

Advanced Macroeconomics

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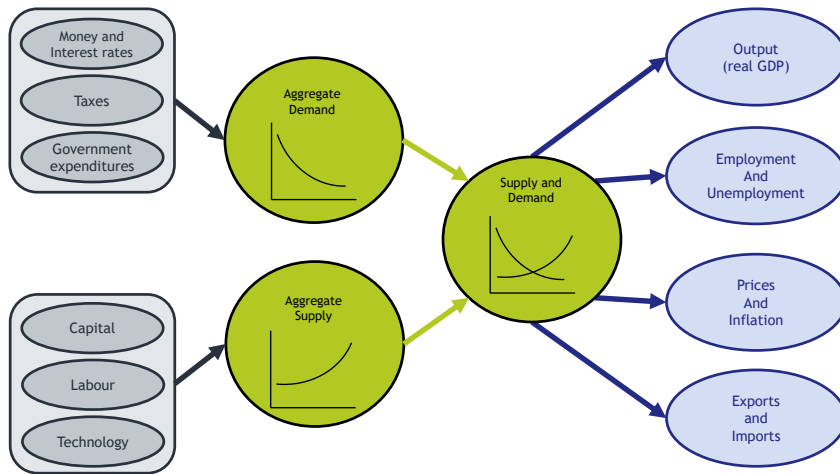
What is Macroeconomics?

Macroeconomics studies the functioning of the economy as a whole. It examines the overall level of a nation's output, employment, prices, and foreign trade.

(Samuelson and Nordhaus 1992, p. 396)

Aggregate Supply and Aggregate Demand

(Samuelson, Nordhaus 1992)



Macroeconomic Methodology: Quantitative Models

Calculations are to economics what bones are to the human body. Without them, science would remain imprecise, confused, and would fall prey to error and prejudice in every branch.

(François Quesnay, 1694-1774, letter to Mirabeau, own translation from Gilbert 1989)

Why Do We Use Mathematical Models?

(Gottfries 2013, p. 6f.)

- The model helps us to avoid **errors of logic** in our reasoning.
- The model helps us to see what **assumptions** we need to make in order to come to a certain conclusion.
- Once we have set up a model, it is easier to see how **alternative assumptions** affect the answer to the question under analysis.
- Models help us to **quantify** results.

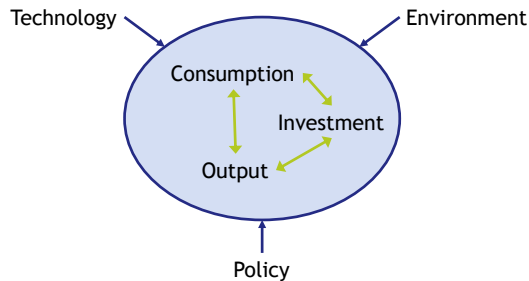
All theory depends on assumptions which are not quite true. That is what makes it theory. The art of successful theorizing is to make the inevitable simplifying assumptions in such a way that the final results are not very sensitive.

(Robert M. Solow; A contribution to the theory of economic growth; Quarterly Journal of Economics 70, 1956, 65-94)

Economic Models

(Gottfries 2013)

- We do not try to explain **everything**
 - **Exogenous**: not explained in the model
 - **Endogenous**: explained in the model



Macroeconomic Analysis: Four Steps

- 1 Describe the **facts**
- 2 Develop a **model**
- 3 **Compare** the model predictions to the facts
- 4 **Use** the model to understand economic problems and to make predictions

1. Introduction

What is Macroeconomics?

