Chapter 3

Supply and Producer Choice

1. **Individual Supply**: What You Sell, at Each Price
2. Your Decisions and **Your Individual Supply** Curve
3. **Market Supply**: What the Market Sells
4. What **Shifts** Supply Curves?
5. **Shifts versus Movements** Along Supply Curves

Chapter 3 (1 of 5)

Defining, drawing, and understanding an **individual business's** supply curve

- Ceteris Paribus
- The Law of Supply

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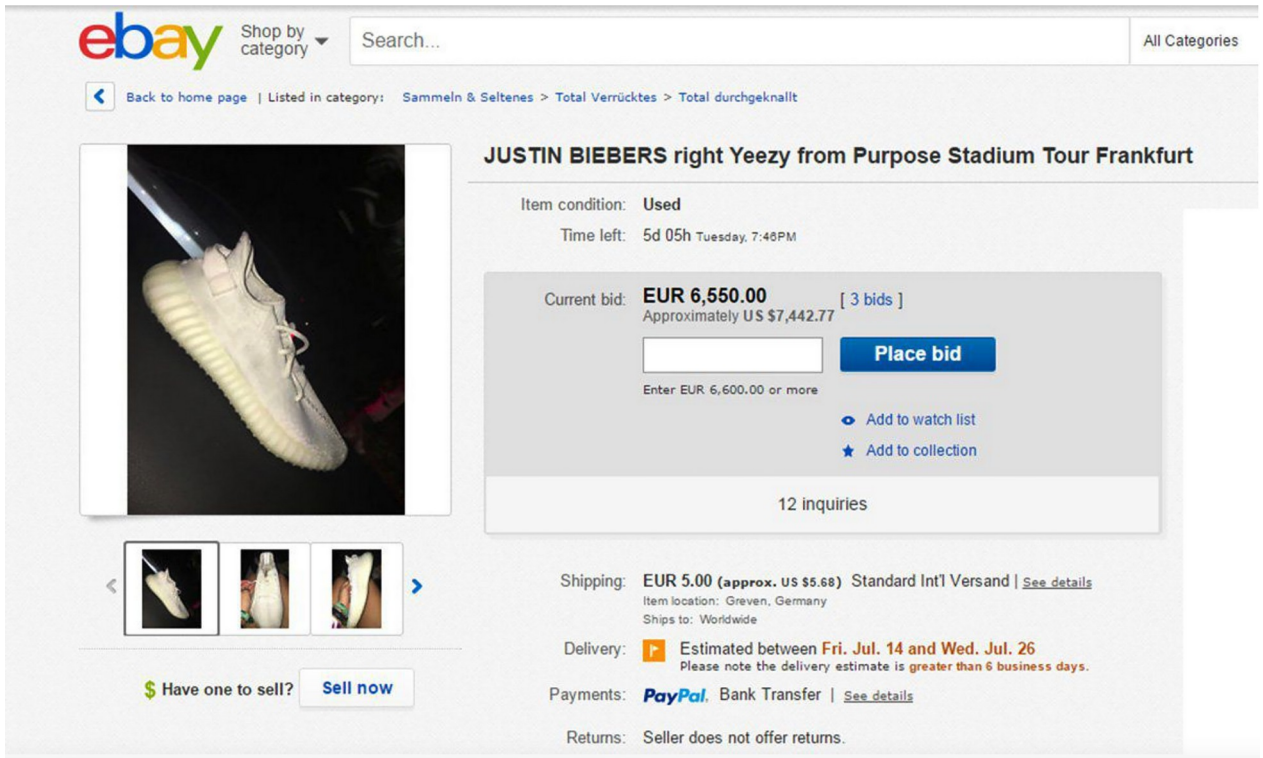
Suppliers come in all shapes and sizes



Can you name a seller?

- Amazon
- Target
- Netflix

You are also a seller!

- Sold furniture on Facebook Marketplace or eBay.
- Sold your tickets to an event.
- If you have a job, you sell your labor in return for a wage.

Key Definition (1 of 2)

Individual supply curve: A graph **plotting the quantity** of an item that a **business plans to sell** at **each price**.

In other words, the supply curve **visually summarizes** the **selling plans of a business**, and how those **plans vary with price**:

- Suppose you work part-time as a tutor. How many hours are you willing to tutor someone if they pay you $15 per hour? What if the rate increases to $30 per hour?

Diving into the Definition

Individual: We are referring to one business (as opposed to many businesses).

Supply: We are examining selling decisions (as opposed to buying decisions).

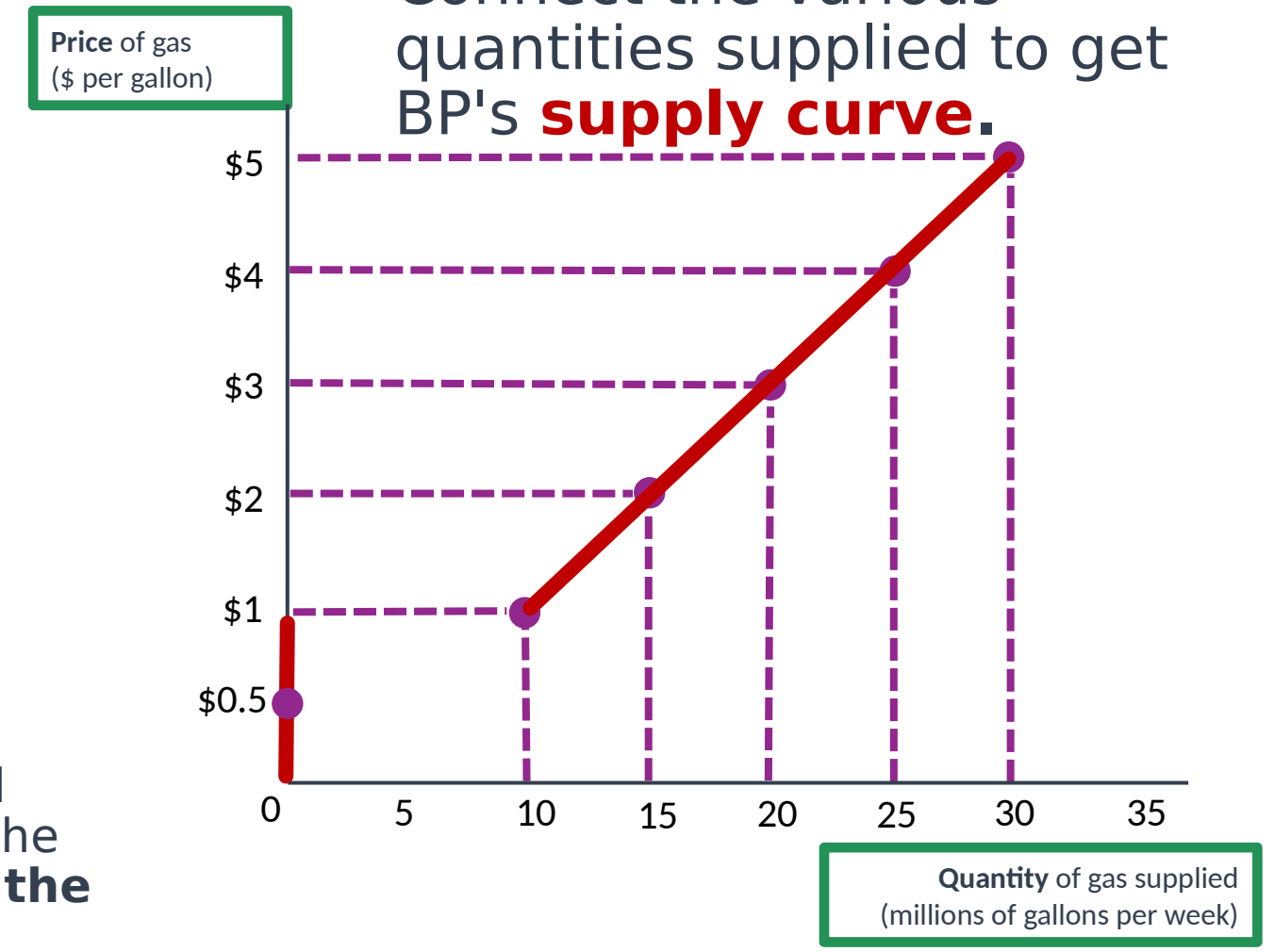
Curve: We are graphing things (sometimes these curves are straight lines).

