Mathematical Modeling of Social Phenomena

Introduction

Who are we?

Name?

Why this course?

Experience with models?

Expectations

What are your expectations on this course?

Outline of the course

Basic Theory Segment

Project Segment

Advanced Theory Segment

Basic Theory Segment

Modeling exposé

Modeling worthwhile?

What is a good model?

Project Segment

From popular knowledge

To question

To model - and beyond!

Advanced Theory Segment

Frameworks and techniques

Agent-based modeling, simulation

Game theory, evolution and behavior

Examination

40 %	Participation
40 %	Project
20 %	Final project

Rough introduction

Introduction

Why models?

What is modeling?

How does models relate to theory and the real world?

Why modeling?

Ubiquitous in modern world, science and more

Help us think (stringency)

Help us communicate (well-defined)

Why modeling?

Explorative

Contrafactual

- point estimates
- boundaries
- stories

Why modeling?

Assuring deduction:

“Rather deduction from the false, than induction from the true.”

Caveats

All models are wrong

We gain deduction, but we lose worldliness

Mislead us. Get us into trouble

What is modeling

Finding the stuff that matters

Describing relationships between that stuff

Deduce “insights” about the workings of stuff

Models and stories

A model [...] is a story with a specified structure. The structure is given by the logical and mathematical form of a set of postulates, the assumptions of the model. The structure forms an uninterpreted system, [...] Although the term ‘model’ is often applied to a structure alone, we shall use it in another sense. In economists’ use of models, there is always an element of interpretation: the models always tells a story. (Gibbard & Varian, 1978)

Models and stories - incoherent

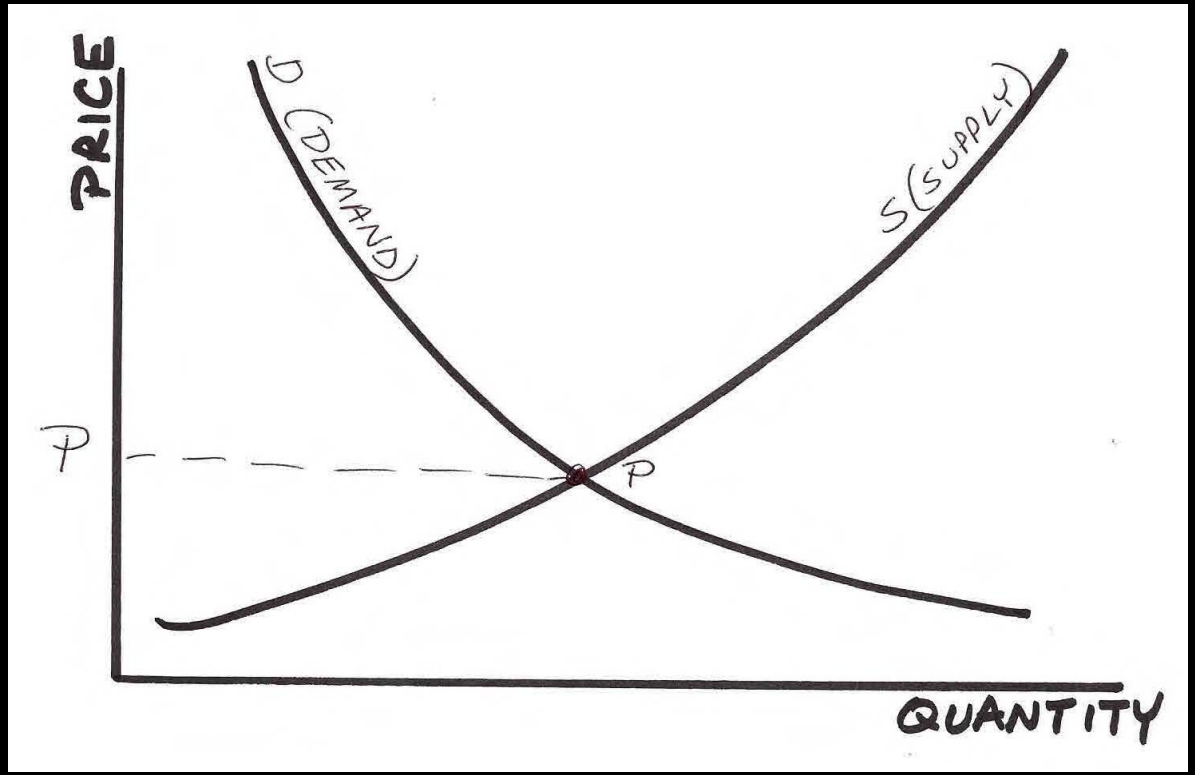
Deirdre McCloskey:

The vaguer the model the better the story can fit into the historical world, while the more exact the model, the more absurd the history becomes.

Vague may be OK?

“The models I wrote down [...] were incomplete, if one demanded of them they specify exactly who produced what. And yet they told meaningful stories” (Krugman 1993)

An example: Supply demand curve



Models and reality

At build time

And at use time

Models need to be employed!

Isolation and simplification

Not the whole real

Hence simpler - dynamics need not be simpler though

Isolation of the “heart of the issue”

The End

Next time we will take a flyover glance at a few models.

I promise more pictures.