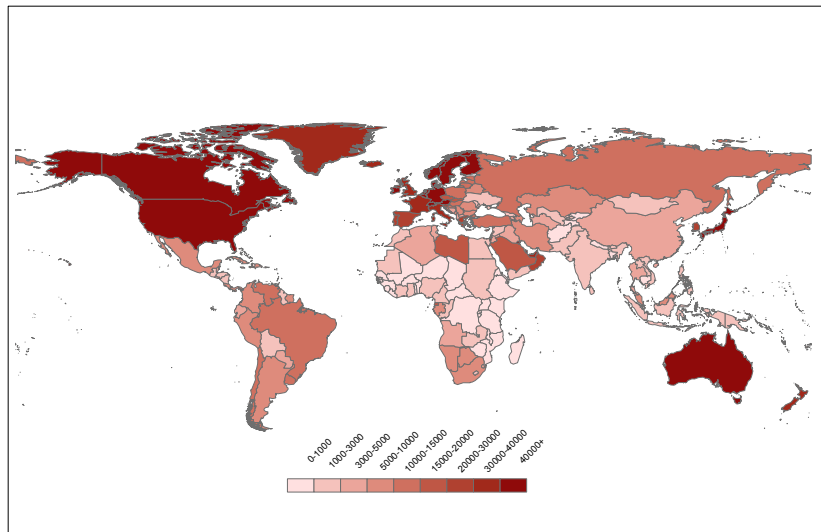


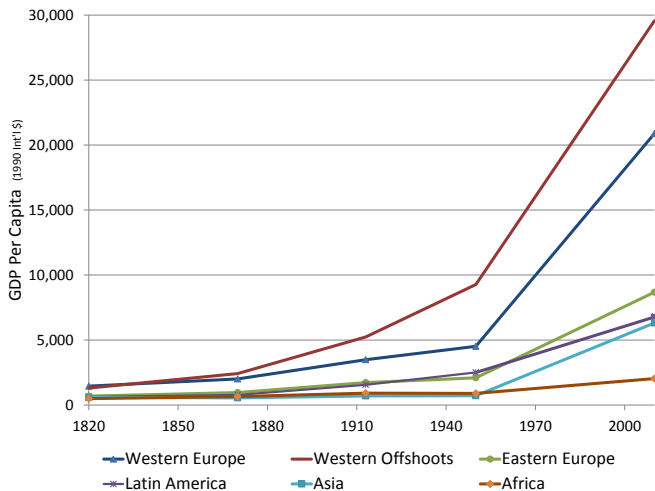
Growth and Comparative Development

Oded Galor

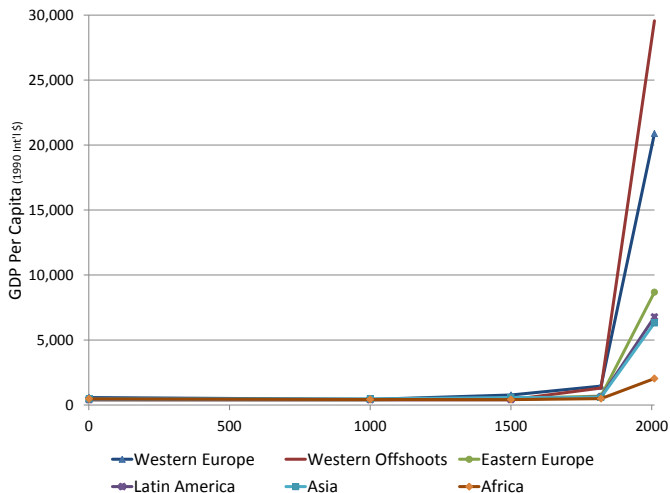
Income per Capita across the Globe in 2010



Divergence across Regions: 1820–2010



Regional Income per Capita: 1–2010



Evolution of Inequality across Regions: 1–2010

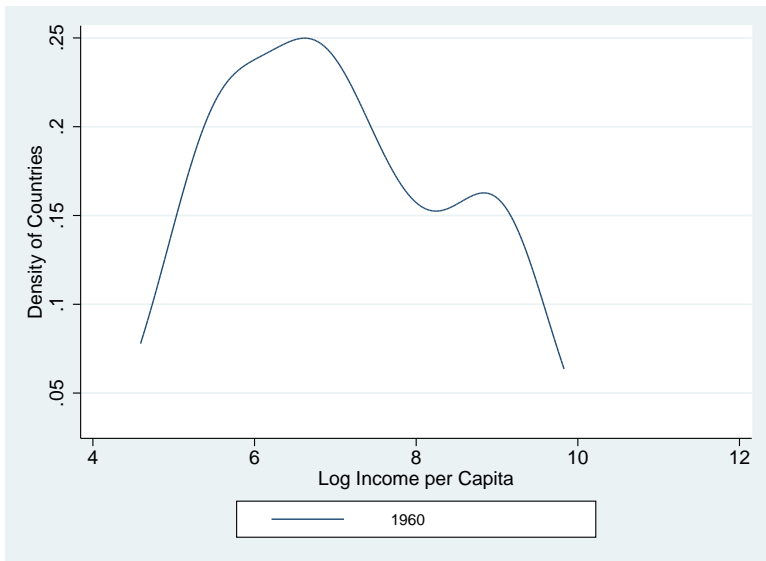
	Income per Capita (1990 Int'l \$)				
	1	1000	1500	1820	2010
Western Offshoots	400	400	400	1,302	29,564
Western Europe	576	427	771	1,455	20,889
Latin America	400	400	416	628	6,767
Asia	456	470	568	591	6,307
Africa	472	425	414	486	2,034
Richest-Poorest Ratio	1.4	1.2	2	3	15

Western Offshoots: USA, Canada, Australia, New Zealand.

