Economic growth: an introduction

Lecture Notes

Advanced Macroeconomics (7SSPN402)

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These lecture notes cover three main areas:

1. an introduction to history's 'hockey stick' pattern of economic growth
2. definitions of how we measure economic growth including gross domestic product, employment and unemployment, and inflation
3. an examination of the stylized facts of economic growth.

1 History's Hockey Stick

Figure 1 depicts what economists like to call "history's hockey stick" (simply because it looks like one!). It shows estimates of Real GDP per capita – an indicator of productivity and average living standards – in six countries in the very long-run (1000 to 2018).

The term "history's hockey stick" describes the dramatic change in economic growth patterns over human history. For most of human history, average living standards were stuck at the subsistence level. Growth started in the West after the 1750s and accelerated dramatically after the 1850s, ushering in the modern world. Growth started later (generally not until the mid 20th Century) in the rest of the world, leading to an explosion in inequality across countries. As can be seen in Figure 1, average living standards in China, India and Nigeria are still several times lower than in countries like the UK, Italy and Japan.

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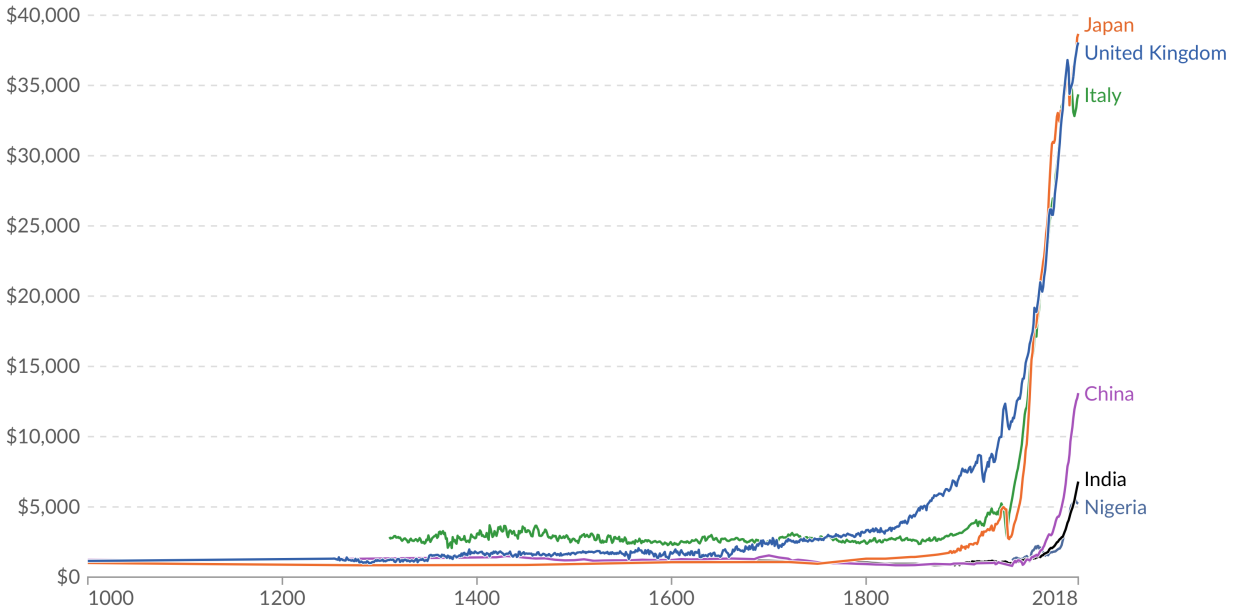
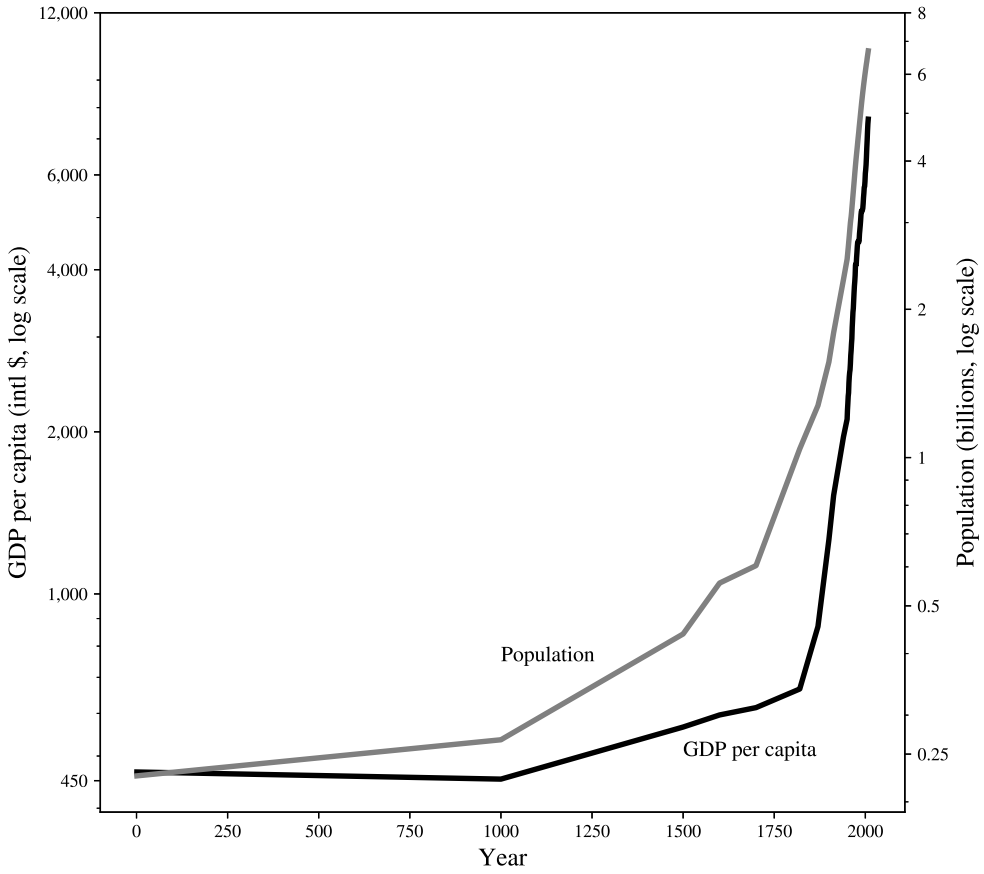
Figure 1: History's hockey stick: Real GDP per capita 1000-2018 for UK, Japan, Italy, China, India, and Nigeria.



Source: CORE project based on data from Maddison Project Database (2018).

An interesting historical pattern emerges when we examine population versus living standards, as done in Figure 2. World population took off before living standards began to rise significantly. Indeed, world population started increasing since the late Middle Ages, a few centuries before the start of modern economic growth. This indicates that some type of economic progress had already been in motion for centuries before the industrial take-off, but it was a different type of economic progress that resulted in larger population but not higher average living standards.

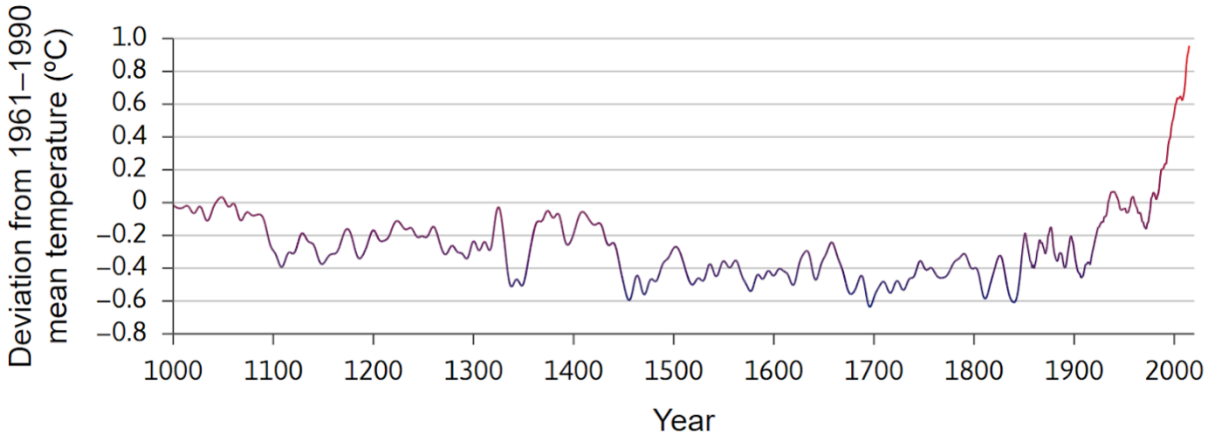
Figure 2: World population and GDP per capita over time, showing population growth preceding living standards improvements.



Source: Jones & Vollrath (2023).

