

# Chapter 11

## The Labor Market

1. Supply and Demand at Work
2. Labor Demand: Thinking Like an Employer
3. Labor Supply: How to Balance Work and Leisure
4. Changing Economic Conditions and Labor Market Equilibrium

# Chapter 11 (1 of 5)

Understanding how wages and employment are determined by the forces of supply and demand



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# The Market for Haircuts

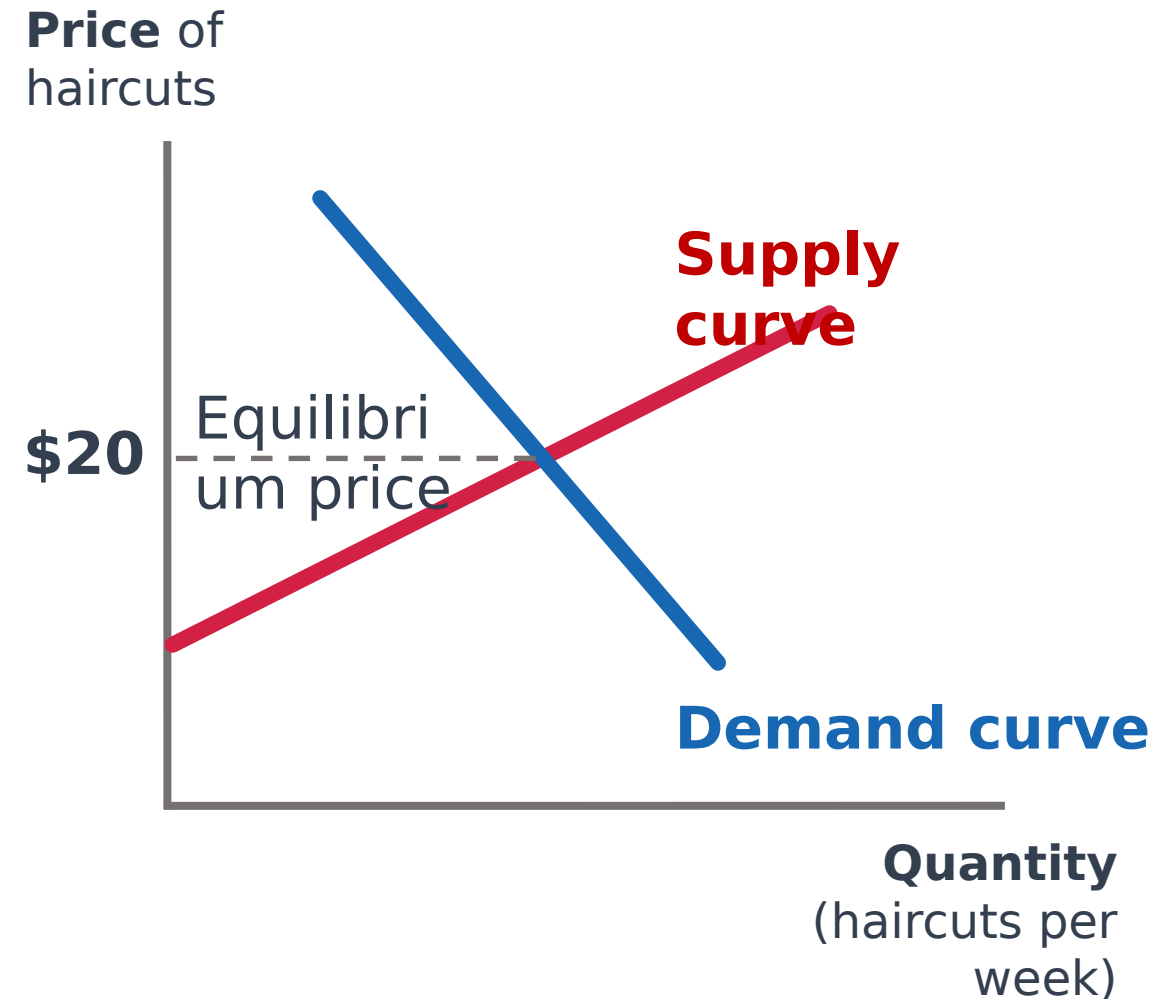
## Chapter 4 Review:

What determines the price of a haircut?

The price of a haircut is determined by the intersection of:

- The **demand** curve
  - reflects decisions of **customers**.
- The **supply** curve
  - reflects decisions of **hair salons**.
- Equilibrium price is **\$20** per haircut.

## The Market for Haircuts



# The Labor Market for Hair Stylists

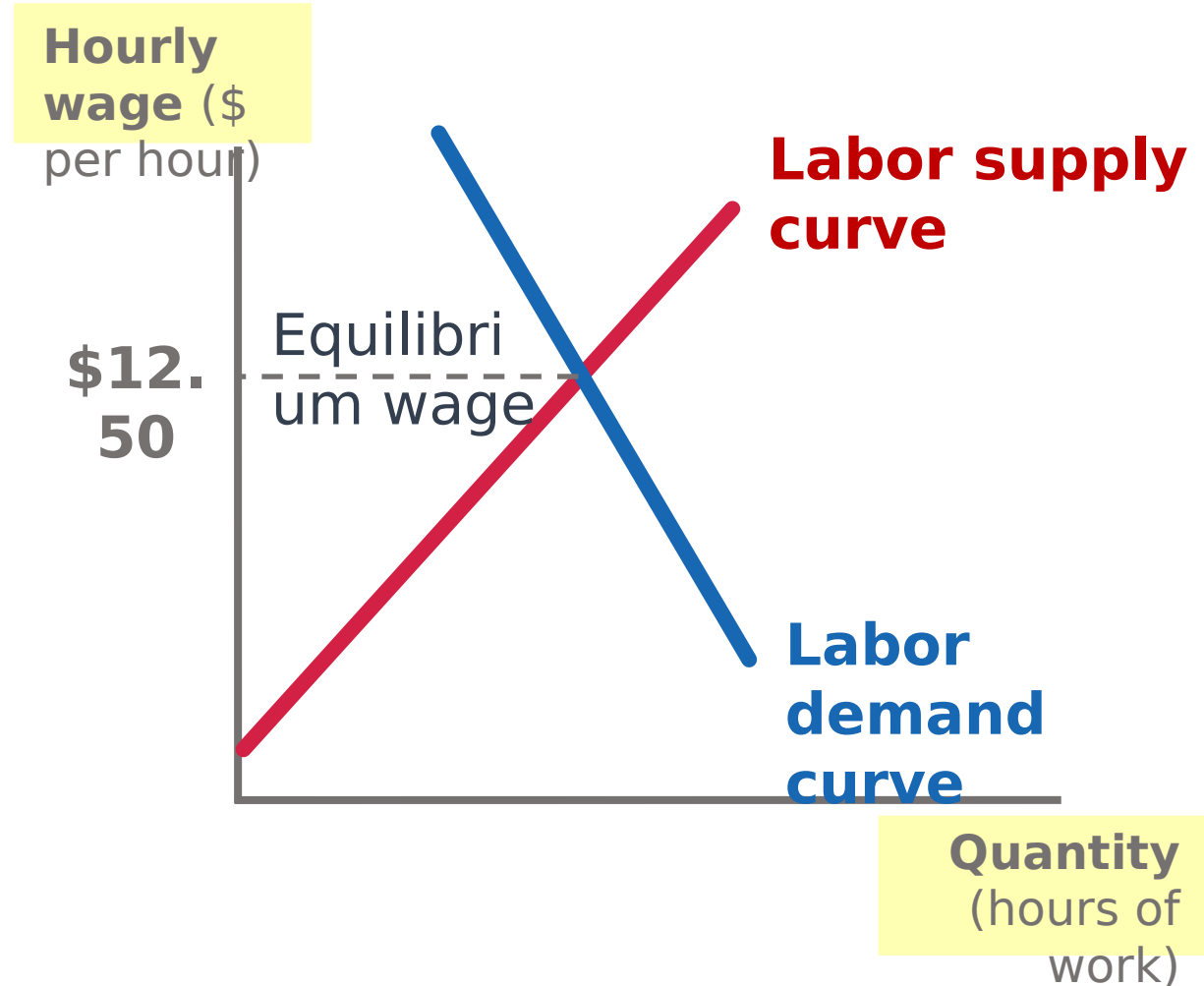
What is bought and sold in a **labor** market?

- Buy and sell a worker's time.
  - **Wage** is the price of labor.
  - Quantity axis tracks “**hours of work**” (instead of number of “units of a good”).

