

Thinking like a modern macroeconomist

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Maybe there is in human nature a deep-seated perverse pleasure in adopting and defending a wholly counterintuitive doctrine that leaves the uninitiated peasant wondering what planet he or she is on.

— *Robert Solow*

Chapter Goals

- Distinguish between the standard macro model and the modern macro model
- Trace the development of the standard and modern models of the economy
- Discuss the advantages and disadvantages of the standard macro model

Chapter Goals

- Explain what assumption each of the letters in “DSGE” from the DSGE model represents
- State three policy implications of the dynamic stochastic general equilibrium (DSGE) model
- Summarize the complex systems approach to macro

Why It Is Important to Know about Modern Macro Theory

- If you're learning macro, you don't want to learn outdated arguments and theories
- Modern macro models are fundamentally different from **standard macro models** which are the models (such as the AS/AD and multiplier models and their derivatives) used by most applied macroeconomists
- Modern macro models are being used for policy decisions

Engineering Models and Scientific Models

- Macroeconomists debate whether to use an engineering or deductive scientific model
- **Engineering model** is a model with loose formal foundations whose primary purpose is to guide thinking about policy
- **Deductive scientific model** is a model with carefully specified formal foundations whose primary purpose is understanding for the sake of understanding

Standard Models as Engineering Models and the Modern Model as a Scientific Model

- Standard macro models are engineering models and are used by most business and government macroeconomists
- Modern macroeconomic scientists use deductive scientific models of the macroeconomy such as the dynamic stochastic general equilibrium (DSGE) model
 - These models are only indirectly relevant for policy
- The different focuses of the standard macro model and modern macro model are reasonable

Engineering and Scientific Models Are Different Models

- Ideally, the scientific and the engineering models would work in parallel, with the engineering models being simplified and less formal versions of the scientific models
- Scientific models are completely different from engineering models
- Modern macroeconomists have come to believe that the standard macro models are fundamentally unscientific

From the Keynesian Revolution to Modern Macro Models

- Classical economic precepts included sound finance, maintaining a strong currency and the central bank being the lender of last resort
- Keynesian economics, as it initially developed, was based on an idea known as the **fallacy of composition** (that what is true for the parts is not necessarily true for the aggregate)
 - Some features of the economy can't be understood just by understanding individuals and firms

A Model without Microfoundations

- The standard macro model began as a top-down model that emphasized the fallacy of composition
- Microeconomics made its way into macro models in the 1960s when macroeconomists built various sectors into a composite model of the macroeconomy
- The higher-level macro models were extensions of the simple multiplier model
 - More sectors are modeled
 - More sophisticated analysis of those sectors

A Model without Microfoundations

- Problems begin to surface
 - Real-world data didn't fit the multisector macro models
- Consumption depends on lifetime income
 - Models were developed that would reflect rational behavior in the traditional microeconomic sense
- Questioning theoretical foundations
 - Empirical evidence showed that these models were imperfect

- **New Classical macroeconomics** is an approach to macroeconomics that studies macroeconomic questions using traditional microeconomic building blocks that emphasize rationality
 - The fallacy of composition was discarded
 - Focused instead on the decisions that a single individual (**a representative agent**) would make over multiple time periods
- This led to the modern DSGE (dynamic stochastic general equilibrium) model

A Beginner's Guide to the DSGE Model

A single immortal consumer–worker–owner

- Representative individual is interested in consuming as much as possible and working as little as possible
- Manage the trade-off between work and consumption over his lifetime

A perfectly conventional time-additive utility function

- Representative individual sees trade-offs in life
- There is a willingness to give up some pleasure now to get more later
- Decisions about what to do today don't affect tomorrow's choices

Perfect foresight or rational expectations

- Representative individual is able to make all decisions perfectly and instantaneously
- **Rational expectations** are expectations that turn out to be correct in reference to the model

Universal price-taking behavior

- Almost all markets are assumed to be highly competitive and in equilibrium

A Beginner's Guide to the DSGE Model

“D” **Dynamic** means taking “time” explicitly into account

“S” **Stochastic** means that events happen with a certain probability that can be specified mathematically

“GE” **General Equilibrium model** which means that it is a model of all the markets in the economy, not just a single market

Policy Implications of the DSGE Model

- Three policy implications that modern macroeconomists have drawn from the DSGE model are:
 1. **Ricardian equivalence problem**
 - anything the government does to affect the economy will mostly be offset by countervailing actions by private individuals as they optimize over the future

Policy Implications of the DSGE Model

2. Time-inconsistency/ credibility problem

- The best government policy from today's point of view can turn out to be a policy the government wants to change in the future, and that rational individuals can anticipate this

3. Lucas critique problem

- Because government policies can affect the behavior of individuals, historical data can lead to misleading predictions about the impact of a new policy

How Relevant Are the Problems?