Inferences from Growth Theory

- Diminishing returns to physical and human capital accumulation
- Diminishing effect of technological progress on productivity
 - \implies Reduction in inequality
 - \implies Convergence

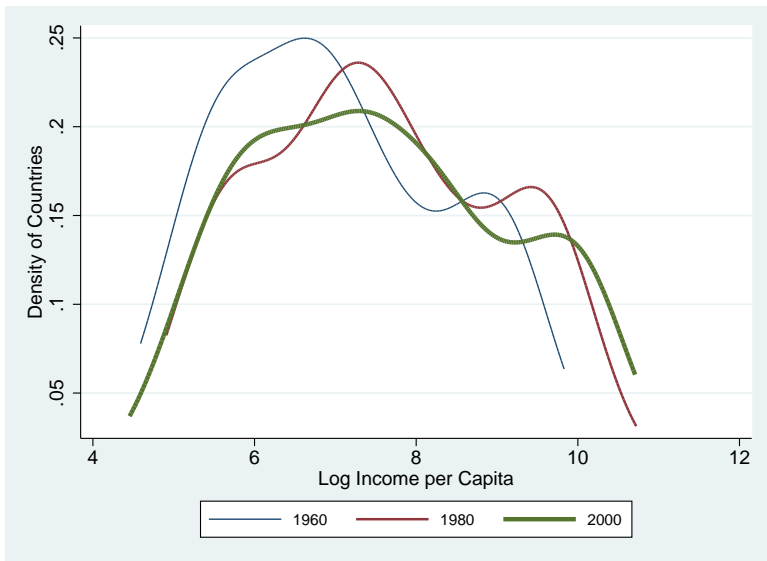
Income Distribution in 1960



Lack of Convergence across Nations: 1960–1980



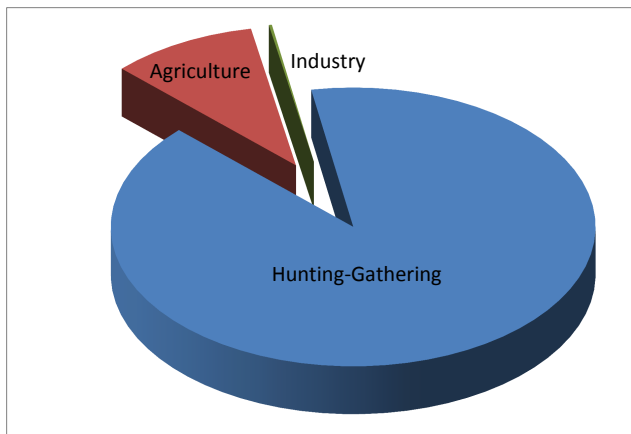
Lack of Convergence across Nations: 1960–2000



Fundamental Research Questions

- What is the origin of the vast inequality in income per capita across countries and regions?
- What accounts for the divergence in per-capita income across countries in the past two centuries?
- What are the factors that inhibited the convergence of poor economies toward richer ones in the past decades?
- What is the role of deep-rooted factors in explaining the observed patterns of comparative development?

Phases of Development: Modes of Production



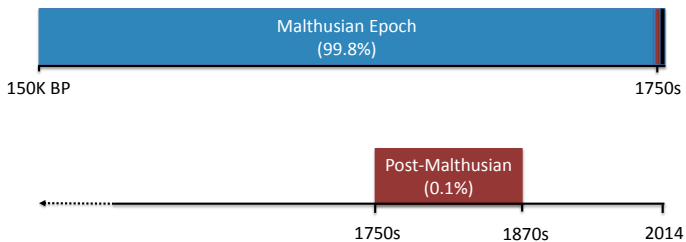
Phases of Development: Standard of Living

- The Malthusian Epoch
- The Post-Malthusian Regime
- The Modern Growth Regime

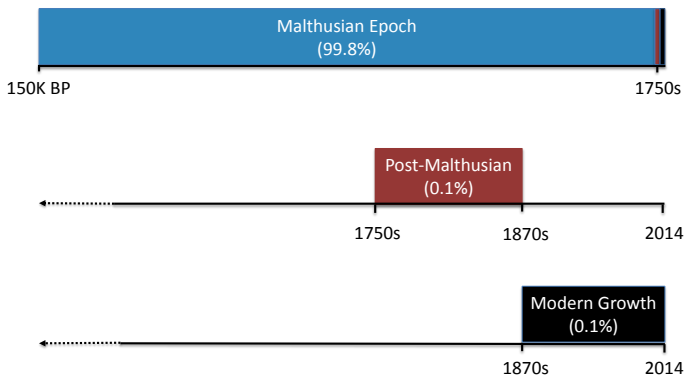
Phases of Development: Timeline of the Most Developed Economies



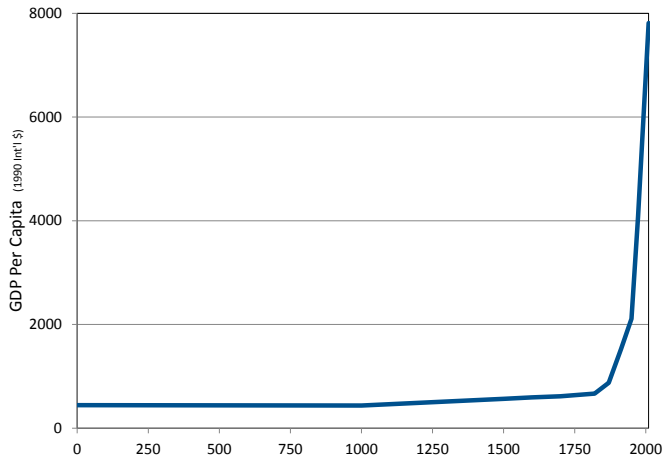
Phases of Development: Timeline of the Most Developed Economies



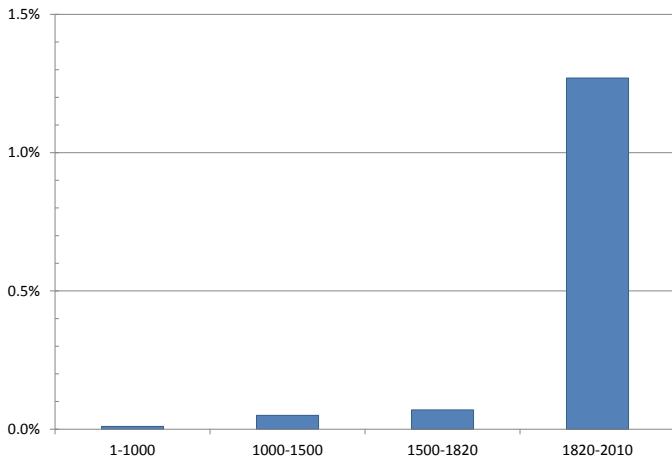
Phases of Development: Timeline of the Most Developed Economies



