Lunch atop a Skyscraper (1932). Taken during the construction of the RCA Building in New York

Ascent

Capitalism, Markets, and Innovation

Measuring economic influence

Management 3050: Course Structure

Section 1. The American Venture

- How did the United States create institutions that produced prosperity?
- What were the main economic challenges faced by the young nation, and how did they affect our future?

Section 2: Industry & Innovation

- How did the United States become the world's largest manufacturing nation?
- Why were many of the great inventions created or commercialized here?

Section 3: Booms & Busts

- How did the U.S. develop the world's dominant currency and financial system?
- How did recessions and panics shape the U.S. economy and government?

Today's question: what were the main sources of long-term economic growth in America, and how did they change over time?

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2. The production function
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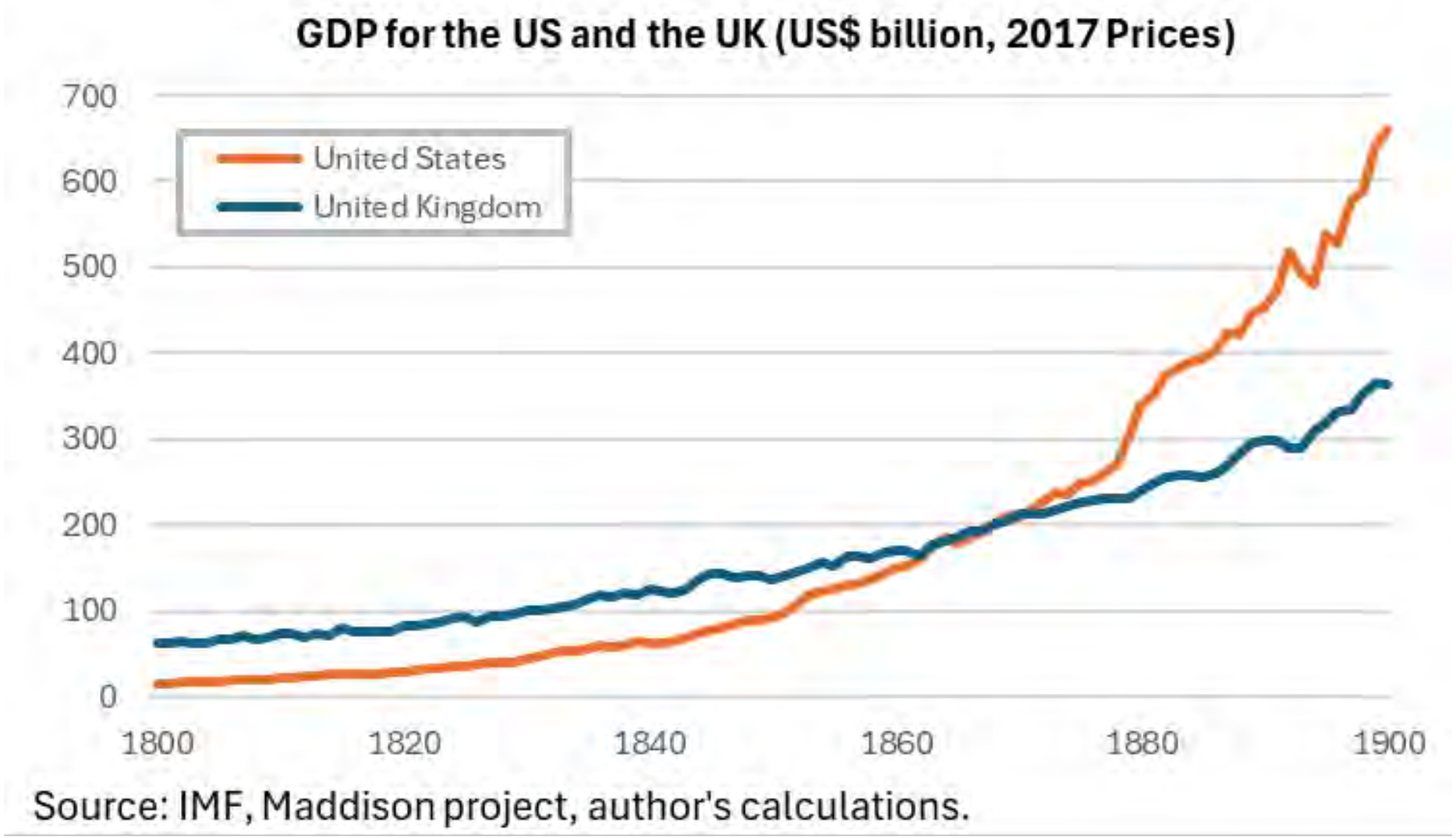
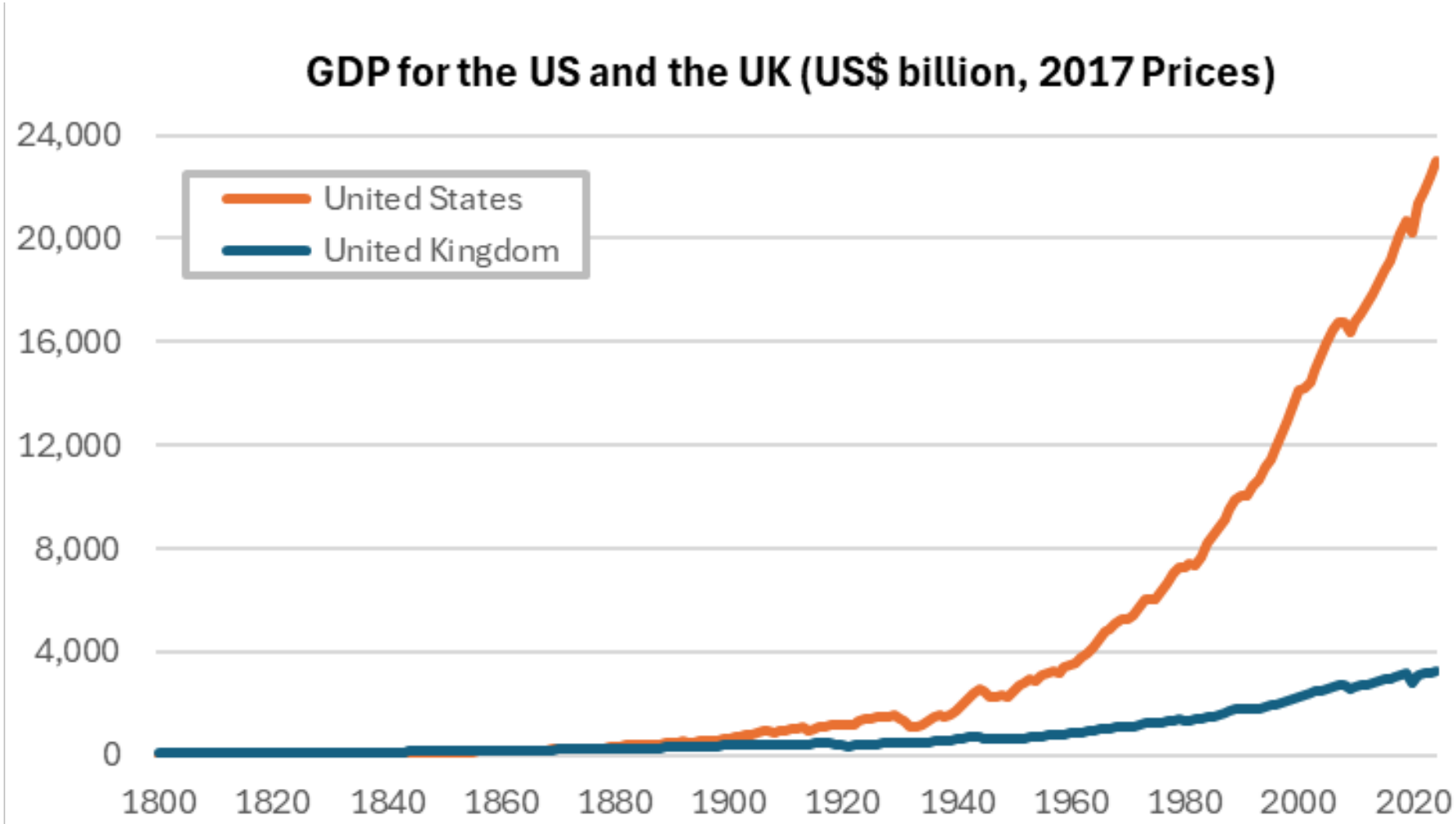
Measuring economic influence



Source: IMF, Maddison project, author's calculations.