- DSGE model poses challenges for the logic and policy implications of the standard macro model
- Advocates of the standard macro model have answers for each of these problems
- Some DSGE advocates argue that the standard macro model is just plain wrong
- DSGE model provides helpful cautions for the standard macro policy but it should not be used for direct policy analysis

Modern Macroeconomic Policy and the Collapse of the Tacoma Narrows Bridge

- Formal scientific models of the bridge concluded that the Tacoma Narrows Bridge was solid and safe
- The modelers were not able to include something that we now call “aerodynamic flutter”
- Potential interactive positive feedback effects undermine a model’s results when they are not included
- Similarly, the DSGE model cannot yet take into account many second- or third-order dynamic effects that can occur when individuals interact in the economy

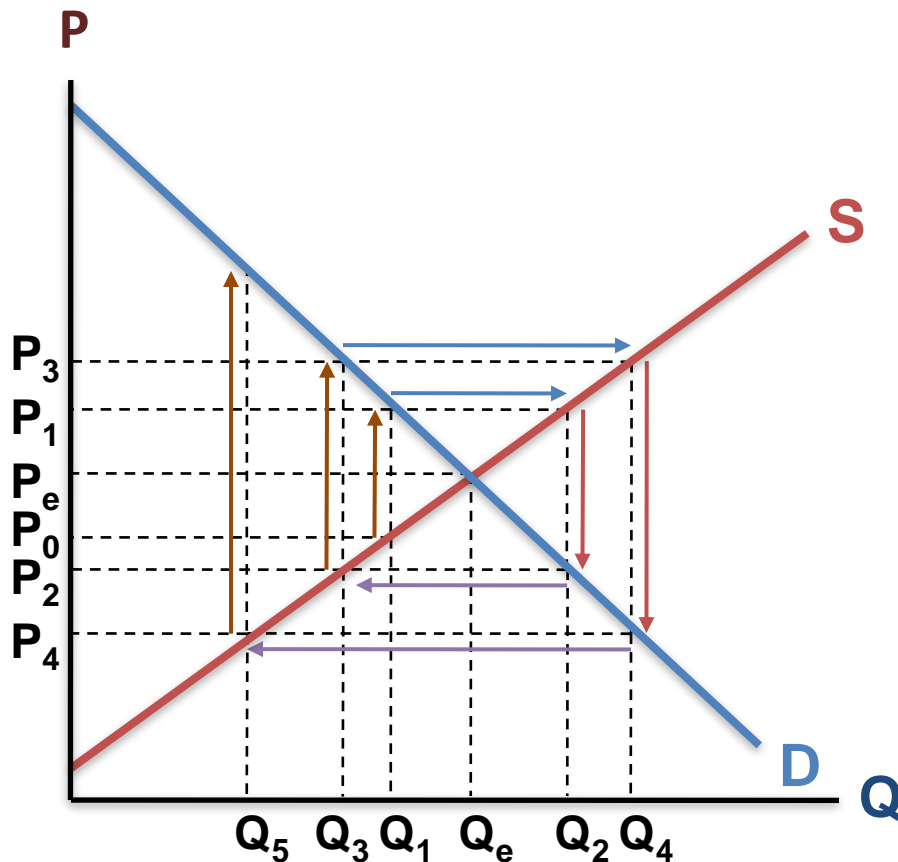
The Complexity Approach to Macro: The Future of Modern Macro

- **Complex systems macro models** are macro models of the economy that take into account dynamic interactions of agents in the models, where agents have less than full information and can be less than infinitely rational
- **Emergent properties** are properties of the system that could not have been predicted from a deductive analysis starting from the components of the system

