1. Modeling Issues

Based on Mankiw, Chapter 1: *The Science of Macroeconomics*

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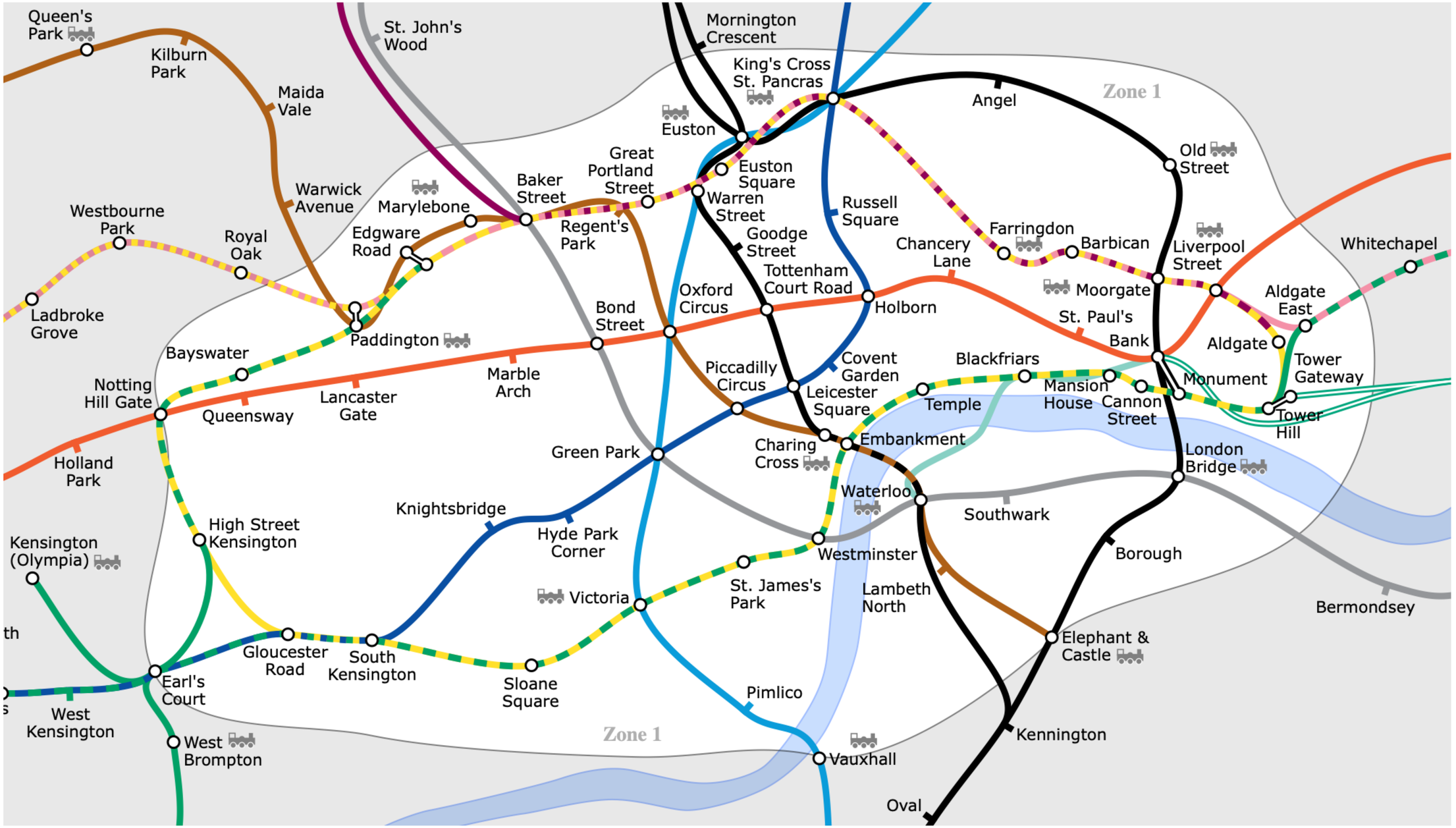
What is macroeconomics?