Key Facts About Long-Run Economic Growth

Key Facts About Aggregate Fluctuations

Outlook

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Summary and Literature

Tools for Data Analysis

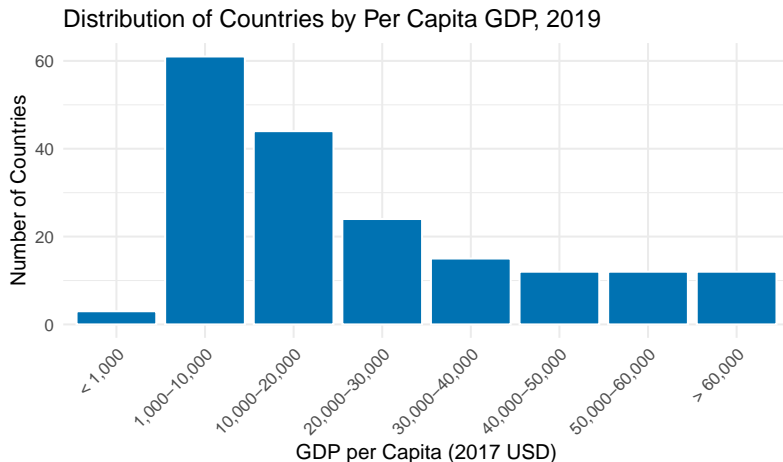
- Many statistical software packages available
- **R-Project**: Free with many useful extensions for data analysis (www.r-project.org)
- **RStudio**: Integrated development environment for R (www.rstudio.com)
- Alternatives: Stata, Python, EViews, Julia, ...
- Important sources for macroeconomic **data**
 - Long-run growth: Penn World Table 10.01 (PWT), World Development Indicators (WDI), Global Macro Database (GDM)
 - Short-run fluctuations: St. Louis Fed (FRED), Eurostat (database)

The Definition of Economic Growth

- If not stated otherwise **economic growth** refers to the rate of change of per capita gross domestic product (GDP)
- The **Penn World Table** (<https://www.rug.nl/ggdc/productivity/pwt/>) is a database with information on relative levels of income, output and productivity, covering 183 countries between 1950 and 2019 (Feenstra, Inklaar, Timmer 2015)
 - Comparison of **living standards** across countries: expenditure-side real GDP, using prices for final goods that are constant across countries
 - Comparison of **productive capacity** across countries and across time: output-side GDP using prices that are constant across countries and over time

Cross-Country Differences in Per-Capita Income

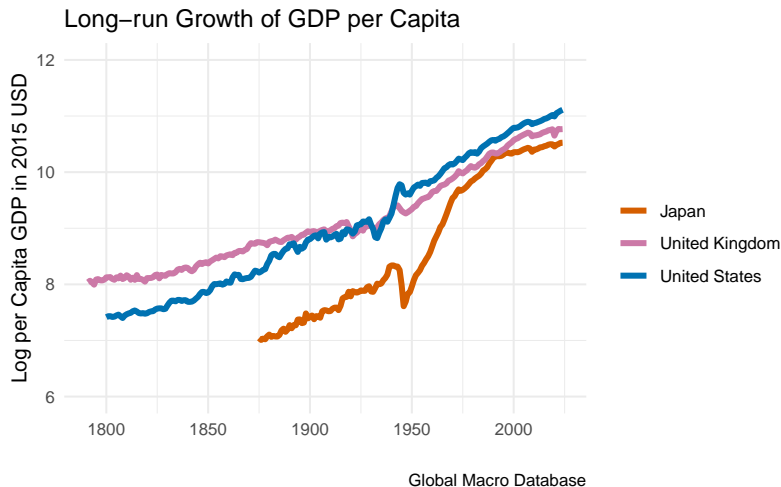
($cgdpe/pop$)



PWT 10.1

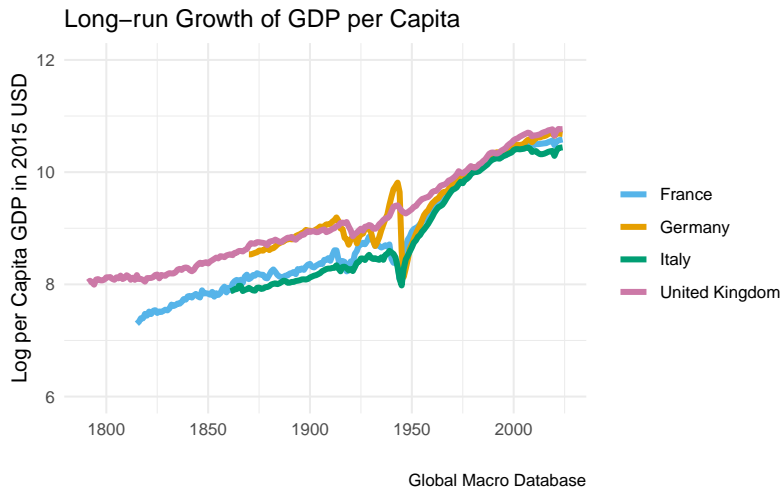
Evolution of Per Capita Output and Income over Time

