Lecture 1: Introduction and Course Overview

ECON 30020: Intermediate Macroeconomics

Prof. Eric Sims

University of Notre Dame

Spring 2026

Readings

GLS Chapters 1, 2, and 3

GLS Appendix A, math review handout

Introduction

Macroeconomics:

- Better called aggregate economics
- Focus on dynamic and intertemporal nature of economic decision-making
- Economics is "micro": "macro" is grounded in microeconomic decision-making, but focuses on aggregate outcomes

Key questions:

- Why does the economy grow over time? Why are some countries rich and others poor?
- What is the business cycle? Why do we have recessions?
- What is the role of policy?

Recent applications:

- What happened in 2007-2009 (Financial Crisis)?
- What happened in 2020-2022 (COVID-19)?

Course Structure

Part I: Long-Run Growth

- Solow Model

Part II: Micro of Macro

- Consumption, investment, production, labor demand & supply
- Money
- Fiscal policy
- Equilibrium

Part III: Business Cycles

- Neoclassical model (medium run)
- Keynesian model (short run)

Part IV: Applications

- Optimal Monetary Policy
- Zero Lower Bound
- Great Recession & COVID-19

Grading

In-Class Exams: February 3, March 5, April 2 (**40 percent**)

- Drop lowest
- Two remaining worth 20 percent each

Cumulative Final exam: May 6, 4:15-6:15 (**30 percent**)

Problem Sets: Jan. 29, Feb. 17, March 3, March 31, April 28 (**15 percent**)

- Three percent each
- Graded on completion basis (100, 85, 70, or 0)

Quizzes: Jan. 27, Feb. 17, Feb. 26, March 26, April 21 (**15 percent**). *Must use Respondus LockDown Browser application!*

- Three percent each

Graduate Student Teaching Assistant

Celia Schurman: third-year PhD student, BA from Bentley University (email)

Weekly review session: Mondays, 5:30-7 pm (location TBD)

Weekly office hours: Wednesdays, 5-6:30 pm (JNH 3005)

