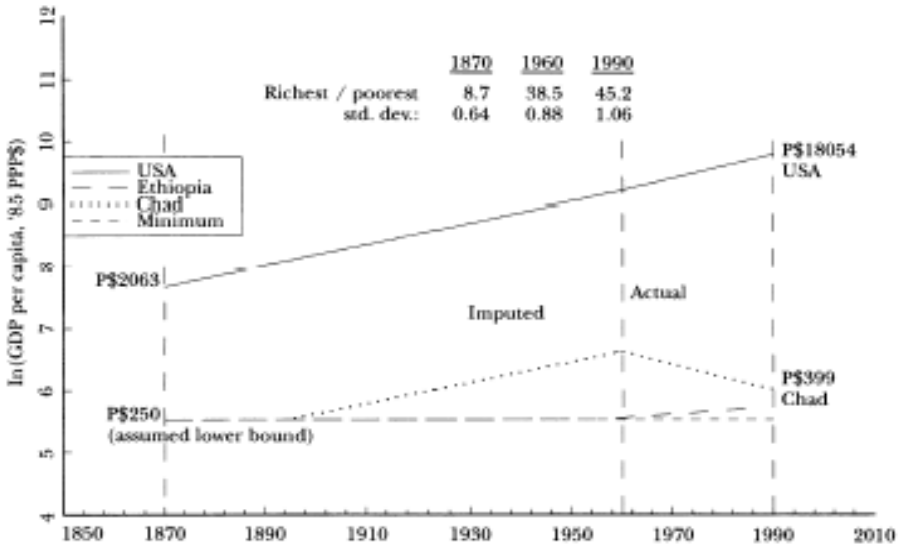



Figure 5: Source: Pritchett, 1997.

Data for subperiods (60→): no tendency for convergence of per capita income, measured by, say, stdev of log income, Gini index or the like.

# FACT 5: MODERN DAY GDP P.C. DIFFERENCES ARE HUGE

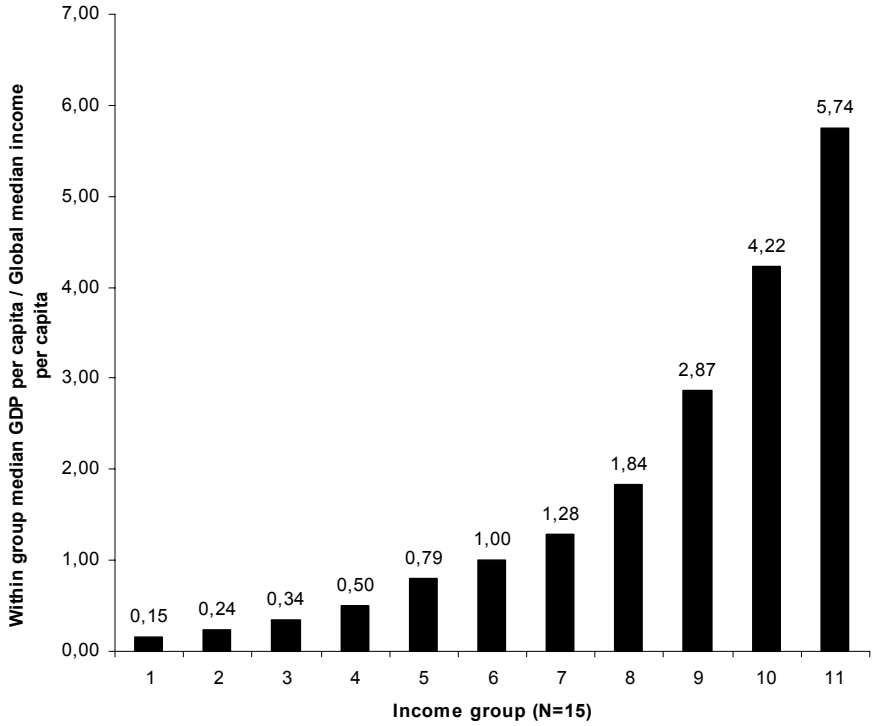



Figure 6: The numbers refer to the year 2000 and are PPP corrected. Source: World Development Indicators CD-rom 2004.

Moving from median in the top group to median of lowest group: Difference on a scale of 1:30.

# SUMMING UP: REGULARITES AND ISSUES

Key issue: Understand level differences (GDP per capita), of the order of magnitude observed (1:30)

Key part of the story involves persistent growth differences over long periods of time.

– Though not nessesarily permanent growth differences

Observed growth differences do no seem random (ex ante middel/rich outperforms ex ante poor)

## THINKING ABOUT PRODUCTIVITY DIFFERENCES

The point of departure (and a common feature of all the models we'll be looking at) is the aggregate production function:

$$Y = F(K, L, A)$$

K = Physical capital, L= Human input; comprises # people, working hours, skills, A = Index measuring technological development (and more)

Important conceptual assumptions:

(i). F(.) is assumed to be *identical* across countries

(ii). F(.) features constant returns (CRTS) to rival factors of production (K,L); thus increasing returns to K,L and A.

