

Introduction

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Object of economic growth theory

- ▶ **Object of economic growth:** dynamics of aggregate per capita income across (long) time, and across locations.
- ▶ **Main questions**
 - ▶ what is the meaning of "long time" (millenia, centuries, decennies) ?
 - ▶ why rates of growth change along historical times ?
 - ▶ why the rates of growth differ across countries ?
 - ▶ why countries hold inequalities in the GDP per capita while having similar rates of growth ?
 - ▶ what are the main drivers of economic growth ?

Main takeaways from the course

- ▶ The **current measure**, rate of growth of real GDP per capita, is usually **badly interpreted**
 - ▶ The observed increase in the GDP per capita has two main components:

$$\left. \frac{\Delta y}{y} \right|_{\text{observed}} = \gamma_{\text{growth}} + \gamma_{\text{transition}}$$

where γ_{growth} is a true measure of economic growth

- ▶ We need some **theory** to separate the two
- ▶ There is economic growth only if there is an **exponential reproduction mechanism**

$$y(t) \approx y_{\text{level}} e^{\gamma_{\text{growth}} t}, \text{ with } \gamma > 0$$

- ▶ We should not confuse the **level of GDP** with the **rate of growth of GDP**.

Main takeaways from the course

- ▶ Growth is usually a **hidden phenomenon**
- ▶ This poses both theoretical and empirical difficulties:
 - ▶ every theory (and empirical strategy) tries to find (exogenous) factors which explain the rate of growth

$$\gamma_{\text{growth}} = F_g(\text{factors})$$

- ▶ and/or differences in levels

$$y_{\text{level}} = F_l(\text{factors})$$

- ▶ However, in the very long run (history) everything is endogenous.
- ▶ Solution: choose a **time scale** such that some factors seem to be exogenous (constant or not)

Beyond economic growth

Human impact on Earth's geological phases

The **Anthropocene** as a new geological era (a decision was scheduled for 2021 but was not taken):

- ▶ consensus: there is a geological impact of human activity
- ▶ no consensus: periodization (when did it started ?)
 - ▶ around 8000 BCE ? (deforestation, increase in carbon concentration preventing a "natural" reduction in Earth's temperature)
 - ▶ around 1600 CE ? (exchange of animal and plant species between continents)
 - ▶ around 1800 CE ? (industrial revolution, increase in earth's temperature)
 - ▶ around 1944 CE ? (clear increase in temperature, start of the atomic era)
- ▶ see <https://en.wikipedia.org/wiki/Anthropocene>

Main growth factors

By increasing degree of variability

- ▶ Physical and biological environments: geography, size, resources, biology;
- ▶ Population: demography, human capital, social capital;
- ▶ Technology: capital accumulation, productivity growth (learning by doing, R&D);
- ▶ Aggregation: externalities, public goods;
- ▶ Economic institutions: inclusive/exclusive (free entry vs barriers to entry), financial institutions, trade openness, patent protection;
- ▶ Political institutions: in a broad sense (inclusive/exclusive, rule of law, enforcement, accountability) or in a narrow sense (government intervention, governance)
- ▶ Luck (good or bad)

Phases of economic growth

Secular long run perspective:

1. Malthusian trap and first globalization (goods) : (almost) constant rates of growth (6000 BCE to 1700 CE)
2. Industrial Revolution: transition with modest increases in the rate of growth
3. Modern economic growth and second globalization (goods): rapid economic growth and Great Divergence: post 1820 and until 1990 (according to some authors)
4. Great convergence and third globalization (ideas): post 1990 until ?
5. Recent trends (are humans redundant ?): nature strikes back and automation/robotization

See <https://ourworldindata.org/economic-growth>

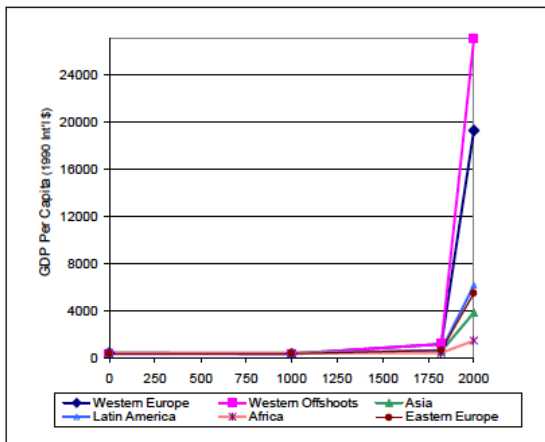


Figure 1: The Evolution of Regional Income Per Capita, 1-2000 CE
 (Source: Maddison, 2003)