AI

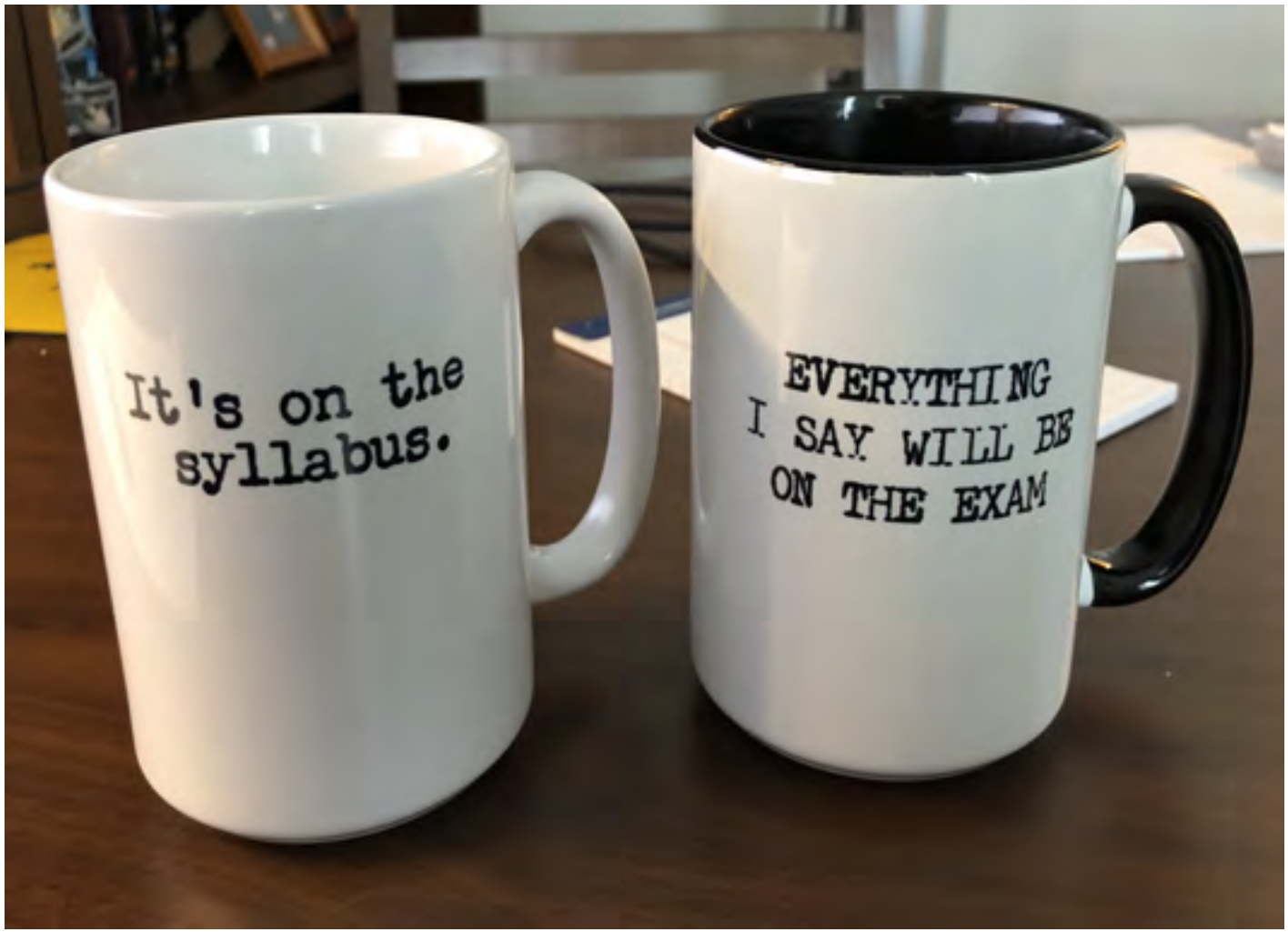
You are free to use AI however you wish in this class

- Help with problem sets
- Summarizing slides / chapters
- Asking for explanations of different topics
- Writing practice questions

You (not ChatGPT) are responsible for anything you submit

Just remember: You cannot use AI (or any computer or notes) during in-class exams nor during online quizzes

Gentle Reminder



About Me

Professor and Department Chair, Dept. of Economics

- B.A. Trinity University, 2003
  - "Miracle in Mississippi" October 27, 2007
- Ph.D. University of Michigan, 2009
  - Don't get the wrong picture
  - Wife proud ND graduate – Lewis chicken
  - Signed Charlie Weis picture in office (oops?)

