

Chapter 1. The Science of Macroeconomics *

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1 What Macroeconomists Study

Questions Macroeconomists intend to answer:

1. Why have some countries experienced rapid growth in incomes over the past century while others have stayed mired in poverty?
2. Why do some countries have high rates of inflation while others maintain stable prices?
3. Why do all countries experience recessions and depressions—recurrent periods of falling incomes and rising unemployment—and how can government policy reduce the frequency and severity of these episodes?

There are three important macroeconomics variables:

1. Real **gross domestic product (GDP)**: it measures the total income of everyone in the economy (the term “real” means that real GDP is adjusted for the level of prices).
2. **Inflation rate**: it measures how fast prices are rising.
3. **Unemployment rate**: it measures the fraction of the labor force that is out of work.

*This note mainly uses materials from Macroeconomics by N. Gregory Mankiw (9th edition) and is supposed to be used for education only.

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2 How Economists Think

Economists are trying to address politically charged issues with a scientist's objectivity. In my view, economists are engineers whose research objective is human society instead of machines.

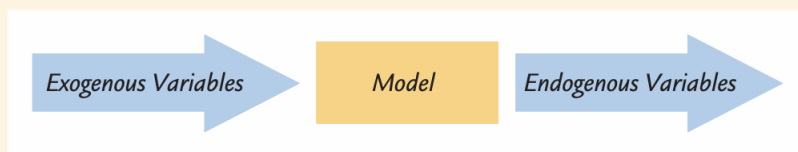
2.1 Theory as Model Building

Economists also use **models** to understand the world. Economic models illustrate, often in mathematical terms, the relationships among the variables.

Models have two kinds of variables: **endogenous** variables and **exogenous** variables.

1. Endogenous variables are those variables that a model tries to explain.
2. Exogenous variables are those variables that a model takes as given.

FIGURE 1-4



How Models Work Models are simplified theories that show the key relationships among economic variables. The exogenous variables are those that come from outside the model. The endogenous variables are those that the model explains. The model shows how changes in the exogenous variables affect the endogenous variables.

Here is a classic example of a model — the model of supply and demand. An economist wants to figure out what factors influence the **price** of pizza and the **quantity** of pizza sold. To build up a model describe the behavior of pizza buyers, the behavior of pizza sellers, and their interaction in the market for pizza, she uses the following notations:

- Q^d : the quantity of pizza demanded by consumers.
- P : the price of pizza
- Y : aggregate income

If we believe the demand of pizza depends on the prices of pizza and income, then the relationship can be expressed as:

$$Q^d = D(P, Y), \quad (1)$$

where $D(\cdot, \cdot)$ represents the demand function. Similarly, the economist supposes the quantity of pizza supplied by pizzerias Q^s depends on the price of pizza and the price of materials P_m . The materials could be cheese, tomatoes, and flour. And these cost determines how costly it is to produce a pizza. The supply relationship is:

$$Q^s = S(P, P_m), \quad (2)$$

where $S(\cdot, \cdot)$ represents the supply function.

Finally, the economist assumes that the price of pizza adjusts to bring the quantity supplied and quantity demanded into balance:

$$Q^s = Q^d. \quad (3)$$

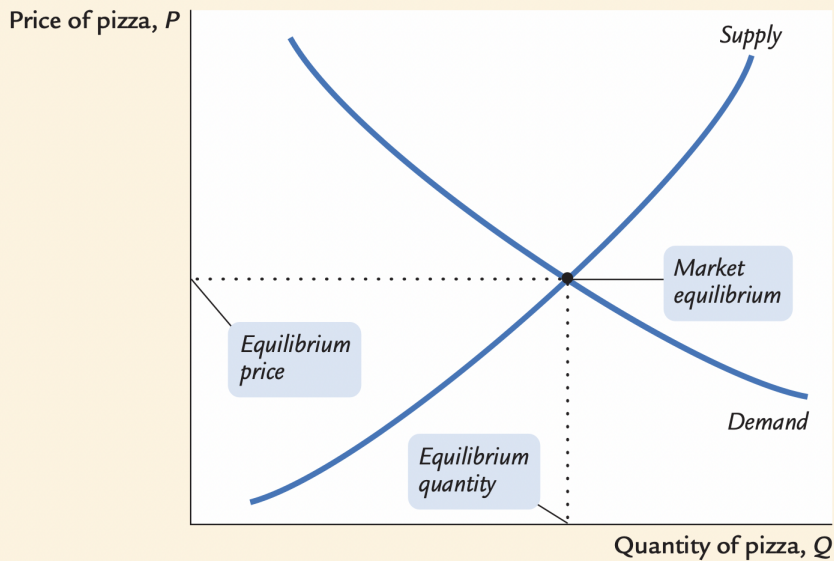
These three equations, (1), (2), and (3), compose a model of the market of pizza.

This model of the pizza market has two exogenous variables and two endogenous variables.

- Exogenous variables are aggregate income and the price of materials. The model does not attempt to explain them but instead takes them as given (perhaps to be explained by another model).
- The endogenous variables are the price of pizza and the quantity of pizza exchanged. These are the variables that the model attempts to explain.

The model can be used to show how a change in one of the exogenous variables affects both endogenous variables. For example, if aggregate income increases, then the demand for pizza increases, as in Figure 2. Similarly, if the price of materials increases, then the supply of pizza decreases, as in Figure 3.