Measuring economic influence



Source: IMF, Maddison project, author's calculations.

Basic measures

- **Real GDP** is the main measure of the economic health of a country.
  - ✓ We'll use GDP to assess whether a country is expanding or contracting, and to compare economic size and influence across countries.

- **GDP per capita** is a widely used measure of living standards.
  - ✓ GDP per capita is real GDP divided by population.

GDP: definition

Gross domestic product (GDP) is the market value of all final goods and services produced in a country in a given period of time.

- **Final goods and services** are not used in the production of another good or service.
  - ✓ We do not count intermediate inputs (such as steel or energy).
- **Period of time:** we'll focus on annual GDP.
- We'll focus on **real GDP,** which calculates market value using constant prices from a base year.

In or out?

Choose whether the following items would be included in estimates of a country's GDP.

1. New car bought from a dealership.
2. Used car bought from a friend.
3. Wood used to make furniture.
4. Meal purchased at a restaurant with your family.
5. Meal cooked at home for your family.
6. Purchase of NVidia on the stock market.
7. Construction of a new office building.
8. You buy meth behind the stadium.

GDP: key concepts

1. An increase in real GDP is an increase in the quantities of goods and services produced.

2. GDP measures the value of production, but also provides a measure of the **income** of a nation.
   - Income includes wages, rents, and profits.

GDP and economic influence

The GDP of a nation represents:

- Importance as an importer or an exporter.
- Ability to support military or provide foreign aid.
- Influence in international organizations through contributions or voting shares.

All of these affect political influence (as well as economic influence).

Drawbacks of GDP

- Many dimensions of well-being are not directly included in GDP.
  - ✓ For this reason, we often look at life expectancy, height and weight, years of education, surveys of happiness.
  - ✓ GDP doesn't include leisure.
- Measurements of GDP exclude most activity that takes place outside markets.
- GDP says nothing about the distribution of income.

Drawbacks of GDP

- Production of goods and services can have negative externalities.
  - ✓ An externality is a cost or benefit that arises from an economic activity which (a) affects an unrelated third party and (b) is not included in the cost of the activity.
  - ✓ For example, fossil fuels account for 75% of carbon emissions. Neither the producer or consumer of fossil fuels pay for the cost of emissions.

Historical GDP is imprecisely estimated

- National economic statistics were developed in the 1930s and 40s, spurred by the Great Depression and the end of World War II.
  - ✓ The United Nations published the System of National Accounts in 1953.
- Historical GDP is estimated using indirect methods (for example, estimating based on agricultural productivity).

Economic growth

- Economic growth = the percentage change in real GDP in one year.

  Growth (1900) = [GDP (1900) – GDP (1899)] / GDP(1899)

- In the first part of the course, we're interested in economic growth over long periods of time.
  - ✓ Thus, we will look at averages (for example, the average over 10 or 20 year periods).

Economic growth in the United States (period average)

1800-49	3.9%
1850-99	4.1%
1900-49	2.8%
1950-99	3.6%
2000-24	2.2%
1800-2024	3.4%

Measuring economic influence

Source: IMF, Maddison project.

