Introduction

ECON 30020: Intermediate Macroeconomics

Prof. César Sosa-Padilla

University of Notre Dame

Fall 2018

Introduction

- Macroeconomics:
  - Better called *aggregate economics*
  - Focus on *dynamic* and *intertemporal* nature of economic decision-making
  - Economics is "micro": "macro" just studies issues at aggregated (country) level
- Key questions:
  - Why does the economy grow over time?
  - Why are some countries rich and others poor?
  - Why do economies experience recessions?
  - What is the role of government?
  - More recently:
    - What the heck happened in 2007-2009?

Logistics

- Syllabus
  - Textbook
  - Assignments and grading
  - Office hours
  - TAs
  - Course outline

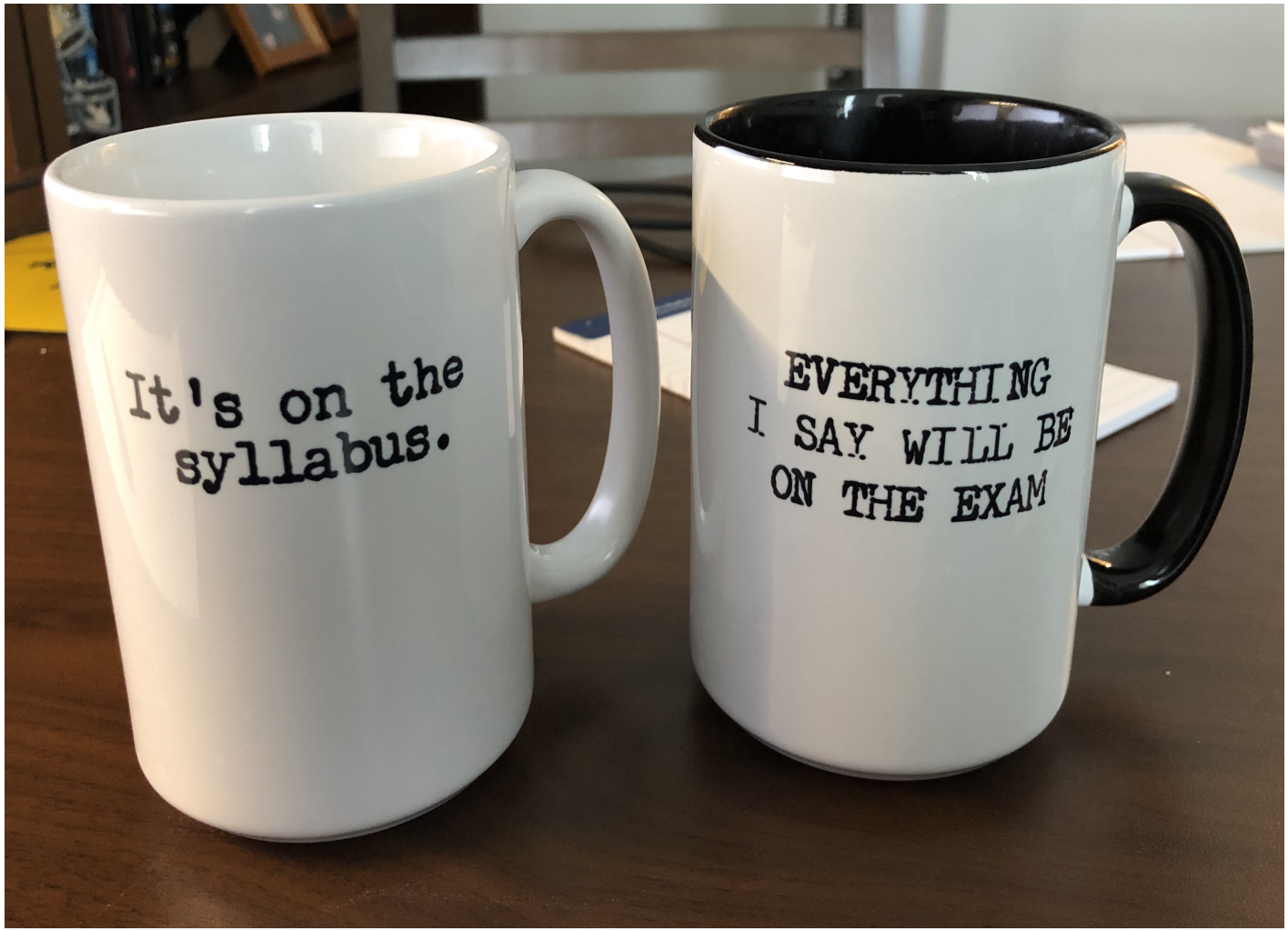
Textbook

- We'll follow *Intermediate Macroeconomics* by Garín, Lester and Sims. We'll refer to it as *GLS*.
- It's a great book:
  - Rigorous
  - Accessible
  - Modern
  - ... and free (for now)!
- You can get the pdf here:

  `https://www3.nd.edu/~esims1/gls_int_macro.pdf`

- A nice alternative is *Modern Macroeconomics* by Sanjay Chugh (MIT Press 2015).

