Macroeconomics

2. Introduction to Macroeconomics

Bachelor's Degrees in Management and in Finance and Accounting

Luís Clemente-Casinhas

https://luisclementecasinhas.org/

ISCTE-IUL - Department of Economics

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Solving a Macroeconomic Model

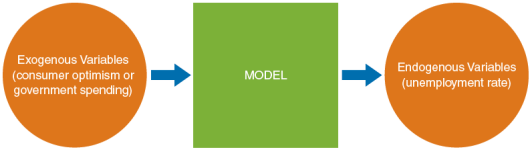
Endogenous variables, exogenous variables, parameters. Example from Mishkin (2014).

- **Endogenous variables**: variables determined by the model.
  - Example: unemployment rate.
- **Exogenous variables**: the inputs of a model / variables used to explain endogenous variables and that are not explained by the model but rather determined outside the model.
  - Example: consumer optimism or government spending.
- **Parameters**: the structure of a model reflecting the set of impacts that variables have on each other.
  - Example: sensitivity of the unemployment rate to changes in government spending.

Solving a Macroeconomic Model

Endogenous variables, exogenous variables, parameters. Example from Mishkin (2014).

- **Our illustrated example**:



Exercises in Pluto

- ☒ Exercise 1 (Endogenous vs Exogenous Variables, I).
- ☒ Exercise 2 (Endogenous vs Exogenous Variables, II).
- ☒ Exercise 3 (Solving a Macroeconomic Model).

Interpreting Macroeconomic Data

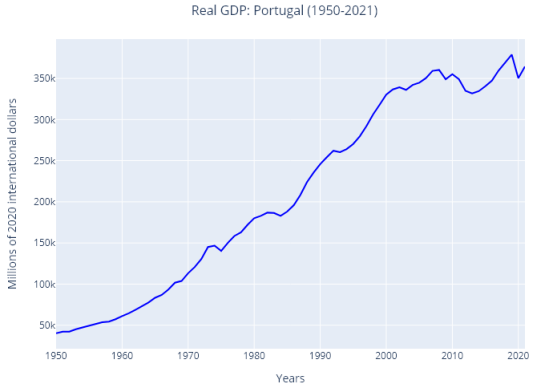
3 main variables: real GDP, unemployment, inflation.

- **Real GDP** (the focus of this lecture)
  - The quantity of goods and services produced within the geographical area of a country during a given period (one year).
- **Unemployment rate**
  - Measures the proportion of the active population (labour force) that is unemployed.
- **Inflation**
  - The rate of growth of the general price level.

Interpreting Macroeconomic Data

Real GDP vs Potential Real GDP: business cycles.

- **Real GDP and potential real GDP for Portugal** (source: Total Economy Database)



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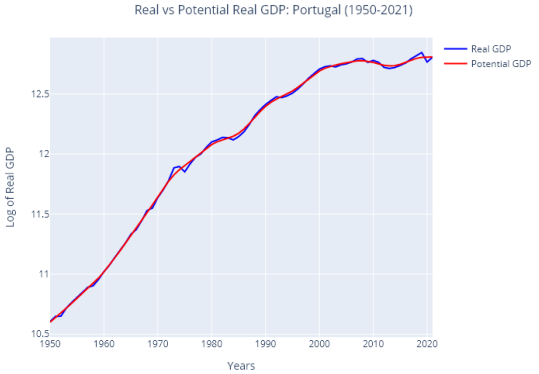

Interpreting Macroeconomic Data

Real GDP vs Potential Real GDP: business cycles.

- **Business cycles** – short-term percentage deviations in macroeconomic activity around a trend.
  - The trend / potential real GDP is obtained using the Hodrick-Prescott filter.
  - The percentage deviations are obtained as:

$$\Delta\% = \ln(\text{Real GDP}) - \ln(\text{Potential GDP})$$

  - Interpretation of the deviations:
    1. Positive deviations: boom.
    2. Negative deviations: recession.

Interpreting Macroeconomic Data

Real GDP vs Potential Real GDP: business cycles.