(rGDP_USD/pop)



Evolution of Per Capita Output and Income over Time in Europe

(rGDP_USD/pop)



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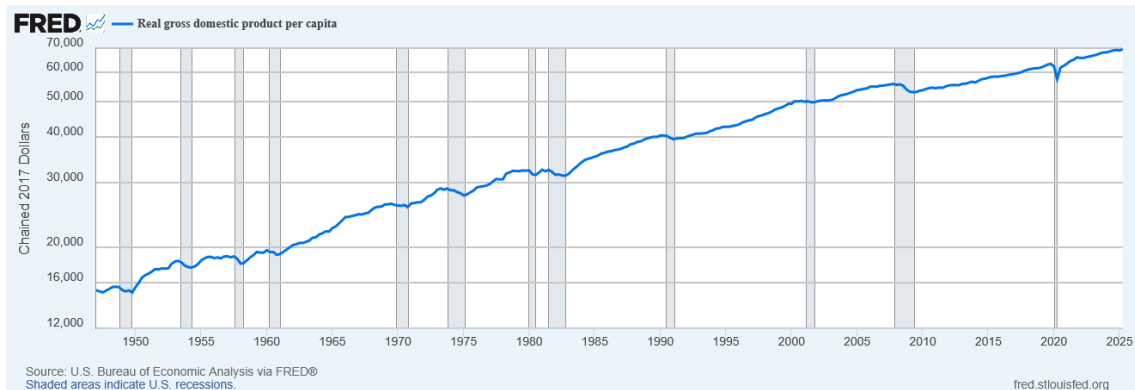
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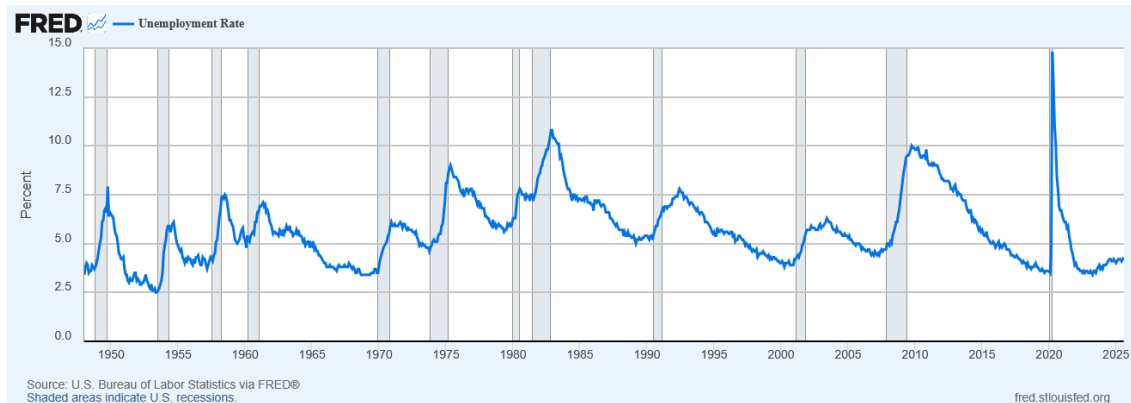
Recessions and Per Capita GDP in the United States

(FRED: A939RX0Q048SBEA)