**In the hair stylist labor market...**

- **Buy labor:** Purchase an hour of a hair stylist's time.
- **Sell labor:** Hair stylists *supply an hour of their time* in return for an hourly wage.
  - If you are a worker, then YOU are the supplier in a labor

## The Labor Market for Hair Stylists



# The labor market: Note the switch

## Supply

As a worker, **you are on the supply side** of the labor market.

- You are looking to sell your labor.

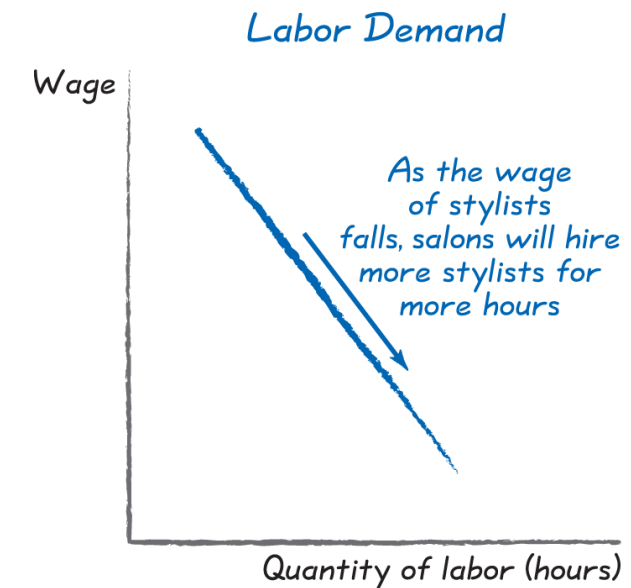
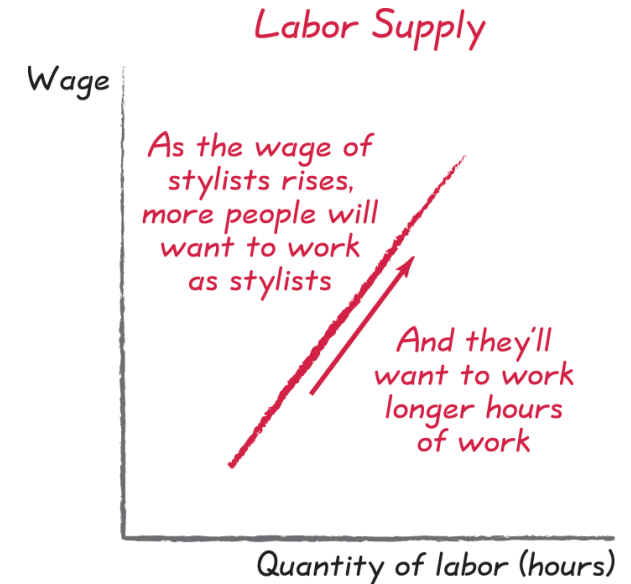
The higher the wage, the more hours you are willing to work.

- Law of supply: As wage rises, quantity of labor supplied rises.
- Labor supply curve **slopes upward**.

## Demand

Who demands labor? ☾ Businesses!

**Businesses are on the demand side** of the labor market.



# Chapter 11 (2 of 5)

Discover how employers decide how many workers to hire:

- Rational rule for employers
- Labor demand shifters

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# Thinking Like an Employer: What Wage Do You Pay Your Workers?

In perfectly competitive labor markets...

- **You are one of many** employers in the market.
- There is a **prevailing market wage** (\$12.50 per hour).

**If you pay less** than \$12.50 ☹ no one will work for you (workers can earn \$12.50 elsewhere).

**If you pay more** than \$12.50 ☹ why pay more? You can hire all the workers you want at \$12.50.

**Result:** Employers **pay workers the market wage** when markets are perfectly competitive.

# How many workers do you hire?

**At \$12.50 per hour, how many hair stylists should you hire?**

- Or how many *hours* of labor should you hire?

Apply the core principles to answer the question:

**Marginal principle:** Break a “how many” question into a “one more” question.

- Should I hire one more worker?

**Cost-benefit principle:** Does the marginal benefit exceed the marginal cost? If yes, then do it!

- **Marginal cost** of one more worker ☾ the **additional wage** you now must pay this worker.
- **Marginal benefit** ☾ the **extra revenue** you get **from the extra stuff** they produced for you.
- This is called **Marginal Revenue Product.**



# How Many Workers Do You Hire? (1 of 2)

**Marginal Revenue Product:** Measures the marginal revenue from hiring an additional worker.

- The marginal revenue product equals the **marginal product of labor** multiplied by **the price** of that product.
- $MRP_L = MP_L \times P$

**Marginal product of labor ( $MP_L$ ):** The extra production that occurs from hiring an extra worker.

**Example:** One more hairstylist allows you to provide 35 more haircuts per week at \$20 per haircut.

- Marginal revenue product of labor = Marginal product of labor × Price
  - Marginal revenue product of labor = 35 haircuts × \$20 per haircut
  - Marginal revenue product of labor = \$700
- The value of the extra stuff this person helps you produce.

# How many workers do you hire? (2 of 2)

**Cost-benefit principle:** Does the marginal benefit exceed the marginal cost? If yes, then do it!

- **Marginal cost** of one more worker is the **additional wage** you now must pay this worker.
- **Marginal benefit** is the **extra revenue** you get **from the extra stuff** they produced for you.
  - This is called **Marginal Revenue Product** ( $MRP_L = MP_L \times Price$ ).  
The extra stuff this person helps you produce. The price at which you can sell that extra stuff.
  - Marginal revenue product =

**The Rational Rule for Employers:** Hire an additional worker if their **marginal revenue product** is **greater than** (or equal to) the **wage**.

- In other words, hire another worker if the marginal benefit exceeds (or equals) the marginal cost.
- Hire additional workers until **wage = marginal revenue product**.

Apply the **Rational Rule for Employers** to determine **how many workers to hire: (2 of 2)**

Number of hair stylists	Marginal product (haircuts per week)	Marginal revenue product (marginal product × \$20 per haircut)	Wage for a hair stylist (\$ per week)
1	40		\$500
2	35		\$500
3	30		\$500
4	25		\$500
5	20		\$500

## Does the Rational Rule for Employers **maximize profits?** (2 of 5)

Number of hair stylists	Total output (haircuts per week)	Total revenue (\$20 price × total output)	Total costs (\$500 per hairstylist)	Profit (total revenue less total costs)
1	40			
2	75			
3	105			
4	130			
5	150			

## Does the Rational Rule for Employers **maximize profits?** (3 of 5)

<b>Number of hair stylists</b>	<b>Total output</b> (haircuts per week)	<b>Total revenue</b> (\$20 price × total output)	<b>Total costs</b> (\$500 per hairstylist)	<b>Profit</b> (total revenue less total costs)
1	40	\$800		
2	75	\$1,500		
3	105	\$2,100		
4	130	\$2,600		
5	150	\$3,000		

## Does the Rational Rule for Employers **maximize profits?** (4 of 5)

Number of hair stylists	Total output (haircuts per week)	Total revenue (\$20 price × total output)	Total costs (\$500 per hairstylist)	Profit (total revenue less total costs)
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3	105	\$2,100	\$1,500	
4	130	\$2,600	\$2,000	
5	150	\$3,000	\$2,500	

# Does the Rational Rule for Employers **maximize profits?** (5 of 5)

Number of hair stylists	Total output (haircuts per week)	Total revenue (\$20 price × total output)	Total costs (\$500 per hairstylist)	Profit (total revenue less total costs)
1	40	\$800	\$500	\$300
2	75	\$1,500	\$1,000	\$500
3	105	\$2,100	\$1,500	\$600
4	130	\$2,600	\$2,000	\$600
5	150	\$3,000	\$2,500	\$500

Following the **Rational Rule for Employers**, you hired **4 hair stylists**.

Now we see that hiring **4 hair stylists** also allows you to **maximize your profits**.