The Underlying Dynamic Assumptions of the Standard, DSGE, and Complex Systems Models

- The assumptions of the *standard model*, *the DSGE model*, and *the complex systems model* will be used to analyze the cobweb model
- **Cobweb model**
 - Standard supply/demand model, but
 - Suppliers don't know what price they'll be able to sell their product for when they decide how much to supply
 - The model starts at equilibrium and then demand shifts up

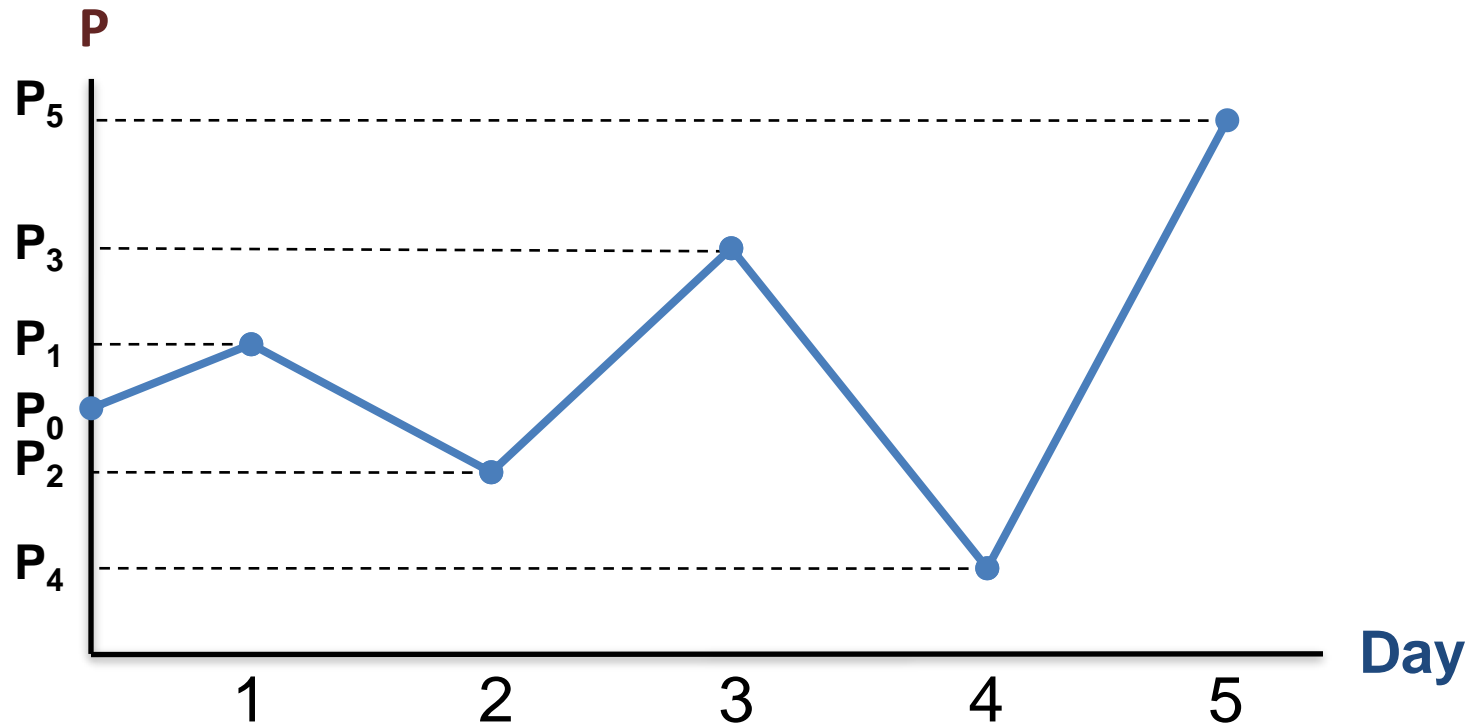
The Standard Macro Model: Backward-Looking Expectations



- **Historically based expectations** are expectations about the future that are based on past events
- With historically based expectations, a small gap in expected and actual prices can become larger and larger