Let's create our first individual business's supply curve!

Creating BP's Individual Supply Curve for Gasoline

Price per gallon	Quantity (millions of gallons per week)
$5 per gallon	30m gallons
$4 per gallon	25m gallons
$3 per gallon	20m gallons
$2 per gallon	15m gallons
$1 per gallon	10m gallons
$0.50 per gallon	0 gallons

Connect the various quantities supplied to get BP's **supply curve.**



The quantity of gasoline BP plans to sell depends on the price it will receive for the gas: the **higher the price**, the **higher the quantity supplied.**

An individual supply curve holds other things constant

Recall, "Ceteris Paribus"

(Latin phrase for "holding other things constant")

Every time you draw an individual's supply curve, you are drawing this person's selling plans **holding other things constant**.

- **If something important changed,** like the wage of oil refinery workers fell, then BP's selling plans would change, which means its **individual supply curve would change**.

Economists know that many **factors other than price can influence selling plans.**

- But first, understand what happens when the price (and only the price) changes.
- **Push these other factors aside** for the time being when drawing an individual's supply curve.
  - Then, later, bring other factors into consideration separately.

The Law of Supply

As a seller, think about how you would react to high versus low prices:

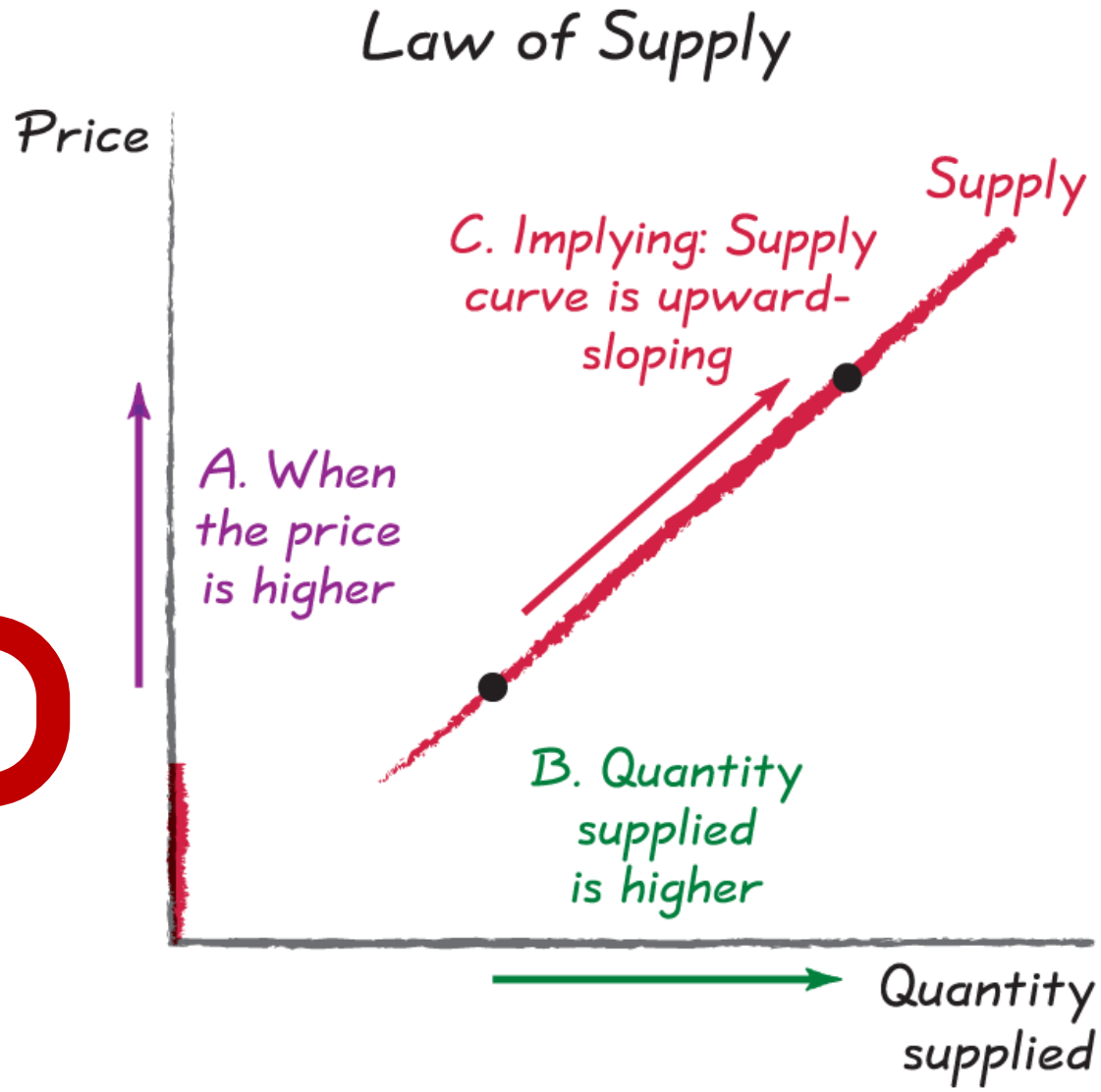
- As the **price rises** higher and higher…
- Your **quantity supplied gets higher** and higher.

This pattern is so commonly seen among sellers that it has its own name:

The Law of Supply: The tendency for quantity supplied to be higher when the price is higher.

This law implies that **supply curves slope upward:**

- When drawing a supply curve, think: ***"Supply to the Sky!"***



Key take-aways: Individual supply

The **individual supply curve** plots the **quantity** a person **plans to sell** at **each price**, holding all other factors constant (**ceteris paribus**).

- Other factors that impact a person's selling plans will be assessed later.

The Law of Supply: As the **price rises**, the **quantity supplied rises**.

- Or, equivalently, as the price falls, the quantity supplied falls.