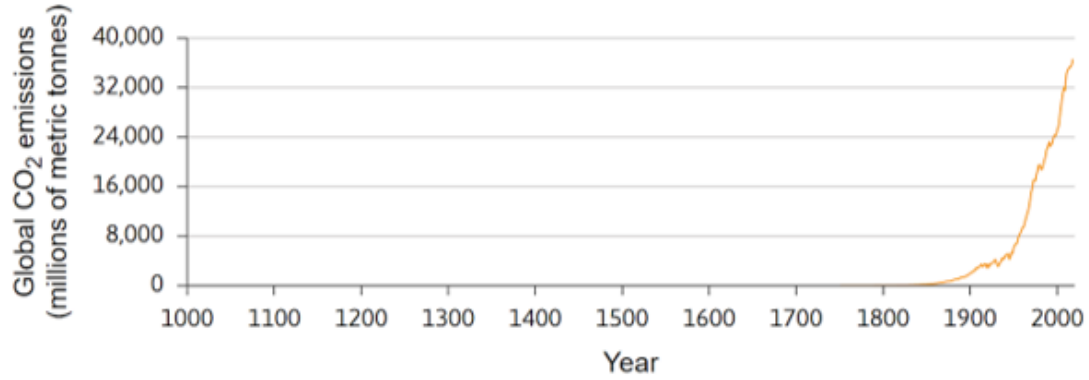
The dramatic increase in production and population growth has had significant environmental consequences. These include global impacts such as climate change, as well as local impacts including pollution in cities and deforestation. Figures 3 and 4 show the steep increase in global average temperature and global carbon emissions. The crucial question, on which our future might depend, is whether technological progress (together with government intervention) will also provide the solution to these environmental challenges.

Figure 3: Deviation from 1961-1990 mean temperature (°C) (1000-2018)



Source: CORE project.

Figure 4: Global carbon emissions from burning fossil fuels (1000–2018)



Source: CORE project.

2 Measuring Economic Growth

2.1 Macroeconomics is the field that studies growth

Within economics, the field that studies economic growth is called Macroeconomics. Macroeconomics is traditionally divided into two broad subjects: (1) Long-run economic growth; and (2) short-run fluctuations in economic activity.

Macroeconomics studies the behavior of the economy taken as a whole. It tries to explain the evolution of some key aggregate variables that describe the state of the economy. Given our interest in growth, we focus on defining and measuring three key areas: economic output through GDP, labor used in or available for production, and the price level and inflation rate.

When working with economic variables over time, we use specific mathematical notation. For any variable x, we denote x_t as the variable observed at time t; x_{t-1} as the variable at time $t-1$; and x_{t+1} as the variable at time $t+1$. The rate of change or *rate of growth* of x is sometimes denoted as g_x, and calculated as

$$g_x = \frac{x_t - x_{t-1}}{x_{t-1}} \tag{1}$$

2.2 Gross Domestic Product (GDP)

We measure economic activity or output using Real Gross Domestic Product (GDP), defined as the market value of all goods and services for final use.

GDP has been calculated since 1948, at least in Western countries. In the USA, this is done through the National Income and Product Accounts (NIPA), and in the UK through the UK National Accounts. In developing countries, national income accounts including GDP estimates typically started being built and published around the 1960s.

Let us unpack the definition of Gross Domestic Product, the market value of all goods and services for final use:

- "Value" means that to sum up quantities of different goods or services, we weight them according to their market prices.
- "Goods and services" encompasses both physical goods like cars, food, or iPhones, as well as services such as university lectures, doctor visits, accounting, and legal work.
- "Final use" means we count goods and services that are either consumed or accumulated as durable physical capital, but not ones used to produce other goods or services in the same period. For example, consider a car made of metal. The metal used in the production of the car (an *intermediate* good) is not included in computing GDP. However, the car, as the *final* product in which the metal is embedded, is included.
- "Real" indicates that we try to ignore raw inflation in all prices over time and all currency differences across countries, to get a measure of the actual volume of goods and services.

2.2.1 Three Equivalent Definitions of GDP

There are actually not one but three equivalent ways to define GDP. First, it represents the value of final goods and services produced in the economy during a given period. Second, it

equals the sum of value added in the economy during a given period. Third, it constitutes the sum of all incomes earned in the economy during a given period.

To illustrate these concepts, consider an economy with just two firms: a steel company and a car company. This economy is described in Figure 5. For simplicity, we assume that the steel company needs only labor to produce steel. The car company uses labor and steel to build cars. The steel company has revenues from sales of $100, expenses of $80 (all wages), and profit of $20. The car company has revenues from sales of $200, expenses of $170 (comprising $70 in wages and $100 in steel purchases), and profit of $30.

Figure 5: An example economy with two firms

Steel Company (Firm 1)			Car Company (Firm 2)		
Revenues from sales		$100	Revenues from sales		$200
Expenses		$80	Expenses		$170
Wages	$80		Wages	$70	
			Steel purchases	$100	
Profit		$20	Profit		$30

Source: Blanchard (2016)

- **Using the final goods approach**, GDP equals the value of cars ($200). Steel is not counted because it is an *intermediate* good that is used to produce the final good (cars).
- **The value added approach** computes GDP as the sum of the value added of all firms in the economy. The steel company's value added is $100. The car company's value added is $200 minus $100 equals $100. Therefore, aggregate value added is $200.
- **The income approach** sums labor income of $150 and profit income of $50 to reach $200.

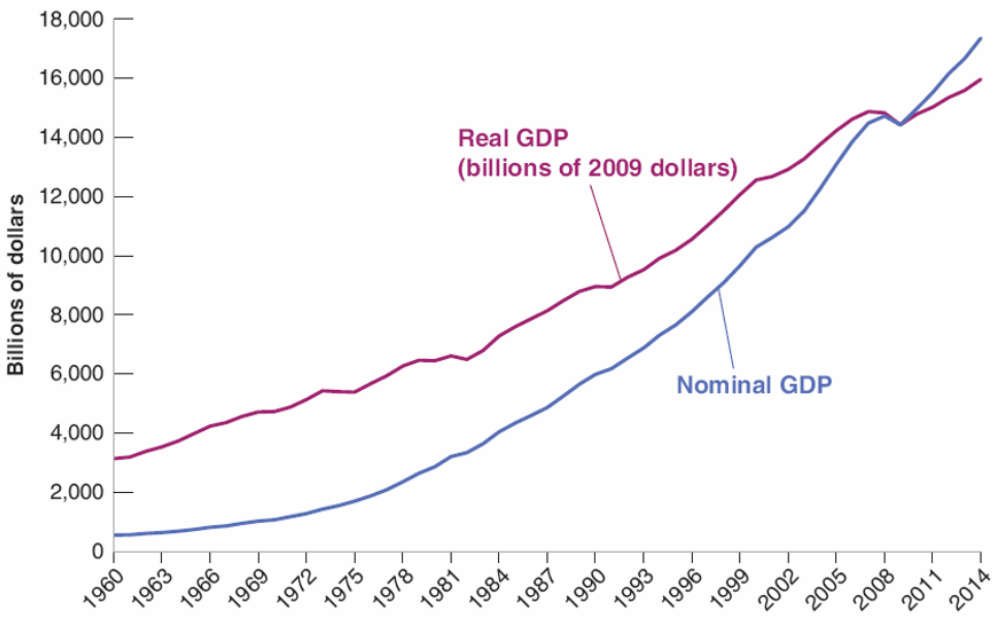
As you can see, all three methods yield the same result. This is always true in any economy, not only in our simple example.

2.2.2 Nominal vs. Real GDP

An important distinction exists between *nominal* and *real* GDP. Nominal GDP represents quantities produced multiplied by current prices, but since prices can change over time, this measure can be misleading. Real GDP represents quantities produced multiplied by constant prices. We basically fix prices in a given year to avoid changes in GDP just due to price

inflation rather than actual changes in quantities produced. Figure 6 displays nominal GDP vs Real GDP in the US economy (with Real GDP measured in billions of 2009 dollars), illustrating the divergence between current price and constant price measures over time. In the Real GDP measure in Figure 6 (purple line), the quantities of goods and services produced in each year are multiplied by their prices in 2009.

Figure 6: Nominal GDP vs Real GDP (in billions of 2009 dollars) for the USA



Source: Blanchard (2016)

2.2.3 GDP Level vs. Growth

We must distinguish between GDP level and GDP growth, and between total GDP and GDP per capita.

- **The GDP level** represents the volume of economic output produced during a given period, usually a year.
- **GDP per capita**, calculated as GDP divided by population, serves to measure living standards and make international comparisons.
- **GDP growth** represents the percentage increase or decrease in GDP over the previous period, calculated as $\frac{GDP_t - GDP_{t-1}}{GDP_{t-1}}$.

2.2.4 Purchasing Power Parity (PPP) Adjustments

When comparing GDP per capita across countries, we face the challenge that different countries use different currencies and have different price levels. A Purchasing Power Parity (PPP) adjustment is used to address this problem and produce Real GDP per capita figures that are comparable across countries.

First consider the problem of different countries using different currencies. GDP per capita in the USA is measured in US Dollars, but GDP per capita in China is measured in Renminbi, for example. To address this, we could simply convert GDP figures using market exchange rates: for example convert the GDP of all countries in US dollars. For example, on average in 2024 one Renmibi was worth around 0.14 US dollars at market exchange rates (or, equivalently, one US dollar was worth around 7.14 Renminbi). So, we could take GDP per capita in China in 2024 in Renmbibi, and multiply it by 0.14 to get China's GDP per capita in US dollars.