**Conclusion: Following the Rational Rule for Employers maximizes your profits.**

4

130

\$2,600

\$2,000

\$600

5

150

\$3,000

\$2,500

\$500

## The Rational Rule for Employers in Competitive Markets

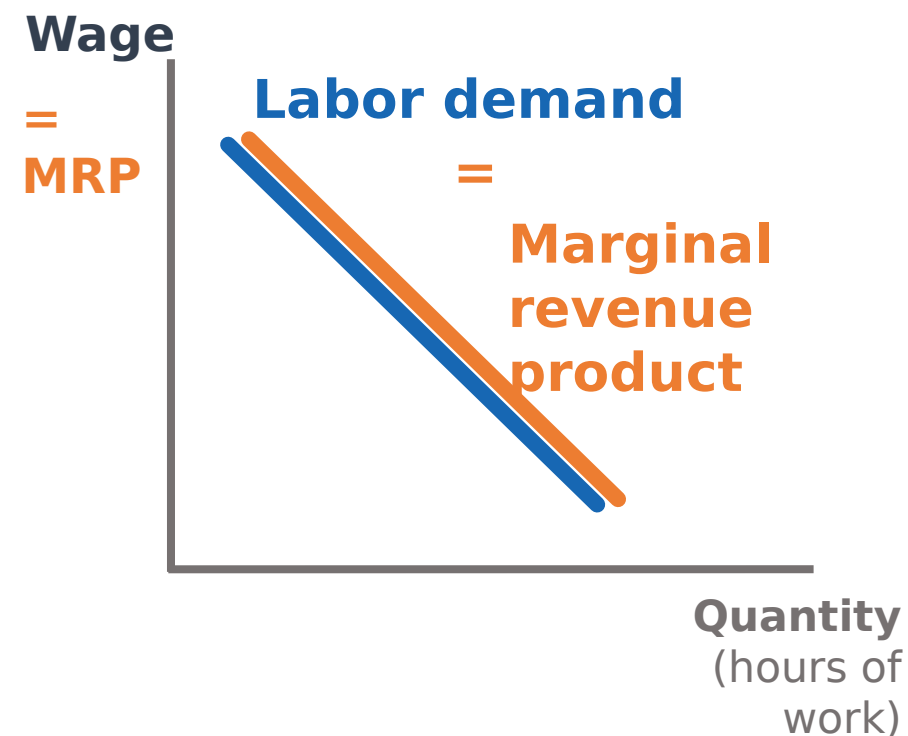
- Hire additional workers until **wage = marginal revenue product**.

If wage = marginal revenue product, then your **labor demand is your marginal revenue product of labor**.

- **Labor demand** summarizes the **wage** at which you will **buy each quantity of labor**.
- **The wage** at which you are willing to buy each quantity of labor **is informed by** the **extra revenue from the extra stuff** this worker produced for you (i.e., the **marginal revenue product**).

Thus, the **marginal revenue product** and **labor demand** curves are **one and the same**.

## The Rational Rule for Employers in Competitive Markets





# The Interdependence Principle and Shifting Labor Demand

## Recall

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

- Your best hiring decision **depends on factors beyond wage** — it also depends on outcomes in other markets. When economic conditions change, so might your hiring decision.

The **four factors** that **shift** the market **Labor Demand** curve:

1. Changes in demand for your product
2. Changes in the price of capital
3. Better management techniques and productivity gains
4. Nonwage benefits, subsidies, and taxes

# Labor Demand Shifter 1: Changes in Demand for Our Product

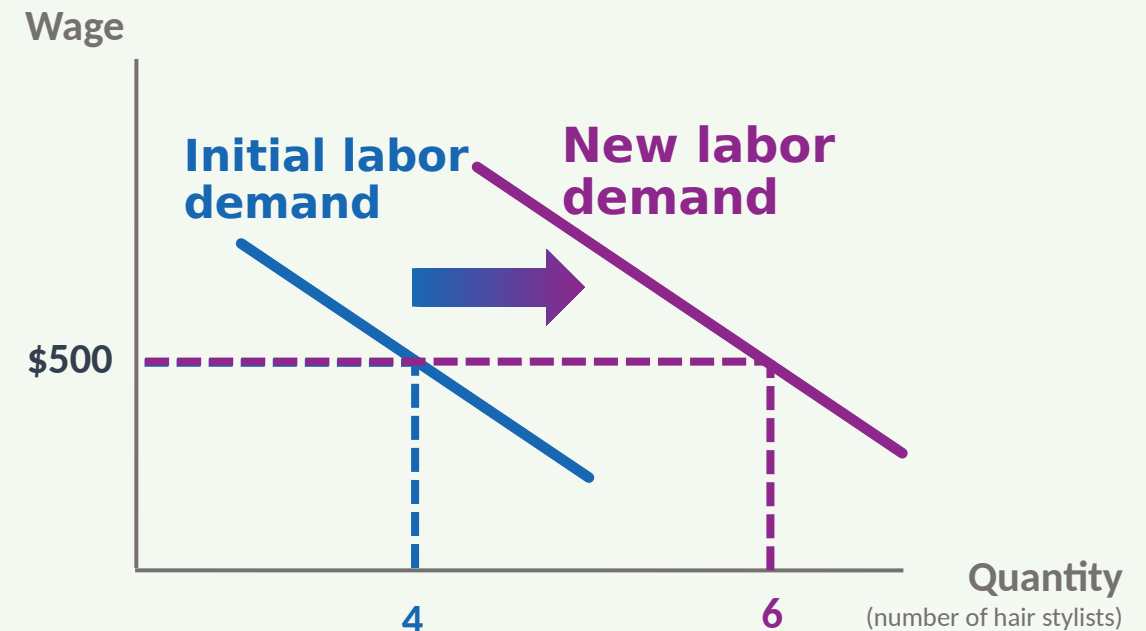
You hire **workers** because they **are an input** in the production of your good or service.

- Your demand for workers is a **result** of the demand your customers have for your product.

**Derived demand:** The demand for an input derives from the demand for the stuff that input produces.

**Haircut scenario:** Suppose demand for haircuts increases and causes the price of haircuts to rise from \$20 to \$30.

The increase in demand for haircuts causes an **increase in the labor demand** curve for hair stylists, because the work they do is now more valuable (\$30 per haircut instead of \$20!).



# Labor Demand Shifter 2: Changes in the Price of Capital (1 of 2)

**Decline in the price of capital** can lead to either **increase or decrease** in labor demand.

➤ Why? Because there are two forces at play...

**Scale effect:** When the **price of capital declines** (or any input gets cheaper), you can now produce at a lower cost. This encourages you to **produce at a larger scale**, which may **require more workers**.

➤ **Labor demand increases**

**Substitution effect:** Many tasks can be done by **either workers or machines**. When the **price of machines falls**, the company will **replace workers** with the cheaper machinery.

➤ **Labor demand decreases**

**Which force dominates** determines whether labor and capital are **complements or substitutes**, and whether labor demand ultimately **increases or decreases**.

# Labor Demand Shifter 2: Changes in the Price of Capital (2 of 2)

Which force dominates?

If the **scale effect dominates**, then labor and capital are **complements**.

A decrease in the price of capital will lead to expanded production, which uses **more machinery and more workers** (complements!).

➤ **Labor demand increases** (visually, a **shift to the right**).

If the **substitution effect dominates**, then labor and capital are **substitutes**.

A decrease in the price of capital will lead to **greater use of machinery**, and that machinery will **replace workers** (substitutes!) in the production process.

➤ **Labor demand decreases** (visually, a **shift to the left**).

# Labor Demand Shifter 3: Better Management and Productivity Gains

Improved management and technological changes can **increase the productivity of labor**.

- Each worker can produce more.
  - **Labor demand** = Marginal revenue product = Marginal product of labor × Price
  - Since marginal product of labor increased, your **labor demand** will increase.

## Hair Salon Example:

- You implement a new technology that allows online booking.
- Workers can now spend **more time cutting hair** (and less time scheduling on the phone).
- Each worker now **generates more revenue for you**, so you want to hire more workers.
- **Result:** Your **labor demand** increases!

# Labor Demand Shifter 4: Nonwage Benefits, Subsidies, and Taxes

When you hire a worker, you pay more than just their wage:

- Health insurance
- Retirements benefits
- Paid days off
- Pay taxes for each worker
- Contribute to social security

If any of these **nonwage costs rise** ☾ labor demand **decreases** (shift left).

If any of these **nonwage costs fall** ☾ labor demand **increases** (shift right).

# Will robots take your jobs?

1. Higher wages create an incentive to invest in capital
  - but it takes many years for business to shift production methods.
2. New technology helps the owners of the robots at the expense of the workers.
3. Technology leads to the end of some jobs and birth of others:

“If you are looking for a career where your services will be in high demand, you should find something where you provide a **scarce, complementary service** to something that is getting ubiquitous and cheap. So what’s getting ubiquitous and cheap? Data. And what is complementary to data? Analysis.”

- Google’s Chief Economist, Hal Varian

# Key take-aways: Labor demand

## Rational Rule for Employers

- Hire additional workers until **wage = marginal revenue product**.
- The **marginal revenue product** measures the extra revenue you get from the extra stuff the worker produced for you.