Chapter 3 (2 of 5)

Being a seller in a perfectly competitive market setting

- Sellers are price-takers

Examining Marginal Benefits and Marginal Costs

The Rational Rule for Sellers

1. Individual Supply: What You Sell, at Each Price
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NOTICE! We have been discussing an individual's selling plans, **given the price.**

Why isn't BP choosing its own price?

- Because there are **many other gasoline companies** who can **provide the same product**!

BP, just like many businesses, operates in a **perfectly competitive market**:

- Markets in which 1) all firms in an industry sell an **identical good** and 2) there are **many buyers and sellers**, each of

Because there are many small firms, all selling the same product, an individual seller cannot set their own price.

Example: If the prevailing market price for gas is $3.00 per gallon, you could charge…

- $3.10, but would sell nothing
- $3.00 and sell whatever quantity you want
- $2.90 and sell whatever quantity you want

Outcome: You decide to **charge the prevailing market price** and sell as

Not All Markets Are Perfectly Competitive

Most markets have some degree of imperfection:

- Only a **few** buyers and/or sellers.
- Selling a **unique** product.
- Product has **loyal** customers.

Result: Buyers and sellers **may no longer be price-takers**.

So why start with perfect competition?

- Nearly all markets have some degree of competition.
- Simplifies analysis
- Builds an analytical foundation

Applying the core principles to make good selling decisions

Marginal Principle: Break down the question of "**how many** gallons of gas to sell?" into a series of **smaller marginal choices**.

- "Should I supply one more gallon of gas?"

Cost-Benefit Principle: For each marginal choice, **sell** the additional gallon of gas **if the benefits exceed the costs**.

- Is the price for which you can sell the extra gallon of gas at least as much as it costs to make (its marginal cost)?

Opportunity Cost Principle: "**Or what?**" Always make a **comparison to the next best alternative**:

- If my business doesn't produce this gallon of gas, **how else could we use our resources?** (This helps you figure out what to count as marginal costs.)

Interdependence Principle: **Everything is connected!** Your best choice depends on your other choices, the choices others make, developments in other markets, and expectations about future markets.

- **"Holding other things constant"** means we will **put aside these other factors for now** and return to them later.

A closer look at marginal benefit and marginal cost

Should you **produce one more gallon** of gas?

- Yes, if the **benefits** of that **extra** gallon **exceeds** the **costs.**
  - Do the marginal benefits exceed the marginal costs?

The **marginal benefit** of the extra gallon is the **amount of money you get** for it!

- If the price of gas is $3, then the marginal benefit of producing another gallon is $3.
- Your **marginal benefit is the market price**!

When thinking about **marginal costs**, **apply the opportunity cost principle**

- Sell this gallon of gas, or what?
- What else could these resources be used for?

If BP expands production, it will need to…

- buy more crude oil, buy more chemical additives, pay its workers to work overtime.

If BP does not expand

Examining Marginal Costs

Marginal costs **include variable costs** but **exclude fixed costs**.

Variable costs: Those costs — like labor and raw material — that **vary with the quantity** of output you produce.

Fixed costs: Those costs that **don't vary when you change the quantity** of output you produce.

Variable costs:

- Buying more crude oil, buying more chemical additives, paying workers overtime

Your **marginal costs** are your **additional variable costs**!

Fixed costs:

- Refinery building, and the land the building is on, the equipment used in the refinery process, CEO salary

Your **pay these costs regardless** of whether you expand production or not.

- Fixed costs are **irrelevant to your marginal cost!**

The Rational Rule for Sellers in Competitive Markets (1 of 2)

The Rational Rule for Sellers in Competitive Markets:
Sell one more unit if the price is greater than (or is equal to) the marginal cost.

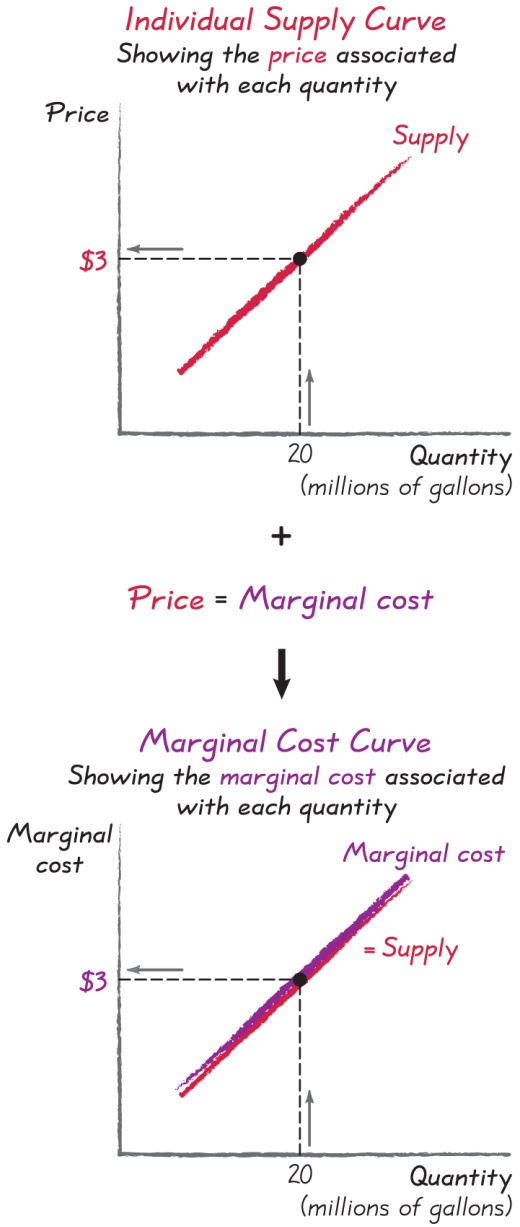
- Keep producing until **Price = Marginal Cost**

Following this rule **maximizes your profits** as a seller!

- Why?
- Because you expand production whenever it will **boost your profits**:
  - If the price of that extra gallon exceeds the marginal cost, then **revenues will rise by at least as much as costs**.

  Result ☾ profits will rise!

The Rational Rule for Sellers in Competitive Markets (2 of 2)



The Rational Rule for Sellers in Competitive Markets

- Keep producing until **Price = Marginal Cost**

If price = marginal cost, then your **supply curve is also your marginal cost curve**!

- **Supply summarizes** the **price** at which you are **willing to sell each quantity**.
- **The price** you are willing to sell each unit for **is informed by the marginal cost** of producing that unit.

Thus, the **marginal cost** and **supply** curves are **one and the same**.

The Supply Curve Is Upward-Sloping (1 of 2)

Rising marginal costs explain why the **supply curve is upward-sloping**.

- Eventually, as you try to expand production, there will be **bottlenecks** that cause marginal costs to increase.

Marginal product: The **increase in output** that arises **from an additional unit of an input**, like labor.

Diminishing marginal product: The **marginal product of an input declines** as you use more of that input.

Diminishing marginal product can occur in the short run when some of your inputs are fixed.

Restaurant Example: To increase production, you need to **hire more cooks, but the kitchen is only so big**.

