Microeconomics

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Contents

1 Foundations of Economics

1.1 Fundamental Problem of Economics

Human beings have many wants and needs. The physical objects they want or need are called *goods* (e.g., food, clothing, books), while the non-physical activities are called *services* (e.g., education, health care, entertainment).

The study of economics arises because people's needs and wants are unlimited, but the *resources* needed to satisfy them are limited. Resources are inputs used to produce goods and services, and for this reason are also known as *factors of production*. Factors of production do not exist in abundance; they are *scarce*.

Definition 1.1: Scarcity

Scarcity is the situation in which available resources, or factors of production, are finite, whereas wants are infinite. There are not enough resources to produce everything that human beings need and want.

As a result of scarcity, choices need to be made. Resource scarcity forces society to make a choice between available alternatives. Another important consequence of scarcity is avoiding waste in using resources. If resources are not used effectively and are wasted, they will end up producing less. Finally, scarcity gives rise to *opportunity cost*.

Definition 1.2: Opportunity Cost

Opportunity cost is defined as the value of the next best alternative that must be given up or sacrificed in order to obtain something else.

When a consumer chooses to use her \$100 to buy a pair of shoes, she is also choosing not to use this money to buy books. The foregone books are the opportunity cost.

1.2 Assumptions in Model-Building

Economists primarily make two assumptions when building models:

1. Ceteris Paribus

2. Rational Agents

Definition 1.3: Ceteris Paribus

A Latin expression that means 'other things equal'. In the context of economics, it is saying that all other things are assumed to be constant or unchanging in order to study the effect of one independent variable on a dependent variable.

Definition 1.4: Rational Agents

Rational economic decision-making. This means that individuals are assumed to act in their best self-interest, trying to maximise (make as large as possible) the satisfaction they expect to receive from their decisions.

1.3 What is Microeconomics?

Definition 1.5: Microeconomics

Microeconomics is concerned with the behaviour of consumers, firms and resource owners, who are the most important economic decision-makers in a market economy.

2 Demand and Supply

2.1 What is a Market?

It is easiest to understand what a market is and how it works by dividing individual economic units into two broad groups, according to function, *buyers* and *sellers*.

Buyers purchase goods and services. Usually, there are two types of buyers: consumers and firms. Consumers purchase regular goods and service while firms purchase labor, capital, and raw materials that they use to produce goods and services.

Sellers sell goods and services. Usually, there are three types of sellers: firms, resource owners, and workers. Firms sell their goods and services, resource owners rent land or sell mineral resources to firms, and workers sell their labor services.

Definition 2.1: Market

A market is an arrangement where buyers and sellers meet to carry out an exchange which determines the price of a product.

2.2 Competitive and Non-Competitive Markets

A *perfectly competitive market* has many buyers and sellers, so that no single buyer or seller has any impact on price. Most agricultural markets are close to being perfectly competitive. This should be contrasted with *market power* (a.k.a *monopoly power*), which refers to the control that a seller has over the price of the product they sell. To make analysis easier, we begin the study of microeconomics by assuming perfectly competitive markets.

Some markets contain many producers but are *non-competitive*; that is, individual firms can jointly affect the price. The world oil market is one such example. Since the early 1970s, that market has been dominated by the OPEC cartel.

2.3 Demand

Definition 2.2: Demand

The demand represents how much of a good consumers are *willing* and *able* to buy at different possible prices in a particular time period.

There are two keywords in the definition; willing and able. 'Willing' means that consumers want to buy the product. 'Able' means they can afford the product. For instance, consider the demand for Ferraris. You may want to buy a Ferrari, but can you afford it? If not, your desire to buy one will not show up as demand for Ferraris.

The demand for a product is usually represented by a curve with the possible prices on the y-axis and the quantity demanded on the x-axis.