The **labor demand** curve and the **marginal revenue product** curve are one and **the same!**

Four factors **shift** the **labor demand** curve:

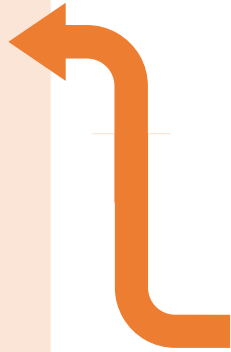
1. Changes in demand for your product ☾ derived demand
2. Changes in the price of capital ☾ scale versus substitution effect
3. Better management and technology
4. Nonwage benefits



# Chapter 11 (3 of 5)

Discover how much time to devote to work versus leisure:

- Rational rule for workers
- Labor supply shifters



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# How to Balance Work and Leisure

There are only **24 hours** in a day.

**Your task:** Figure out **how to best allocate** this time.

**Opportunity cost principle:** “Or what” ☾ labor-leisure trade-off

- Every hour you are spending working is one fewer hour you have available for other things besides paid work — leisure for short.
- Leisure: Relaxing, hanging out with friends, sleep, making meals, cleaning your house, etc.

# How many hours do you work? (1 of 2)

At \$12.50 per hour, how many hours will you choose to work?

Apply the core principles to answer the question:

**Marginal principle:** Break a “how many” question into a “one more” question.

➤ **Should I work one more hour?**

**Hmmmm...** Do you *really* get to decide whether to work one more hour? What about jobs with fixed paychecks or a fixed number of hours?

➤ The marginal principle still applies because there are **different margins of adjustment!**

Margins of adjustment: You can choose to...

➤ take some overtime shifts; get a second job; look for a different job with different hours; work longer hours to increase the likelihood of a raise or promotion.

# How many hours do you work? (2 of 2)

**At \$12.50 per hour, how many hours will you choose to work?**

Apply the core principles to answer the question:

**Marginal principle:** Break a “how many” question into a “one more” question.

➤ **Should I work one more hour?**

**Cost-benefit principle:** Weigh the costs and benefits of working one more hour.

➤ **Marginal benefit** of working one more hour € the **wage** you earn.

➤ **Marginal cost** of working one more hour € the hour of **leisure you forgo**.

**Rational rule for workers:** Work one more hour as long as the **wage** is **at least as large as** the **marginal benefit of** another hour of **leisure**.

# The slope of an individual's labor supply curve

When the **wage rises**, there are **two different effects** working in **opposite directions**. The interaction of these effects ultimately informs **the slope** of your labor supply curve:

**Substitution effect:** When your wage goes up, the opportunity cost of an hour of leisure goes up.

- You now forfeit more money when you take an hour of leisure.

Higher wages are an incentive to **substitute toward work** and away from leisure.

- **Result:** If you work longer hours when wage rises, then you get an **upward-sloping labor supply curve**.

**Income effect:** A higher wage increases your income, leading you to choose more leisure and hence less work.

- Leisure is a **normal good**, and people **consume more** normal goods when their **income increases**.

Thus, under the income effect, a higher wage leads you to work fewer hours.

- **Result:** If you work fewer hours when wage rises, then you get a **downward-sloping labor supply curve**.

# Which effect dominates? (1 of 2)

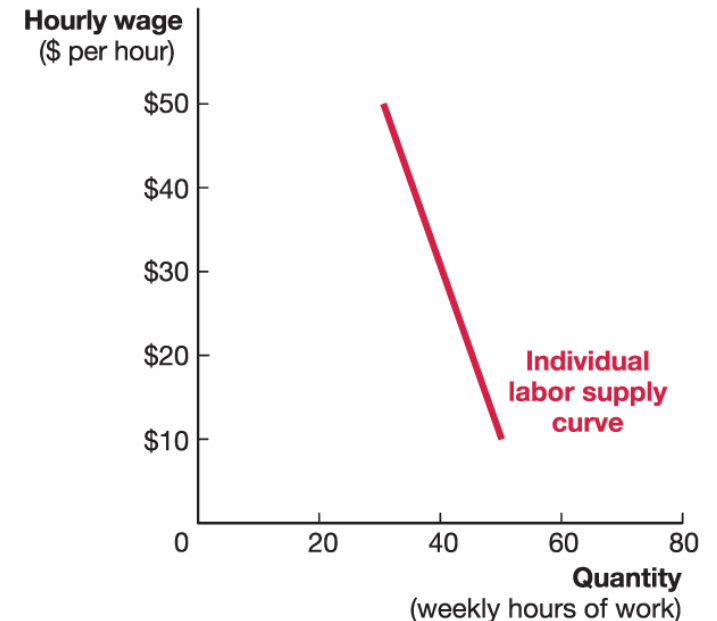
If the **substitution effect dominates**, then the high wage has provided a stronger incentive for you to work.

- As wage rises, you work more hours.
- Labor supply curve slopes **upward**.



If the **income effect dominates**, then a high wage raises your income and you “spend” this extra income buying more leisure

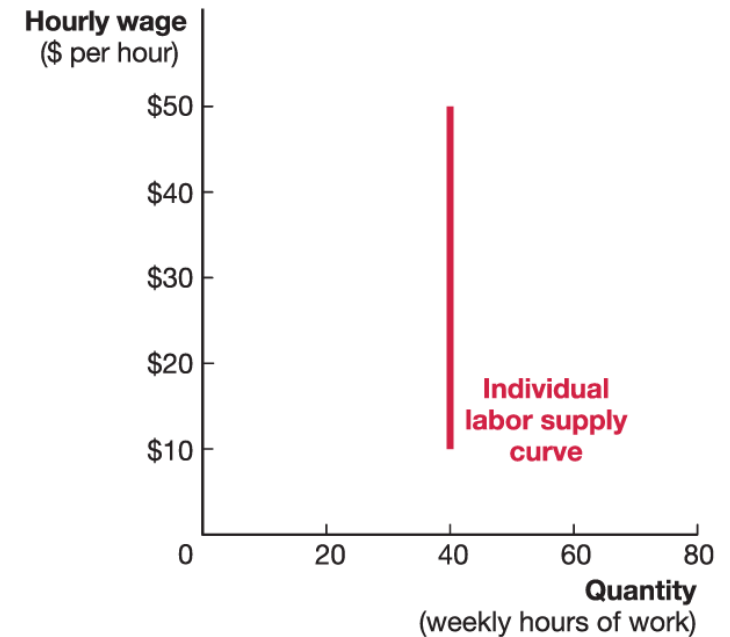
- As wage rises, you work fewer hours.
- Labor supply curve slopes **downward**.



## Which effect dominates? (2 of 2)

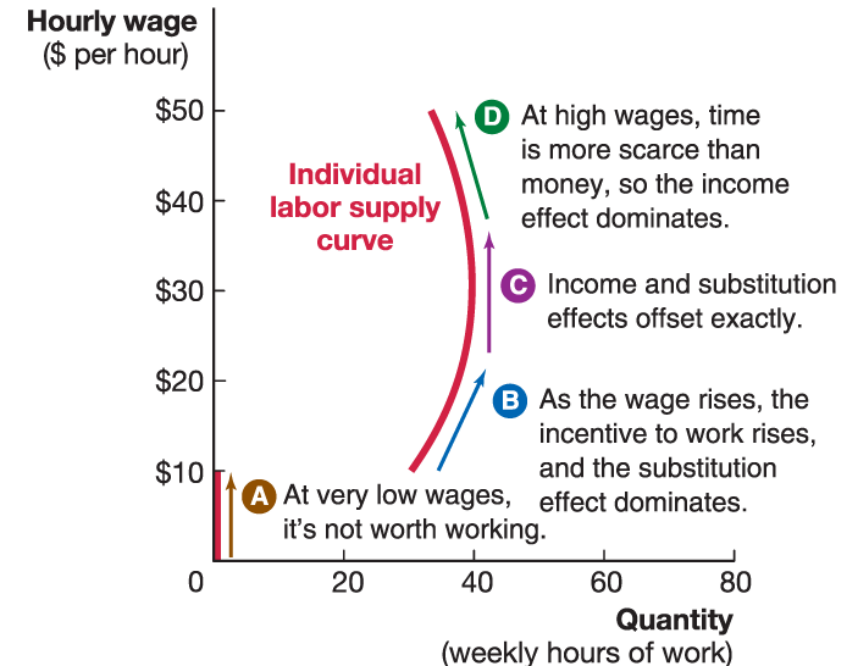
If the **income and substitution effects offset**, then your incentive to work more hours is perfectly counterbalanced by your incentive to work fewer hours.