World Income per Capita: 1–2010



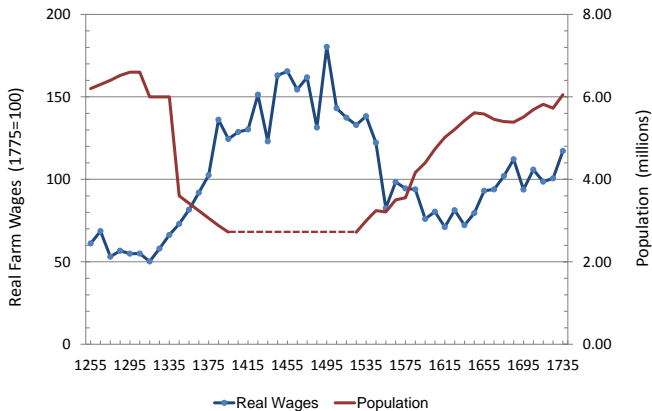
Growth of World Income per Capita: 1–2010



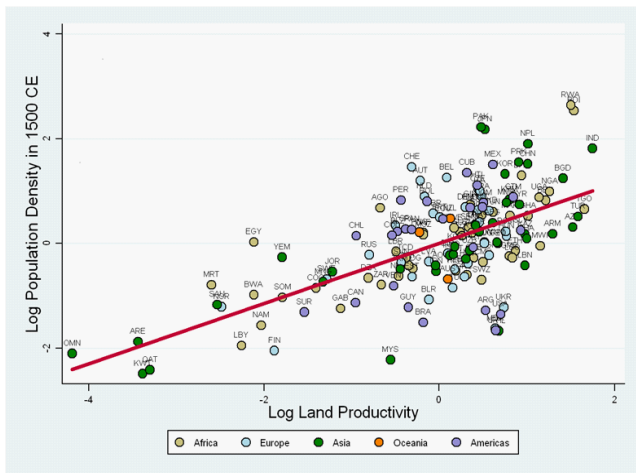
The Malthusian Epoch

- Stagnation – Absence of economic growth
- Characteristics of the period:
 - Income per capita (above subsistence) has a positive effect on population growth
 - Diminishing returns to labor (reflecting the existence of fixed factor)
- Technological progress, land expansion or adverse shock to population
 - Increases (temporarily) the marginal productivity of labor
 - The level of income per capita increases (above subsistence)
 - Population increases, as long as income remains above subsistence
 - Marginal productivity of labor declines towards its long-run level
 - Income per capita returns to the subsistence level in the long-run
- Technologically advanced & land-rich economies:
 - Higher population density
 - Largely similar levels of income per-capita in the long-run

Malthusian Adjustments to the Black Death: England, 1250–1750



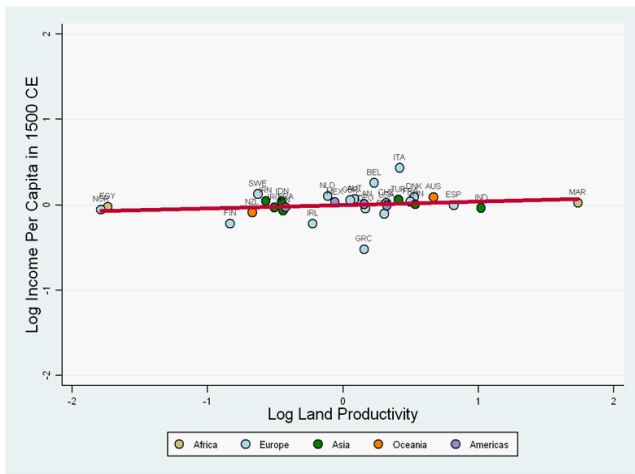
Land Productivity and Population Density in 1500 CE



Conditional on transition timing, geographical factors, and continental fixed effects.

Source: Ashraf-Galor (AER 2011)

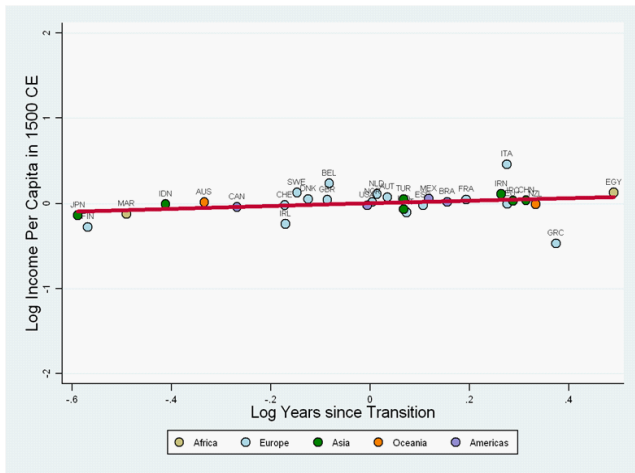
Land Productivity and Income per Capita in 1500



Conditional on transition timing, geographical factors, and continental fixed effects.

Source: Ashraf-Galor (AER 2011)

Technology and Income per Capita in 1500



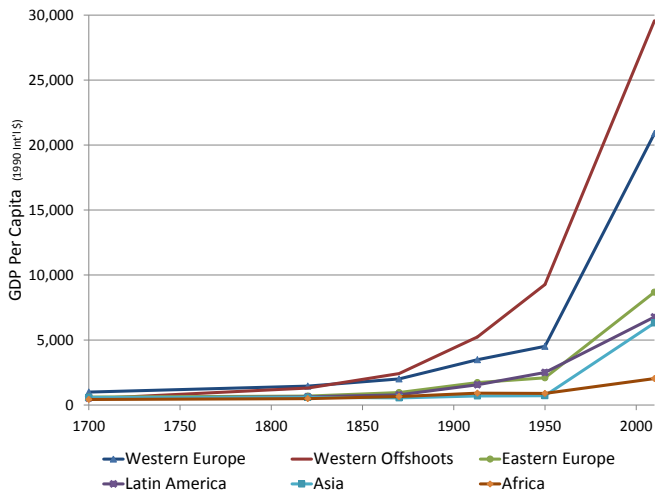
Years elapsed since the Neolithic Transition reflects the technological level in 1500. Conditional on land productivity, geographical factors, and continental fixed effects.