Gentle Reminder



Before we start...

... questions/comments?

... a bit more about me

- Assistant Professor at the Department of Economics
  - Ph.D. from Univ. of Maryland (2012)
  - B.A. from Univ. Nacional de Tucumán, Argentina (2005)

- 2012–2016: working as Assistant Prof. in McMaster University, Canada.

- Research interests: Macroeconomics and Int'l Finance.

  Especially, sovereign default crises.

Readings

- GLS Chapters 1, 2, and 3
- GLS Appendix A
- *What Economists do* by Robert Lucas.

Math

"It is true that modern macroeconomics uses mathematics and statistics to understand behavior in situations where there is uncertainty about how the future will unfold from the past. But a rule of thumb is that the more dynamic, uncertain and ambiguous is the economic environment that you seek to model, the more you are going to have to roll up your sleeves, and learn and use some math. That's life."

Thomas Sargent, 2011 Nobel Prize Winner

What Kind of Math We Will Be Using

- Basically:
  - Algebra
  - Differential calculus
- Will also need to know:
  - Microsoft Excel
  - How to play with graphs
  - Some basic statistics
- See GLS Appendixes A and B

Variable Types and Timing Notation

- Two kinds of variables: exogenous and endogenous
  - Exogenous: taken as given, determined outside of a model
  - Endogenous: determined inside of a model
- Will denote variables with Latin letters
- Timing notation: time is discrete. t is the present. $t-1$ is one period in the past. $t+1$ is one period in the future
  - e.g. X_t is the value of variable X observed at date t
- Parameter: fixed value governing mathematical relationships in a model
- Will typically denote parameters with lowercase Greek letters (e.g. α, β), sometimes with lowercase Latin letters without a time subscript

Basic Accounting

- GDP: current dollar value of all final goods and services produced within a country during a particular period of time
- GDP a measure of production and a *flow* concept
- Production = Income = Expenditure
- Income approach:

$$\text{GDP}_t = \text{Wages}_t + \text{Interest}_t + \text{Rent}_t + \text{Profit}_t$$

- Expenditure approach:

$$\text{GDP}_t = \text{Consumption}_t + \text{Investment}_t + \text{Government}_t + \text{Net Exports}_t$$

- See GLS Ch. 1.

Real vs. Nominal I

- GDP is defined in terms of current dollar prices
- Effectively, prices are weights reflecting relative valuations of different goods
- But makes comparisons across time difficult
- Want a "real" or "inflation-adjusted" measure of GDP
- How to do this?

Real vs. Nominal II

- In a single good world (most of this course), something real is denominated in quantities of goods, whereas nominal is measured in units of money (i.e. dollars)
- So suppose you produce 10 cans of beer valued at $2 per can. Real quantity is 10 cans, nominal value is $20
- Not so obvious how to do this with many different goods (the real world, but not most of this course)
- Solution: "constant dollar" GDP. Value quantities of goods at different points in time using fixed prices (base year prices). So real GDP actually denominated in units of money, but facilitates comparisons over time
- Can "back out" a measure of aggregate prices via the implicit price index: ratio of nominal (current dollar) GDP to real (constant dollar) GDP
- Inflation: rate of growth of price index

Variable Notation

- Y_t: real GDP (also output, income, production)
- C_t: consumption
- I_t: investment
- G_t: government spending
- NX_t: net exports
- P_t: price level. Price level times real value of any of these is the nominal value – e.g. $P_t Y_t$ is nominal GDP
- N_t: labor hours (also labor input)
- K_t: capital stock
- r_t: real interest rate
- w_t: real wage
- i_t: nominal interest rate
- W_t: nominal wage
- π_t: inflation rate

What Economists Do

- Basically three related modes of inquiry:
  - Retrospective: trying to understand *what* happened in the past and *why* it happened
  - Counterfactuals: trying to understand what *would have* happened under some alternative scenario or policy regime
  - Policy advice: trying to advise policymakers on *what to do* in the future
- Ultimately our objective is to give sound policy advice, but to do so need to conquer retrospective and counterfactual analysis