- As wage rises, you **do not change your hours worked**.
- Labor supply curve is **perfectly vertical**.

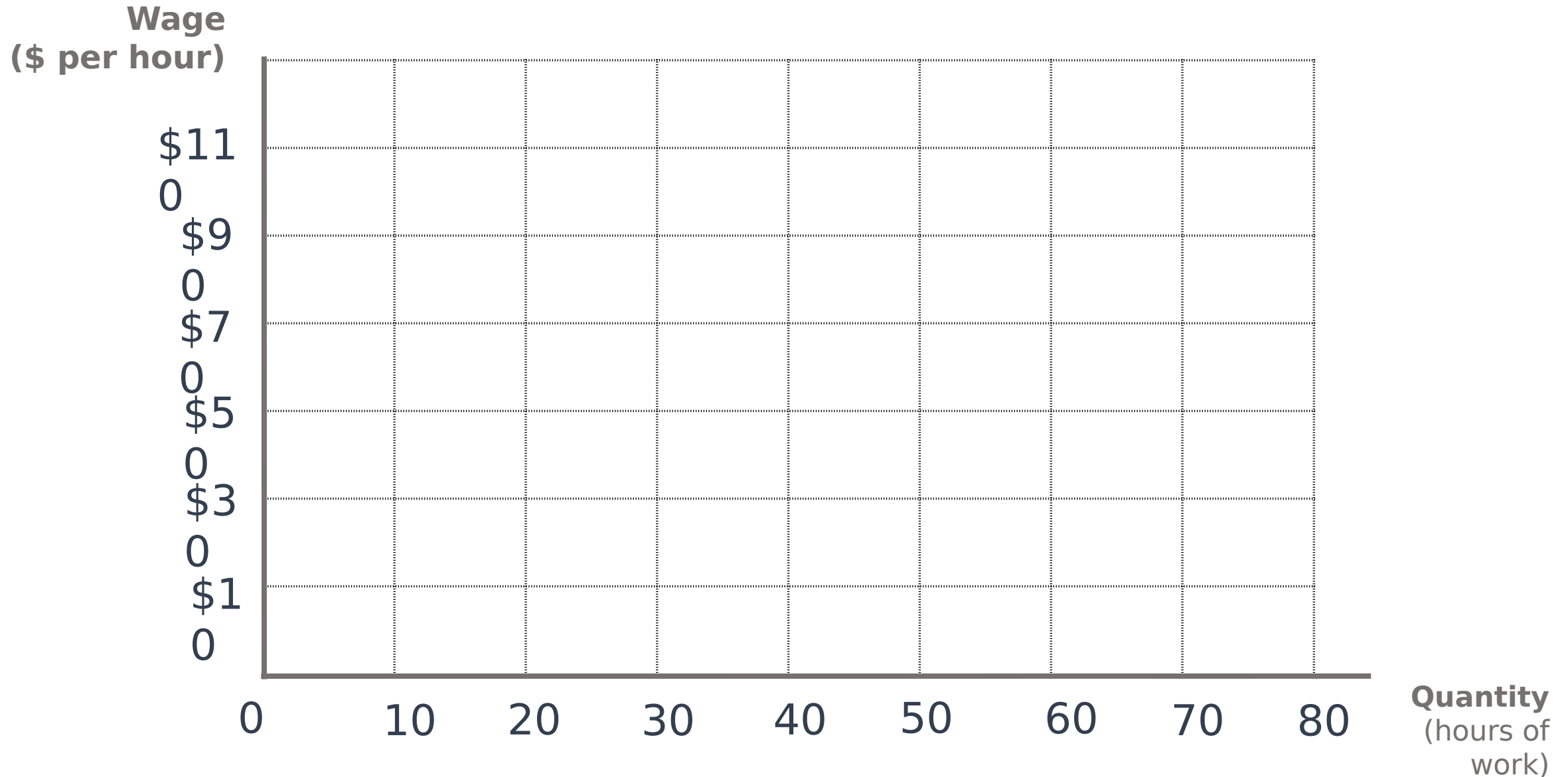


If the **dominant effect changes** as wage changes, then the labor supply curve takes a **backward-bending** shape.

- **At lower wages**, the **substitution effect** dominates, resulting in an **upward** slope.
- **At mid-range wages**, the two effects **offset**, resulting in a **vertical** slope.
- **At higher wages**, the **income effect** dominates, resulting in a **downward** slope.



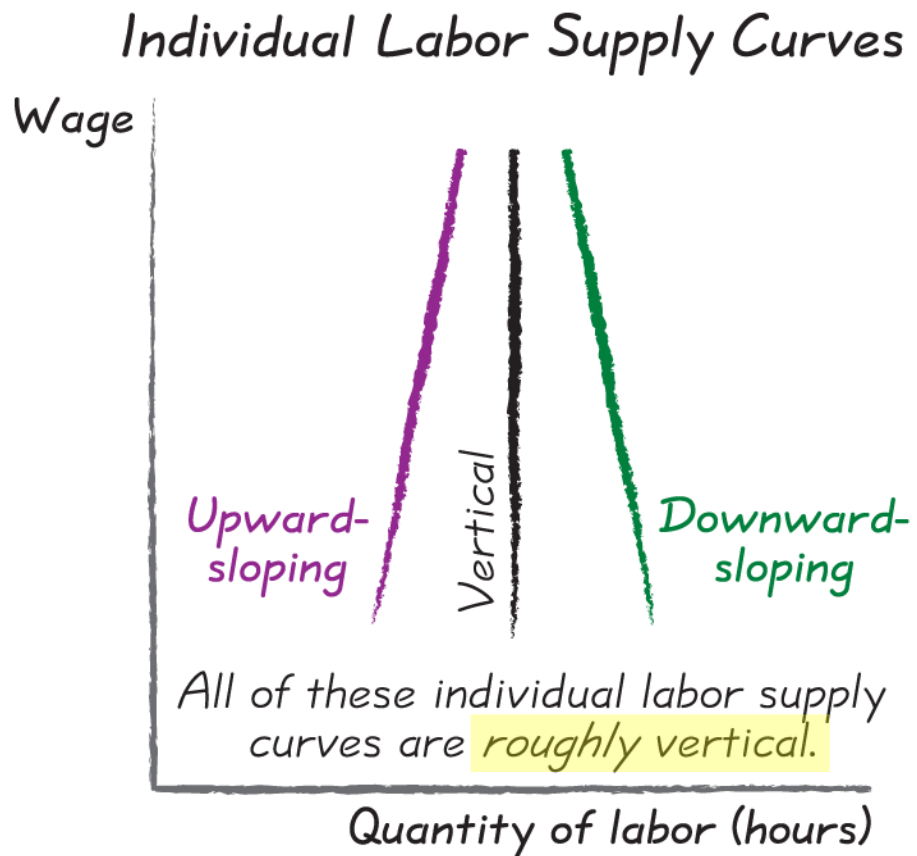
# Draw your personal labor supply curve:





# Interpreting the Data:

## Does the labor supply curve slope up or down?



When income taxes are cut, take-home wages rise:

- After-tax wage rises 10% ☾ people work 1–3% more.
- **Upward-sloping** labor supply curve.

People with different paying jobs tend to work the same number of hours:

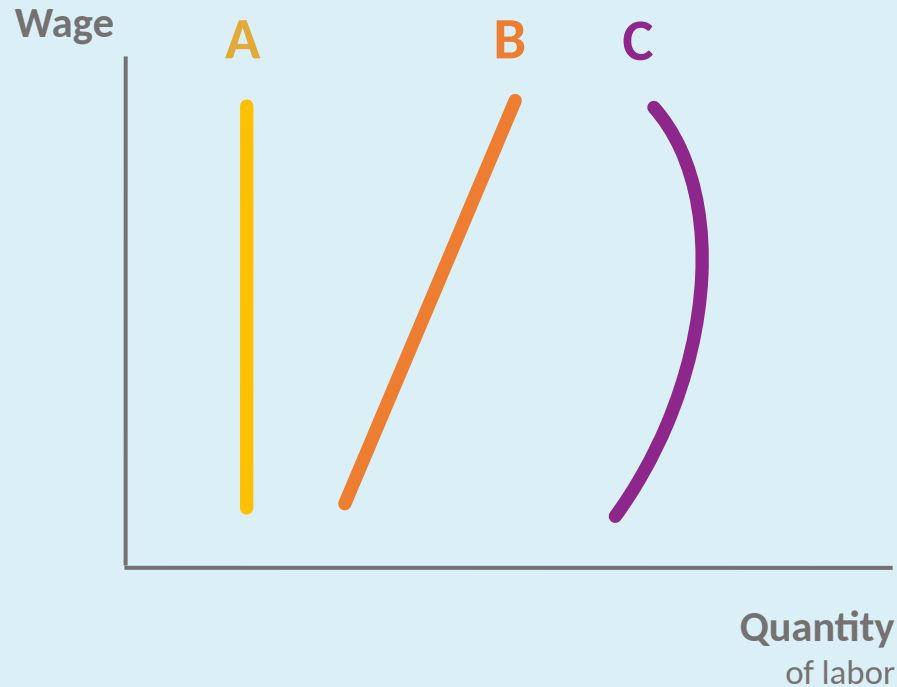
- **Vertical** labor supply curve.