Source: Ashraf-Galor (AER 2011)

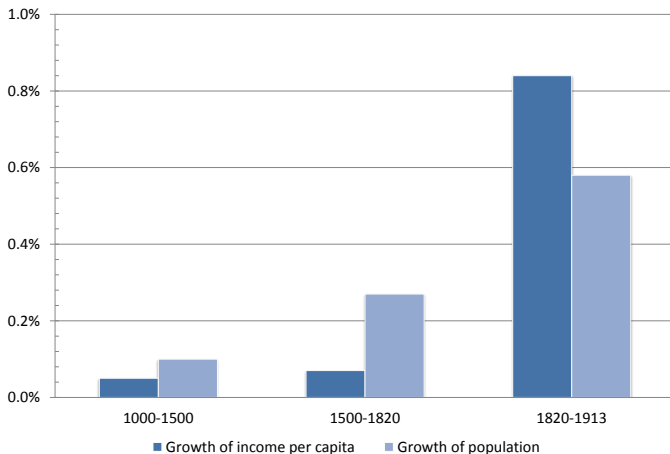
The Post-Malthusian Regime

- Characterized by the onset of economic growth:
 - Technological progress accelerates
 - Income per capita still has a positive effect on population growth
 - Technological progress:
 - Increases output more than population
 - \implies growth in income per capita

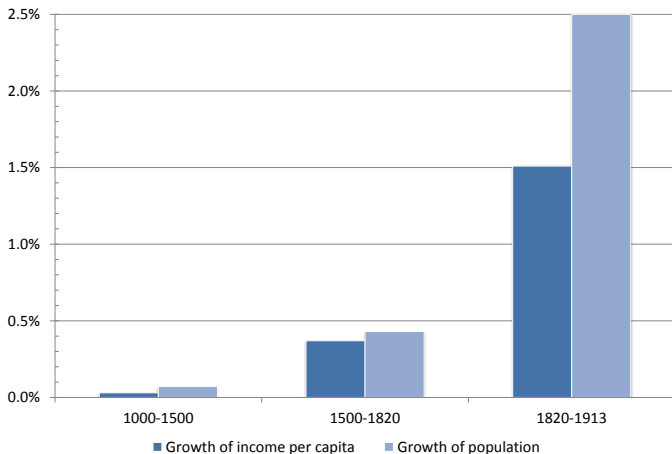
Regional Variation in the Timing of the Take-off



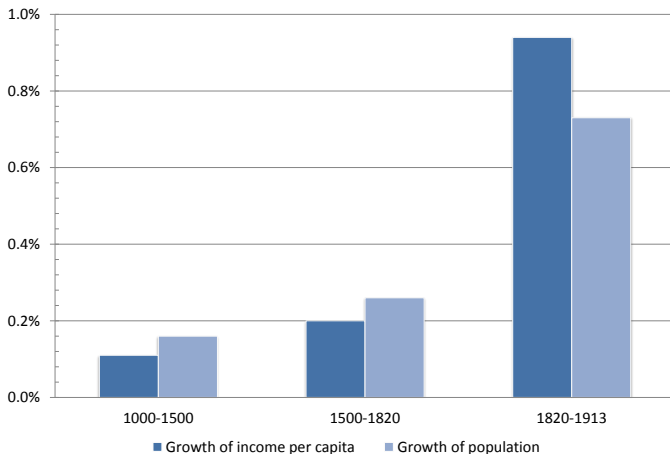
Take-off: Growth of Population & Income per Capita – World



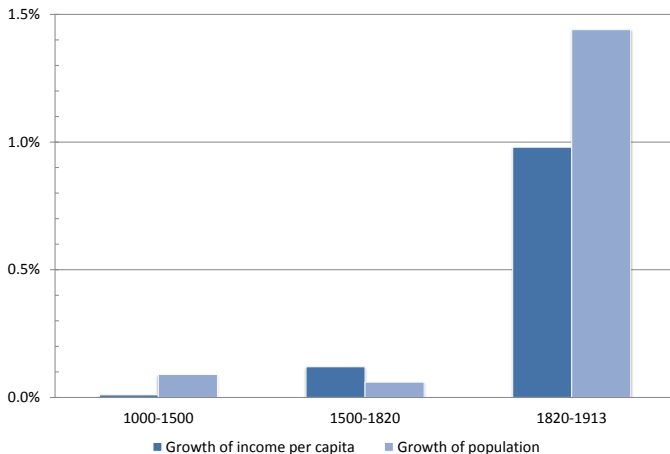
Take-off: Growth of Population & Income per Capita – Western Offshoots



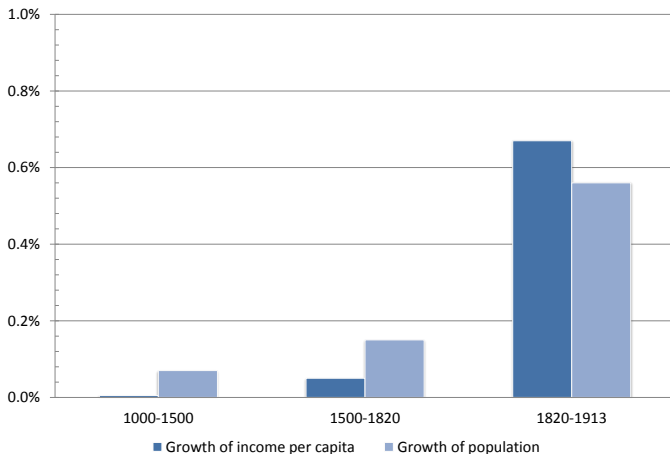
Take-off: Growth of Population & Income per Capita – Western Europe



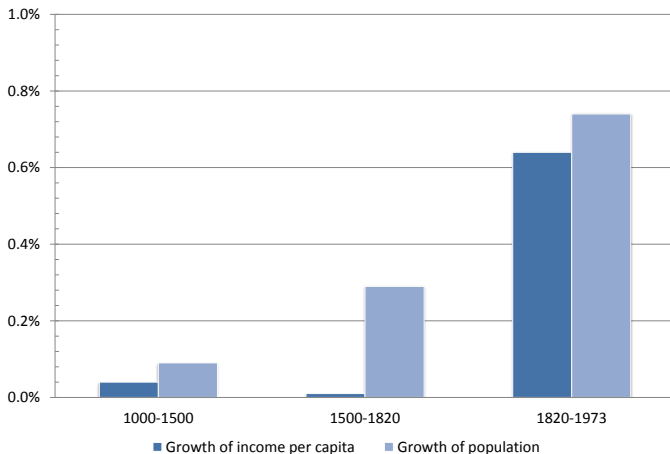
Take-off: Growth of Population & Income per Capita – Latin America