There is a further problem, however: there are significant differences in the price levels of goods and services across countries. Typically, prices are lower in poorer countries compared to richer ones. Ten US dollars buy much more in China than in the USA, for example. Because of this, if we simply converted GDP per capita in all countries in US Dollars (or some other currency), the resulting comparison would not accurately reflect differences in the amount of goods and services that people are able purchase with their income. In particular, we would overestimate the gap in living standards between rich and poor countries.

To summarize: *market exchange rates can be misleading because exchange rates may not reflect the actual purchasing power of currencies in their home countries.*

Purchasing Power Parity (PPP) is a method that adjusts for differences in price levels across countries. PPP-adjusted GDP per capita tells us how much a currency can buy in terms of goods and services in its home country, allowing for more meaningful international comparisons of living standards. The key insight behind PPP is that identical goods should cost the same in different countries when prices are expressed in a common currency. When this is not the case, PPP adjustments correct for these price differences.

In practice, the PPP methods consists in computing currency conversion rates across countries that equalize the purchasing power of one currency unit. Typically the US dollar is used as the benchmark. Therefore, the PPP method computes a "fictional" currency called 'international US dollars', and converts GDP per capita in all countries in this currency. This is constructed in such a way that the purchasing power of one international US dollar is the same in all countries.[1]

[1]This is the (more formal) definition provided in the OECD official website: "Purchasing power parities (PPPs) are the rates of currency conversion that aim to equalise the purchasing power of different currencies

But how do we know what the different price levels are in different countries (beyond a broad acknowledgement that prices are lower in poorer countries)? PPP adjustments are based on extensive price surveys conducted by international organizations like the World Bank. These surveys compare the prices of a standardized basket of goods and services across countries. The PPP conversion factor is then calculated as the ratio of domestic prices to international prices for this basket.

For example, if a standardized basket of goods costed $100 in the United States and 400 renminbi in China in 2024, the PPP conversion factor would be 4 renminbi per dollar (rather than using the market exchange rate of 7.14 renminbi per dollar).

Consider two countries with the same nominal GDP per capita when converted at market exchange rates. If one country has much lower domestic prices (particularly for non-traded goods and services), its PPP-adjusted GDP per capita will be higher, indicating that residents can actually purchase more goods and services with their income.

PPP adjustments are particularly important when comparing countries at different levels of development, as developing countries typically have lower price levels for many goods and services, especially those that are not traded internationally.

Consider again the example of China and the US. In 2024, China's GDP per capita was around 96 thousand renminbi, according to the National Bureau of Statistics of China. At market exchange rates, this translates to approximately 13 thousand USD. The PPP-adjusted figure is significantly higher, however, at around 24 thousand international dollars.

In this course, we will primarily use PPP-adjusted GDP per capita figures when making international comparisons, as they provide a more accurate picture of relative living standards across countries.

2.2.5 Using the logarithmic scale to visualize growth

To visualize long-run growth and differences across countries, we often use a logarithmic scale, plotting $\log(GDP)$ or $\log(GDP$ per capita). This means that instead of plotting GDP in constant dollars (or pounds or yens), we plot the *natural logarithm* of GDP in constant dollars. This means using a *log scale*.

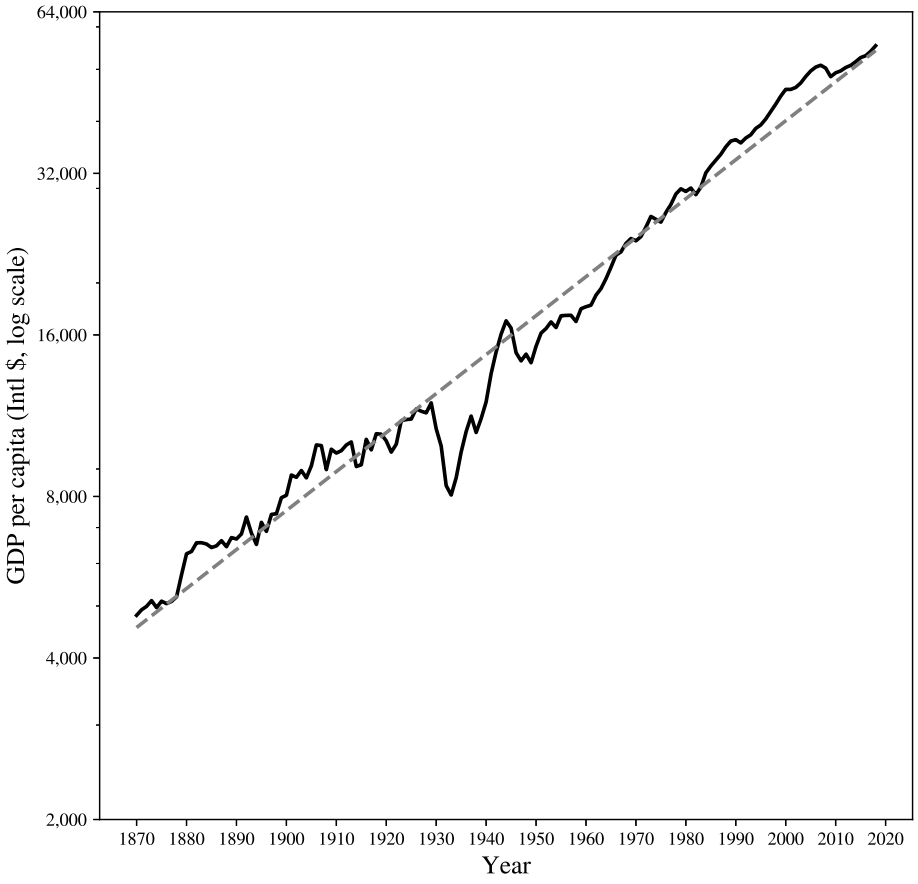
The log scale has several useful advantages. A constant growth rate appears as a straight line, with slope proportional to growth rate, where steeper slope indicates faster growth. Equal percentage changes appear as equal distances on the chart, facilitating comparison

by eliminating differences in price levels between countries. The basket of goods and services priced represents a sample of all those included in final consumption expenditure, actual consumption, gross fixed capital formation, and total goods and services. This indicator is measured in terms of national currency per US dollar."

across countries. If the GDP of country A remains 10% higher than the GDP of country B over time, their distance on the log scale remains the same.

Figure 7 illustrates this by showing the natural logarithm of Real GDP per capita for the United States from 1870 to 2020. The average growth rate was broadly constant in the US since 1870 (approximately at 3 percent), which on the log scale results in a straight line.

Figure 7: Real GDP per capita for the United States, 1870-2020, log scale



Source: Jones & Vollrath (2023)

2.3 Measuring Labor used in (or available for) production

A key factor, in studying economic growth, is the amount of labor used in (or available for) production.

Some key concepts help us define and measure labor used in production. Employment (N) refers to the number of people who have a job, while unemployment (U) represents the number of people without a job and actively looking for one. The labor force (L) equals employment plus unemployment, and working-age population refers to the number of people aged 15-64.

From these basic measures, we derive several important rates. The unemployment rate equals unemployment divided by the labor force, often denoted as $u = \frac{U}{L}$. The employment rate represents employment divided by working-age population, while the participation rate equals labor force divided by working-age population.

2.4 Inflation

Understanding inflation requires first introducing the concept of the *price level*. The price level (P) represents a weighted average of the prices of all goods and services. The inflation rate (π_t) represents the growth rate of the price level, calculated as

$$\pi_t = \frac{P_t - P_{t-1}}{P_{t-1}}$$

Deflation occurs when inflation is negative, meaning that the price level decreases.

2.4.1 Alternative measures of the price level and inflation

Two main empirical measures capture the price level: the GDP deflator and the Consumer Price Index (CPI).