# A. Neoclassical growth models (B&S Ch. 1 + articles)

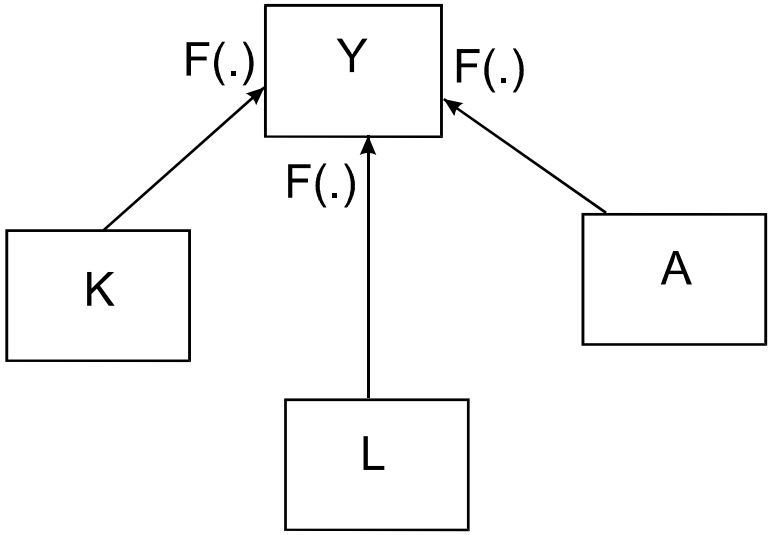



Figure 7:

Features of the framework: (i) Income differences are driven by differences in rates of investment (enough?). (ii) Growth differences are transitionary (long enough transitions)

-"A" is completely autonomous; technological change is exogenous. Is this a satisfactory view of the world?

## B. "Basic" endogenous growth models (B&S Ch. 4-5)

Illustrative example: Growth through externalities.

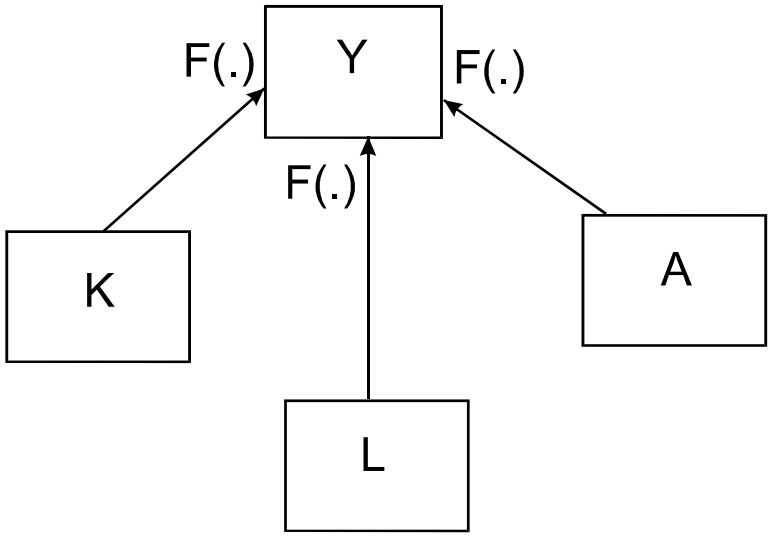



Figure 8:

Some features of these (AK) models: (i) Growth is no longer exogenous; huge income differences may be generated. (ii) Gov'ment policies can affect the long-run growth rate! But why do policies differ? Issues: No technological change. The process of tech change is still a black box.

# C. Innovation-based endogenous growth models (B&S Ch. 6-8)

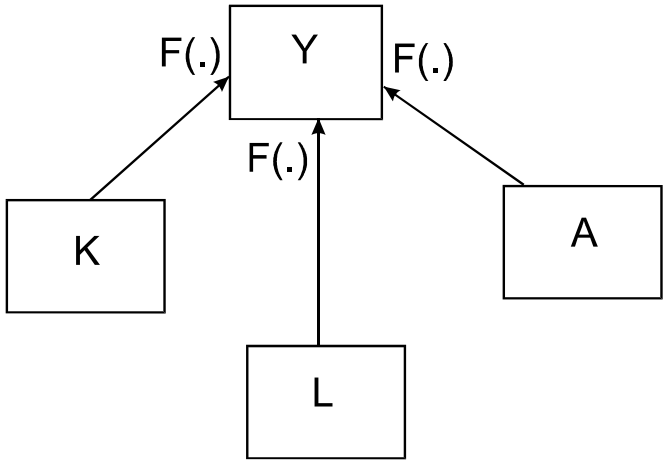



Figure 9:

New features: (i) Technological change is an endogenous process in the model. (ii) The framework allows for the presence of imperfect competition. E.g. how does market power affect growth? (iii) Adoption and transfer of technology between countries. "Conditional convergence" revisited.