Over the past century, wages have risen and the typical workweek has declined a little in response:

- **Downward-sloping** labor supply curve.

# Concept Check: Scale and Substitution effects

Assess how the scale and substitution effects stack up against one another for each of these individual labor supply curves?



substitution effect

# To Work, Or Not to Work, That Is the Question!

Previously examined **intensive margin** — how many hours each worker supplies.  
Now...

Examine **extensive margin** — how many people choose to **join the workforce or not**.

**Cost-benefit principle:** Join the workforce if the **benefits exceed the costs**.

- **Benefits:** Wage, nonwage benefits (health insurance, social security contributions, etc.), gain work experience to boost future earnings.
- **Costs:** Not staying at home to raise kids, not taking a full course load at school, not enjoying long-awaited retirement.

These opportunity costs associated with joining the workforce help explain why some groups of people choose to **opt out of the workforce entirely**.

# Choosing Your Occupation

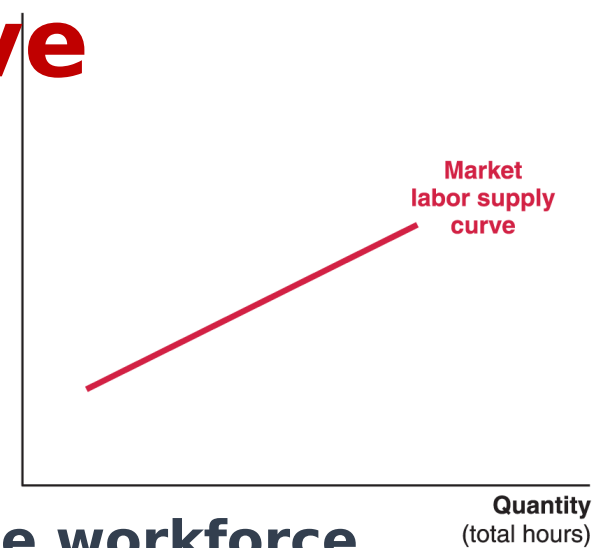
## **What factors to think about when choosing an occupation:**

- Likely earnings and earnings trajectory
- Nonwage benefits: health insurance, annual leave, housing assistance, etc.
- Number of hours you will typically need to work
- Benefits of doing something you enjoy (versus something you hate)
- Will your job allow you to develop skills that will continue to be valuable?
- Evaluate the risks — do few people actually “make it” (actors)?
- Volatility of the occupation — paid only on commission

# The market labor supply curve

Market labor supply curves are **upward-sloping**.

- The higher the wage for an occupation, the more people are willing to work in that occupation.



**Reason 1:** High wages convince **more people to join the workforce**.

- Rather than pursue a master's degree, you go straight to the workforce so you can start earning that high wage.

**Reason 2:** Existing workers may **put in more hours**.

- People already working in that occupation may increase the number of hours they work.

**Reason 3:** Some people may **switch occupations**.

- If the wage of hair stylists increases, people may switch over from a job in retail.

# The Interdependence Principle and Shifting Labor Supply

## Recall

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

- your decision to work or not, as well as how many hours to work **depends on factors beyond wage** — labor supply decisions are connected to other markets and to government policies.

The **four factors** that **shift** the market **Labor Supply** curve:

1. Changing wages in other occupations
2. Changing the number of potential workers
3. Changing the benefits of not working
4. Nonwage benefits, employment subsidies, and income taxes

# Labor Supply Shifter 1:

## Changing wages in other occupations

Some labor markets are connected

- Employers compete for similar workers.

**Example:** People working as personal trainers could also work as yoga instructors.

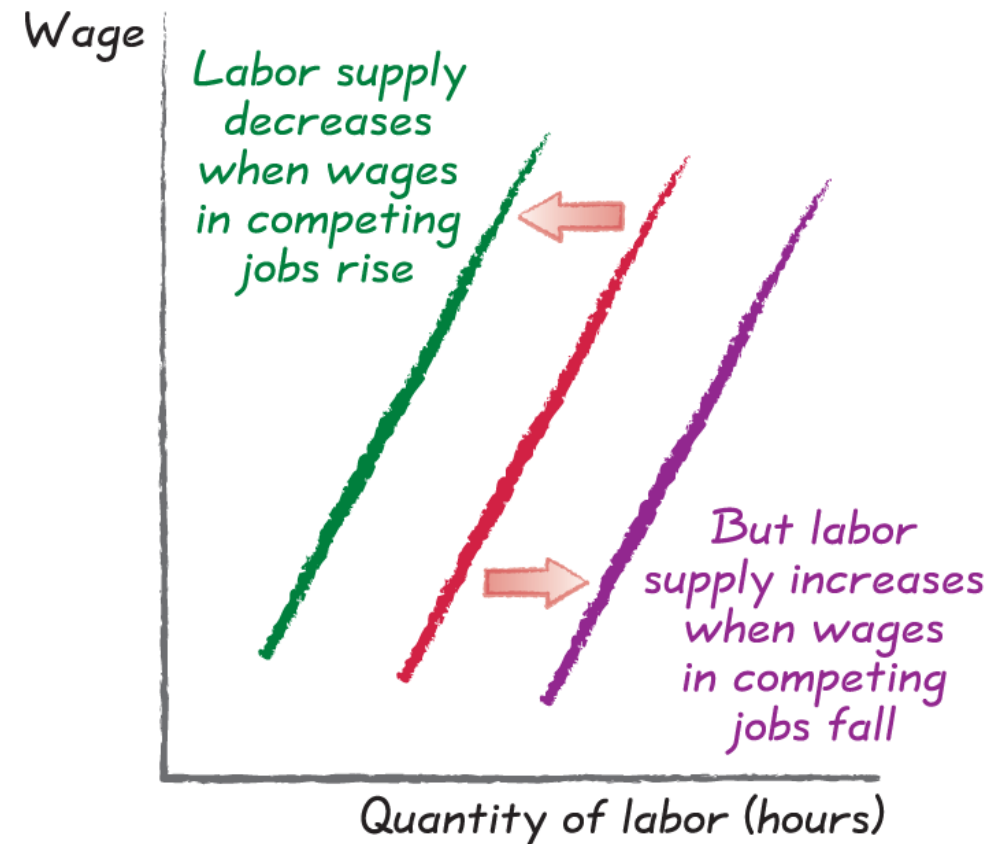
If wages for yoga instructors **rise**...

- labor supply for personal trainers will **decrease (shift left)**.

If wages for yoga instructors **fall**...

- labor supply for personal trainers will **increase (shift right)**.