The GDP deflator measures the price level of *domestically produced* goods and services, calculated as the ratio of nominal GDP to real GDP:

$$P_t = \frac{\text{Nominal GDP}_t}{\text{Real GDP}_t}$$

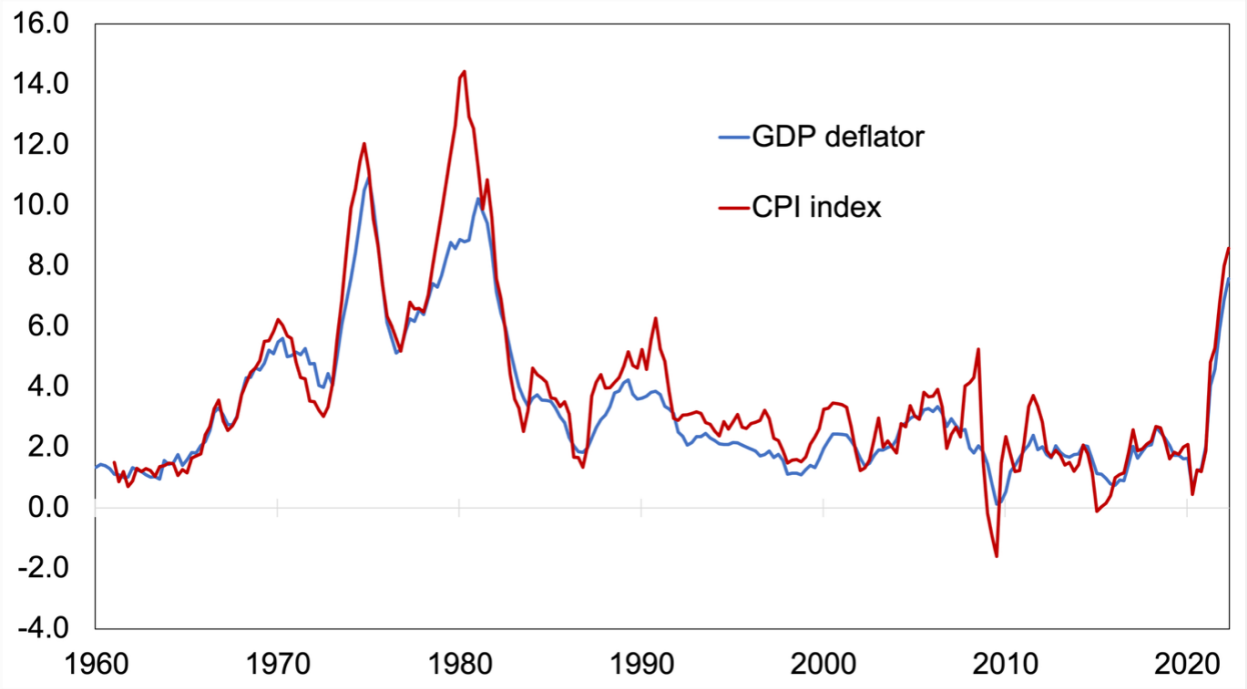
The Consumer Price Index (CPI) measures the price level of goods and services bought by consumers, representing the dollar (or pound, or yuan) cost of a 'typical' basket of goods and services. The typical consumption basket used to compute the CPI includes domestically produced goods and services sold on the domestic market, but also *imported* goods and services).

Given that there are two main measures of the price level, it follows that there are also two main measures of inflation: Inflation using the GDP deflator; and inflation using the CPI ('CPI inflation').

Generally, measures of inflation using the CPI or the GDP deflator move together, as shown for the US economy in Figure 8. The main exception occurs when the price of imported goods rises much faster than that of domestically produced goods. This for example happened in the US (and in other industrialized countries) during the oil shocks of the 1970s, when the price of oil imported from international markets rose much faster than the prices of

domestically produced goods. In the recent inflation surge of 2021-2024, CPI and GDP deflator behaved similarly in the US.

Figure 8: Inflation in the US: GDP deflator vs CPI index, 1960-2020



Source: The author based on data from Federal Reserve Economic Data (FRED)

2.4.2 Why Inflation Matters

Inflation matters for several reasons. It tends to redistribute income arbitrarily, creates uncertainty and instability for families and firms, and decreases competitiveness of a country's exports. Deflation also presents problems, as it increases the real value of debts, makes monetary policy less effective, and makes people postpone spending. In general, low and stable inflation is considered best for growth.

3 Economic growth in human history: Stylized facts

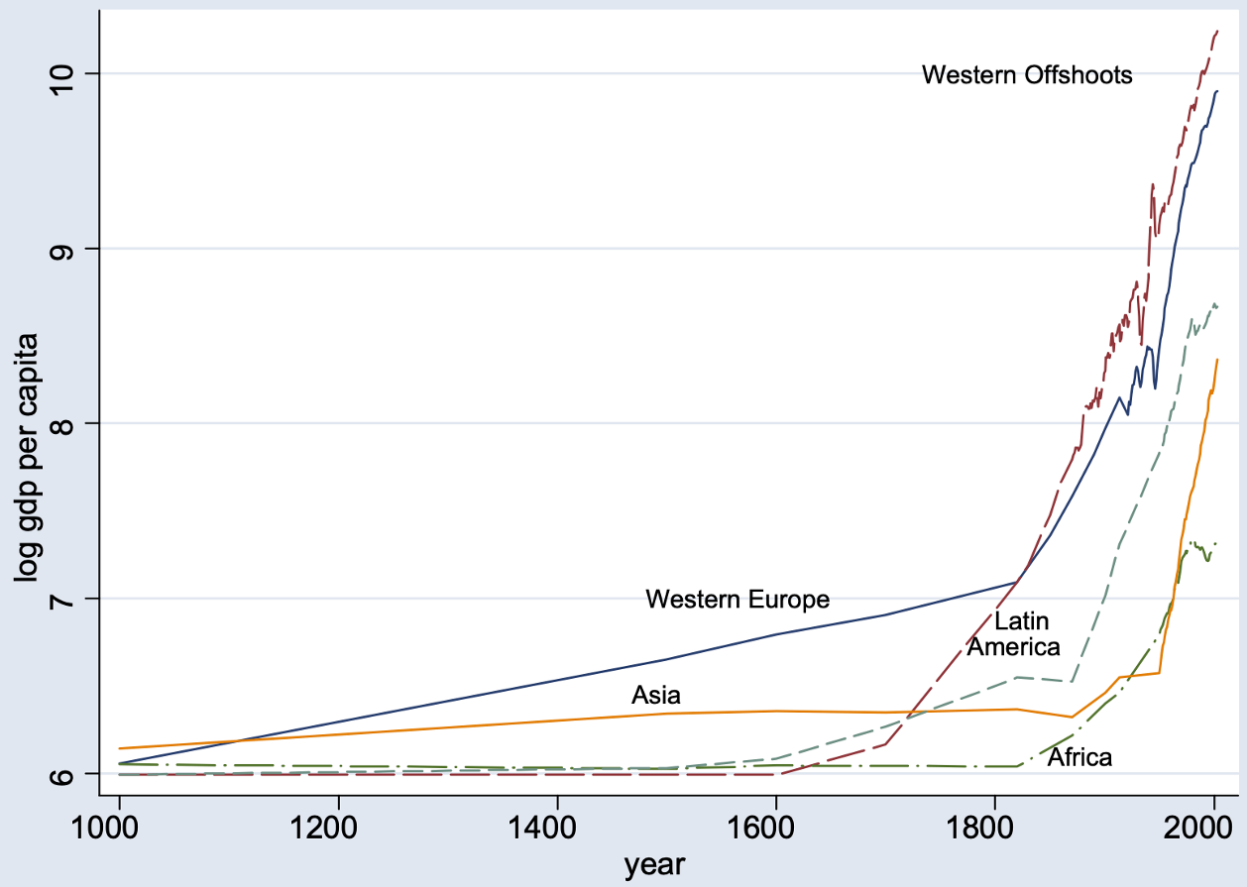
3.1 The Great Divergence

The "hockey stick" graph of Figure 1 reveals several important patterns in global economic development. The initial waves of economic growth in the 18th and 19th centuries were enjoyed by only a few countries in Western Europe and in the Western 'offshoots' (United States, Canada, Australia and New Zealand). The rest of the world was left out of economic

development– or in many cases its development was actively blocked by colonization. This led to a huge gap between a small number of industrialized Western countries and the rest of the world, known as the Great Divergence. This gap largely persists today, with a huge gap still existing between rich countries like Britain or the United States, and poorer countries like China or India, although in the late 20th century China and India have started growing as well.

Figure 9 is another version of the 'hockey stick' graph, this time by world region. In 1,000 AD, Asia was actually richer than Western Europe – although differences were small compared to the ones we observed today. During the 1800s, the Great Divergence took place: a huge gap developed between the West (including both Western Europe and Western offshoots like USA, Canada and Australia) and the rest of the world.

Figure 9: Log GDP per capita by world region, 1000-2000, showing the Great Divergence between the West and the rest of the world.