Figure: Maddison on the evolution of income per capita

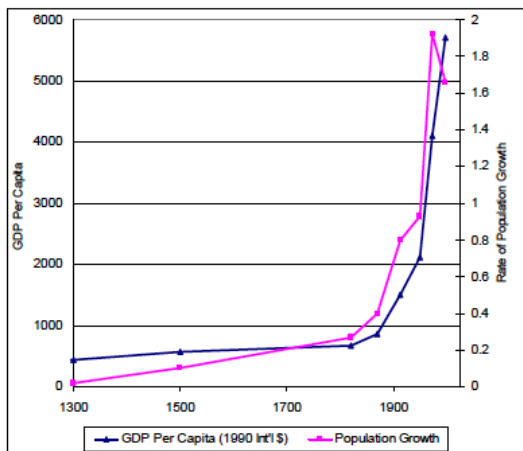


Figure 4: World Population Growth and Income Per Capita
(Source: Maddison, 2001)

Figure: Maddison on the evolution of population

Ancient growth experience

Malthusian trap

- ▶ Low rates of growth: between 0% and 0.5%
- ▶ Rises in income implied rises in population (not income p.c.)
- ▶ Negative correlation between population growth and real wages
- ▶ But wide fluctuations (civilizations appear and disappear)
- ▶ Big impact of demographic changes and (ex Black-Death (1347-1350)) and institutions (ex. different responses to it in E. and W.Europe);

Ancient growth experience

Malthusian trap

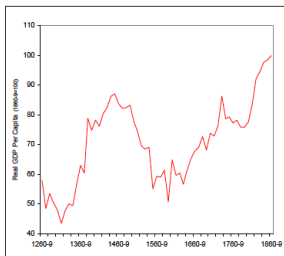


Figure 2: Fluctuations in Real GDP Per Capita in England, 1260-1870 CE
(Source: Clark, 2005)

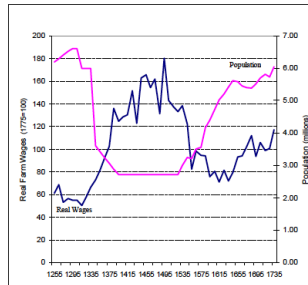


Figure 5: Population and Real Wages in England, 1250-1750 CE
(Source: Clark, 2005)

Figure: Clark on the UK's population and real wages

Ancient growth experience

Limits to growth

- ▶ labor (unskilled ?) and land were the main factor of production
- ▶ land is not reproducible: no growth because of decreasing returns;
- ▶ there were some gains in productivity, although not related to a purposeful activity as R&D;

Ancient growth experience

First globalization

- ▶ there was a small difference in GDP per capita across the world (Eurasian continent)

Table: Ratio richest to poorest region: before the great divergence

1000	1500	1820
1.1:1	2:1	3:1

- ▶ E. and SW. Asia were richer (see **frankopan2016**)
- ▶ first globalization: a first sustained decoupling between production and consumption took place with trade in a small number of (luxury) goods (Silk road)
- ▶ physical distance was a major factor (spatial friction)

Modern economic growth

Main features

- ▶ modern economic growth: permanent positive rates of growth;
- ▶ it may have started in the UK around 1800;
- ▶ it was contemporaneous with a demographic revolution, but growth became independent from the growth population;
- ▶ non-Malthusian features: rise in wages and almost stationary rate of return of capital
- ▶ start of a process of the build-up of state-capacity

Modern economic growth

Main factors

- ▶ Two driving forces: increases in productivity and capital accumulation (physical, human, social)