Out of Style I

Out of Style II

In Style

Family

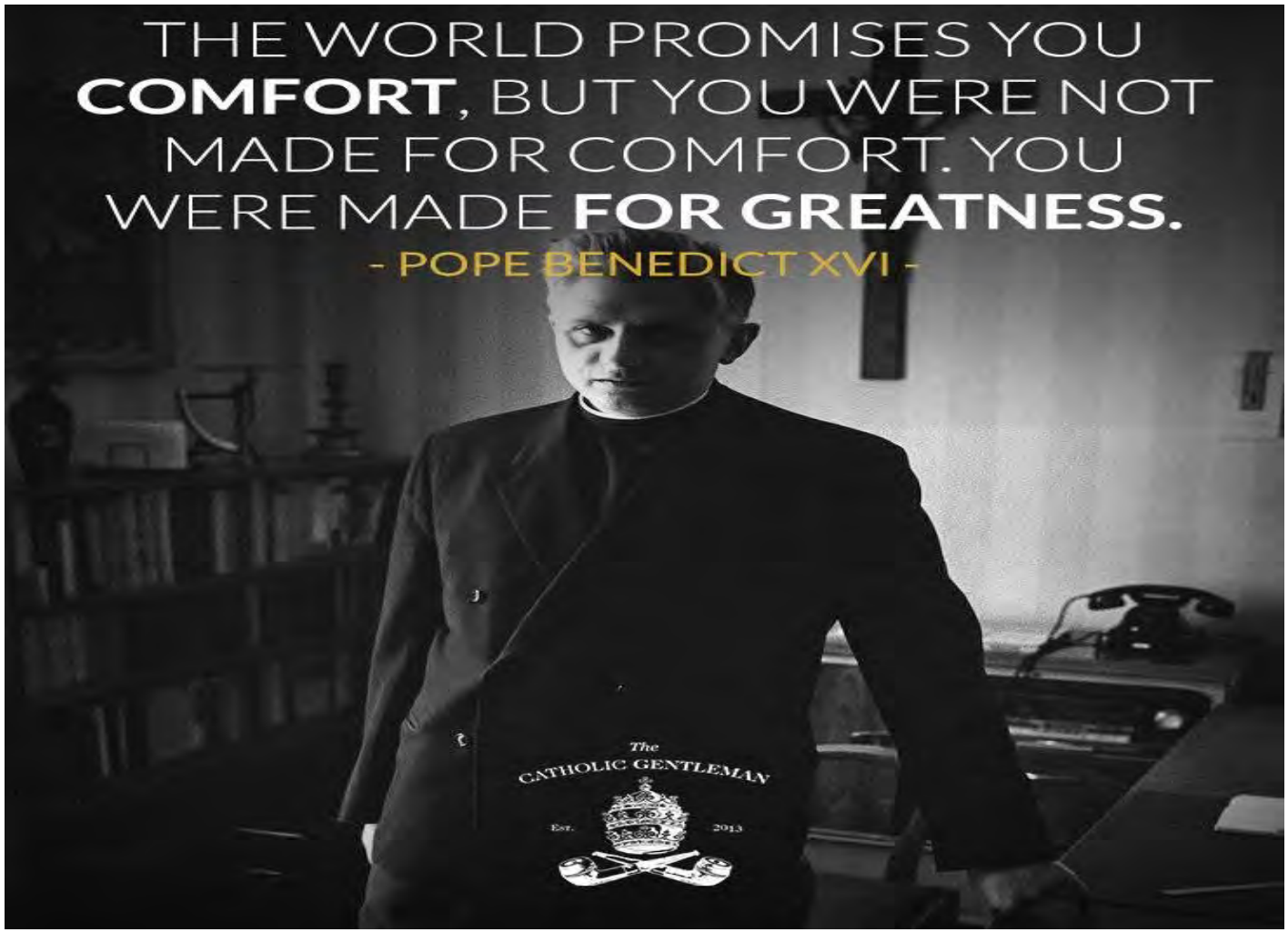
Family II

Fun

Choose Hard


“”
FIGHTING IRISH PREVIEW
Everyday you wake up
you’ve got to choose hard.
Marcus Freeman
on Notre Dame’s Sugar Bowl preparation and his philosophy on life

Greatness


THE WORLD PROMISES YOU
COMFORT, BUT YOU WERE NOT
MADE FOR COMFORT. YOU
WERE MADE FOR GREATNESS.
- POPE BENEDICT XVI -
The
CATHOLIC GENTLEMAN
Est.
2013

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, as well as the math review handout available on Canvas

Optional math review session with Celia: this Friday (January 16), 2:30-4 pm

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 typically 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 (this course), something real is denominated in quantities of goods, whereas nominal is measured in units of money (i.e. dollars)

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)

- e.g., what if you produce 10 cans of beer at \$2 per can and five pounds of beans at \$5 per pound?