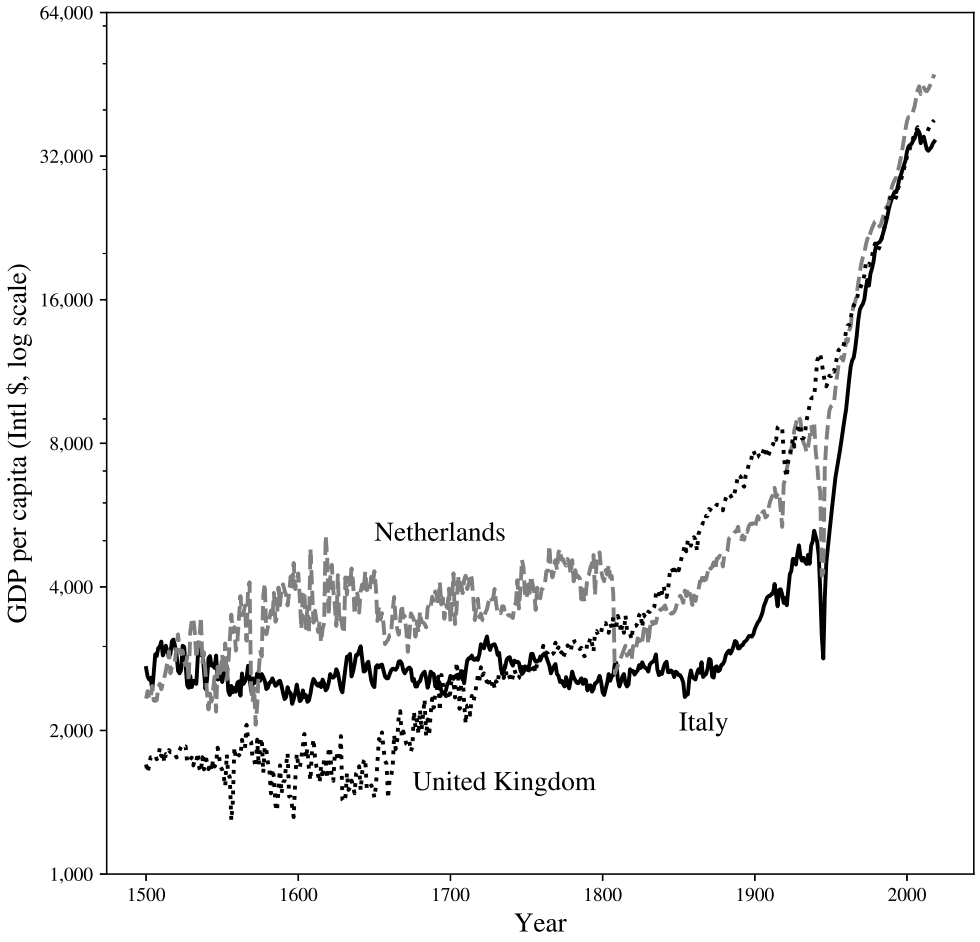


Source: Acemoglu (2017).

3.2 Variation within the West

Even within the West, however, substantial variation in growth patterns exists. This is illustrated in Figure 10, which uses the Netherlands, Italy and the United Kingdom as an example. During the 1500-1700 period, the Netherlands and Italy were the richest countries in Europe, and the United Kingdom was substantially poorer than them. By the mid-1750s, however, Britain became the first country to experience sustained industrial growth and overcame these earlier leaders. While the Netherlands industrialized relatively soon after the United Kingdom, Italy fell behind until its 1950s-60s "growth miracle". In the 20th century, the USA (not shown in Figure 10) surpassed Great Britain to become the greatest economic and political power.

Figure 10: GDP per capita, 1500-2019, selected western countries



Source: Jones & Vollrath (2023)

3.3 Current Global Inequality

The huge inequalities that opened up during the Great Divergence largely persist today. Approximately 80% of the world population lives in countries with GDP per capita less than one-third of the USA level. However, thanks to rapid growth in India and China, there was a substantial drop in the percentage of world population with income less than one-tenth that of rich countries, meaning that extreme poverty has decreased.

These pattern are displayed in Figures 11 and 12.

Figure 11 displays the cumulative distribution of world population by GDP per capita in 2019. To interpret this cumulative distribution figure, we need to understand each axis and what the curve represents. The horizontal axis shows GDP per capita relative to the United States, ranging from 0 to about 120, where 100 represents the US level of GDP per capita. The vertical axis shows the percent of world population, ranging from 0 to 100 percent. The curve itself represents a cumulative distribution, meaning that for any point on the horizontal axis, the corresponding point on the vertical axis tells us what percentage of the world's population lives in countries with GDP per capita at or below that level. For example, reading from the graph, we can see that approximately 80 percent of the world's population lives in countries with GDP per capita less than one-third (33 percent) of the US level. The curve rises steeply at first and then flattens out, indicating that most of the world's population is concentrated in relatively poor countries, while only a small fraction lives in countries approaching US-level prosperity.

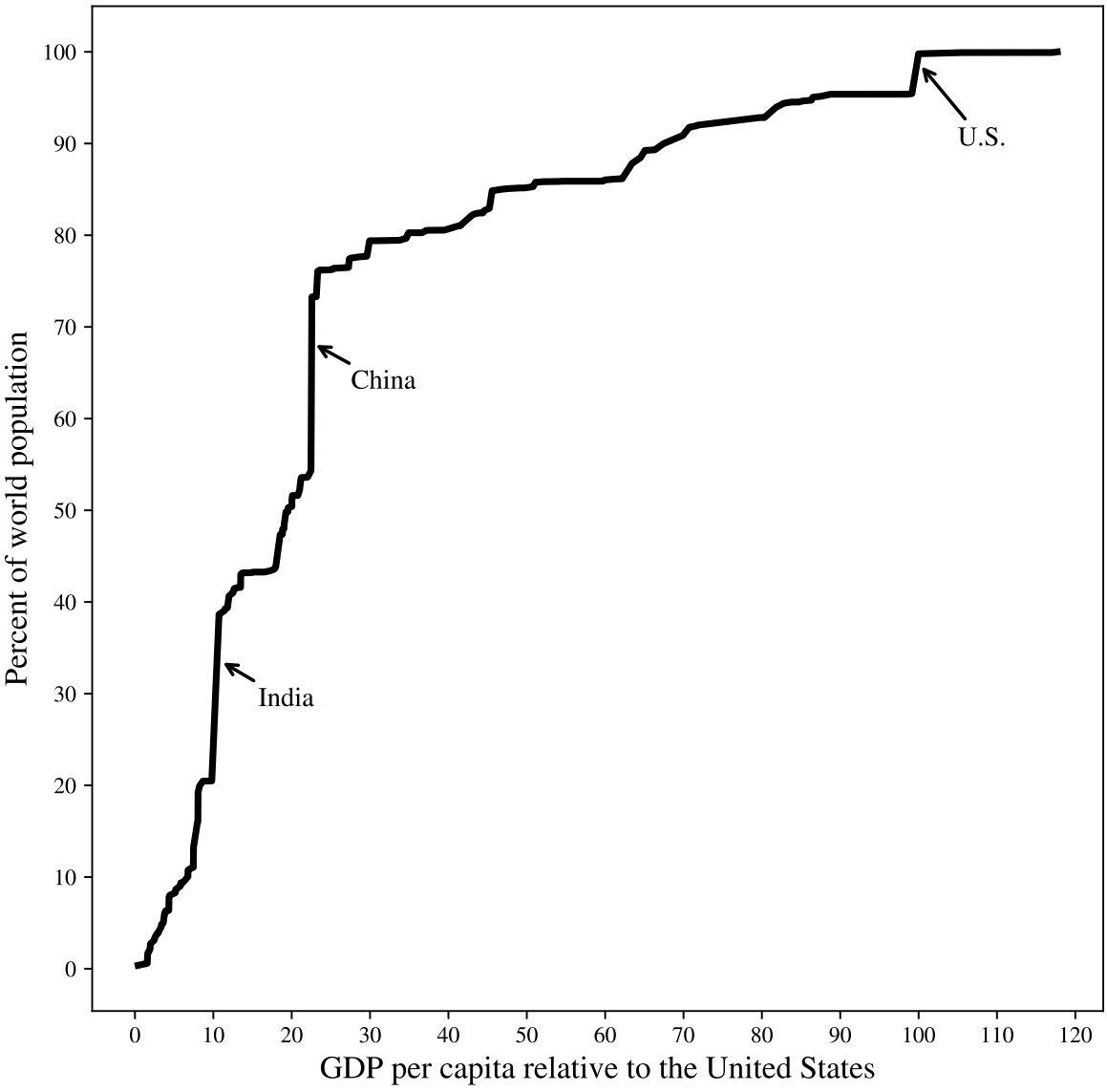
Key insights from this figure include the dramatic global inequality in living standards, with the vast majority of humanity living in countries significantly poorer than the United States, and the fact that countries like China and India, despite their fast recent growth, still have GDP per capita levels well below those of developed nations.

Figure 12 displays a histogram of world population by GDP per capita in 1960 and in 2019. To interpret this comparative histogram, we need to understand how it displays changes in global income distribution over nearly six decades. The horizontal axis shows GDP per capita relative to the United States, where each bar represents a range of income levels from 0 to 100 (with 100 being the US level). The vertical axis shows the percent of world population falling within each income range. The chart displays two sets of bars: black bars representing the distribution in 1960, and gray bars representing the distribution in 2019. Reading from left to right, we can observe several important patterns. In 1960, there was a massive concentration of world population in the leftmost bar (representing the poorest countries), with nearly 60% of global population living in countries with GDP per capita less than one tenth of the US level. By 2019, this extreme concentration had diminished significantly: the share of world population with GDP per capita less than one tenth of the USA fell to around 20%, and the

world population more spread across relatively higher income categories.