- The new workers don't have sufficient space to work in the kitchen.
  - They cannot make sizeable contributions to output.

Thus, **marginal costs of production**

The Supply Curve Is Upward-Sloping (2 of 2)

Diminishing marginal product can occur in the long run because, despite being able to increase all inputs (i.e., expand the kitchen or open another restaurant)…

- the new location isn't as good.
- the new workers are less experienced and take longer to get things done.
- managing a larger workforce or multiple restaurants creates coordination problems.

Ultimately, adding **extra inputs**

Rising input costs also lead to **rising marginal costs**.

- Pay time-and-a-half to get your staff to work overtime.
- Need to offer higher wages to attract more workers.
- Harder to find workers or other inputs
  - Maybe these inputs are located farther away, raising transportation costs

Whatever the reason, marginal costs start to rise, and so the

How Realistic Is This Theory of Supply?

As **sellers experiment**, they may come to act as if they follow the core principles.

- Produce a bit more or a bit less each week to see how it affects their profits.
- Eventually land on the profit-maximizing quantity.
  - End up making the same supply choices as if they were following the Rational Rule for Sellers.

Thinking through the principles provides useful **advice and helpful forecasts**.

- The rational rule guides sellers toward decisions that earn the largest possible profit.
- If you understand how sellers are thinking, then you can better forecast their decisions.

Key take-aways: Your decisions and your supply curve

In **perfectly competitive markets**, sellers are **price-takers**.

The Rational Rule for Sellers: Sell one more unit if the price is greater than (or equal to) the marginal cost.

- Keep selling until **Price = Marginal Cost**

Your **supply curve** and your **marginal cost curve** are one and **the same**.

Diminishing marginal product sets the stage for **rising marginal costs**.

- Hence, the supply curve is upward-sloping.

Chapter 3 (3 of 5)

Add up individual supply to discover market supply

Market supply is **upward sloping**

Movements along the supply curve

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Key Definition (2 of 2)

Market supply curve: A graph plotting the **total quantity** of an item supplied by the **entire market**, **at each price.**

Individual supply curves are the **building blocks** of **market supply:**

- At each price, the total quantity of gas supplied is the **sum** of the quantity that **each business** will supply at that price.
- The market supply curve **visually summarizes** these selling decisions across the various price points.

Diving into the Definition

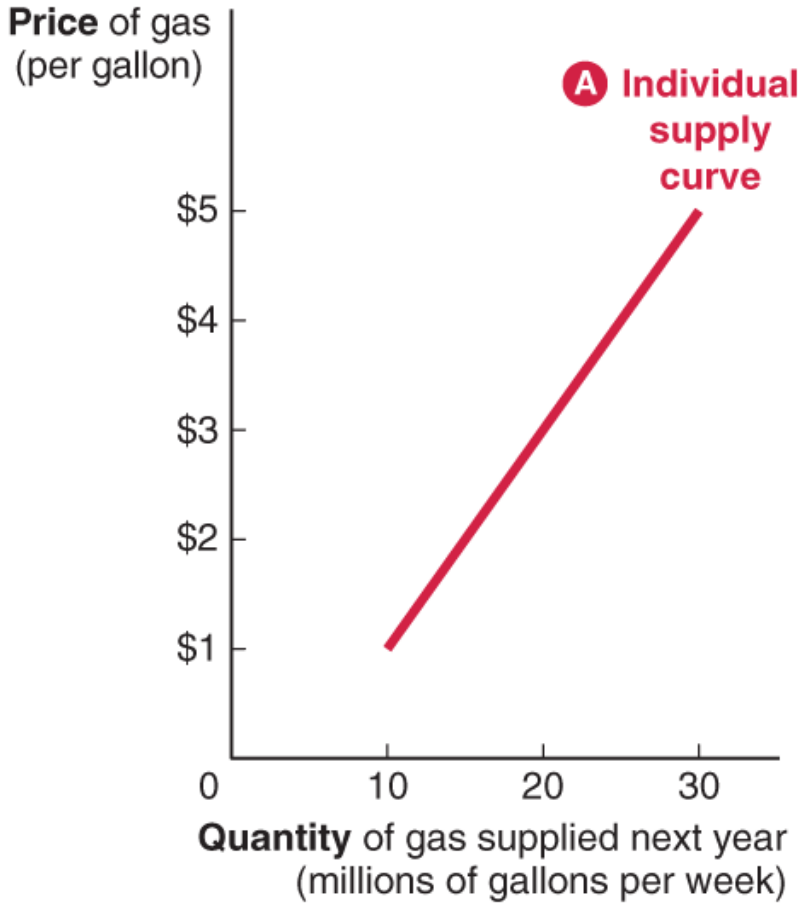
You can use the same **four-step process** you used when estimating market demand to estimate market supply.

1. Survey suppliers (and potential suppliers).
2. For each price, add up the total quantity supplied by all sellers.
3. Scale up!
4. Plot the total quantity supplied at each price.

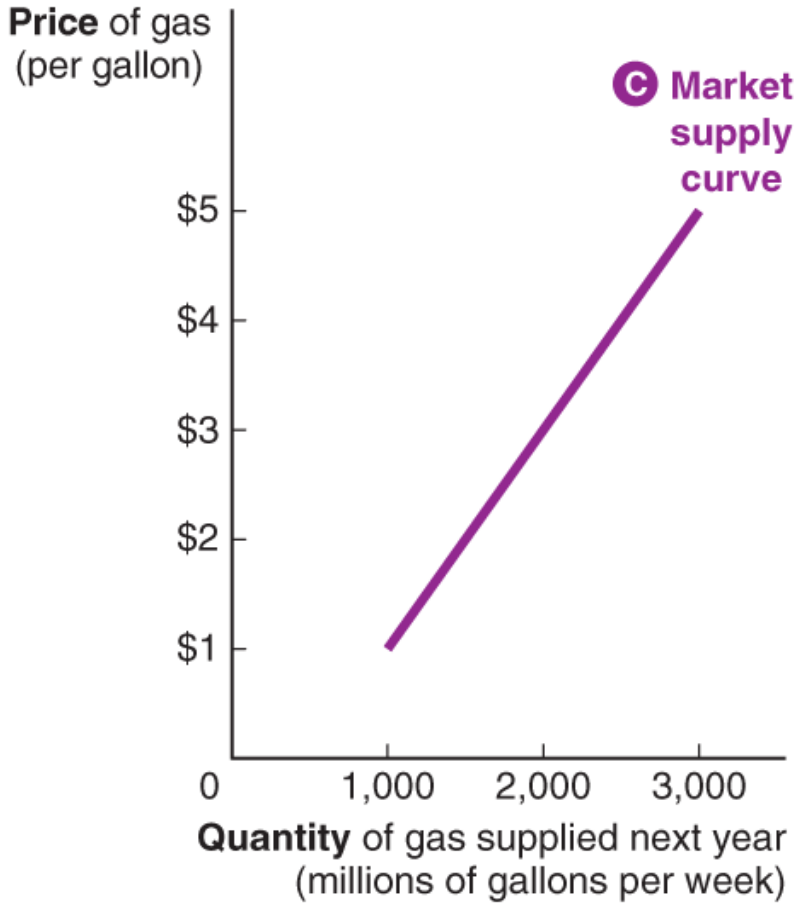
Shortcut if suppliers are similar:

- Suppose there are **100 other oil refineries** that are making the **same supply decisions as BP**, then at any given price the quantity supplied will be **100 times the quantity** BP supplies.