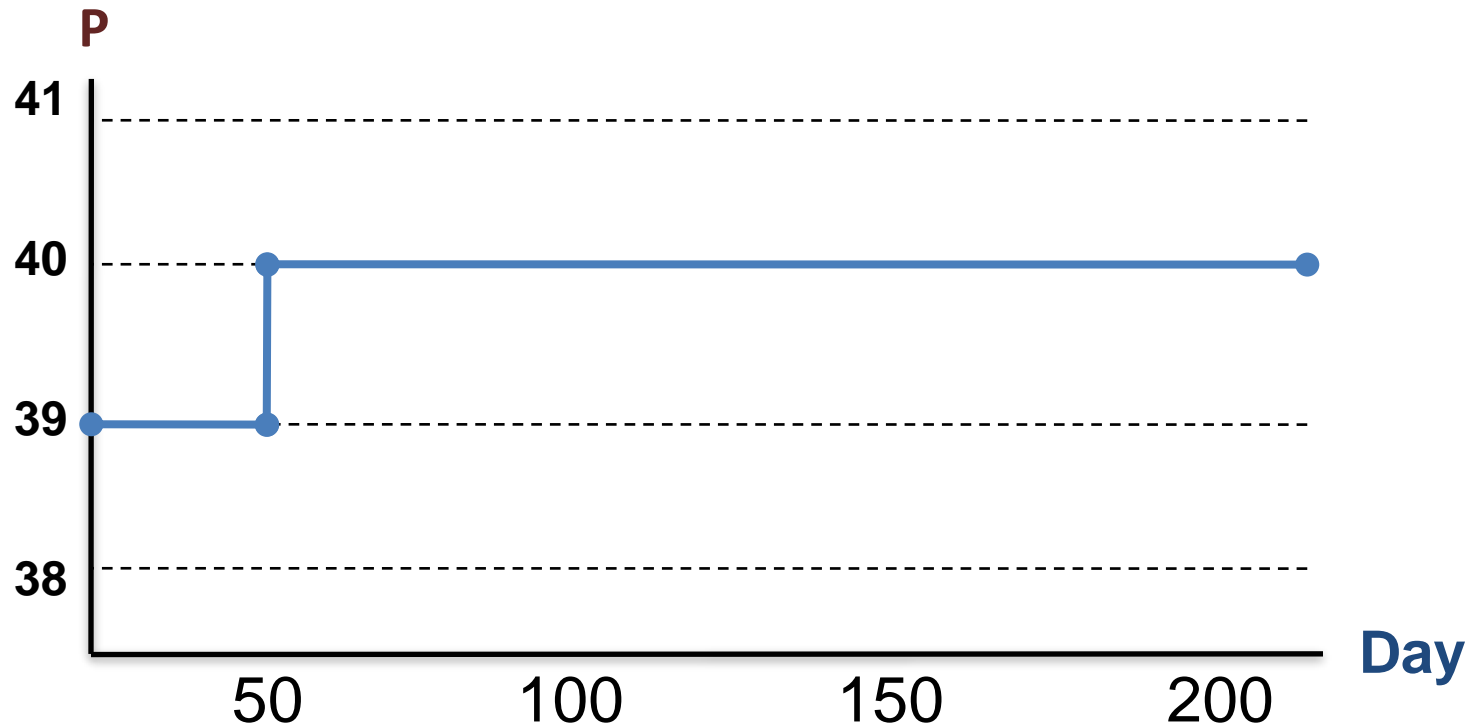
The Standard Macro Model

With backward-looking expectations, fluctuations in price can explode



The DSGE Model: Rational Expectations

With rational expectations (people expect the price predicted by the model) price adjusts to its new equilibrium immediately