### Personal Trainer Labor Market



# Labor Supply Shifter 2: Number of Potential Workers

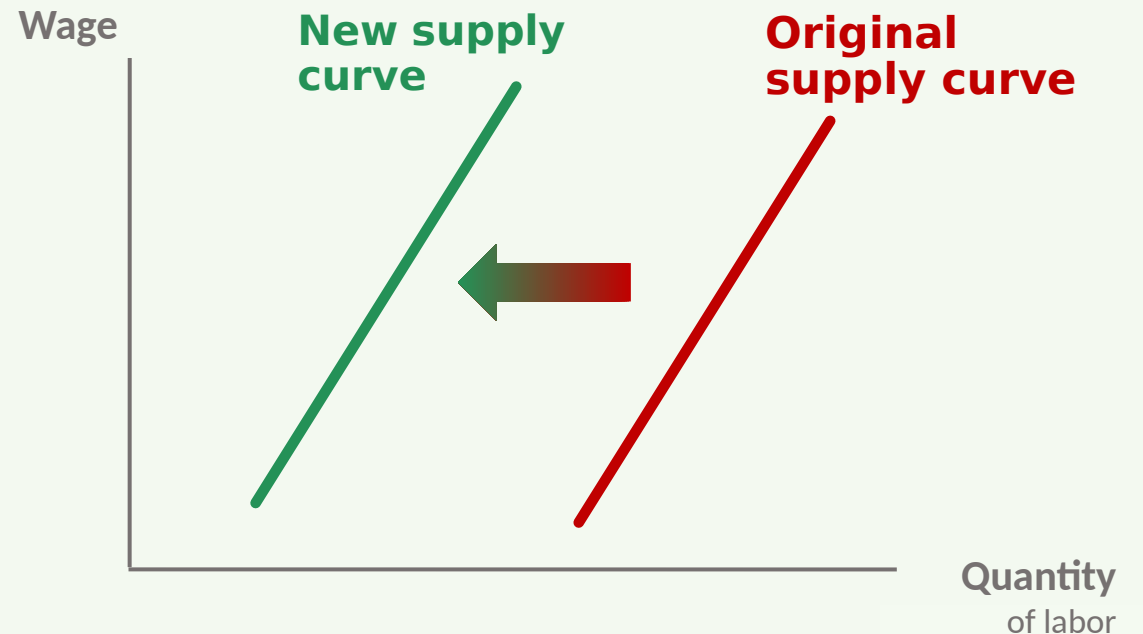
The total number of people in the labor market is a subset of the total number of people in society.

- When population grows, so does potential labor supply.

Population growth can come from...

- Increase in births
- Increased life expectancy
- Immigration
- Shift in the age distribution of the population toward people in their 30s and 40s

**Scenario:** The United States is currently experiencing a shift in the age distribution toward retirement age, **decreasing labor supply** (leftward shift).





# Labor Supply Shifter 3: Changing the Benefits of Not Working

Factors that **increase the benefits of not working** prompt people to **not join the labor force**:

- Government programs that make **college more affordable** **decrease** the labor supply of young workers.
- Generous **unemployment insurance or disability insurance** has an unintended side effect of **decreasing** the labor supply.
  - Less work disincentive in the United States because of less generous programs and strict rules that govern qualifications for program support.

Factors that **decrease the benefits of not working** prompt people to **join the labor force**:

- Anything that **lowers the cost of child care** will **increase** the labor supply of parents.
- If Congress were to **reduce Social Security retirement payments**, then the labor supply of people over age 60 would likely **increase**.
- Over the years Congress has **increased the age** at which people **qualify for full social security benefits**, **increasing** the labor supply of older workers.

# Labor Supply Shifter 4: Nonwage Benefits, Subsidies, and Income Taxes

Changes in nonwage benefits, subsidies, and income taxes change the total compensation a worker gets, and thus the labor supply curve.

Factors that increase the market labor supply (shift right):

- Increase in nonwage benefits or employment subsidies
- Decrease in income taxes

Factors that decrease the market labor supply (shift left):

- Decrease in nonwage benefits or employment subsidies
- Increase in income taxes

# Key take-aways: Labor supply

## Rational Rule for Workers

- Keep working until **wage = marginal benefit of leisure**

The **individual labor supply** curve can slope up, down or something in between.

- depends on whether **Substitution** or **Income effect** dominates.

The **market labor supply** curve **slopes up**.

Four factors **shift** the **labor supply** curve:

1. Changing wages in other occupations
2. Changes the number of potential workers
3. Changing the benefits of not working
4. Nonwage benefits, subsidies, and income taxes

# Chapter 11 (4 of 5)

Evaluate how the labor market will respond to changing economic conditions:

- Three-step recipe
- Examples

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## Three-step recipe for analyzing the labor market

Let's **apply** the labor supply-and-demand framework we have just learned to **forecast** how short- and long-term changes will affect **wages and employment** in any job you are considering.

1. Determine **which curve is shifting**: labor supply, labor demand, or both?
2. Determine if the shift is an **increase or a decrease**.
3. Determine how wages and number of jobs will change in the **new equilibrium**.

Hopefully, this framework will allow you to **take advantage**

# Example

**Step 1:** Software and computers complement the work of data analysts.

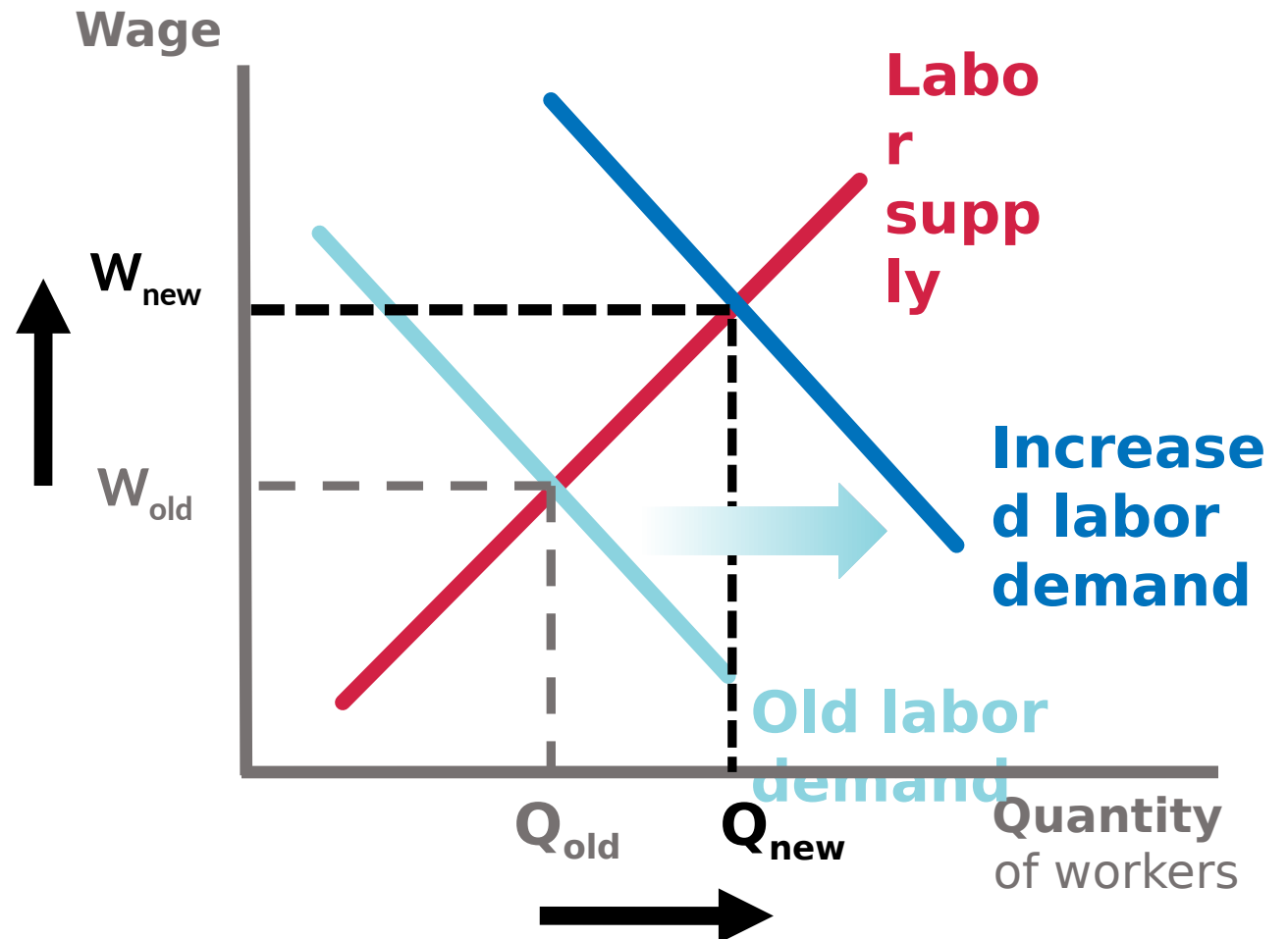
- This price drop in capital will change the **demand for data analyst**.

**Step 2:** The capital is **complementary** to workers in this scenario, so cheaper capital leads businesses to **use more capital AND more workers** (demand shifter #2: capital).

- **Demand** for data analysts **increases** (shift right).