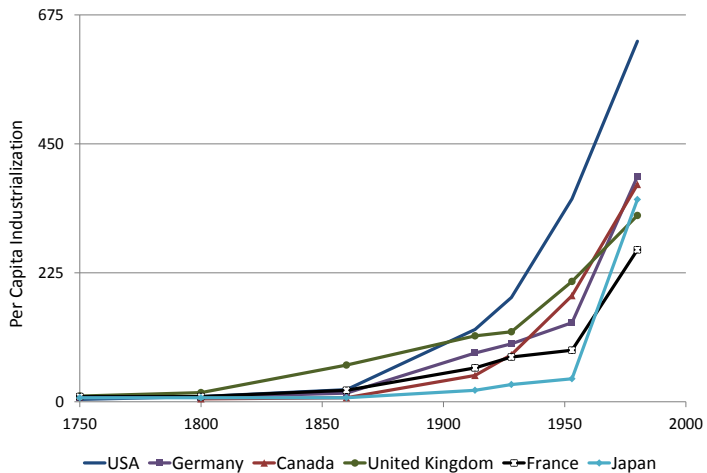
Take-off: Growth of Population & Income per Capita – Africa



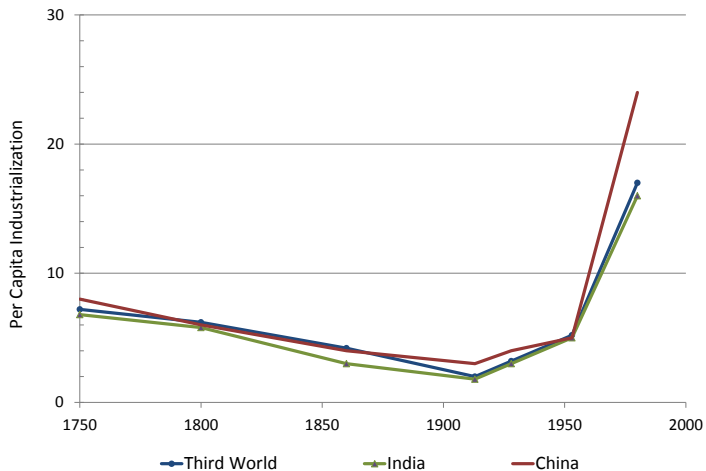
Take-off: Growth of Population & Income per Capita – Asia



Take-off & Increased Industrialization per Capita



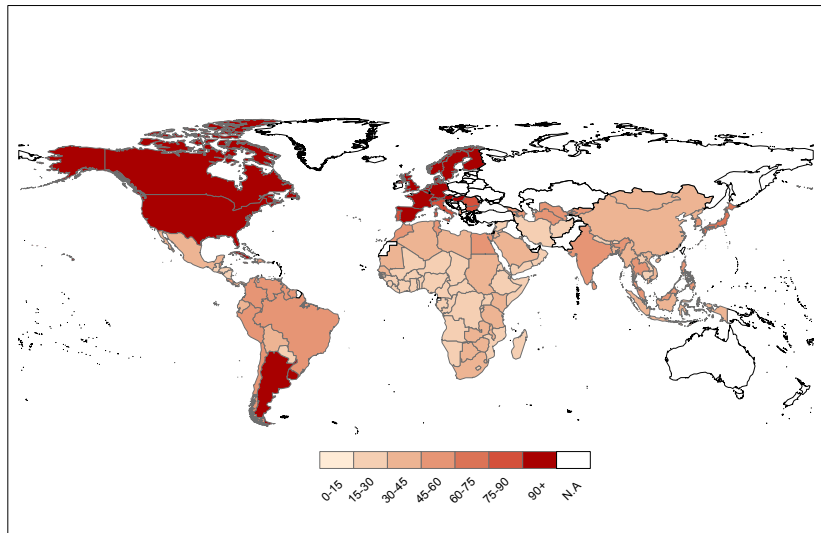
Take-off in Developed Economies & Decline in Industrialization in LDCs



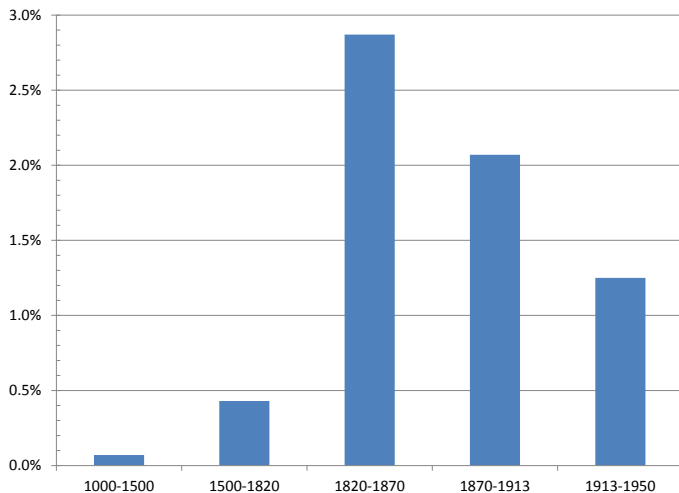
The Modern Growth Regime

- Sustained economic growth
 - Acceleration in technological progress
 - \implies Industrial demand for human capital
 - Human capital formation
 - \implies Decline in fertility rates (substitution of quantity by quality)
 - The decline in population growth
 - \implies Freed the growth process from counterbalancing effects of population growth
 - Technological progress, human capital formation & decline in population growth
 - \implies Sustained economic growth

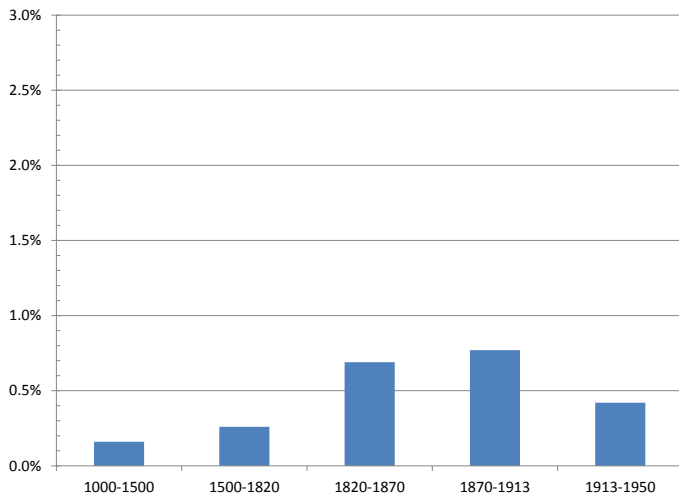
Variation in years Elapsed since the Onset of the Fertility Decline