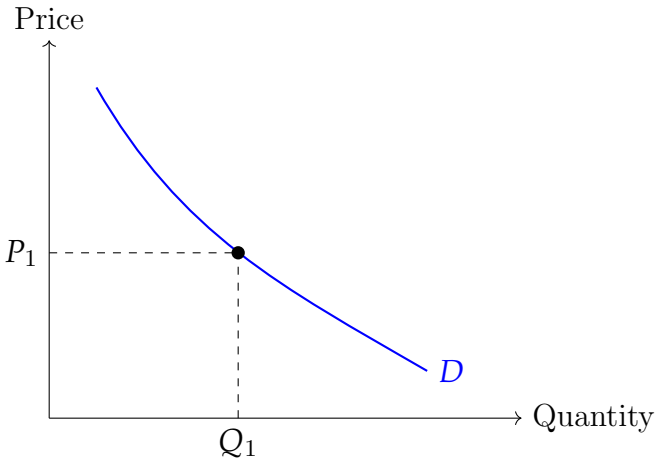


Figure 1: Demand Curve

2.3.1 Why Does the Demand Curve Slope Downward?

There are two explanations for the downward slope of the demand curve:

1. Law of Demand
2. Law of Diminishing Marginal Benefit

Definition 2.3: Law of Demand

There exists a negative causal relationship between price and quantity demanded. As the price of a good decreases, the quantity of the good demanded increases, ceteris paribus.

Definition 2.4: Law of Diminishing Marginal Benefit

Consumers buy goods because it provides them with some benefit or satisfaction known as *utility*. The greater the quantity of a good consumed, the greater the utility. However, the extra benefit provided by each additional unit increases by smaller and smaller amounts. The extra benefit that you get from each additional unit of something you buy is called the *marginal benefit* or *marginal utility* (marginal means extra or additional). Since each successive unit of the good you consume produces less and less benefit, you will be willing to buy each extra unit only if it has a lower and lower price.

2.3.2 Non-Price Determinants of Demand

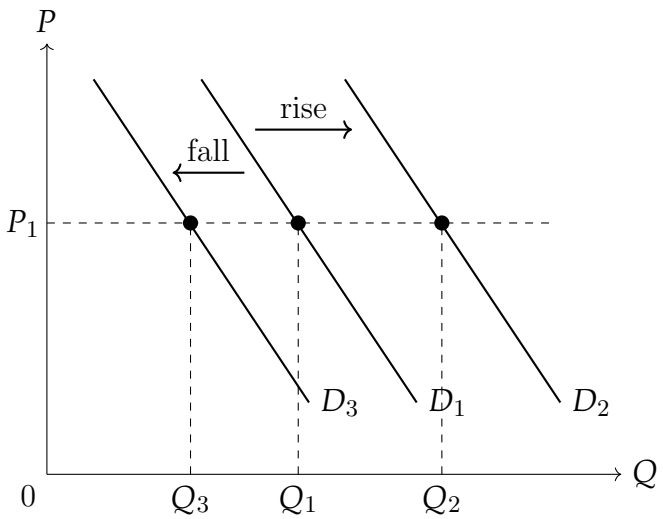


Figure 2: Shift in Demand

The non-price determinants of demand are factors other than price which influence demand. These are the factors assumed to be constant by the ceteris paribus assumption in the law of demand. Changes in the determinants of demand cause shifts in the demand curve; the entire demand curve moves to the right or left. The factors that cause a shift in the demand curve are:

1. Income (Normal Goods)
2. Income (Inferior Goods)
3. Preferences
4. Price of Substitute Goods
5. Price of Complementary Goods
6. Demographic Changes

Definition 2.5: Normal Goods

A good is a normal good when demand for it increases in response to an increase in consumer income. Most goods are normal goods.

Definition 2.6: Inferior Goods

A good is an inferior good when demand for it decreases in response to an increase in consumer income. Examples of inferior goods are second-hand clothes, used cars, and bus tickets.

Definition 2.7: Substitute Goods

Goods are substitutes when an increase in the price of one leads to an increase in the quantity demanded of the other. Coca-cola and Pepsi are examples of substitute goods.

Definition 2.8: Complementary Goods

Goods are complements when an increase in the price of one leads to a decrease in the quantity demanded of the other. Petroleum and automobiles are examples of complementary goods.