Using the Shortcut to Estimate Market Supply



	A Individual supply	×	B Number of suppliers	=	C Market supply
Price (per gallon)	**Quantity supplied per individual business** (millions of gallons per week)		**Number of sellers in the market**		**Total quantity supplied** (millions of gallons per week)
$5	30	×	100	=	3,000
$4	25	×	100	=	2,500
$3	20	×	100	=	2,000
$2	15	×	100	=	1,500
$1	10	×	100	=	1,000



The Market Supply Curve Is Upward-Slopping

Reason 1:

Because the market supply curve is **made from** adding up **individual supply curves** at each price, it inherits many of the **same characteristics.**

Law of Supply: A higher price leads businesses to supply a larger quantity.

Reason 2:

A **higher price** means that it's **more profitable** to be a supplier in that industry.

- **Current suppliers** produce more units.
- **New suppliers** enter the market.

Lower prices means it's **less profitable** to be a supplier.

Key Definitions

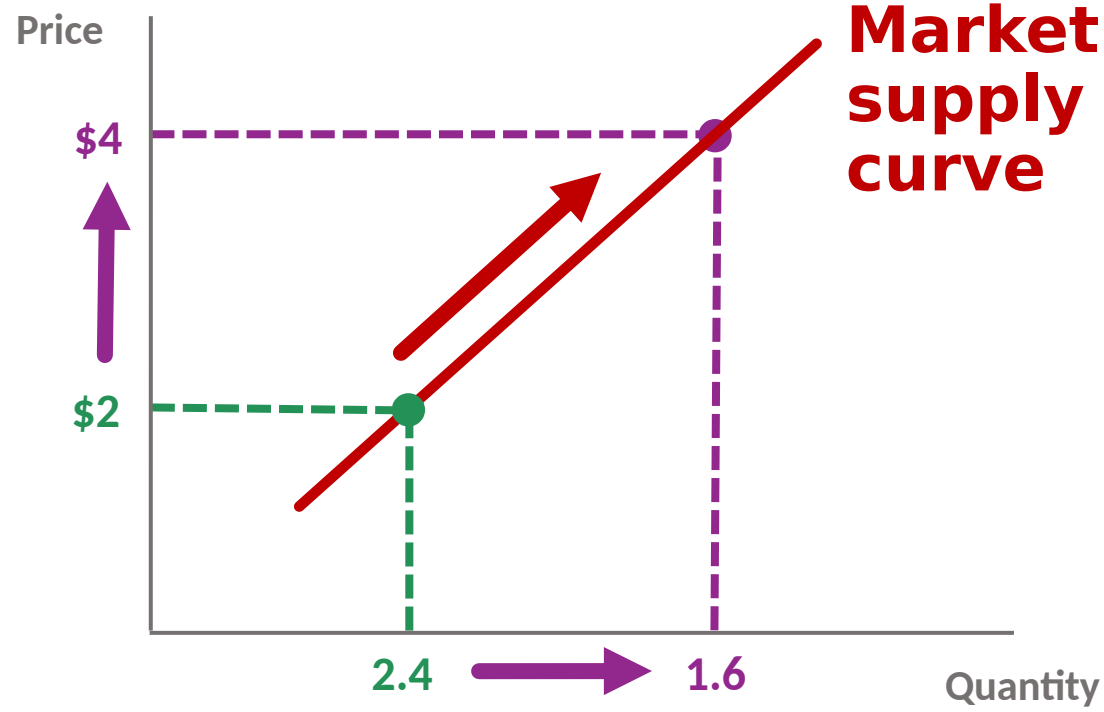
A change in price causes a **movement along the supply curve**, yielding a **change in the quantity supplied**.

Movement along the supply curve:
A price change causes a **movement from one point** on a fixed supply curve to **another point** on the **same curve**.

Change in the quantity supplied:
The **change in quantity** associated with **movement along a fixed supply curve**.

Diving into the Definition

When the **price rises from $2 to $4**, the **quantity supplied changes from 1500 to 2500** units. This is a **movement along** the existing **supply curve**.



Key take-aways: Market Supply

Market supply curve: The **total quantity** supplied by the **entire market** at each price.

- Four-step process to estimate market supply
  - **Add up the quantities** from each supply at each price.

When the **price of the good changes**, you simply **move along** the **existing supply curve** to that new price point.

- Move from one point to another point.
- This **price change** triggers a **change in the quantity supplied** (not a change in supply).

Chapter 3 (4 of 5)

Visualizing **increases** and **decreases** in supply

Naming and understanding the **five factors** that **shift** the supply curve

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Supply curve discussion thus far…

- Focus on the relationship between **price and quantity**, *ceteris paribus*
- **Movement** from **one point to another point** on the same supply curve

Now, something new!

Shift in the supply curve: A movement of the supply curve **itself.**

Recall

The supply curve is just a set of **selling plans**. It illustrates the quantity a business plans to sell at various prices, **holding other factors constant** (***ceteris paribus***).

If other factors change…

- then selling plans change…
  - then the supply curve changes.

Bakery Example: In one month, the quantity of bread you sell at any given price might change if…