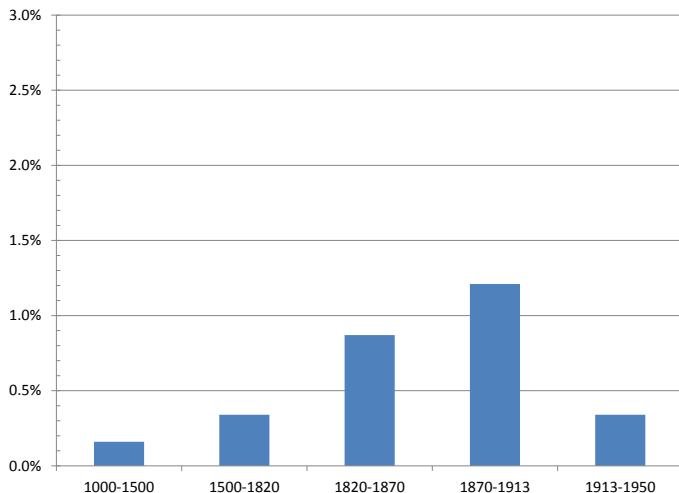
Early Fertility Decline – Western Offshoots



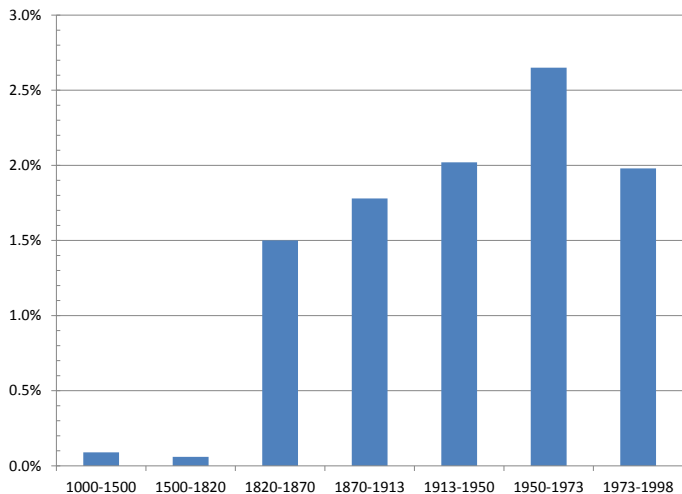
Early Fertility Decline – Western Europe



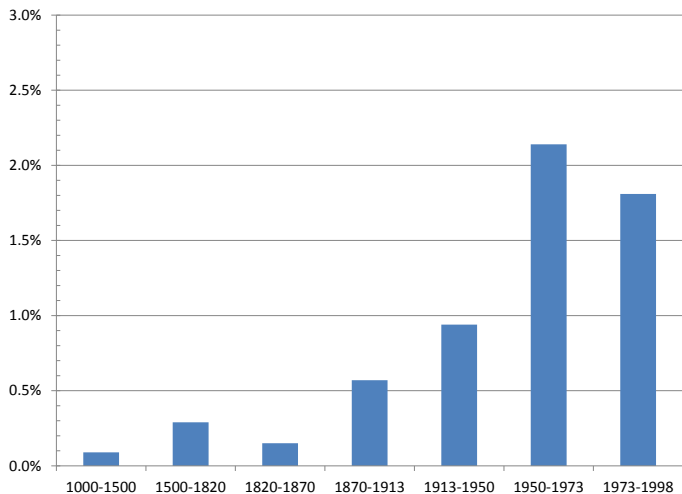
Early Fertility Decline – Eastern Europe