It is important to distinguish between movements on or along a demand curve, and shifts of a demand curve. Whenever the price of a good changes, ceteris paribus, it leads to a movement along the demand curve, this is called *change in quantity demanded*. By contrast, any change in a non-price determinant of demand results in a shift in the entire demand curve, this is called a *change in demand*. To distinguish between these two changes, different terminology is used. The phrase *change in demand* refers to shifts in the demand curve, while the phrase *change in the quantity demanded* refers to movements along the demand curve.

2.4 Supply

Definition 2.9: Supply

The supply represents how much of a good producers are *willing* and *able* to produce at different possible prices in a particular time period.

The supply of a product is usually represented by a curve with the possible prices on the y-axis and the quantity supplied on the x-axis.

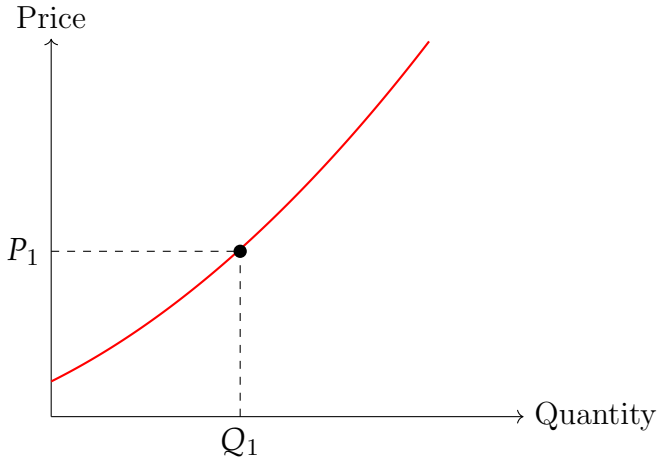


Figure 3: Supply Curve

2.4.1 Why Does the Supply Curve Slope Upward?

Higher prices generally mean that a firm's profits increase, and so the firm faces an incentive to produce more output. Lower prices mean lower profitability, and the incentive facing the firm is to produce less. Therefore, there results a positive relationship between price and quantity supplied: the higher the price, the greater the quantity supplied.

2.4.2 Vertical Supply Curve

While it is true that the supply curve generally slopes upward, a few important exceptions remain wherein the supply curve is vertical.

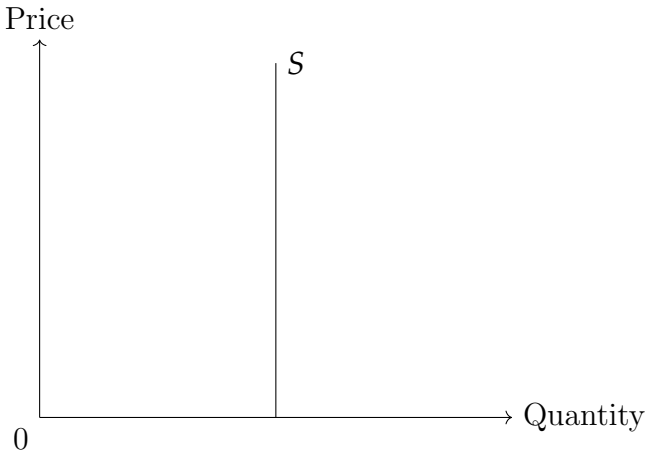


Figure 4: Supply Curve

Consider a movie theatre. No matter what happens, the number of people a theatre can accomodate remains fixed. No matter how high the price, it is not possible to increase the number of seats in a short period of time. Another example for this is original antiques and paintings. There is a fixed quantity of the good because there is no possibility of ever producing more of it.