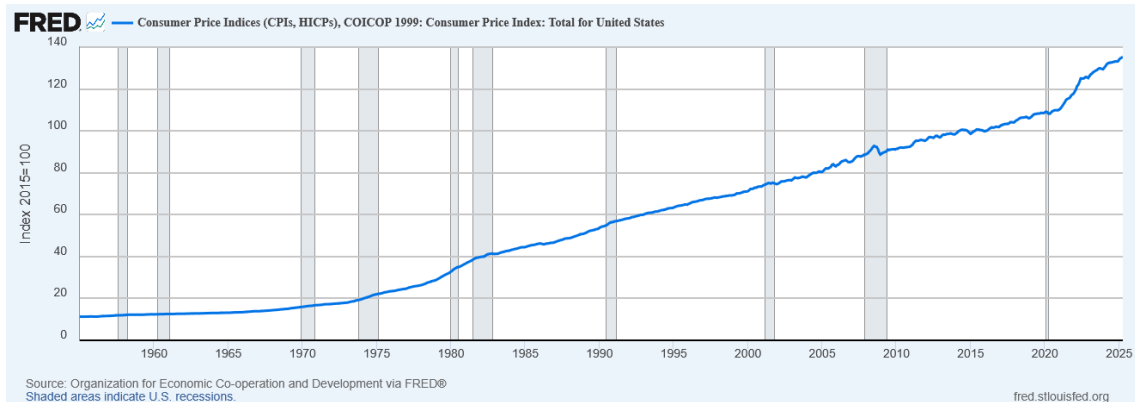
Recessions and Unemployment in the United States

(FRED: UNRATE)



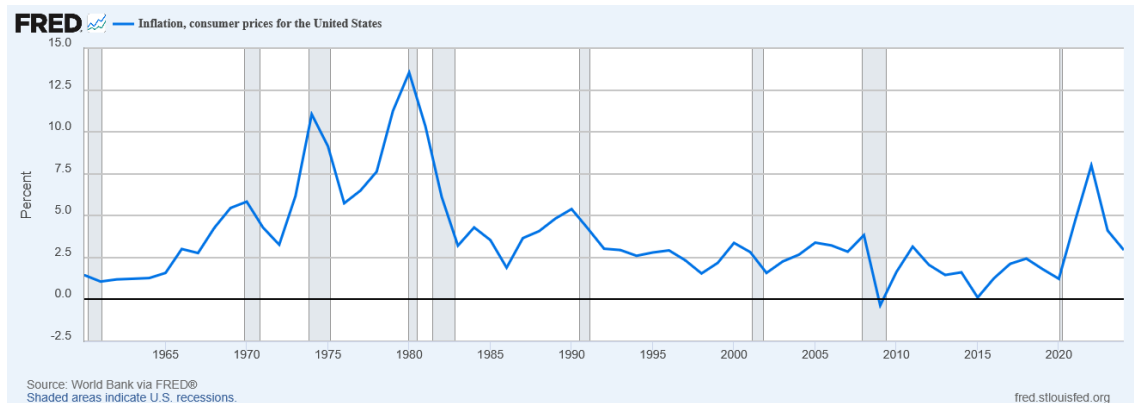
Price Level in the United States

(FRED: USACPIALLMINMEI)



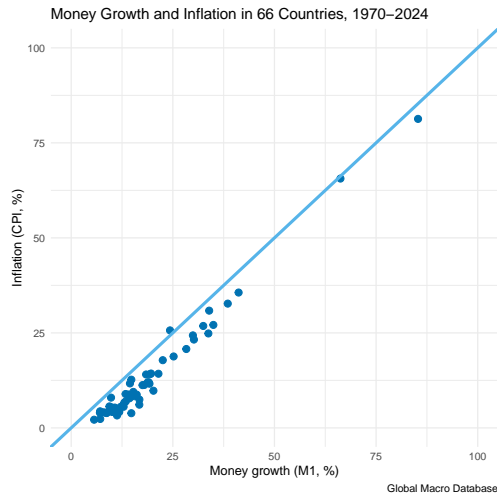
Consumer Price Inflation in the United States

(FRED: FPCPITOTLZGUSA)



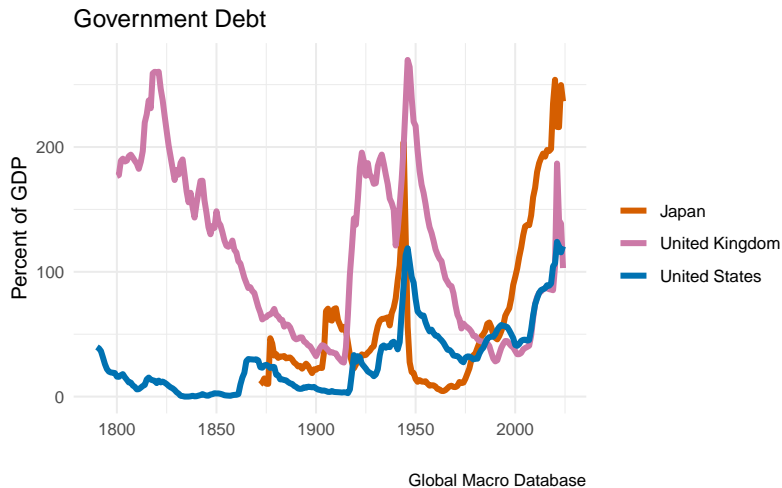
Money Growth and Inflation

(M1, CPI)