- Macroeconomics is the study of the economy as a whole
- It addresses many topical issues, such as:
  - What causes recessions? What is “government stimulus,” and why might it help?
  - How can problems in the housing market spread to the rest of the economy?
  - How does the budget deficit affect workers, consumers, businesses, taxpayers?
  - …

Economic models

- … are simplified versions of complex realities stripped of irrelevant details


Queen's Park
Kilburn Park
Maida Vale
St. John's Wood
Mornington Crescent
King's Cross St. Pancras
Euston
Angel
Zone 1
Old Street
Great Portland Street
Euston Square
Warwick Avenue
Marylebone
Baker Street
Warren Street
Russell Square
Westbourne Park
Royal Oak
Edgware Road
Regent's Park
Goodge Street
Farringdon
Barbican
Liverpool Street
Whitechapel
Chancery Lane
Ladbroke Grove
Paddington
Oxford Circus
Tottenham Court Road
Holborn
Moorgate
Aldgate East
Bond Street
St. Paul's
Bank
Aldgate
Bayswater
Marble Arch
Piccadilly Circus
Covent Garden
Blackfriars
Tower Gateway
Notting Hill Gate
Queensway
Lancaster Gate
Leicester Square
Temple
Mansion House
Monument
Cannon Street
Tower Hill
Holland Park
Green Park
Charing Cross
Embankment
London Bridge
Waterloo
High Street Kensington
Knightsbridge
Hyde Park Corner
Southwark
Kensington (Olympia)
Westminster
Borough
Victoria
St. James's Park
Lambeth North
Bermondsey
Gloucester Road
South Kensington
Sloane Square
Elephant & Castle
Earl's Court
Pimlico
West Kensington
West Brompton
Zone 1
Kennington
Vauxhall
Oval

Economic models

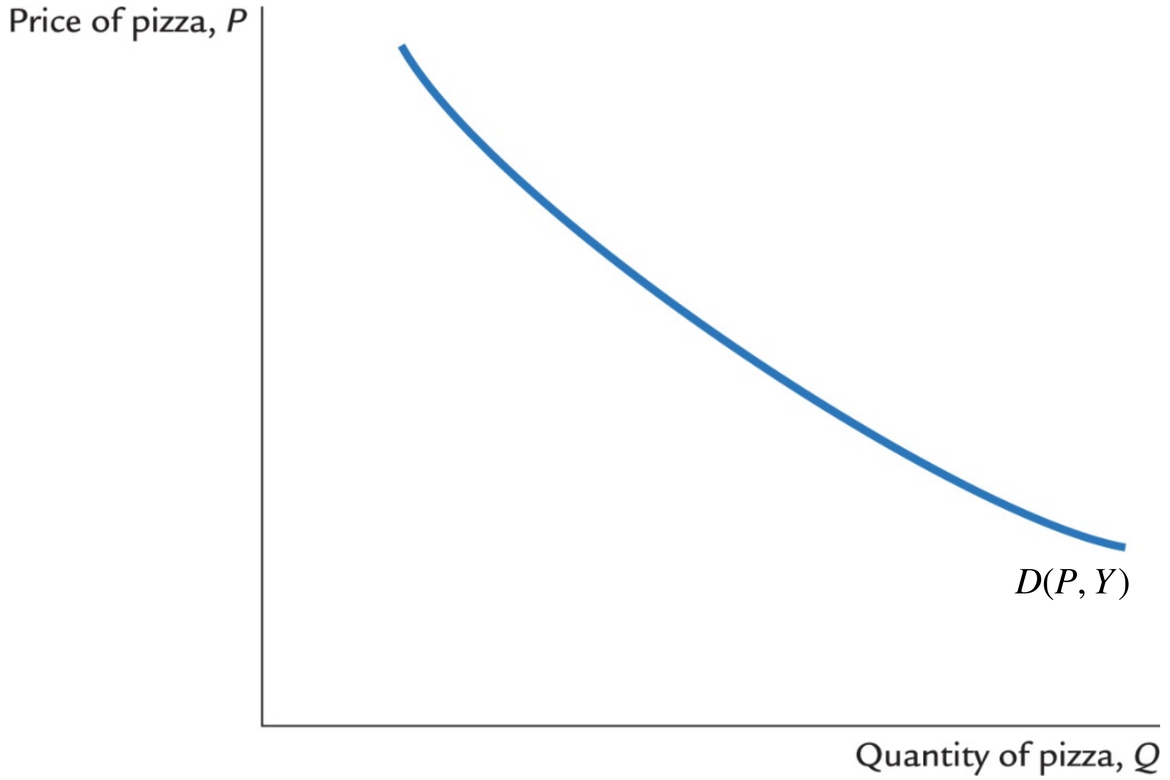
- … are simplified versions of complex realities stripped of irrelevant details
- … are used to:
  - show relationships between variables
  - explain the economy’s behavior
  - devise policies to improve economic performance