- wheat becomes more

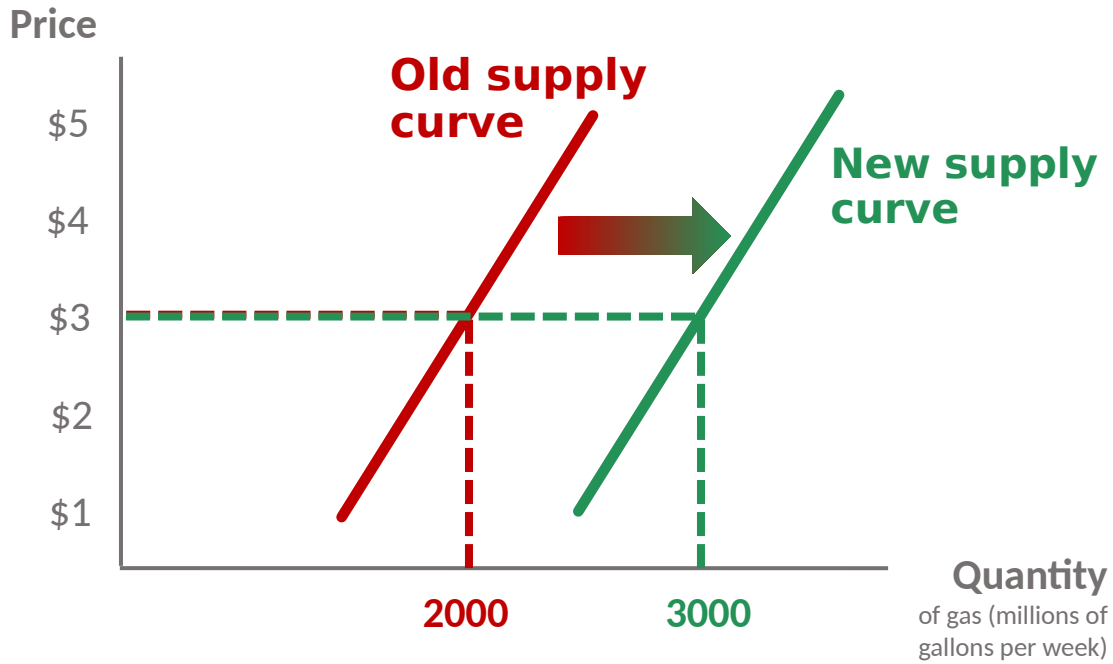
Shifts in the Supply Curve

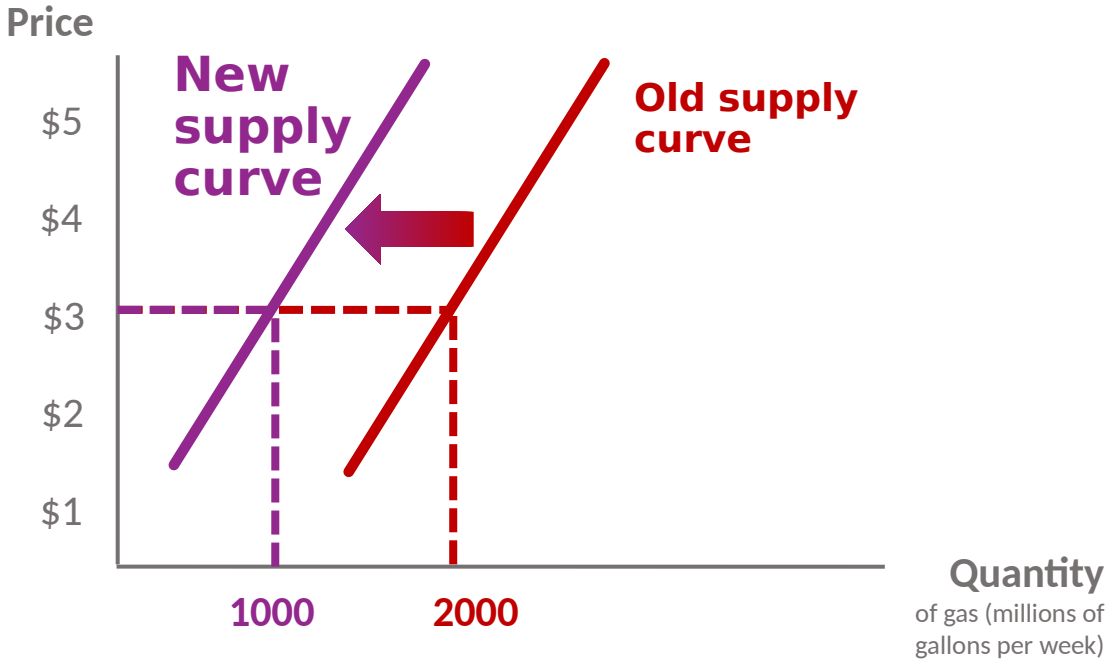
Increase in supply: A **shift** of the supply curve to the **right**.

BP Gas Example: If BP's engineering team discovers a more efficient way to refine crude oil into gas, then BP will increase its supply of gas.

Decrease in supply: A **shift** of the supply curve to the **left**.

BP Gas Example: If the chemical additives used in the refinery process get more expensive, then BP will decrease its supply of gas.





The Interdependence Principle and Shifting Demand Curves

Recall

The ***interdependence principle*** says that **everything is connected**.

- Your best choice **depends on many other factors beyond price**. When these other factors change, so might your selling decisions.

The **five factors** that **shift** the market **supply** curve:

1. Input prices
2. Productivity and technology
3. Prices of related outputs
4. Expectations
5. The type and number of sellers

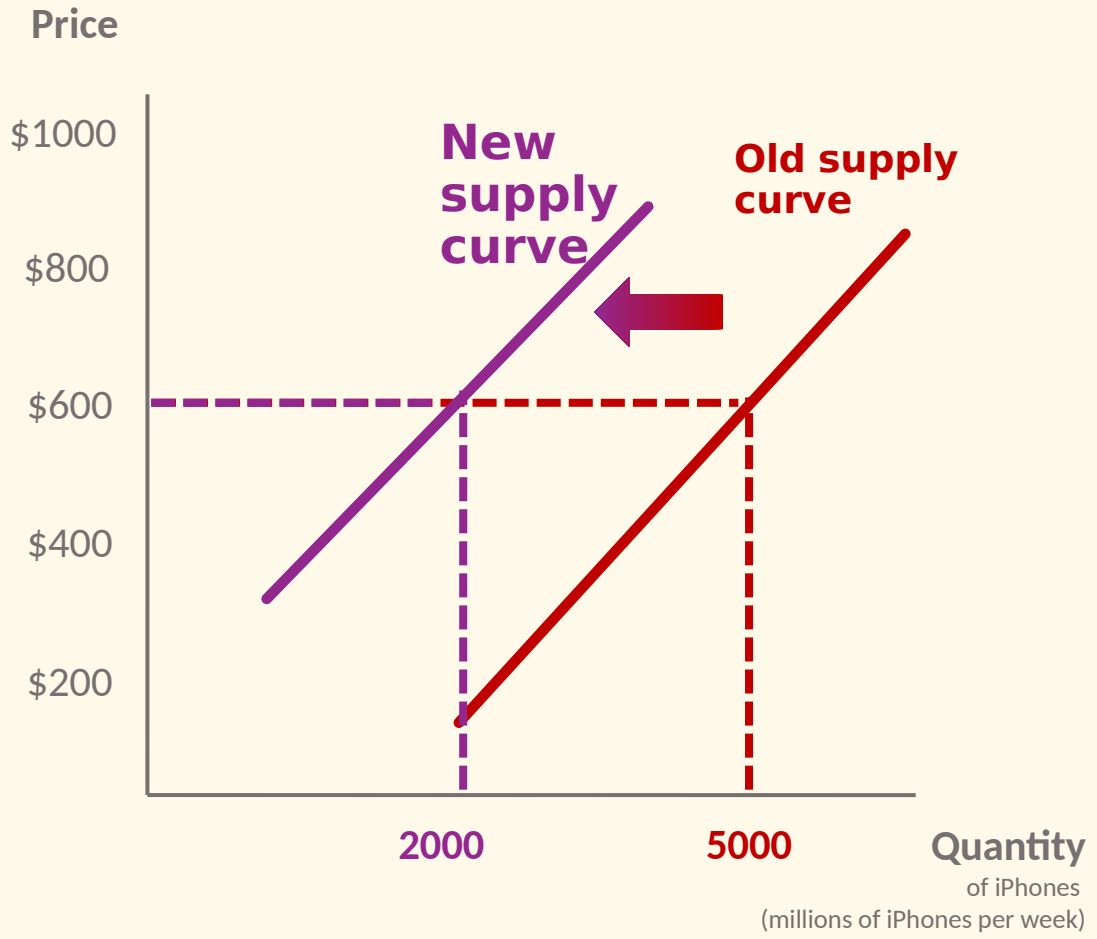
… but not a change in price

Supply Shifter 1: Input Prices

To produce any given good or service, many inputs will be used in the production process.

