

**Class 7**  
**Demand and Supply**

**A. Using Demand and Supply to Predict Changes in Prices and Quantities**

1. Rubric for Applying Demand and Supply
  - a. Begin with a characterization of the “pre-shock” situation. This involves identifying the market in question. Typically, it will be reasonable to assume that the market began in equilibrium. It will usually be helpful to draw the demand and supply schedules.
  - b. Identify the shock.
  - c. Diagnose the effect of the shock on the demand schedule and the supply schedule. Sometimes the shock will affect one schedule or the other. Sometimes it will affect both. It is helpful to ask whether consumers of the good or producers of the good or both were affected by the shock.
  - d. Shift the schedules in the appropriate way.
  - e. Use the diagram you have created to make predictions about price and quantity.
  
2. **TIBER:** The demand schedule may be shifted by changes in:
  - a. Tastes
  - b. Income
  - c. Buyers (Number of buyers or population)
  - d. Expectations of future prices
  - e. Related goods prices (Price of substitutes and complements)
  
3. **STONER:** The supply schedule may be shifted by changes in:
  - a. Subsidies and taxes
  - b. Technology used to produce the good
  - c. Other goods (prices of other goods the producers could produce)
  - d. Number of suppliers
  - e. Expectations of relevant future prices
  - f. Resource costs (prices of labor, raw materials and other inputs).
  
4. Examples
  - a. What do you predict is the impact of the recession on the equilibrium in the market for “restaurant meals”?
  - b. What do you predict is the impact of the “cash for clunkers” program on the equilibrium price and quantity of new fuel efficient cars? ...of used cars?
  - c. What do you predict is the impact of “soaring gas prices” on the equilibrium price of small cars? ...of large cars?
  - b. What do you predict is the impact of a decrease of the price of imported steel on the equilibrium price of new US automobiles?
  - c. What do you predict is the impact on the equilibrium price and quantity of corn this year of newly passed legislation that will raise the federal subsidy for ethanol next year?

Analysis of “As Gas Soars, Buyers Flock to Small Cars,” New York Times, May 2, 2008, Bill Vlasic  
By Thomas Price

The article discusses the automotive market trend of consumers moving away from larger vehicles and towards smaller vehicles. This is the result of a change in the underlying demand for each vehicle type. Consumers are demanding more small vehicles and subsequently fewer large vehicles. We know that the substitution is the result of a change in demand, and not supply, because the article provides a couple of hints. It suggests that consumers are migrating towards smaller vehicles due to the lower gas costs associated with them. It also suggests that consumer preferences in other categories have been changing, “Once considered an unattractive and cheap alternative to large cars... compacts have become the new star...” Cost and preference are two important characteristics that drive product demand.

Looking at the trend from the supply side yields the same conclusion. The article mentions that firms earn lower profits per car on small vehicles than they do on larger vehicles. Firms have an incentive to supply large cars, not small cars, yet sales of small cars are increasing. The article also indicates that automakers such as General Motors have been playing catch-up to the change in consumer preferences, “Automakers ignore the move... at their own peril. G.M., for example, is playing catch-up by introducing a dozen new cars... in the next few model years.” This implies that consumers now want small vehicles, and G.M. must change its product mix to satisfy the new demand.

#### Further Questions

How many different goods (markets) are mentioned in the article?

What happens, according to the article, to the demand and supply schedules for each good?

Draw the demand and supply schedules so that they are consistent with the data reported in the article and with your knowledge of demand and supply.