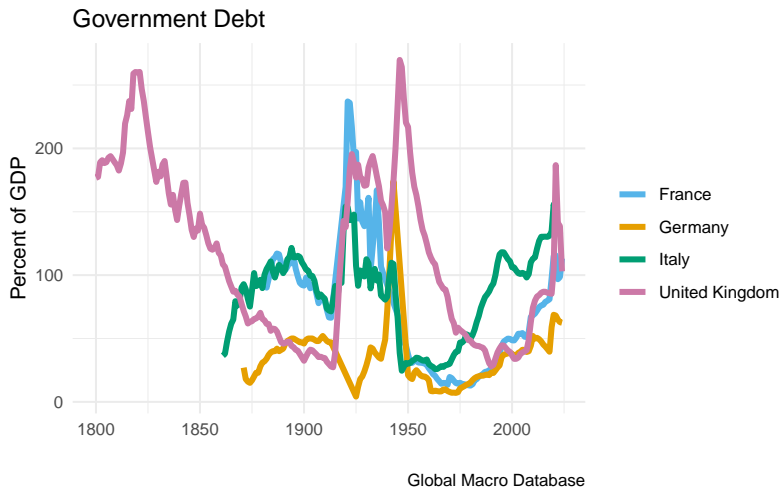
Government Debt

(govdept_gdp)



Government Debt in Europe

(govdept_gdp)



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Advanced Macroeconomics

I. Foundations of Dynamic Macroeconomic Modeling

1. Introduction
2. History of Macroeconomics
3. Static General Equilibrium Models
4. Saving and Investment in a Two-Period Model

II. Long-run Economic Growth

III. Short-run Fluctuations

IV. Applications

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Exam

- The exam consists of two parts: a **midterm exam** and a **final oral exam** with a project presentation
- Midterm exam: 90 minutes under supervision, online (single/multiple choice, calculations)
- Final oral exam: project presentation (discussion of a given paper), 20 minutes (10 minutes presentation, 10 minutes questions)

Grading Dates

| Exam | Weight | Date | Time |
|-------------|--------|-------------------|------------------------------------|
| 1st Midterm | 40% | December 17, 2025 | 2.15 p.m. – 3.45 p.m. |
| 1st Final | 60% | February 12, 2026 | slot between 8.00 a.m. – 6.00 p.m. |
| 2nd Midterm | 40% | January 16, 2026 | 6.00 p.m. – 7.30 p.m. |
| 2nd Final | 60% | March 30, 2026 | slot between 8.00 a.m. – 6.00 p.m. |

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Important Concepts

- Aggregate supply and demand
- General equilibrium
- Exogenous and endogenous variables
- Long-run economic growth
- Aggregate Fluctuations

General Literature

Main textbook



Alogoskoufis, George (2019): Dynamic Macroeconomics, MIT Press

Repetition Introductory Macroeconomics



Burda, Michael; Wyplosz, Charles (2022): Macroeconomics. A European Text, 8th Edition, Oxford University Press

Additional Literature at the end of each section

Literature Chapter 1



Alogoskoufis, George (2019): Dynamic Macroeconomics, MIT Press, Chapter 1



Feenstra, Robert C.; Inklaar, Robert; Timmer, Marcel P. (2015): The Next Generation of the Penn World Table, American Economic Review 105(10), 3150-3182, [doi](#)



Gottfries, Nils (2013): Macroeconomics, Palgrave Macmillan, Chapter 1



Jones, Charles I. (2015): Facts of Economic Growth, NBER Working Paper 21142 [url](#)



Wickham, Hadley; Grolemund, Garrett (2017): R for Data Science, O'Reilly