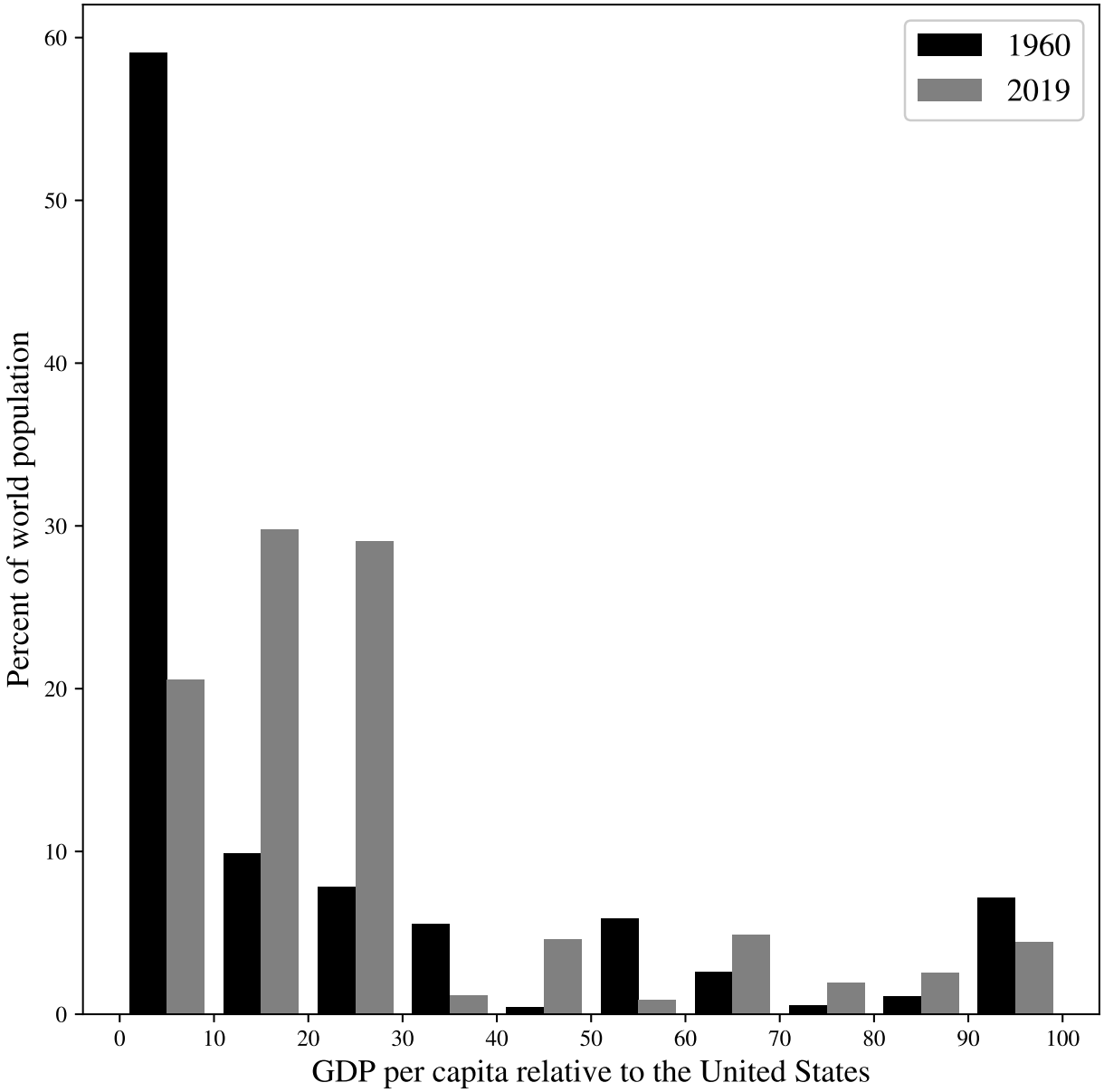
Figure 12, therefore, reveals a substantial reduction in extreme poverty, as the percentage of people with extremely low income levels declined dramatically. However, it also shows the persistence of global inequality, as most of the world's population in 2019 still lived in countries with GDP per capita well below half of the US level. The rightward shift of the distribution reflects the economic growth experienced by large developing countries, particularly China and India, which moved hundreds of millions of people out of extreme poverty while still remaining significantly poorer than developed nations.

Figure 11: Cumulative distribution of world population by GDP per capita in 2019



Source: Jones & Vollrath (2023).

Figure 12: World population by GDP per capita, 1960 and 2019



Source: Jones & Vollrath (2023).

The case of India illustrates both the persistence of global inequalities and the recent progress. Let us use the UK, which was historically the colonial power in India, as the benchmark in this case. GDP per capita in India relative to the UK was 8.6% in 1960, 9.4% in 2008, and 15.2% in 2019. This shows clear gradual improvement, especially in the last two/three decades, but it still represents a *massive* gap.

3.4 Four stylized facts

Summarizing the evidence reviewed so far, we can identify four key facts that characterize global economic growth patterns in human history to date:

1. The rate of economic growth has not been constant in human history. For most of human history, growth rates were essentially zero, but increased sharply in the 19th and 20th centuries. There is also large variation in growth rates between different countries.

2. The first waves of growth in the 18th and 19th Centuries only involved a few nations in the West, opening up a big gap with the rest of the world, which largely persisted subsequently.

3. As a result, today there is enormous variation in GDP per capita across economies, with GDP per capita in the poorest countries around *twenty times smaller* than in the richer ones.

4. However, many countries outside the West have started growing in the 20th century.

3.5 GDP and Living Standards

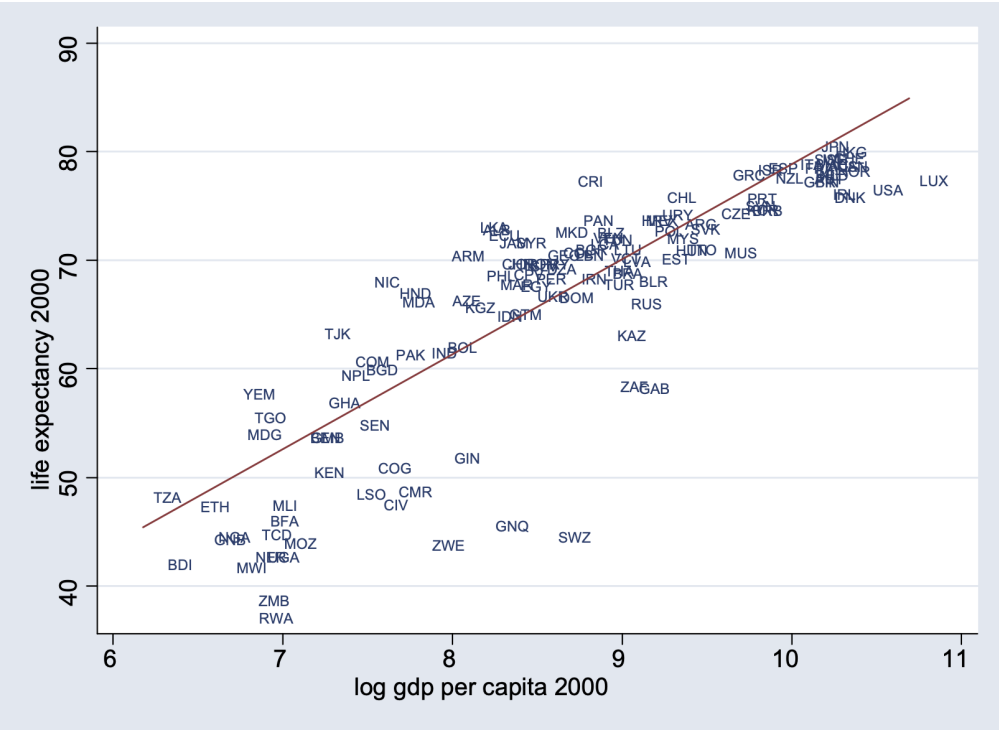
While GDP per capita serves as our primary measure of economic development, it has important limitations as an indicator of material living standards. It ignores many of the things that make life worth living, and it ignores how income is distributed within the country. Some things that make life worse, like car accidents and excessive alcohol consumption, increase production and therefore GDP. In a given country in a given period, a positive rate of growth alone is not a guarantee that life improved for most people.

However, GDP per capita differences between rich and poor countries do reflect similarly large differences in quality of life, living standards, and health. Higher GDP per capita strongly correlates with higher consumption per capita. People in the richest countries are not only producing more than 20 times as much as in the poorest ones, but they are also consuming 20 times as much. Higher GDP per capita also correlates with higher life expectancy. Life expectancy at birth is around 80 years old in the richest countries, but only between 40 and 50 years old in many sub-Saharan African nations.

Figure 13: Correlation between income per capita and consumption per capita (2000)

Source: Acemoglu (2007).