2.4.3 Non-Price Determinants of Supply

1. Cost of Resources
2. Technology
3. Taxes
   - A *tax* is a mandatory fee levied on individuals and firms by the government to improve infrastructure and quality of life
   - Therefore, the imposition of a new tax (or an increase of an existing tax) is equivalent to an increase in production cost
4. Subsidies
   - A *subsidy* is a payment made to a firm by the government, and so has the opposite effect of a tax
   - The introduction of a subsidy (or an increase of an existing subsidy) is equivalent to a fall in production costs
5. Price of Related Goods (Competitive Supply)
   - Competitive supply of two products refers to them competing for the use of the same resources, and producing more of one means producing less of the other
   - For example, a farmer, who can grow wheat or corn, chooses to grow wheat. If the price of corn increases, the farmer may switch to corn production as this is now more profitable, resulting in a fall in wheat supply and a leftward shift of the supply curve
6. Price of Related Goods (Joint Supply)
   - Joint supply of two or more products refers to production of goods that are derived from a single product. Hence, it is not possible to produce more of either product without producing more of its source

- For example, butter and skimmed milk are both produced from whole milk; petrol and diesel are produced from crude oil

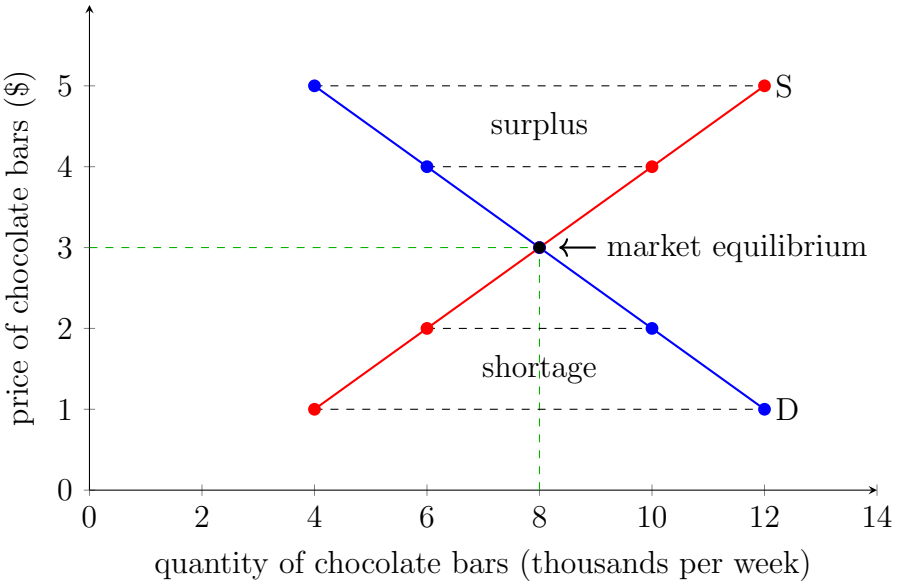
7. Number of Firms
8. 'Shocks' or Unpredictable Events
9. Producer Expectations

Similar to demand, any change in price produces a change in quantity supplied, shown as a movement on the supply curve. Any change in a determinant of supply (other than price) produces a change in supply, represented by a shift of the whole supply curve.

2.5 Market Equilibrium

Until now, market demand and market supply have been considered separately to show the quantities consumers and firms are willing and able to buy and sell at each price. However, this is not how much they actually buy and sell. Consider the following *demand and supply schedule* showing various prices and the quantities of chocolate bars bought and sold at those prices:

Price of chocolate bars ($)	**Quantity of chocolate bars demanded (per week)**	**Quantity of chocolate bars supplied (per week)**
5	4000	12000
4	6000	10000
3	8000	8000
2	10000	6000
1	12000	4000



Here, there are three important observations:

1. There is only one price at which the quantity demanded is equal to the quantity supplied: \$3. Here, the quantity demanded (Q_d) is 8000 units and quantity supplied (Q_s) is also 8000 units.

2. At a higher price, say \$4, quantity supplied (10000 bars) is greater than quantity demanded (6000 bars). Hence, there is a *surplus* (*excess supply*) of 4000 bars.

3. At a lower price, say \$2, quantity demanded (10000 bars) is larger than quantity supplied (6000 bars). Hence, there is a *shortage* (*excess demand*) of 4000 bars.