FIGURE 1-5



The Model of Supply and Demand The most famous economic model is that of supply and demand for a good or service—in this case, pizza. The demand curve is a downward-sloping curve relating the price of pizza to the quantity of pizza that consumers demand. The supply curve is an upward-sloping curve relating the price of pizza to the quantity of pizza that pizzerias supply. The price of pizza adjusts until the quantity supplied equals the quantity demanded. The point where the two curves cross is the market equilibrium, which shows the equilibrium price of pizza and the equilibrium quantity of pizza.

Figure 1: Demand and Supply functions

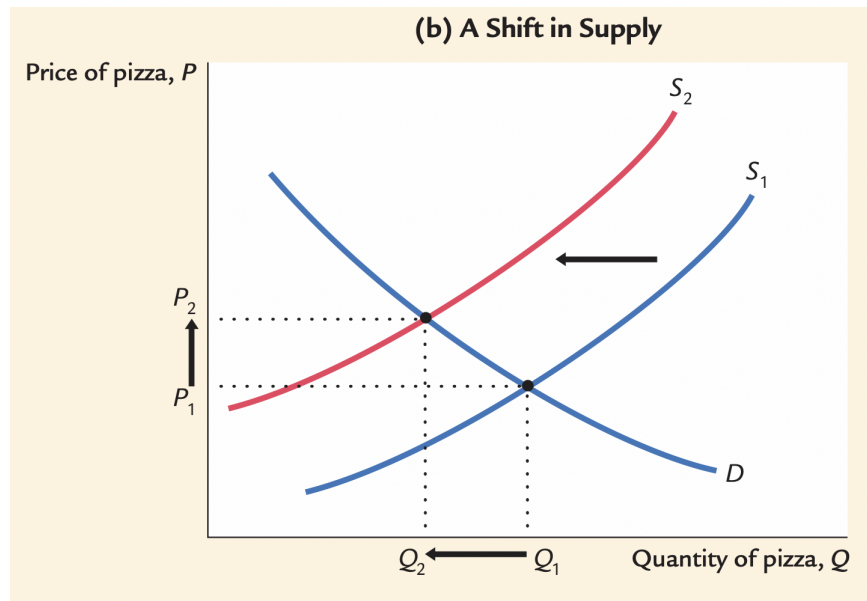


Figure 3: An increase in material cost P_m shifts the supply function to the left

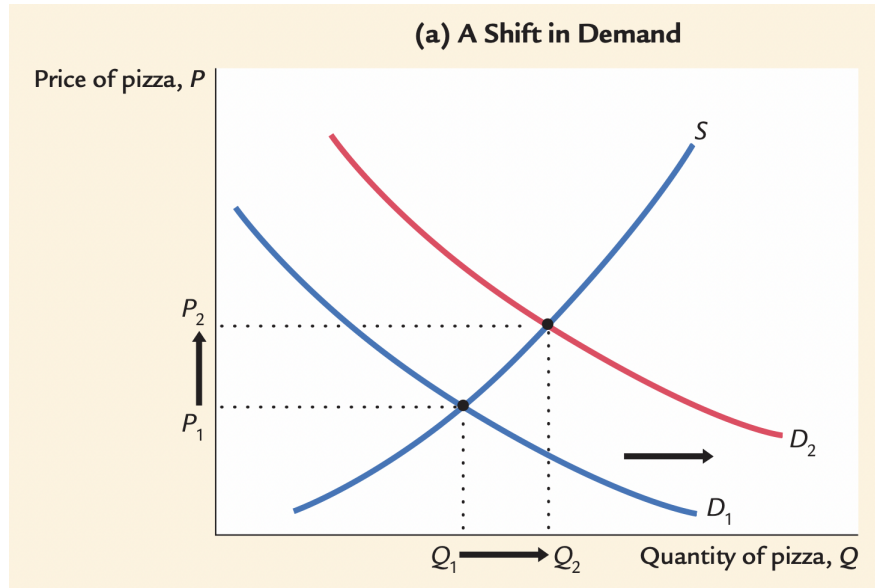


Figure 2: An increase in income Y shifts the demand function to the right

Thus, the model shows how changes either in aggregate income or in the price of materials affect price and quantity in the market for pizza.

Like all models, this model of the pizza market makes simplifying assumptions. The model does not take into account, for example, that every pizzeria is in a different location. For each customer, one pizzeria is more convenient than the others, and thus pizzerias have some ability to set their own prices. The model assumes that there is a single price for pizza, but in fact there could be a different price at every pizzeria.

3 An overview of the class

- Week 2: we will discuss how economists measure economic variables, such as aggregate income, the inflation rate, and the unemployment rate
- Week 3: The first chapter of *Classical Theory: The Economy in the Long Run*. We will study national income, where it comes from and where it goes
- Week 4: The Monetary System: What it is and How it works
- Week 5: Inflation: Its causes, effects, and social costs
- Week 6: The open Economy

- Week 7: Unemployment and the labor market
- Week 8: The first chapter of *Growth Theory: The Economy in the Very Long Run*. We will study Economic Growth I: Capital accumulation and Population growth
- Week 9: Economic Growth II: Technology, Empirics, and Policy
- Week 10: The first chapter of *Business Cycle Theory (The economy in the short run)*. We will go through the introduction to economic fluctuations.
- Week 11: Aggregate Demand I: Building the IS-LM Model
- Week 12: Aggregate Demand II: Applying the IS-LM Model
- Week 13: The Open Economy Revisited: The Mundell-Fleming Model and the Exchange-Rate Regime
- Week 14: Aggregate Supply and the Short-Run Tradeoff between Inflation and Unemployment

References

- [1] N.Gregory Mankiw Macroeconomics, 9th edition Book Chapters, Worth Publishers.