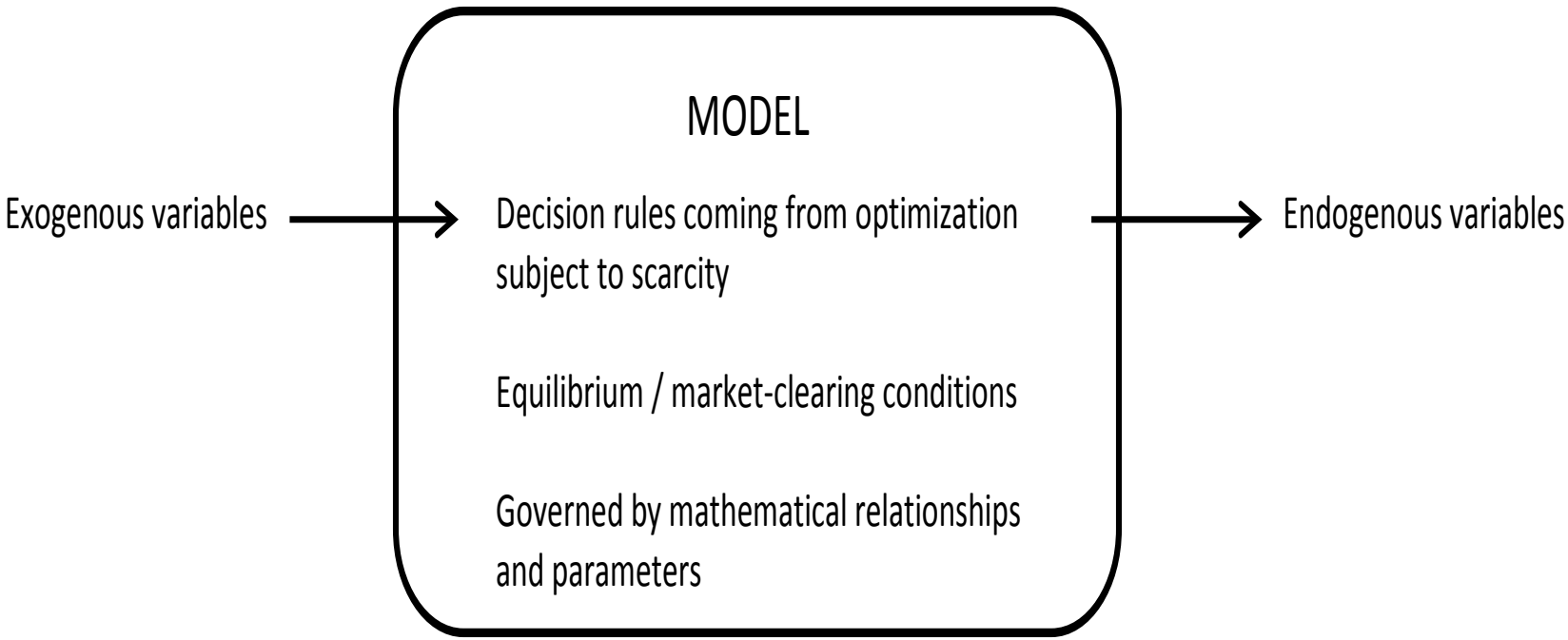
Models

- For better or worse, the real world is messy
- It isn't always easy to do retrospective analysis (e.g. why did the Great Recession happen?), it's hard to do counterfactual analysis (e.g. what would have happened had the Fed not done Quantitative Easing?), it's even harder to give policy advice about the future (e.g. should the Fed raise interest rates?)
- Economics tries to be scientific. In an ideal world, we would like to run experiments
  - What happens when the Fed raises or lowers interest rates?
  - Run an experiment: have a bunch of economies otherwise subject to the same conditions. Change interest rates for one group of economies (the treatment group) and don't for the other group (the control group). Compare differences across groups to get the "treatment effect"
- For most macro questions, this kind of experiment is impossible

The Art and Science of Economic Models

- Because experiments aren't in play, economists use models
- Given a model, we try do "real science": run experiments, and use the outcomes from those experiments to inform policy
- But building the model itself is as much art as it is science

A Model



- A model makes predictions about endogenous variables

How to Judge / Build a Model

- No firm criteria. This is the "art" part
- Characteristics of a good model:
  - Makes good predictions
    - Stronger test: makes good predictions about things which it wasn't designed to explain ("over-identification")
  - Is as simple as possible
    - Abstract from things which are not relevant
    - The simpler it is, the easier it is to understand the mechanisms
  - Makes reasonable assumptions

Models in This Course

- In macro, we do a lot of abstraction (e.g. we assume everyone is the same!)
- Course divided into three "runs" which feature differing levels of abstraction:
  - Long run (decades): abstract from endogenous labor input and many sources of shocks, focus on capital accumulation and productivity growth. Solow model
  - Medium run (several years): abstract from capital accumulation and productivity growth, abstract from nominal price and wage rigidity. Neoclassical model
  - Short run (months to several years): abstract from capital accumulation and productivity growth, allow for price and/or wage stickiness. New Keynesian model
- In addition, close the course with a section on banking/finance and the Great Recession, which builds off the short run part