Real vs. Nominal III

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

- Some more details related to "chain-weighting" but this is basic gist

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

This Course

Think of production as being a single good, e.g., fruit

(Real) consumption is measured in units of fruit

Investment: units of fruit that are unconsumed that are re-planted to yield productive trees (e.g., capital)

Real prices: units of fruit per unit of time (wage) or unit of capital (rental rate)

Rates (e.g., interest rate, inflation rate) are measured in percents and are "unitless"

Can introduce money to measure nominal prices and quantities all in units of money – the numeraire

Typical Variables

- 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: rental rate on capital
- 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 potentially why it happened
- Counterfactuals: trying to understand what would have happened under some alternative scenario or policy regime
- Prospective: 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

The real world is messy

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"

Randomized controlled trials (RCTs) are very popular in lots of economics. But for most macro questions, these kinds of experiments are impossible

Even then, RCTs are not great for counterfactual and prospective analysis

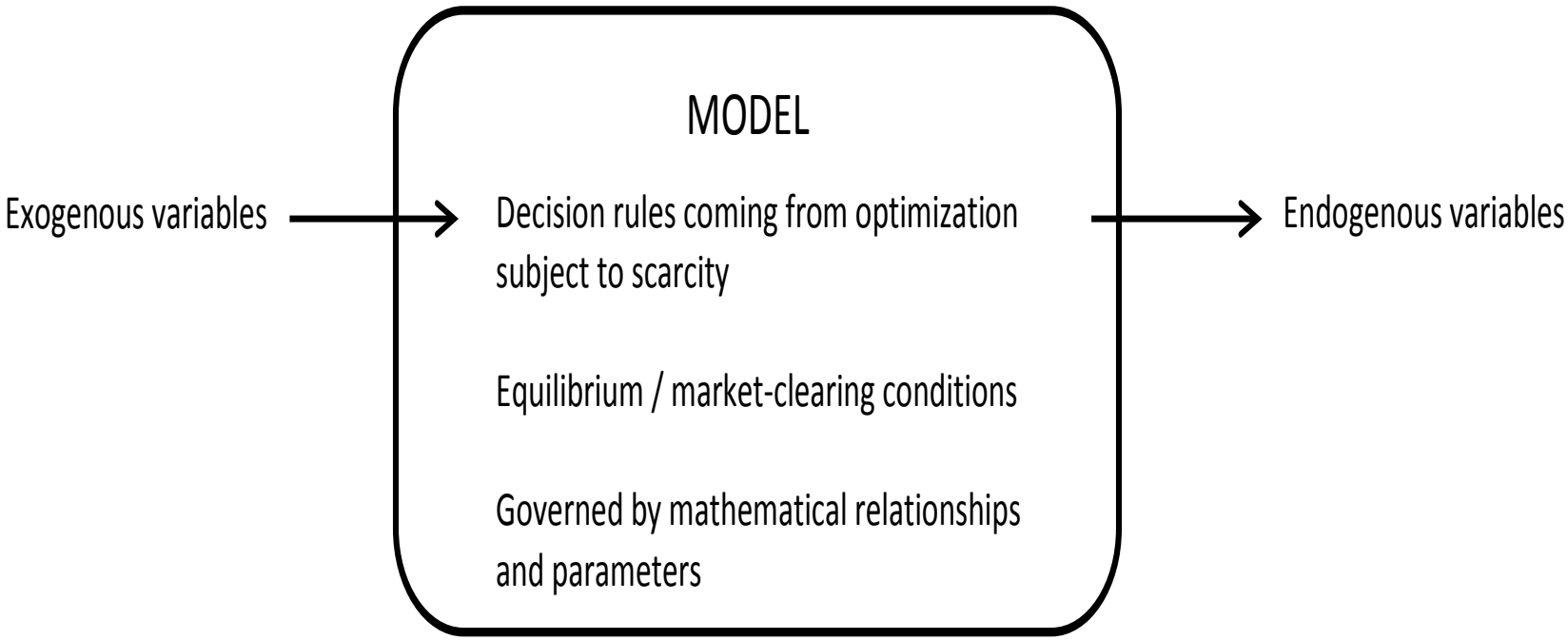
The Art and Science of Economic Models

Because experiments aren't (typically) 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 taken exogenous variables as given

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 that it wasn't designed to explain ("over-identification")

Is as simple as possible

- Abstract from things that 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

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/or 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

Different models applicable to different questions; e.g., we will use short-run models to think about the Great Recession and COVID-19