An example of an economic model

- Supply and demand for pizza
- Goal: analyzing how various events affect the price and quantity of pizza sold
- Assumption: perfectly competitive market
  - That is, buyers & sellers are too small to affect the market price
- Variables:
  - Q^D: quantity of pizza that buyers demand
  - Q^S: quantity of pizza that producers supply
  - P: price of pizza
  - Y: aggregate income
  - P_f: price of 00 flour (an input)

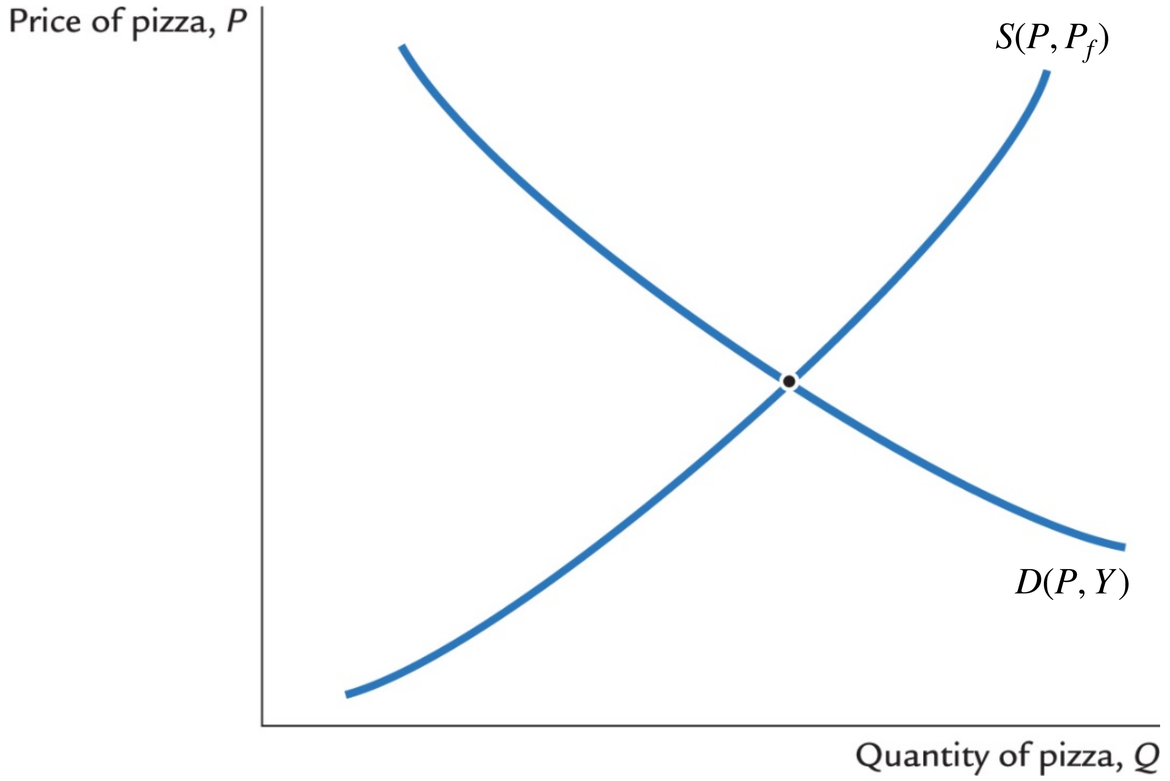
The market for pizza

- Demand equation: $Q^D = D(P, Y)$
- The *demand curve* shows the relationship between quantity demanded and price, other things (such as income) equal
- *How about other variables?*