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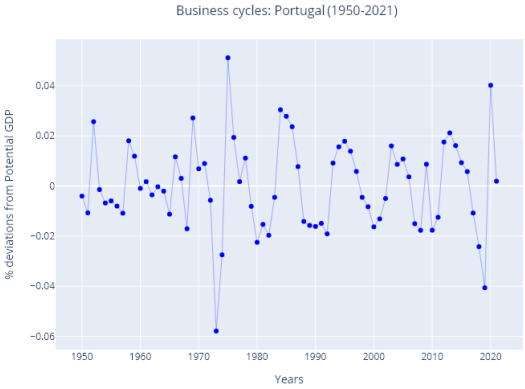


Interpreting Macroeconomic Data

Comparing the impact of business cycles across countries (specifically recessions)

- When a crisis affects several countries, it can be useful to analyse how it affects different economies.
- To do so, we must make them comparable, that is, normalize real GDP levels across economies.
  - Real GDP is fixed at 100 when the crisis occurs.

$$\text{GDP Index}_t = \frac{\text{Real GDP}_t}{\text{Real GDP}_t} \times 100$$

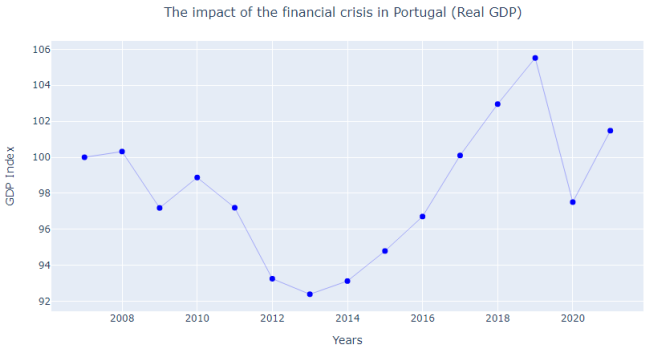
  - Subsequent real GDP values are defined relative to the previous one.

$$\text{GDP Index}_{t+i} = \frac{\text{Real GDP}_{t+i}}{\text{Real GDP}_t} \times 100, \ \forall i \geq 1$$

Interpreting Macroeconomic Data

Comparing the impact of business cycles across countries (specifically recessions)

- **GDP Index for Portugal** (source: Total Economy Database)



Interpreting Macroeconomic Data

Comparing the impact of business cycles across countries (specifically recessions)

Exercises in Pluto

- Exercise 4 (Plotting Real GDP).
- Exercise 5 (Business Cycles).
- Exercise 6 (The Impact of Business Cycles).

The Monetary Policy Rule

Definition

- The monetary policy rule reflects the relationship between the real interest rate (r) and the inflation rate (π) for a given autonomous real interest rate ($\bar{r}$):

$$r = \bar{r} + \lambda\pi$$

Exercises in Pluto

- ☒ Exercise 7 (Inflation vs Interest Rates).

The Short-Run Phillips Curve with Adaptive Expectations

Definition

- Negative relationship between the unemployment gap and the inflation rate (taking into account agents' expectations and the natural rate of unemployment).

$$\pi = \pi_{-1} - \omega(U - U_n) + \rho$$

  - If $\rho = 0$ we say there is no price shock;
  - If $\rho > 0$ we have a positive price shock, i.e. $\uparrow \pi$;
  - If $\rho < 0$ we have a negative price shock, i.e. $\downarrow \pi$.

Exercises in Pluto

- ☒ Exercise 8 (Inflation vs Unemployment).
- ☒ Exercise 10 (International Oil Prices).

Public Debt

Factors affecting public debt

- The level of public debt as a percentage of GDP (d_t) is affected by three factors:
  - Primary deficit as a percentage of GDP (p).
  - Real GDP growth rate (g).
  - Real interest rate paid on public debt (r).
- The equation describing the evolution of public debt as a percentage of GDP is:

$$d_t = p + \left(\frac{1+r}{1+g}\right) d_{t-1}$$

  - If $g > r$ the level of d_t is sustainable;
  - If $g < r$ the level of d_t is unsustainable (it explodes over time).

Exercises in Pluto

- ☒ Exercise 9 (The Budget Balance).

Rules and Discretion

Should macroeconomic policy follow rules?

- Commitment to rules: announcing rules and demonstrating commitment to them, regardless of circumstances.
  - Rules are useful, but sometimes they can place policymakers in a straitjacket.
  - We are going to study a rule widely discussed in monetary policy: the Taylor Rule.
- Discretion: decisions taken depending on circumstances, without previously announced rules.

Exercises in Pluto

- ☒ Exercise 11 (Rules vs Discretion).

References

- Mishkin, F. S. (2014), *Macroeconomics: Policy and Practice*, 2nd Edition, Pearson, Addison-Wesley, New York.