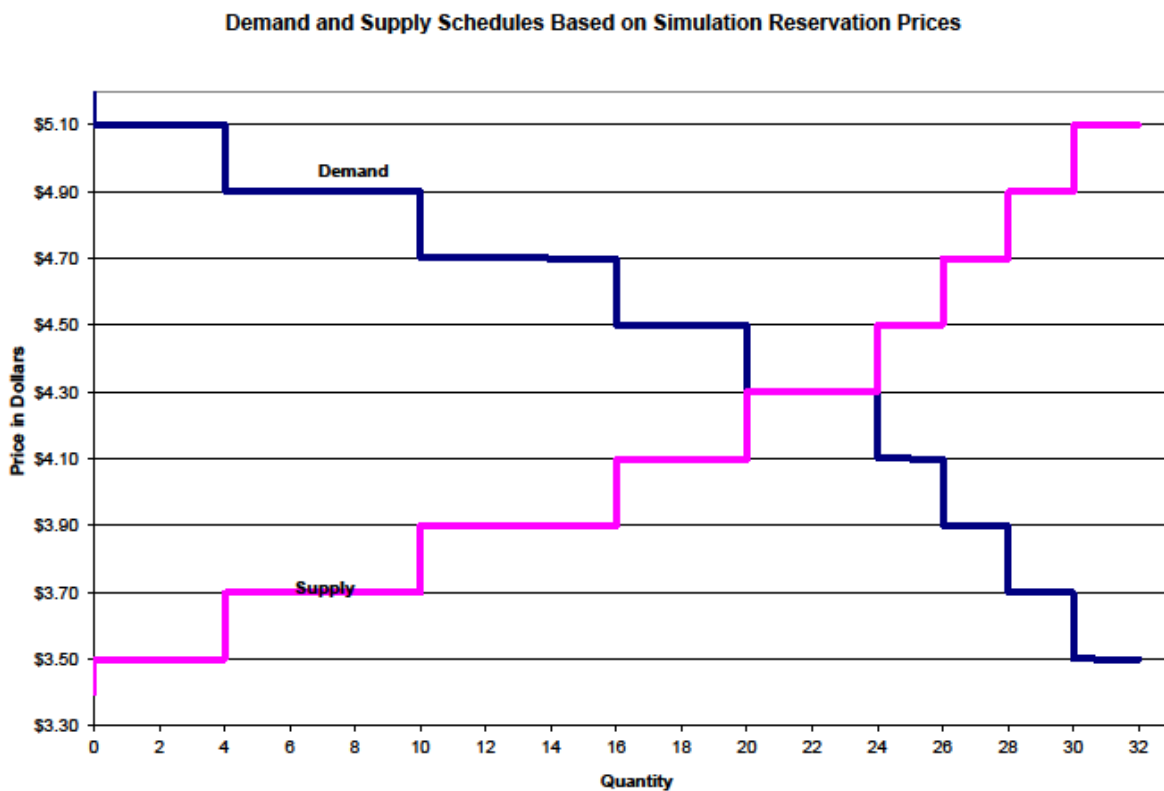
5. De-briefing the classroom simulation

The following graph depicts the demand and supply schedules associated with the decks of buyer cards and seller cards from the simulation.

Why are the demand and supply schedules drawn as “stair steps”?

What is the prediction of this model for the price at which a box of computer chips should be sold?

Did the simulation results confirm or contradict the model’s prediction about price? Why?



6. The algebra of demand and supply.

Structural Equations

$$\text{Demand Schedule:} \quad Q_D = D_0 - D_1 P + X$$

$$\text{Supply Schedule:} \quad Q_S = S_0 + S_1 P + Z$$

$$\text{Equilibrium Conditions:} \quad Q = Q_D = Q_S$$

Where  $Q_D$  is quantity demanded of a good,  $Q_S$  is quantity supplied of a good,  $P$  is the price of the good,  $X$  is a demand shift variable, and  $Z$  is a supply shift variable. A (negative, zero, positive) value of  $X$  represents an (increase, no change, decrease) in demand at a given price level. A (negative, zero, positive) value of  $Z$  represents an (increase, no change, decrease) in supply at a given price level.

$D_0$  and  $D_1$  are numbers that quantify the relationship between the quantity demanded and price.  $D_0$  defines the position of the demand schedule.  $D_1$  defines the rate at which quantity demanded falls as price increases.

$S_0$  and  $S_1$  are numbers that quantify the relationship between the quantity supplied and price.  $S_0$  defines the position of the supply schedule.  $S_1$  defines the rate at which quantity supplied increases as price increases.