Figure 14: Correlation between income per capita and life expectancy in 2000



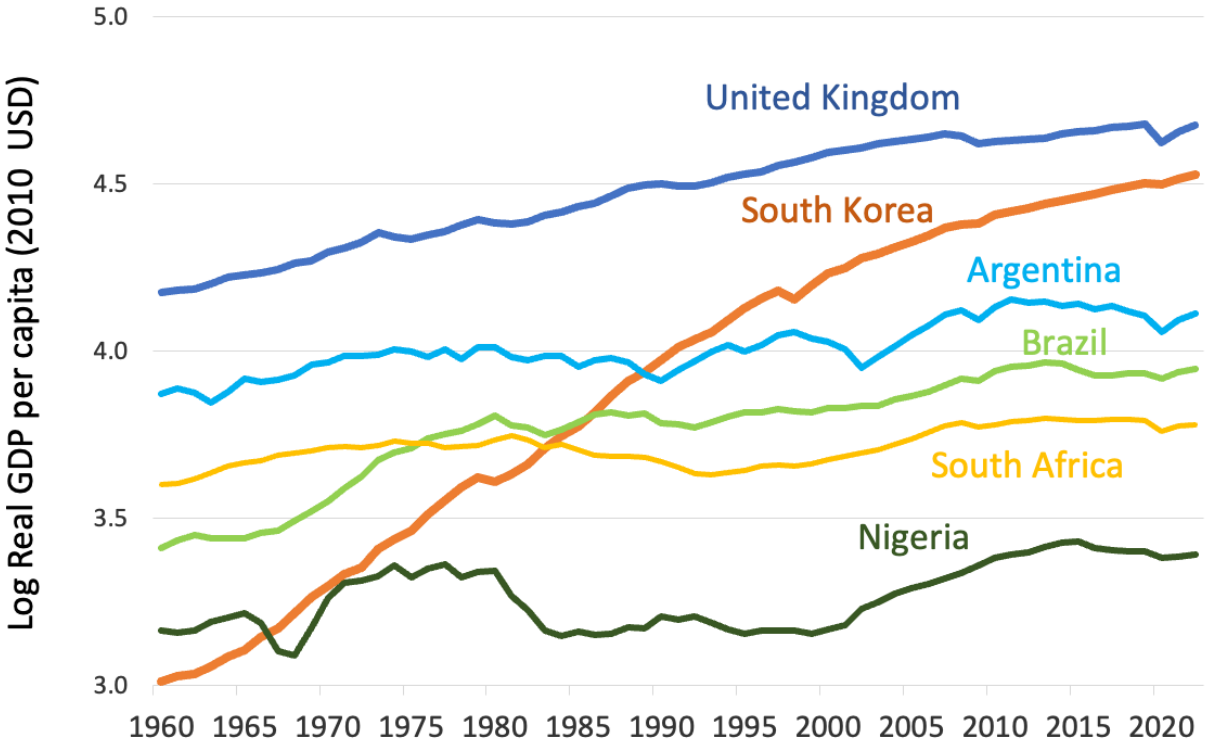
Source: Acemoglu (2007).

3.6 Convergence, Divergence, and Persistence

The organizing concepts of *convergence*, *divergence* and *persistence* are helpful in understanding different patterns of economic development:

- *Convergence* occurs when poorer countries catch up with the richer ones. It requires countries that are initially poor to grow faster than rich ones for long periods of time.
- *Divergence* represents an income gap that keeps *increasing* over time. Divergence occurs when the countries that are initially richer systematically grow faster than the countries that are initially poorer, resulting in a widening income gap.
- *Persistence* occurs when relative income positions remain more or less stable over time. Persistence occurs if there is no systematic tendency for poor countries to grow faster or slower than the rich ones, so that initial differences in the *level* of income per capita persist over time. Persistence implies that the relative ranking of nations with respect to GDP per capita remains stable over time.

Figure 15: Convergence, divergence and persistence: Log Real GDP per capita (2010 USD) for selected countries, 1960-2020



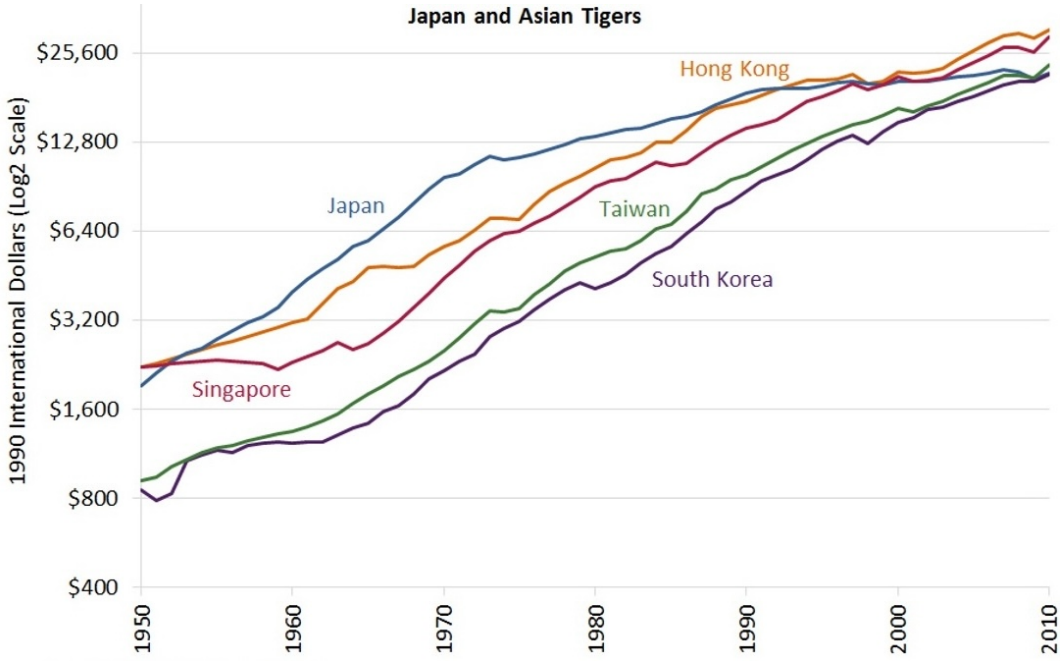
Source: The author based on data from Federal Reserve Economic Data (FRED)

Figure 15 above displays examples of convergence, divergence and persistence. South Korea from 1960 to 2020 exemplifies successful convergence, catching up with Western income levels through sustained high growth. Many countries including Brazil, South Africa, and Nigeria demonstrate persistence, approximately maintaining their gap with Western economies, at least on average over long periods of time. Argentina is an example of divergence, falling further behind despite being relatively close to Western income levels at the beginning of the period.

3.6.1 Convergence: Japan & the Asian Tigers

Japan and the four so-called 'Asian Tigers' (Hong Kong, Singapore, South Korea and Taiwan) achieved successful convergence during the 20th Century. They maintained rapid GDP growth of (on average) 7-10% annually for several decades. By the 1990s they had essentially caught up with the West. They did so through several key factors. Their growth was led by manufacturing exports. They invested heavily in human capital through education and skills development. The government played a role through targeted intervention and planning, including industrial policy, though there is debate about its precise role. They achieved fast technological progress and a gradual shift from labor-intensive to high-tech sectors.

Figure 16: Economic Growth in Japan and the 'Asian Tigers': log Real GDP per capita (1990 $), 1950-2010



Source: Restrepo-Echavarría & Arias (2017) using data from Maddison Project Database.

3.6.2 Convergence within the West but lack of global convergence

We often study convergence (or lack thereof) using a *convergence plot*. A convergence plot shows initial log income on the horizontal axis and the subsequent average yearly growth rate on the vertical axis. A negative relationship between initial GDP per capita and subsequent average growth indicates convergence: the countries that are initially poorer tend to grow faster and therefore to catch up.

The patterns of convergence in the 20th Century differed dramatically when examining Western countries versus all countries globally. This is shown in Figure 17, which shows 'convergence plots' for the period 1960-2000 for Western countries (left panel) and for all world countries for which data is available (right panel). In these Figures, we have the log of GDP per capita in 1960 on the horizontal axis, and the average yearly growth rate during 1960-2000 on the vertical axis.

Western countries post World War II show clear convergence. Within the West, countries like Greece, Portugal, Italy and Spain that were behind grew faster and caught up with leaders like the UK and USA. This is shown in the left panel of Figure 17: There is a clear negative relation between initial income per capita and subsequent growth among Western economies.

However, the same convergence plot for all world countries shows no sign of convergence. This is shown in the right panel of Figure 17. Across all world countries, there is no clear relationship between initial GDP level and subsequent growth, and the average slope is slightly positive, meaning poorer countries tended to grow slower. Clearly, South Korea and the other "Asian Tigers" were exceptional cases.