Example: To produce an **iPhone**, one needs to purchase various raw materials (metals, glass, plastic, etc.), as well as machinery and labor.

- Imagine the **price** of one of these **inputs rose:**
  - The **wage** you pay your workers **went up** (i.e., the price of labor increased).
- Because this **input costs more**, it is now more costly for you to produce iPhones. Specifically, **your marginal cost of production rose**. This means you are less willing to supply at any given price (i.e., **supply decreases**).



Supply Shifter 2: Productivity and Technology (2 of 2)

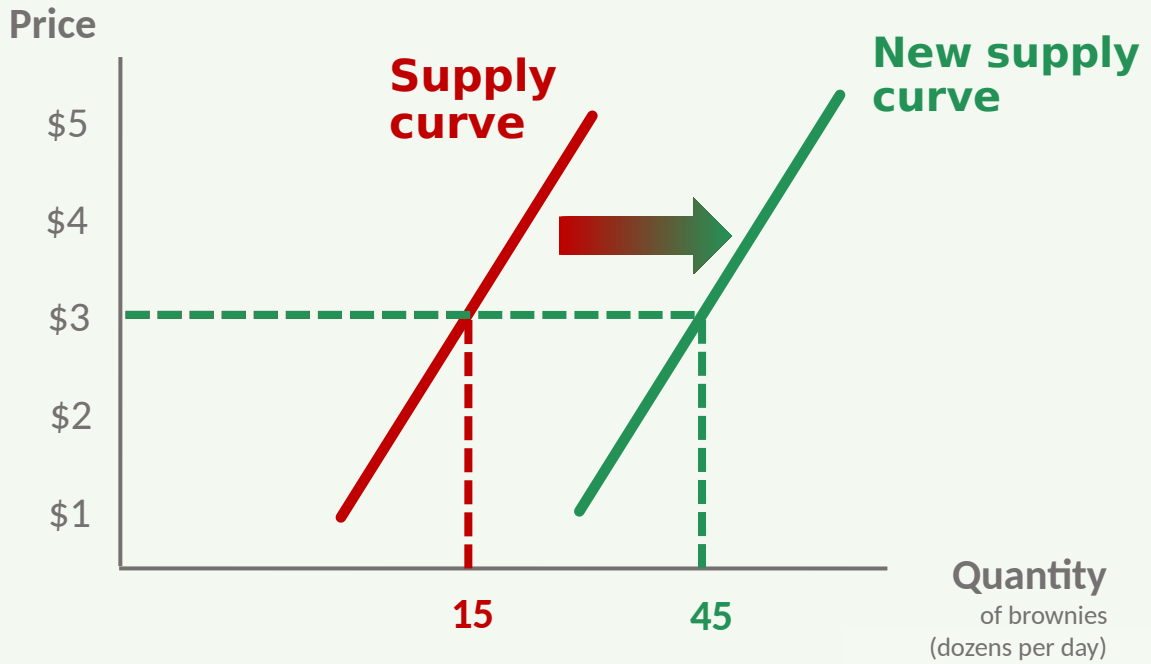
Productivity growth: Producing more output with fewer inputs.

Productivity growth is often driven by **technological change**.

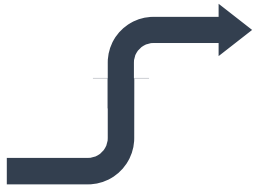
- invention and adoption of new types of machinery, processes, or improved management techniques.

Productivity growth **reduces** the **marginal cost** of production, such that sellers are more willing to supply at any given price (i.e., **supply increases**).

Scenario: You obtained a new oven for your bakery that has three times more baking racks inside than your original oven. Illustrate how this new oven changes your supply of baked goods:



Supply Shifter 3: Prices of Related Outputs



Your choices as a supplier are also interdependent across different outputs as there are many different lines of business in which you could engage.

Complements-in-Production: Goods that are **made together**. Your supply of a good will increase if the price of a complement-in-production rises.

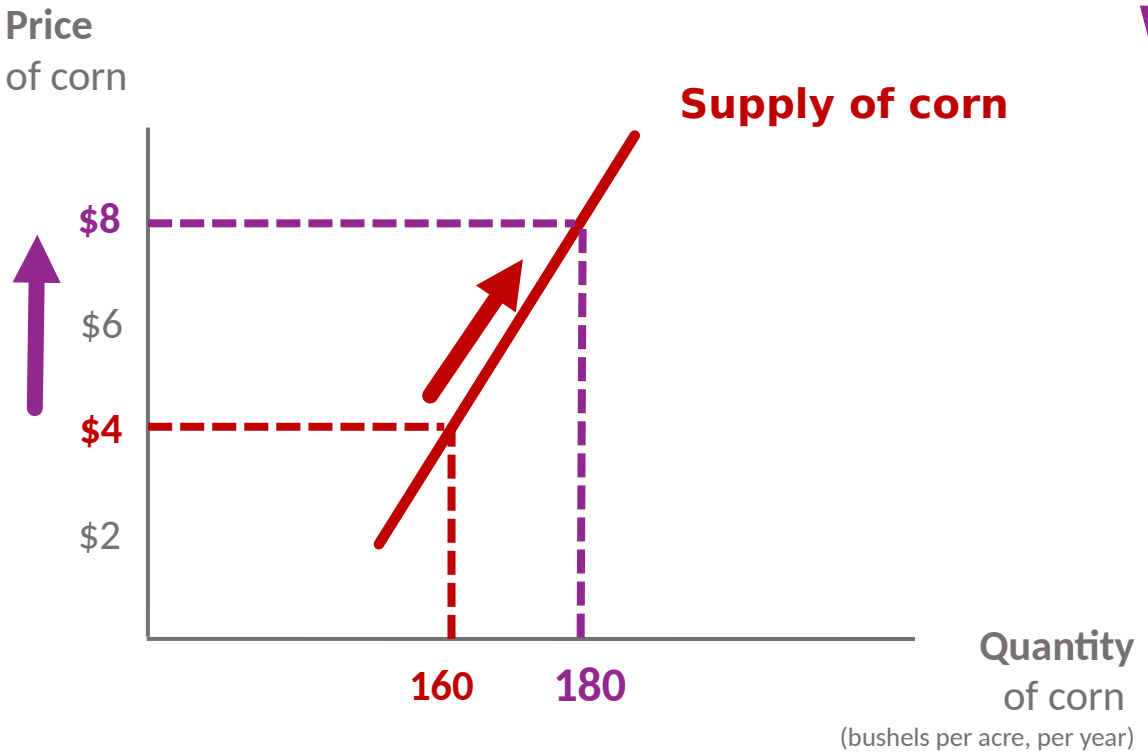
- Asphalt is a byproduct of producing oil at a petroleum refinery.
- A byproduct of beef is leather.
- Donut holes are a byproduct of donuts (they are made together!).