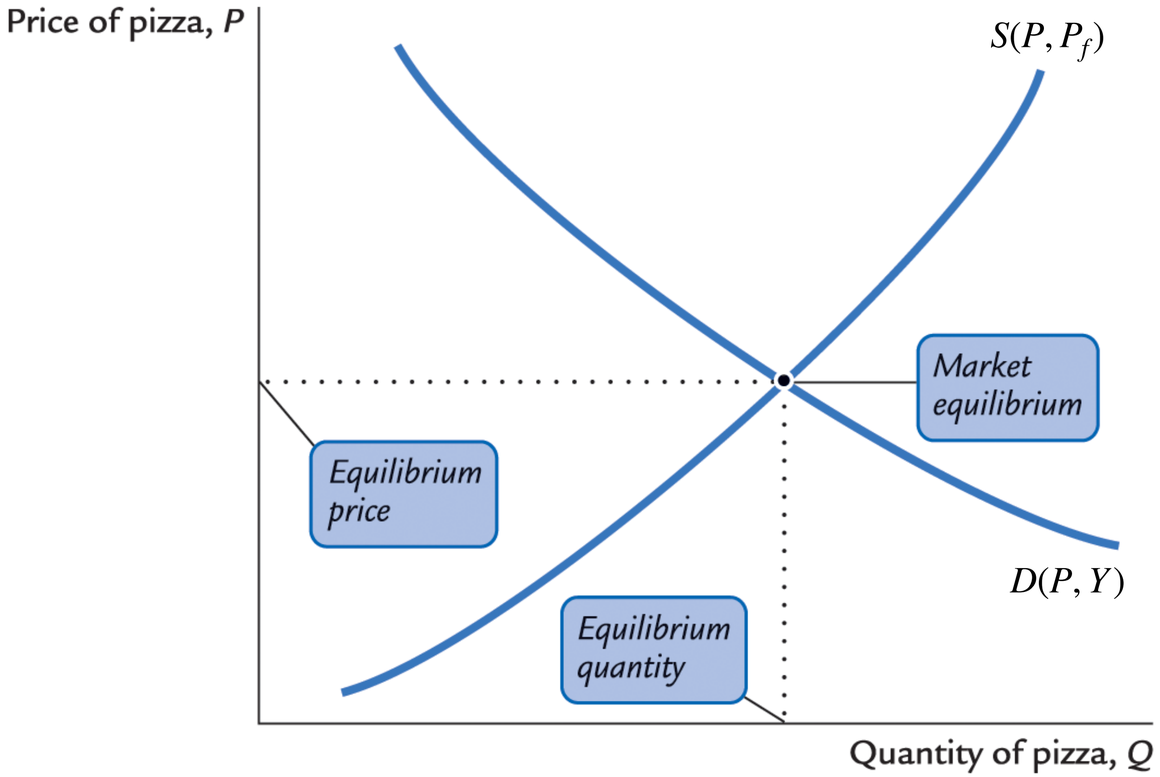
The market for pizza

- Supply equation: $Q^S = S(P, P_f)$
- The *supply curve* shows the relationship between quantity supplied and price, other things (such as the price of flour) equal
- *How about other variables?*



The market for pizza

- Equilibrium price: P^*
- Equilibrium quantity:
  $Q^* = D(P^*, Y) = S(P^*, P_f)$