Table: Growth accounting

	1900	1929	1950	1973	1990	2008
factor	59	59	37	39	28	30
TFP	41	41	63	61	72	70

Source: **crafts&woltjer2020**

- ▶ but intensive has become more important than extensive growth

Modern economic growth

Main factors

- ▶ physical capital accumulation: massive, helped by the development of financial system and of the increase in state capacity
- ▶ better allocation: specialization across activities and geography;
- ▶ technologic progress: rise in productivity as a purposeful activity (R&D, fundamental research), huge reduction in transport costs;
- ▶ unprecedented accumulation of human capital: schooling and knowledge (but quality is becoming more important than quantity see **hanushek&woessmann2015**)
- ▶ social capital: institutions (reduction in uncertainty at all levels, protection of property rights, contract enforcement, etc)
- ▶ non-renewable natural resources: decreasing returns avoided by technology ?

Modern economic growth

Great divergence

► The Great divergence:

Table: Ratio richest to poorest region: after the great divergence

1820	1870	1913	1950	2001
3:1	5:1	9:1	15:1	18:1

- increase in disparities and change of the economic center
- second globalization (inter-industrial trade): huge reduction in transport costs lead to an increase in the trade in **inter-industrial** and the Ricardo comparative advantage mechanism start working massively;
- relative free capital movement re-inforced this movement and lead to an international alignment of interest rates;
- increasing agglomeration of economic activity in a few centers (at national and international levels)

A new phase after the 1990's ?

Global convergence and local divergence

- ▶ Extensive factors are becoming less important and intensive (distributional factors) are becoming dominant
- ▶ Technical progress: drivers
 - ▶ IT lead to a reduction of costs in the movement of **ideas**;
 - ▶ **robotization** leads to a substitution of routine tasks by machines
 - ▶ new energy sources ?
- ▶ third globalization (**intra-industrial trade**): a large part of international trade is related to the supply chains of some multinational corporations (see **baldwin2017**)
- ▶ allowed high increases in wages in a few (7) countries (technology from the "North" and wages from the "South") and competition between countries for parts of the supply chains.

A new phase after the 1990's ?

But reduction of growth may be a good thing

growth rate	explanation
2.25	average growth 1950-2000
	<i>Successes</i>
-0.8	smaller families and aging
-0.2	shift from goods to services
	<i>Possible failures</i>
-0.15	decline in reallocation of workers and firms
-0.1	decline in geographical mobility
+0.0	taxation and regulation
+0.0	increase in inequality
+0.0	trade with China
= 1.00	average growth 2000-2016

Table: Accounting for the growth slowdown US: vollrath2020

A new phase ?

Empirics and consequences

- ▶ Empirical observations:
 - ▶ the elephant curve (see **milanovic2016**, **baldwin2017**):
reduction of inequality at a global level;
 - ▶ polarization curve (v.g <https://voxeu.org/article/job-polarisation-and-decline-middle-class-workers-wages>)
increase in inequality within countries;
 - ▶ global warming
- ▶ Potential consequences:
 - ▶ institutional consequences: rebalances of the
inclusive/exclusive attitudes around the world ?
 - ▶ over-extension of state's capacity ?
 - ▶ limits to growth as a result of the environmental impact of
human activity ?

However: history seems to move in cycles

- ▶ Inequality in the very long run: Scheidel (2017) and Milanovic (2016)

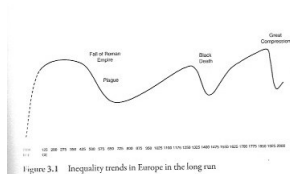


FIGURE 2.4. Expected pattern of changes in inequality versus income per capita from the preindustrial period through the postindustrial period and into the future (dotted line)

- ▶ the labor share in the long run: with hindsight it seems that big technological changes start with substitution of labor with machines <https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2251~e73a1e85d1.en.pdf>

This course

- ▶ We will address just some of those issues;
- ▶ Using as stepping stones the benchmark models which tried to address them;
- ▶ We will refer to the stylized facts those models tried to address when they were proposed;
- ▶ Today with the huge amount of information and the computational capabilities, the research in the field requires a fairly large amount of skills (conceptual, statistical, theoretical and computational). But the central issues remain the same.