Suppose that the price is initially \$5. What will happen? If the price is \$5, then Q_d is 4000 bars while the Q_s is 12000 bars. There is a surplus of 8000 bars. With unsold output of 8000 bars, producers will lower prices to encourage consumers to buy more. As the price falls, Q_d becomes larger. Furthermore, there is downward pressure on the price which falls until Q_d equals Q_s and the surplus is eliminated. The opposite happens if the price is initially \$1. The producers notice that the supply is "quickly" sold, and so they begin raising the prices.

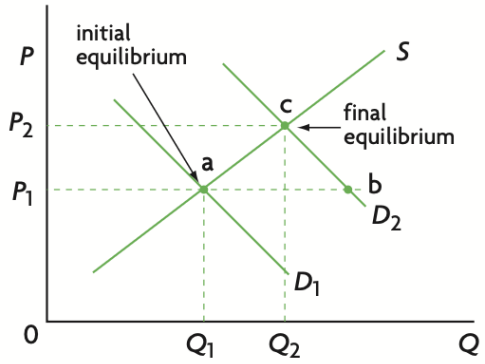
It is, therefore, imperative to understand that the existence of a shortage or surplus in a free market will cause the price to change so that Q_d is equal to Q_s.

Definition 2.10: Market Equilibrium

Equilibrium is a market phenomenon wherein the quantity demanded is equal to the quantity supplied (Q_d equals Q_s) and there is no tendency for the price to change. In a *market disequilibrium*, there is excess demand (shortage) or excess supply (surplus), and the forces of demand and supply cause the price to change until the market reaches equilibrium.

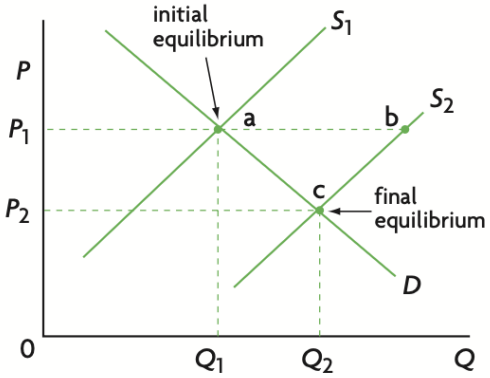
2.5.1 Changes in Market Equilibrium

1. Increase in Demand

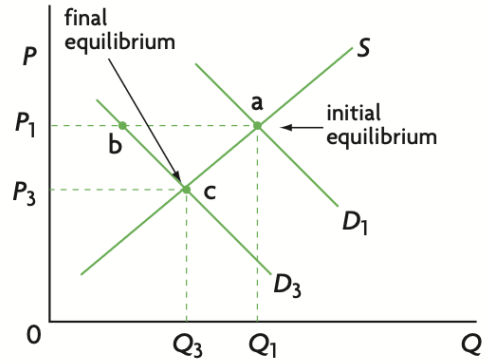


Initially, the market is in equilibrium at point A. Then, a change in a non-price determinant of demand causes an increase in demand shifting the demand curve to the right. As demand increases and price remains the same, there is a shift to point B. There is excess demand (equal to $b-a$) at the current price P_1. Point B is a disequilibrium which causes a shortage, thus exerting upward pressure on price. Hence, the price increases causing a movement along D_2 and the excess demand is eliminated. Finally, the market reaches equilibrium at point C. At C, there is a higher equilibrium quantity (Q_2) and a higher equilibrium price (P_2).

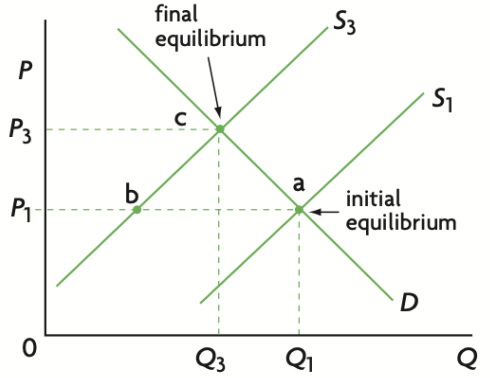
2. Increase in Supply



3. Decrease in Demand



4. Decrease in Supply



2.6 Linear Demand and Supply Functions

2.6.1 Linear Demand Function and Its Graph

A demand function has the form:

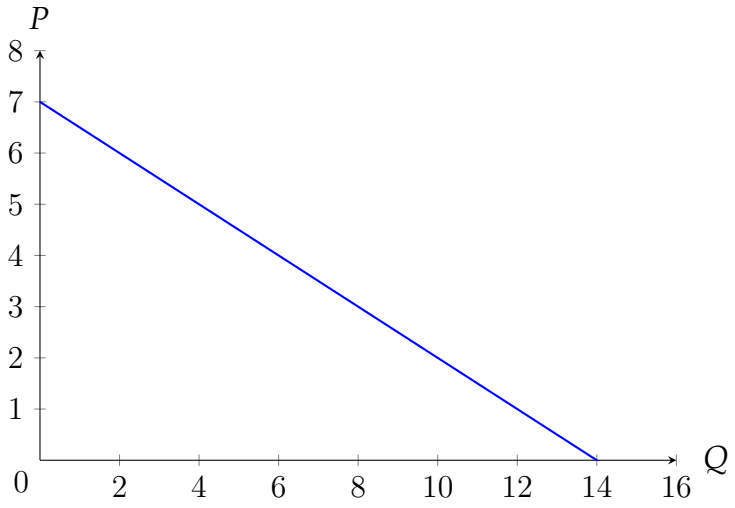
$$Q_d = a - bP$$

where Q_d is the quantity demanded, a is the *x-intercept*, b is the slope, and P is the price.

Note that a is the *x-intercept* not the *y-intercept* and it represents all the variables that are held constant under the ceteris paribus assumption, i.e. the non-price determinants of demand.

The slope is calculated as: $\Delta Q_d \div \Delta P$. It's interpretation is that for every 1 unit change in the price (P), the quantity demanded (Q_d) changes by b units.

Suppose that the demand function $Q_d = 14 - 2P$ is given. It can be plotted as:



Now, we can analyse the parameters a and b. Firstly, a represents the non-price determinants of demand. Therefore, if there is a change in any of the non-price determinants of demand (a), then the curve will shift left or right parallelly.

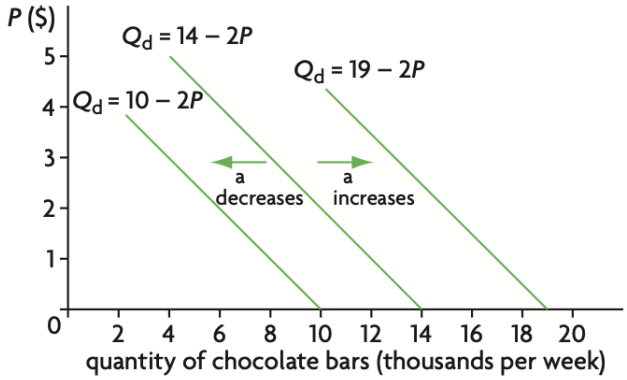


Figure 5: Change in a causing a shift of the demand curve

Finally, b represents the slope of the demand curve. The demand curve becomes flatter as the absolute value of b increases. Why? Shouldn't it become steeper? No. It needs to be understood that the graph is not of the form $y = mx + c$, it is of the form $x = a - by$. When the absolute value of b increases from b_1 to b_2, it means that for a 1 unit change in price, the quantity demanded now changes by b_2 units rather than b_1 units where $|b_2| > |b_1|$; Q_d changes by an amount more than before.

Consider the following example where the demand function changes from $Q_d = 14 - 2P$ to $Q_d = 14 - 4P$:

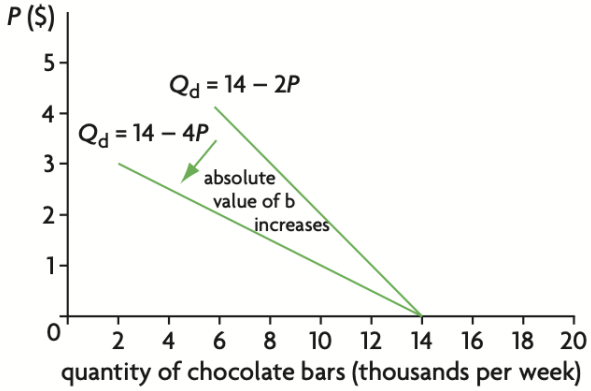


Figure 6: Change in b causing a change in the slope of the demand curve

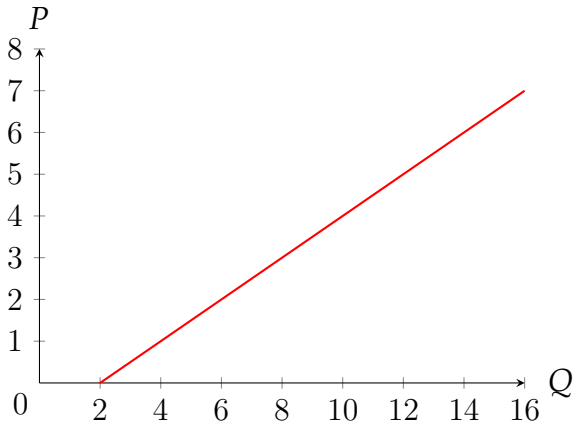
2.6.2 Linear Supply Function and Its Graph

The supply function has the form:

$$Q_s = c - dP$$

where Q_s is the quantity supplied, c is the *x-intercept*, d is the slope, and P is the price.

Suppose the supply function $Q_s = 2 + 2P$ is given. It can be plotted as:



Here, the parameters c and d represent the same things as a and b in the demand function. Firstly, c is the *x-intercept* and represents all of the non-price determinants of supply. If there is a change in any of the non-price determinants of supply, then c changes and this causes a shift of the supply curve left or right parallelly.

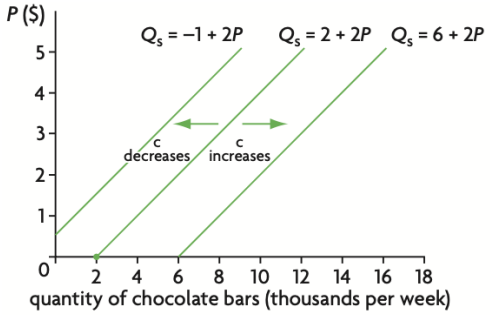


Figure 7: Change in c causing a shift of the supply curve

Then, d is the slope of the supply curve. The supply curve becomes flatter as the absolute value of d increases. Why? Shouldn't it become steeper? No. It needs to be understood that the graph is not of the form $y = mx + c$, it is of the form $x = a - by$. When the absolute value of d increases from d_1 to d_2, it means that for a 1 unit change in price, the quantity demanded now changes by d_2 units rather than d_1 units where $|d_2| > |d_1|$; Q_s changes by an amount more than before for the same change in price.

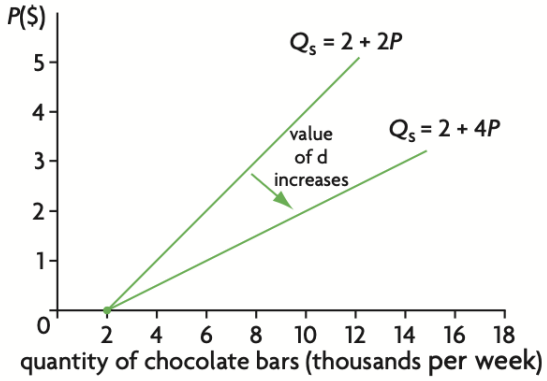


Figure 8: Change in d causing a change in the slope of the supply curve

2.6.3 Market Equilibrium

The demand and supply functions can be combined to find market equilibrium:

$$Q_d = 14 - 2P$$
$$Q_s = 2 + 2P$$

Equilibrium Condition: $Q_d = Q_s$

$$14 - 2P = 2 + 2P \Rightarrow 4P = 12 \Rightarrow P^* = 3$$

$$Q^* = 14 - 2(3) = 2 + 2(3) \Rightarrow Q^* = 8$$