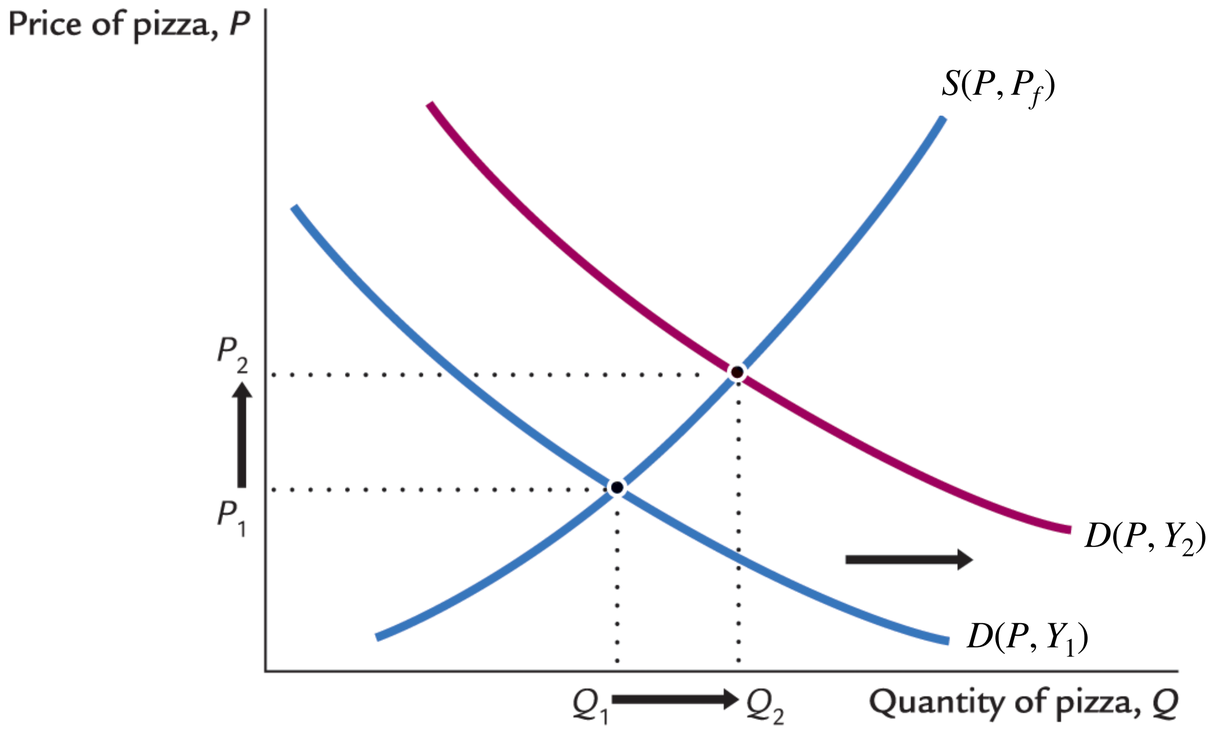


The impact of an increase in income

- Income: $Y_1 \rightarrow Y_2$

The impact of an increase in income

- Income: $Y_1 \rightarrow Y_2$
- Demand: $D(P, Y_1) \rightarrow D(P, Y_2)$
- Equilibrium price: $P_1 \rightarrow P_2$
- Equilibrium quantity: $Q_1 \rightarrow Q_2$