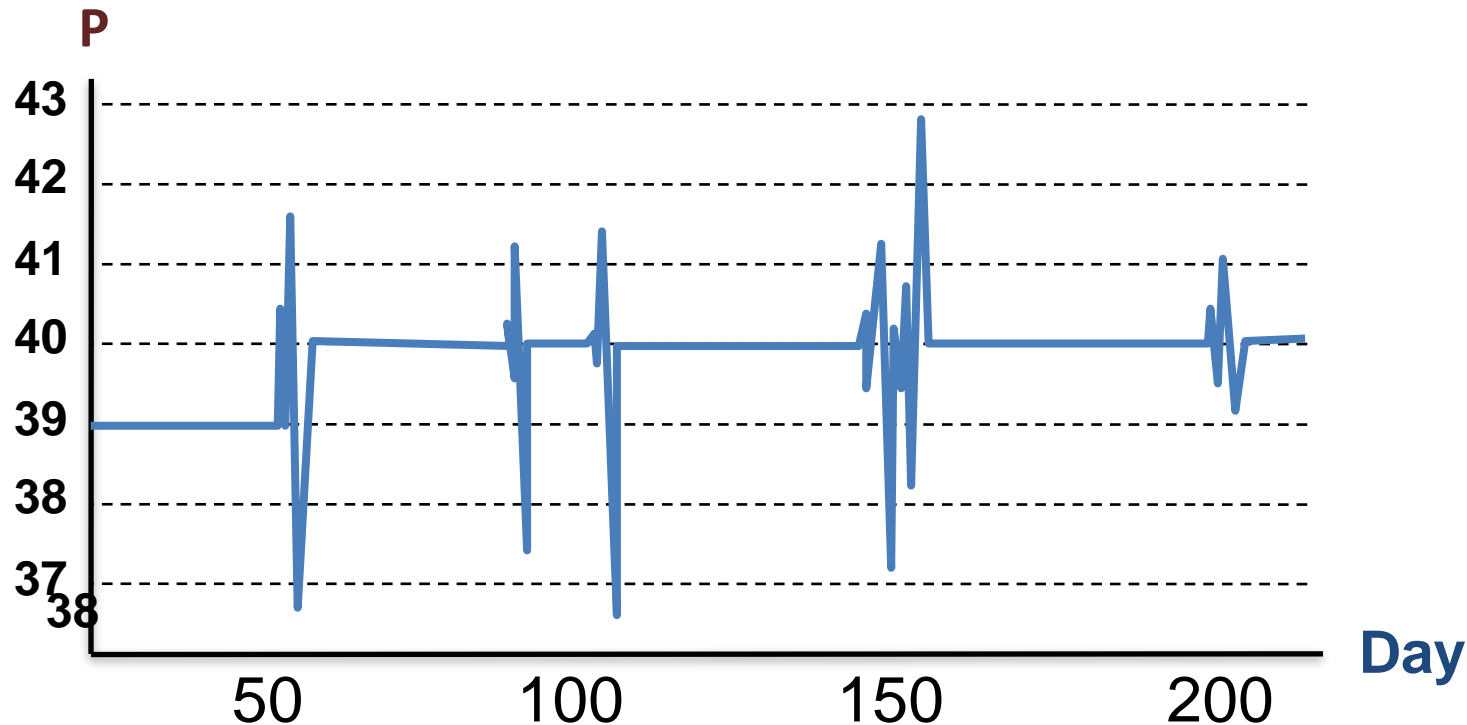


Complex Systems Models: Smart People with Less-Than-Perfect Foresight

- In a complex system, there is no “correct” model on which to base price expectation
- **Learning procedures** (the methods by which people learn about the system) are central to the expectations process
- People learn by discovering patterns in the past data and tentatively check to see if those patterns are likely to continue
- Fluctuations in the aggregate economy are driven by people who are trying to find patterns of patterns

Complex Systems Models: Smart People with Less-Than-Perfect Foresight

In a learning model, prices are relatively stable but experience periodic fluctuations



- Pressures for instability in markets become even greater when behavioral economic insights are added to the model
- People tend to **herd** which is to copy other successful behavior even though that successful behavior may have been just luck
- Herding can result in even larger fluctuations away from equilibrium, keeping the market from equilibrium for long periods of time

Agent-Based Computational Models of the Macroeconomy

- **Agent-based computational economic (ACE) models** are virtual computer macroeconomies of rational agents with less-than-perfect information
- These models create virtual macroeconomies, and the economist can experiment with different learning patterns of the agents in the model
- In complex systems models fluctuations are caused by people trying to learn in an environment that is continually changing
- Limits to ACE models exist

Choosing the Right Model

- The important question for policy makers is which of these many models of the macroeconomy to use
- To figure out which model to use, modern macroeconomists conduct experiments about how people respond in periods of uncertainty and study what people have done historically
- Researchers have found that it is easiest for people to get it right when markets are relatively stable, but are less likely to get it right when markets become slightly unstable