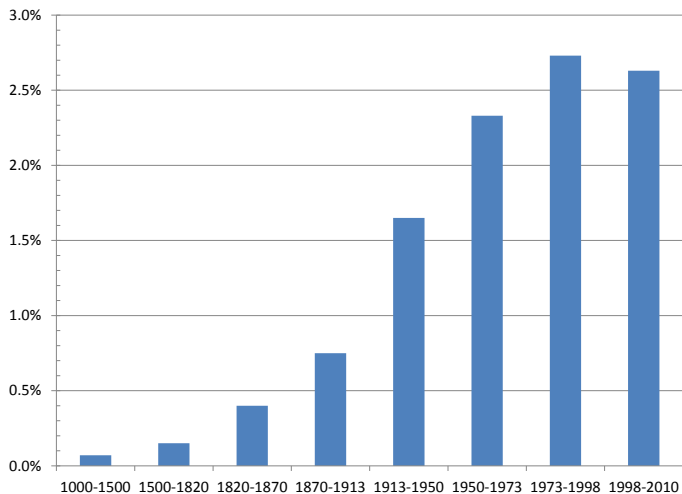
Late Fertility Decline – Latin America



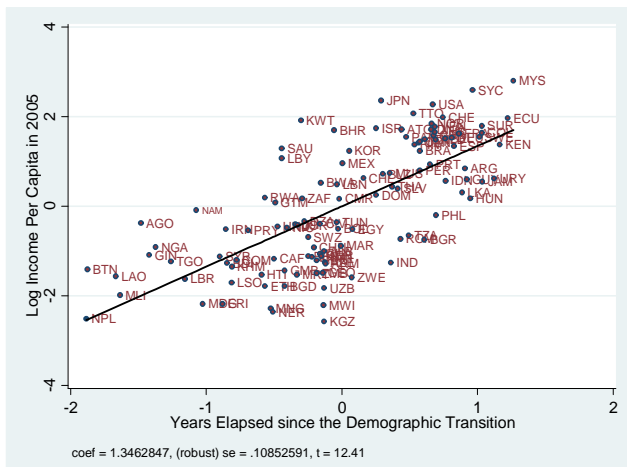
Late Fertility Decline – Asia



Late Fertility Decline – Africa

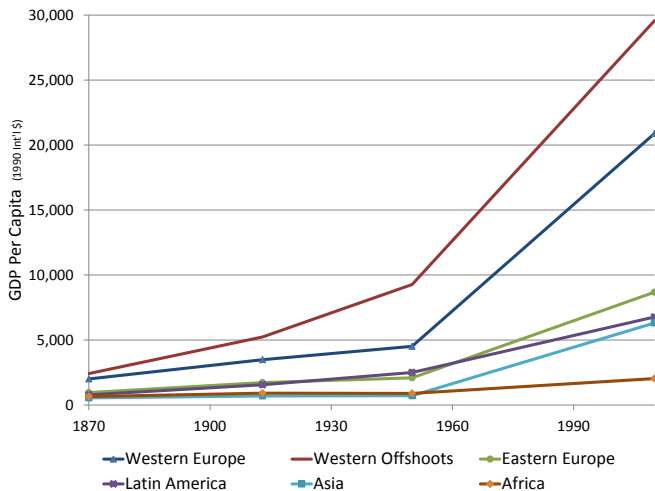


Timing of the Demographic Transition and Current Income per Capita

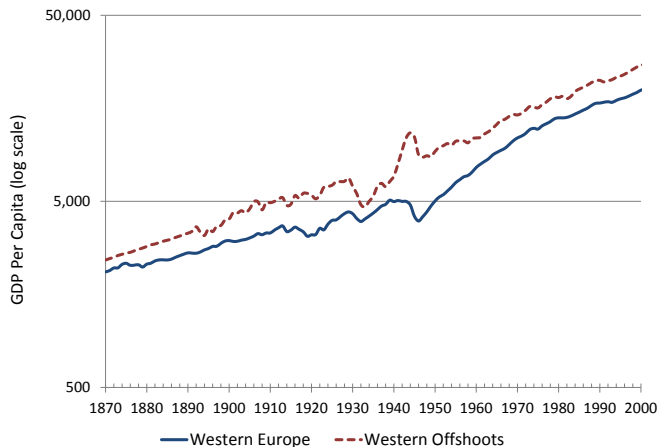


Conditional on absolute latitude.

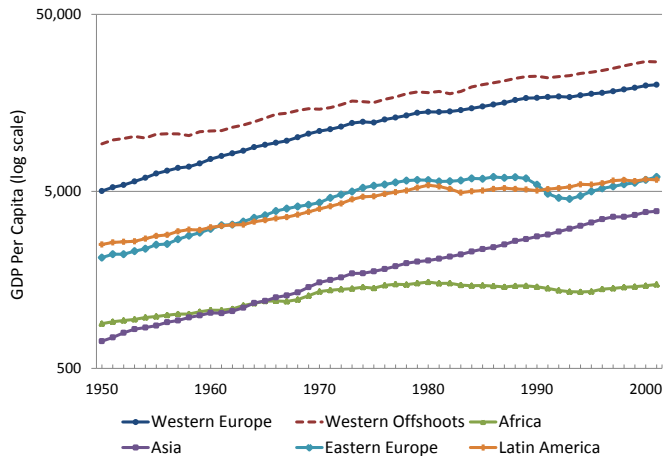
Timing of the Demographic Transition and Divergence across Regions



Sustained Economic Growth: 1870–2000



Regional Variation in Growth of Income per Capita: 1950–2000



Challenges for Growth Theory

- Optimal Growth Theory & Endogenous Growth Theory
 - Focus on the modern growth regime
 - Do not capture the growth process over most of human history
 - Do not capture the vast inequality across countries
 - Unable to address any of the following fundamental questions

Fundamental Research Questions: The Malthusian Epoch

- What accounts for the epoch of stagnation that characterized most of human history?
 - Why did episodes of technological progress in the pre-industrialization era fail to generate sustained economic growth?
 - Why did increased productivity generated population growth rather than growth in income per capita?

Fundamental Research Questions: Transition from Stagnation to Growth

- What are the factors that generated the transition from stagnation to growth of DCs?
- What are the hurdles faced by LDCs in the transition from stagnation to growth?
- What triggered the demographic transition?
- Is the demographic transition a necessary condition for sustained economic growth?

Fundamental Research Questions: Comparative Development

- What accounts for the transition from stagnation to growth in some countries and the persistent stagnation in others?
- What governs the differential timing of the demographic transition across nations?
- What is the origin of the vast inequality that emerged across countries in the past two centuries?
- Has the earlier transition of advanced economies adversely affected the process of development in LDCs?
- What is the contribution of deep rooted factors to the vast inequality across countries?

Proximate Causes of Growth

- Factor Accumulation:
 - Physical capital accumulation (Solow, QJE 1956)
 - Human capital accumulation (Lucas, JME 1988)
- Technological Progress:
 - Endogenous Growth (Romer, JPE 1990; Grossman-Helpman, 1991; Aghion-Howitt, ECT 1992)

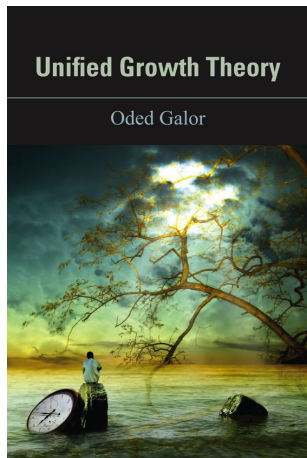
Non-Unified Growth Theory (GT)

- Inconsistent with the development process over most of human history:
 - GT: growth rates decline in the transition to sustained growth
 - Evidence: non-decreasing growth rates in the development of DCs
 - GT: technological progress increases steady-state income per capita
 - Malthusian Epoch - tech progress had no effect on LR income
 - GT: does not capture the demographic transition (DT)
 - Evidence: DT is central for the take-off to modern growth
 - GT: does not capture the take-off from stagnation to growth
 - Evidence: key for the understanding of comparative development
 - GT: convergence
 - Evidence: divergence in the past two centuries

Non-Unified Growth Theory

- Captures the role of factor accumulation and technological progress in the modern growth regime
- Not designed to shed light on:
 - The historical origins of vast and persistent inequality across countries
 - The forces that triggered the transition of DCs from stagnation to growth
 - The hurdles faced by LDCs in their take-off from stagnation to growth
 - The factors that hindered convergence across countries
 - The role of deep rooted factors in comparative development

Unified Growth Theory



Unified Growth Theory

- Captures the:
 - Process of development in its entirety
 - Forces that permitted the transition from stagnation to growth
 - Hurdles faced by LDCs in their transitions from stagnation to growth
 - The origins of the uneven distribution of wealth across the globe
 - Persistent effect of initial biogeographical factors on the growth process

Major Challenge

- Policy based on insights from growth theory encourage
 - Investment in education and health
 - Openness to international capital markets
 - Technological diffusion
 - \implies failed to generate convergence
- Why do some societies fail to:
 - Efficiently invest in physical and human capital?
 - Adopt advance technologies?