If we solve the demand and supply equations simultaneously for equilibrium, we obtain the following expressions for equilibrium price and quantity.

$$P = \frac{D_0 + X - S_0 - Z}{D_1 + S_1}$$

$$Q = \frac{S_1(D_0 + X) + D_1(S_0 + Z)}{D_1 + S_1}$$

Interpretation of the equilibrium price and quantity expressions

How can one use the formulas to predict the effect on equilibrium price and quantity of a shock that increases demand?

How can one use the formulas to predict the effect on equilibrium price and quantity of a shock that increases supply?

Why do the effects on price and quantity of a shift in demand depend on  $D_1$  and  $S_1$ ?

Why do the effect on price and quantity of a shift in supply depend on  $D_1$  and  $S_1$ ?

## **B. What's Behind the Demand Schedule?**

1. The law of demand says that rational individuals do less of what they want to do as the cost of doing it rises.
  - a. In many cases, “do less of what they want to do” translates into “purchases and consumes less of a good or service.”
  - b. Quantity demanded is inversely related to price for two reasons.
    - i. As price rises, it rises above the reservation price for some demanders and they “drop out” of the group that wants the good (at the price in question).
    - ii. As individuals increase consumption of a good or service, their reservation price for additional units of the good or service falls. A second ice cream cone gives me less satisfaction than the first, so my reservation price for it is lower.
    - iii. In later courses you will learn that a characteristic of an optimal allocation of a budget is that the “marginal utility” of a dollar spent on a good or service must be the same for every good and service consumed.
2. There are (almost) always substitutes for things we consume. The existence of substitutes is one important reason why economists think it is more accurate to say that an individual “wants” something than to say an individual “needs” something.
  - a. Why do the wealthy in Manhattan live in smaller houses than the wealthy in Seattle?
  - b. Why are waiting lines longer in poorer neighborhoods?
3. Consumer surplus for a good is defined as the sum across consumers of the difference between the reservation prices of the consumer and what the consumers actually pays.
  - a. If all consumers pay the same price (as in a market equilibrium), consumer surplus is the area of the (roughly) triangle shape formed by the price axis (height), the equilibrium price (base), and the demand schedule (hypotenuse).

### C. What's Behind the Supply Schedule?

1. The supply schedule is a direct (positive) relationship between quantity supplied and price. As price rises, the marginal benefit of supplying the good rises and it is rational for the supplier to take actions that raise the marginal cost of supplying the good.
  - a. As price rises, it rises above the reservation price for some suppliers and they enter the market to supply the good.
  - b. As price rises, suppliers use resources with higher opportunity costs to produce the good (just like in our survivors' problem).

Example: Harry has two jobs. He can work as many hours as he wants as a retail clerk for \$6.00. He can also work as a self-employed soft-drink can recycler. The following table shows Harry's productivity as a can recycler on a typical day.

Hours Worked Recycling	Total Cans Recycled
0	0
1	600
2	1000
3	1300
4	1500
5	1600

If Harry receives two cents per can, should he allocate any time to his recycling business? If yes, how much time should he allocate? Is the socially optimal quantity of pollution zero?

2. In a market with many buyers and sellers where sellers offer products that consumers regard to be near-perfect substitutes, the market sets the price and individual buyers and sellers perceive they have no control over it.
  - a. Economists say that demanders and suppliers are price takers when a market is "perfectly competitive."
  - b. The price in a perfectly competitive market equals the reservation price of the marginal demander and the opportunity cost of the marginal supplier. The "last" demander has a reservation price just equal to the opportunity cost of the "last" supplier.
3. Producer surplus for a good is defined as the sum across suppliers of the difference between the reservation price of a supplier and what the supplier actually receives.
  - a. If all suppliers receive the same price (as in a market equilibrium), producer surplus is the area of the (roughly) triangle shape formed by the price axis (height), the equilibrium price (base), and the supply schedule (hypotenuse).