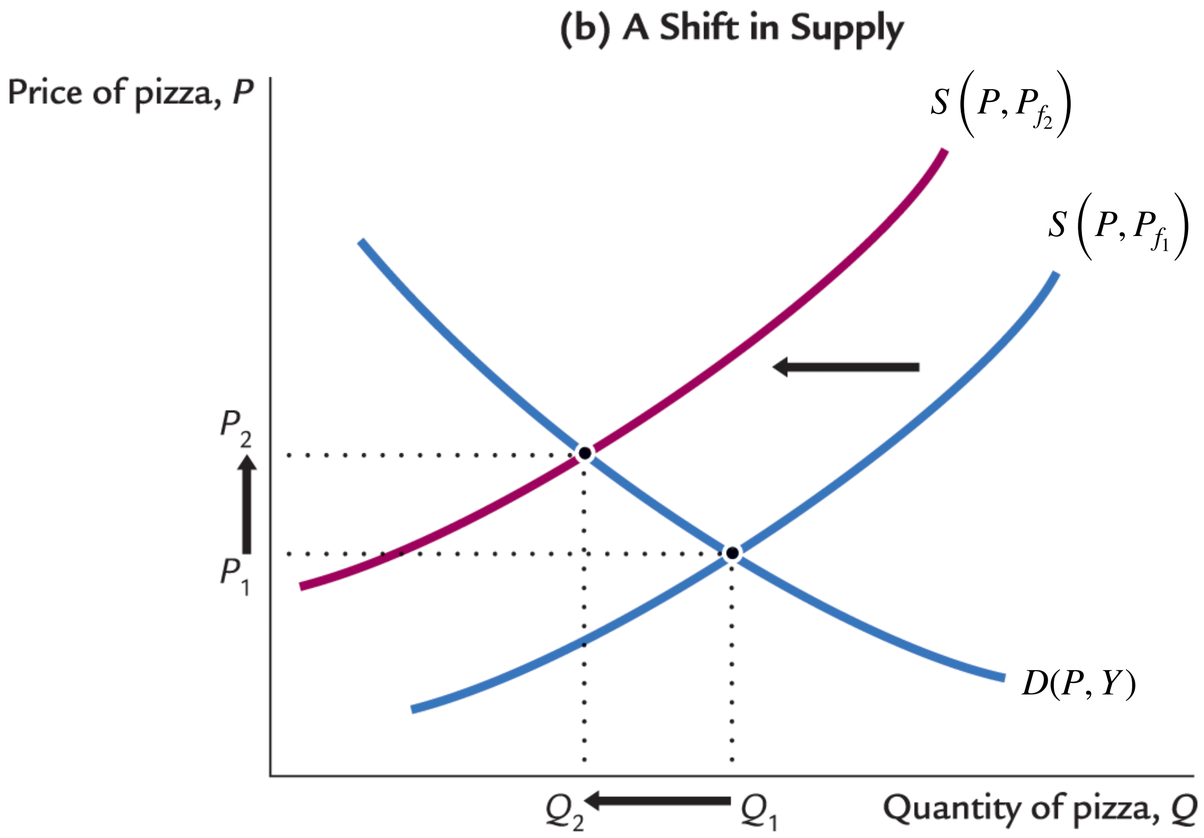


The impact of a flour price increase

- Flour price: $P_{f_1} \rightarrow P_{f_2}$

The impact of a flour price increase

- Flour price: $P_{f_1} \rightarrow P_{f_2}$
- Supply: $S\left(P, P_{f_1}\right) \rightarrow S\left(P, P_{f_2}\right)$
- Equilibrium price: $P_1 \rightarrow P_2$
- Equilibrium quantity: $Q_1 \rightarrow Q_2$



Endogenous vs. exogenous

- *Endogenous variables:* their values are determined in the model
- *Exogenous variables:* their values are determined outside the model
  - The model takes their values and behaviors as given
- In the model of supply and demand for pizza:
  - endogenous variables: *???*
  - exogenous variables: *???*

Endogenous vs. exogenous

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- *Exogenous variables:* their values are determined outside the model
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- In the model of supply and demand for pizza:
  - endogenous variables: P, Q^D, Q^S
  - exogenous variables: Y, P_f

NOW YOU TRY

1. Write down demand and supply equations for smartphones, include two exogenous variables in each equation
2. Draw a supply–demand graph for smartphones and identify the equilibrium price and quantity
3. Use your graph to show how a change in one of your exogenous variables affects the model's endogenous variables

The use of multiple models

- No single model can address all the issues we care about
- For example, our supply–demand model of the pizza market:
  - can tell us how a fall in aggregate income affects prices and quantities
  - … but it cannot tell us *why* aggregate income falls

The use of multiple models

- We will learn different models for studying different issues
  - E.g., unemployment, inflation, long-run growth
- For each new model, you should keep track of:
  - its assumptions
  - which variables are endogenous and which are exogenous
  - the questions it can help us understand and those it cannot

Flexible vs. sticky prices

- *Market clearing:* the assumption that prices are flexible
  - That is, they adjust immediately to equate supply and demand
- In the short run, many prices are sticky
  - That is, they adjust sluggishly in response to changes in supply or demand
- Examples:
  - labor contracts fix the nominal wage for a year or longer
  - magazine publishers change prices only once every three to four years

Flexible vs. sticky prices

- The economy's behavior depends on whether prices are sticky or flexible
- If prices are sticky (short run), demand may not equal supply, which explains:
  - unemployment (excess supply of labor)
  - goods shortages (excess demand for goods)
  - …
- If prices are flexible (long run), markets clear

A few remarks about economic models

- “All models are wrong, but some are useful.” (Box, 1976)
- Understandable but untrue points of criticism:
  - “Economics does not tackle important issues like inequality, climate change, …”
  - “Economics is stuck in the paradigm of homo economicus (a single rational agent)”
  - “Economists failed to predict the 2008 financial crisis”
  - How economics lost its soul (Hauge, 2025)
- Modern macro is not yet distilled enough for undergraduate education
  - … but we’re working on it!
- We will cover the fundamentals in this course

SUMMARY

- Macroeconomics is the study of the economy as a whole, including:
  - growth in incomes
  - changes in the overall level of prices
  - the unemployment rate
- Macroeconomists attempt to explain the economy and to devise policies to improve its performance

SUMMARY

- Economists use different models to examine different issues
- Models with flexible prices describe the economy in the long run
- Models with sticky prices describe the economy in the short run
- Macroeconomic events and performance arise from many microeconomic transactions, so macroeconomics uses many of the tools of microeconomics