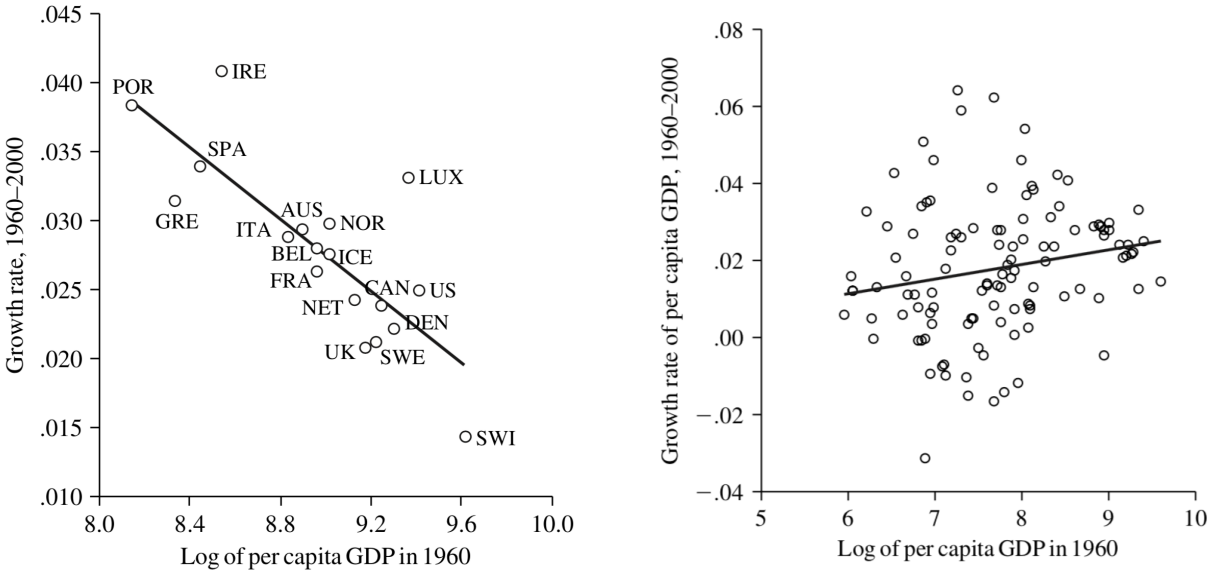
This pattern might have changed in the first two decades and a half of the 21st Century: some convergence might be occurring worldwide, thanks to a high average rate of growth in countries like China and India (much faster than in high income countries). However, they are still very far from the income levels of the richest countries, making it too early to draw definitive conclusions.

3.6.3 Divergence: Argentina's Growth Disaster

Argentina presents a striking case of economic divergence. In 1913, it was the 10th richest country in the world, with a level of average living standards not far below the richest Western countries and a GDP per capita equal to 80% of the US level. By 1960, this had fallen to 50% of US GDP per capita, and by 2022, to just 30% of US GDP per capita.

Several factors contributed to Argentina's decline. Political instability, including military coups and institutional breakdowns, created an unstable environment for economic develop-

Figure 17: International evidence on convergence: 1960 income and subsequent (1960-2000) growth

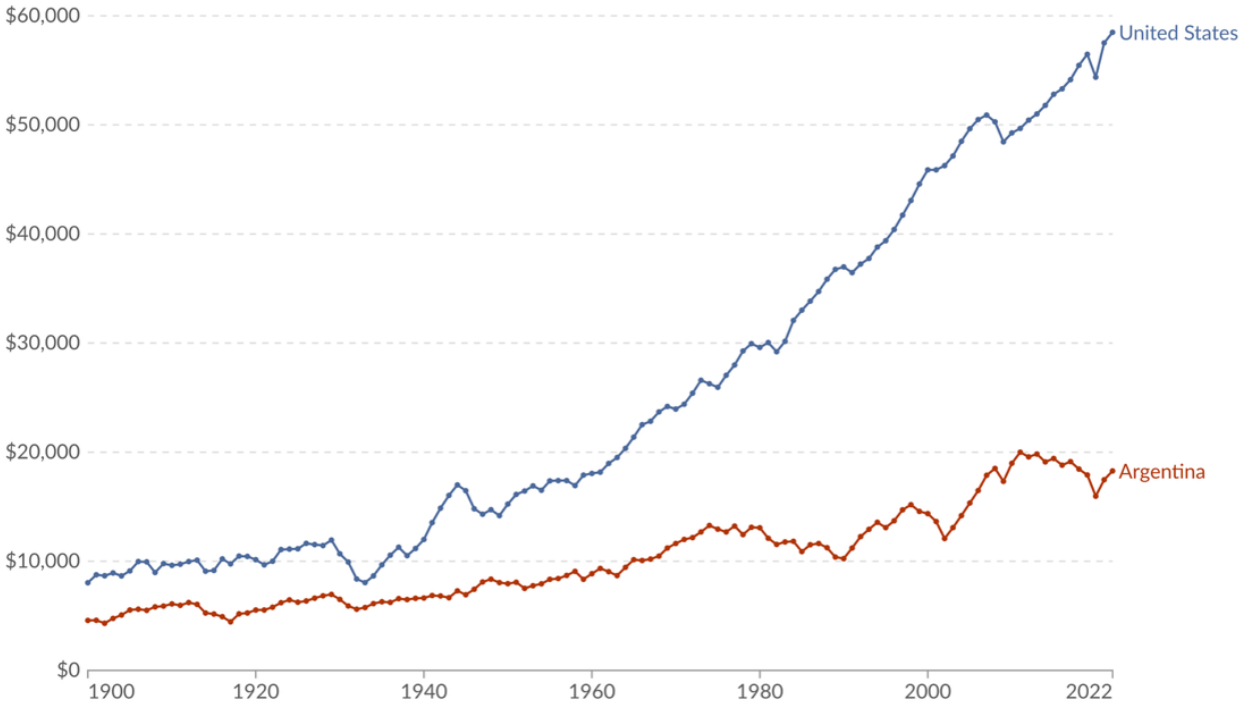


(a) West (18 original OECD members) **(b)** world (114 countries)

Source: Romer (2018)

ment. Protectionist policies limited integration with global markets. Hyperinflation episodes undermined economic stability. Financial crises and debt defaults disrupted economic activity. Finally, the country failed to transition to advanced manufacturing, limiting its ability to compete in higher value-added sectors.

Figure 18: Real GDP per capita 1900 to 2022 for United States and Argentina



Source: Our World in Data, using data from Bolt and van Zanden - MPD 2023.

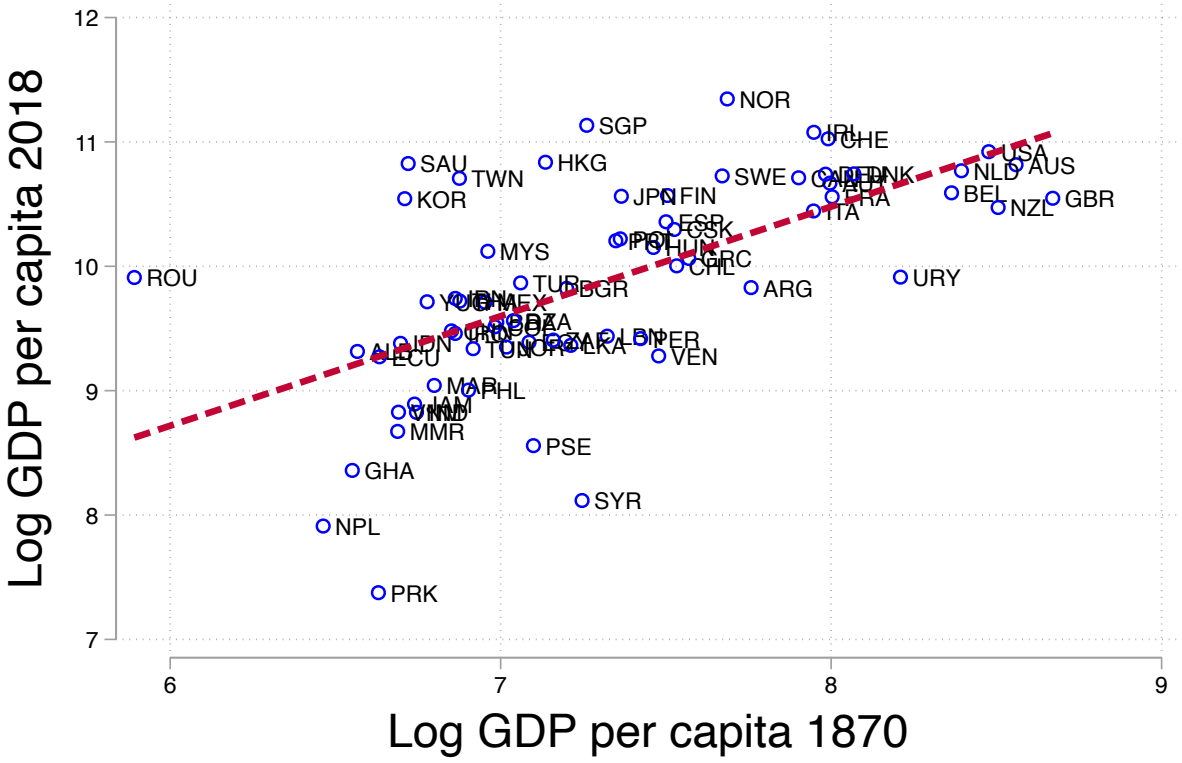
3.7 Persistence in income per capita

While a few countries like Japan and the "Asian Tigers" successfully converged and a few countries like Argentina diverged, they represent (important) exceptions, not the rule.

The general trend, and perhaps the most important force in the history of economic development so far, has been *persistence*. This general trend is displayed in Figure 19 below, which displays log GDP per capita in 1870 on the horizontal axis, and log GDP per capita in 2018 on the vertical axis. The graph shows a clear and strong positive relation between GDP per capita in 1870 and GDP per capita in 2018.

In other words: *income in 1870 strongly predicts income today across countries*. The countries that were richest in 1870 are on average still the richest today, demonstrating the remarkable stability of relative economic positions over more than a century and a half.

Figure 19: Log GDP per capita 2018 vs Log GDP per capita 1870



Source: The author based on data from Penn World Tables