Substitutes-in-Production: **Alternative uses** of your **resources**. Your supply of a good will decrease if the price of a substitute-in-production rises.

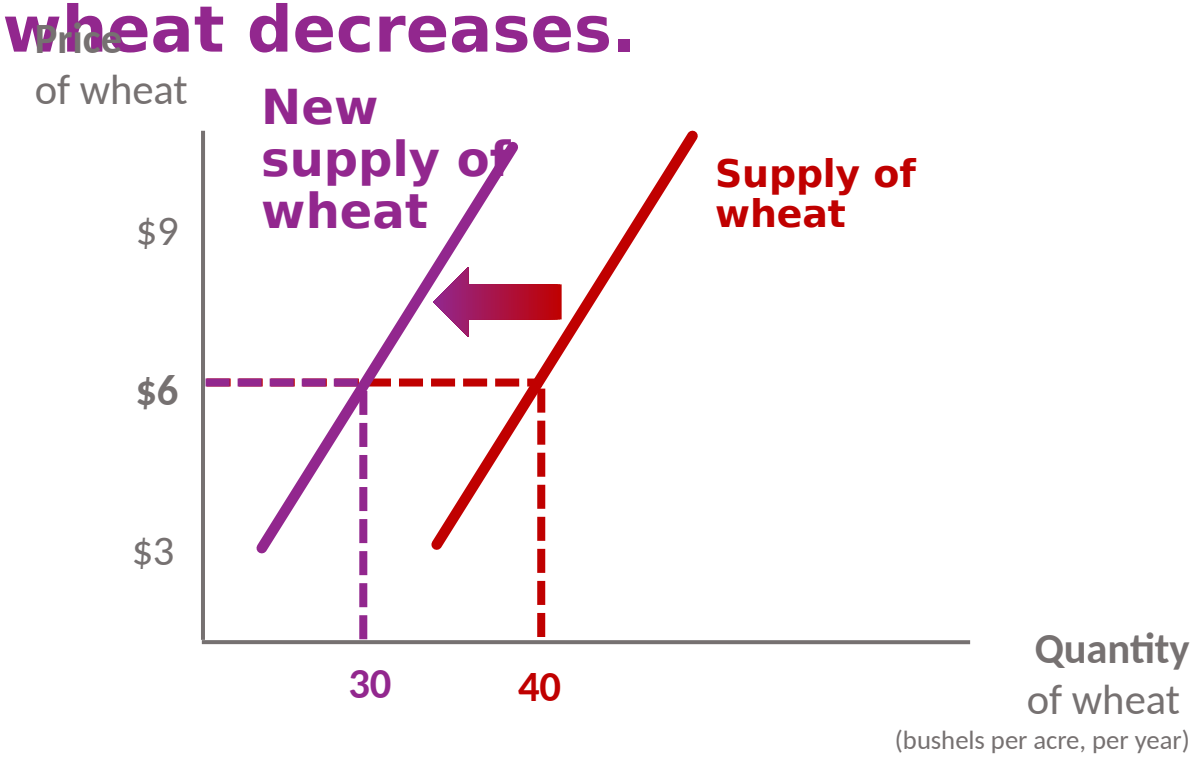
Farmer Example: You could use your machinery and land to grow corn or wheat. Suppose the **price of corn rises**. Now corn has become the more attractive product to sell. As such, your quantity of corn supplied will rise, and your supply of wheat will decrease.

Substitutes-in-Production: Farmer Example

If the **price of corn rises** from $4 to $8, the farmer will put their resources toward corn production. This is a **rise** in the **quantity** of corn supplied.



Because the farmer choose to devote more resources to corn, there is less for wheat production. Thus, the farmer's **supply of wheat decreases.**



Supply Shifter 4: Expectations

Your decisions are linked through time.

If you **expect the price** of your product **to rise next year**, then…

- you want to **store** your product to **sell next year** (at the high price)
  - assuming your product is storable.

Your **current supply will decrease** (supply shifts to the left), and your **supply next year will increase** (supply shifts to the right).

Supply Shifter 5: Type and Number of Sellers

If new **sellers enter** the market

- **total quantity** supplied at each price **increases**
  - supply curve shifts to the **right**.

If **sellers exit** the market

- **total quantity** supplied at each price **decreases**
  - supply curve shifts to the **left**.

Key take-aways: What shifts a supply curve?

Increase in supply: A shift of the supply curve to the **right**.

- An increased quantity is supplied at each and every price.

Decrease in supply: A shift of the demand curve to the **left**.

- A decreased quantity is supplied at each and every price.

Five factors shift the demand curve.

- **Be Careful:** A change in the price does NOT shift supply.

Chapter 3 (5 of 5)

Summarizing key points:

- Shifts versus movements
- Change in quantity demanded versus change in demand

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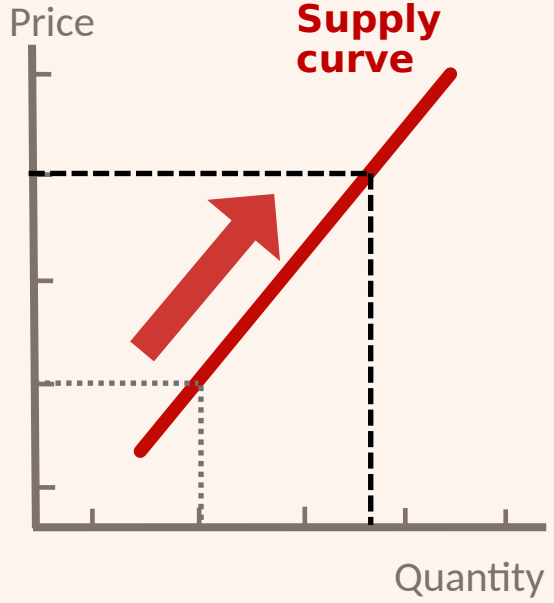
Shift versus Movement Along Supply

If the only thing changing is the **price** of the good itself, then you are thinking about a **movement** along the supply curve. This is a **change in the quantity supplied**.

But when **other factors change**, you need to think about a **shift** in the supply curve (recall the five factors). This is a **change in supply itself**.

Changes in price cause changes in quantity supplied.



Changes in other factors cause shifts in supply.

Parallels Between Demand and Supply

	Demand	Supply
Your Objective	Maximize economic surplus	Maximize profit
Quantity Decision	Rational Rule for Buyers	Rational Rule for Sellers
Quantity Decision implies…	Demand curve is marginal benefit curve	Supply curve is marginal cost curve
Curve slopes…	Down (diminishing marginal benefits)	Up (increasing marginal costs)
The market curve	Sum of the quantity each individual consumer demands, at each price	Sum of the quantity each individual business supplies, at each price
A rise in price causes…	A movement along the demand curve, reducing the quantity demanded	A movement along the supply curve, raising the quantity supplied
A fall in price causes…	A movement along the demand curve, raising the quantity demanded	A movement along the supply curve, reducing the quantity supplied
Curves are shifted by…	A change in one of the six	A change in one of the five