Barriers to Accumulation and Innovation

- Inequality
 - Suboptimal accumulation of human and physical capital
 - Credit market imperfections (Galor-Zeira, RES 1993)
 - Sociopolitical instability (Alesina et al., JEG 1996)
 - Inferior institutions (Engerman-Sokoloff, 1997)
 - Inefficient provision of education (Galor-Moav-Vollrath, RES 2009)
- Inefficient Institutions (limited protection of property rights & rule of law)
 - Reduced incentive to accumulate/innovate (North, 1981; Acemoglu-Robinson, 2012)
- Ethnic fractionalization
 - Sociopolitical instability & Inefficient provision of public goods
 - Suboptimal investment (Easterly-Levine, QJE 1997; Alesina et al., JEG 2003)
- Limited Social capital (limited trust & cooperation)
 - Suboptimal investment (Putnam, 1993; Guiso et al., JEP 2006; Tabellini, JEEA 2010)

Colonialism and the Persistent Effects of Institutions and Human Capital

- Persistent effect of institutions implemented by colonial powers
 - Reversal of fortune (Engerman-Sokoloff, 1997; Acemoglu et al., AER 2001, QJE 2002)
 - Exclusive institutions imposed in densely populated areas
 - Inclusive institutions implemented in sparsely populated areas
 - Slavery (Nunn, QJE 2008)
- Persistent effect of the human capital and diversity brought by the colonists
 - Larger effect of colonizers in sparsely populated areas (Glaeser et al., JEG 2004; Easterly-Levine, 2012; Ashraf-Galor, 2014)
- Persistent effect of the legal system of colonial powers
 - Common law (Britain) is more complementary than civil law (France, Spain & Portugal) to the development of financial systems (La Porta et al., JF 1997)
- Persistent effect of artificial borders & ethnic division created by colonists
 - Sub-Saharan Africa (Alesina et al., JEEA 2011; Papaioannou-Michalopoulos, ECT 2012)

Origin and Persistence of Cultural Factors

- Geographical origins and persistence of:
 - Trust & cooperation (Guiso et al., QJE 2009; Algan-Cahuc, AER 2010; Durante, 2010; Litina, 2012)
 - Cultural diversity (Ashraf-Galor, 2012)
 - The European Marriage Pattern (Voigtlander-Voth, AER 2013)
 - Female labor force participation (Alesina et al., QJE 2013)
- Technological origins and persistence of:
 - Female emancipation & labor force participation (Galor-Weil, AER 1996; Fernández-Fogli-Olivetti, QJE 2004; Greenwood-Seshadri-Yorukoglu, RES 2005; Doepke-Tertilt, QJE 2009)
- Religious origins of:
 - Preferences for human capital (Becker-Woessmann, QJE 2009; Botticini-Eckstein, 2012)
 - Work ethic & thrift & entrepreneurial spirit (Weber, 1905; Andersen et al., 2013)
- Intergenerational transmission of:
 - Preferences for human capital (Galor-Moav, QJE 2002)
 - Entrepreneurial spirit & thrift (Doepke-Zilibotti, QJE 2008; Galor-Michalopoulos, JET 2012)

Persistent Effects of Geographical Factors

- Biogeographical conditions that triggered the Neolithic Revolution
 - Technological head-start: (Diamond, 1997; Olsson-Hibbs, EER, 2005)
 - Persistent effect on population density (1-1500) (Ashraf-Galor, AER 2011)
 - No effect on contemporary income per capita (Ashraf-Galor, AER 2013)
 - Persistence effect on life expectancy (Galor-Moav, 2009)
- Disease environment
 - Persistent effect on labor productivity & investment in human capital (Gallup-Sachs, 2001; Andersen-Dalgaard-Selaya, 2012)
- Geographical isolation
 - Reduced trade and technological diffusion (Gallup-Mellinger-Sachs, 1999)
 - Persistence of culture conducive for innovations (Ashraf-Galor-Ozak, JEEA 2010)

Persistent Effects of Geographical Factors

- Land suitable for large plantations
 - Inequality:
 - Extractive institutions (Engerman-Sokoloff, 1997)
 - Concentration of landownership:
 - Suboptimal investment in public education (Galor-Moav-Vollrath, RES 2009)
- Soil quality conducive for agriculture
 - Specialization in unskilled-intensive goods
 - Reduces human capital formation & increases fertility & slows the transition to modern growth (Galor-Mountford, RES 2008)

Persistent Effects of Geographical Factors

- Range of soil quality
 - Emergence of geographical specific human capital \implies reduced mobility \implies ethnic fractionalization (Michalopoulos, AER 2012)
 - Persistent effect of ethnic fractionalization (Easterly-Levine, QJE 1997)
- Ecological diversity & storable crops
 - Emergence & persistence of state capacity (Fenske, JEEA 2014; Mayshar-Moav-Neeman, 2013)
- Geographical determinants of body size
 - Determined fertility & income per capita in the Malthusian epoch and the timing of the take-off (Dalgaard-Strulik, 2013)

Persistent Effects of Genetic Factors

- Natural selection of traits that are complementary to the growth process:
 - Preference for education (Galor-Moav, QJE 2002; Galor-Klemp, 2015)
 - Entrepreneurial spirit (Galor-Michalopoulos, JET 2012)
- Genetic distance between societies reduces:
 - Diffusion from the technological frontier (Spolaore-Wacziarg, QJE 2009)
 - Interstate wars (Spolaore-Wacziarg, 2013)
- Genetic diversity (GD) within a society:
 - Reduces cohesiveness:
 - Higher cultural fragmentation (Ashraf-Galor, AER-PP 2013)
 - Increased mistrust & prevalence of civil conflict (Arbatli-Ashraf-Galor, 2013)
 - Generates a wider range of complementarity traits conducive for innovations
 - Has a hump-shaped effect on productivity (Ashraf-Galor, AER 2013)
Lower income in overly homogenous & diverse societies