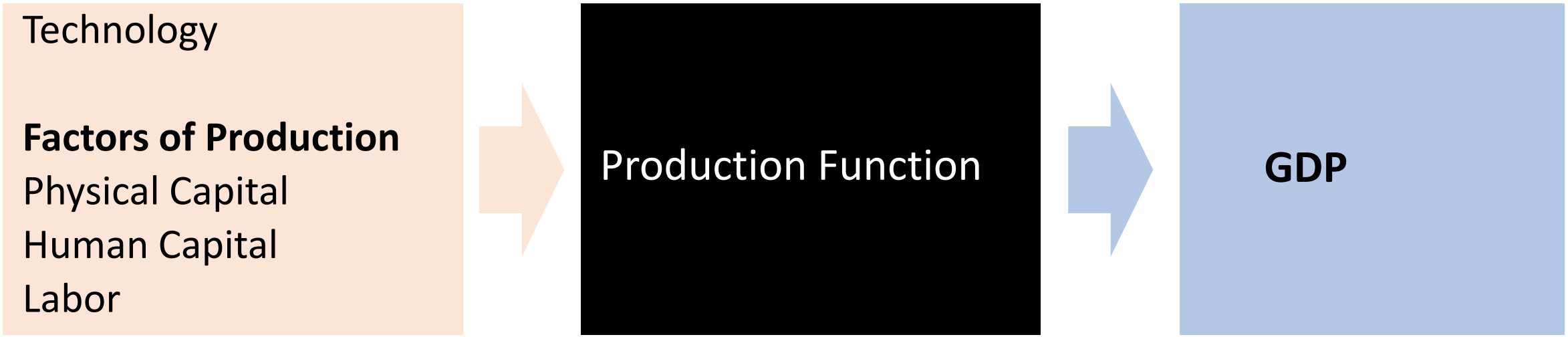
The basic idea

The **production function** shows how GDP is produced with **technology** and inputs called **factors of production.**

- Technology represents society's knowledge of how to produce GDP.

Real GDP growth is driven by (1) increases in factors of production or (2) improvements in technology.

The aggregate production function



Factors of production

GDP is produced with inputs called **factors of production.** These include:

- Land, labor, and natural resources.
- **Physical capital** is the stock of equipment and structures used to produce goods and services.
  - ✓ Physical capital is made from goods and services produced in the past. It is a ***produced*** factor of production.
- **Human capital** is the knowledge and skills that workers acquire through education, training, and experience.

Technology

Technology represents society's knowledge of how to produce GDP.

Technological progress represents improvements in society's knowledge of how to produce GDP.

Technological progress can be due to:

- New forms of energy: steam engines, electricity, fossil fuels.
- New inventions: steamships, railroads, typewriters, computers.
- Improvements to the production process: specialization, interchangeable parts, development of management techniques.

Measuring technology

- Technology is hard to measure directly.
- One common variable is **total factor productivity (TFP),** a measure of the efficiency with which factor inputs are transformed into GDP.
- **Total factor productivity growth** is often used as a measure of technological progress.*
- These terms will appear in the reading.

*TFP can be calculated as the ratio of total output to a harmonic weighted average of factor inputs.

The production mix changed significantly over time

	Colonial America 1607-1776	Industrialization Early 1800s-WW1	Information Age 1970+
New goods produced	Agriculture, raw materials	Rise of manufacturing	Computers, software, services
Factor inputs	Land, labor	Capital, transportation infrastructure	Human capital
What increased factor inputs?	Immigration, settlement	Investment	Education, training
New technologies	Adaption of agriculture to the New World	Steam, electricity, railroads, steel, etc.	Microprocessors, the internet, mobile phones

The structural transformation

The **structural transformation** describes the fundamental changes that took place in the U.S. and many other economies over long periods of time.

Two key features are:

- Sectoral shifts in production, from agriculture to manufacturing and then from manufacturing to services.
- Urbanization, as people move from rural to urban areas for jobs in the manufacturing and service sectors.

Rapid population growth

Population (Thousands)

	1650	1700	1750	1770
White	53	234	964	1,816
Black	2	31	242	467
Total	55	265	1,206	2,283

Source: McCusker and Menaud, *The Economy of British America*.

Public and private investment

Both the private sector and the public sector (federal, state, and local governments) invest in human and physical capital and seek to advance technology.

- Public sector investment is typically concentrated on infrastructure and education.

- Public sector support for technology is typically concentrated on basic science and policies that encourage innovation.

Growth accounting (1840-1990)

	% of Growth attributable to			
	Land	**Labor**	**Capital**	**Total Factor Productivity**
1840-1860	10%	49%	26%	15%
1870-1930	4%	43%	27%	27%
1940-1990	0%	41%	14%	45%

Source: Lance Davis et al. (1972).