**Step 3:** At the new equilibrium, there is an **increase in both**

**Scenario:** The price of statistical software and powerful computer falls. *What happens to the labor market for data analysts?*



# Example 2

**Step 1:** Kiosks and cashiers are substitutes in McDonald's production process.

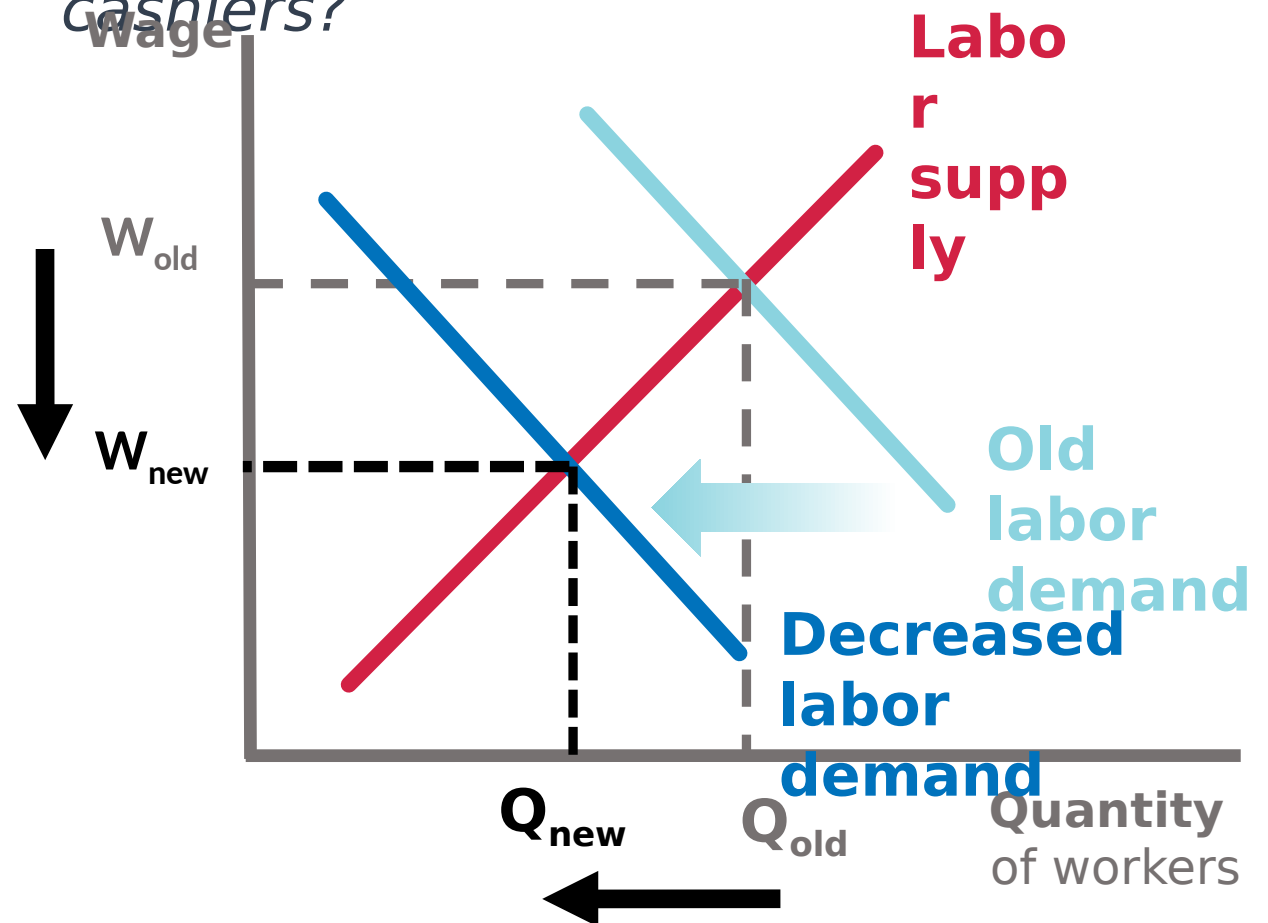
- The **demand for cashiers** will change.

**Step 2:** "No scale effect" implies McDonald's does not adjust to produce at a larger scale, so it doesn't need more workers. Rather, McDonald's is **replacing workers with kiosks** (demand shifter #2: capital).

- **Demand for cashiers decreases** (shift left).

**Step 3:** At the new equilibrium, there is a **decrease in both**

**Scenario:** McDonald's installs new kiosks at all its restaurants but doesn't change the price of its burgers (so there's no scale effect). *What happens to the demand for cashiers?*



## Example 3: You Try! (2 of 2)

**Step 1:** This bill reduces the number of people who could work as computer programmers.

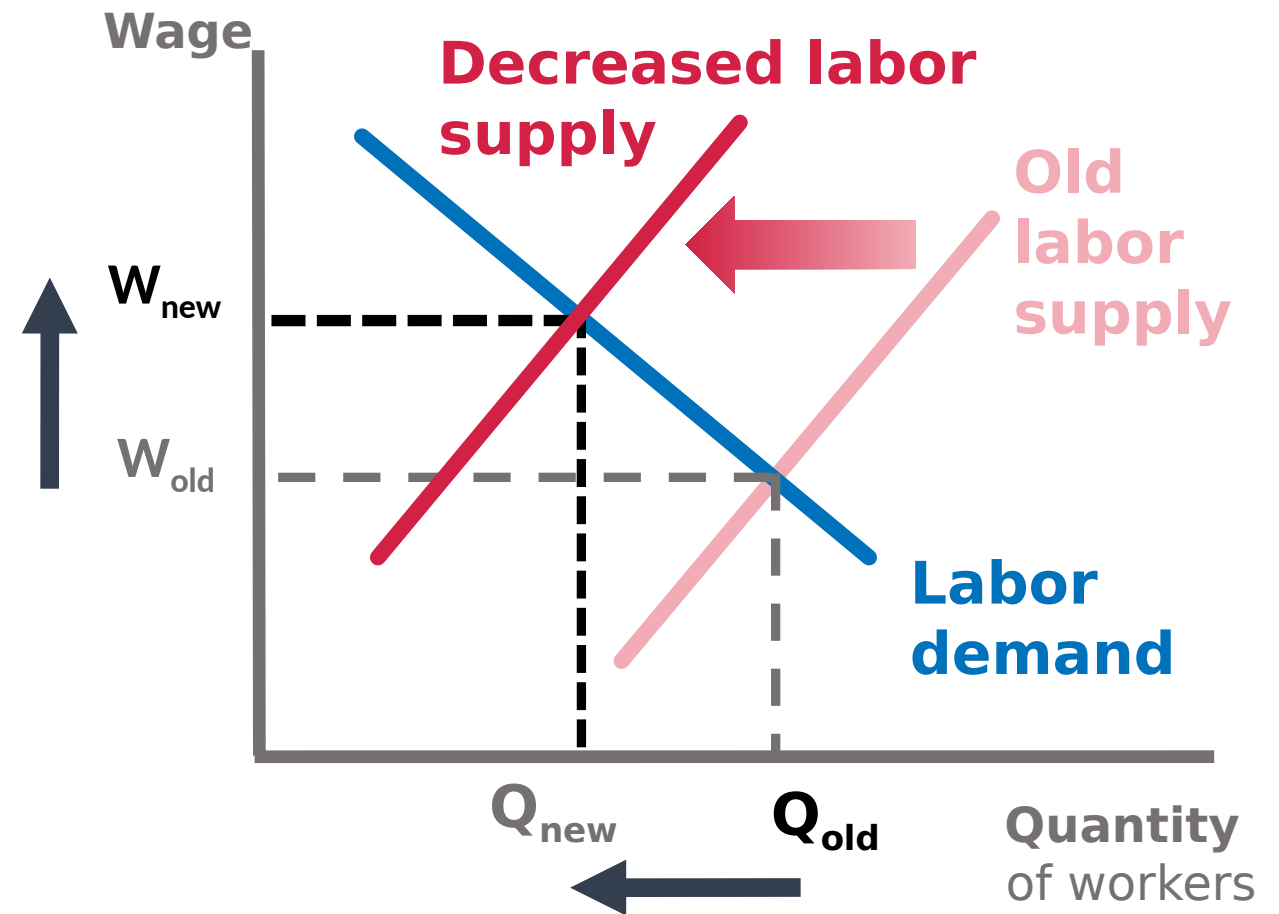
- The **supply** of programmers will change.

**Step 2:** Congress has decreased the number of potential workers in the computer programming labor market (supply shifter #2: potential workers).

- **Supply** of programmers **decreases** (shift left).

**Step 3:** At the new equilibrium, there will be a **higher wage** and a **lower quantity** of workers employed as programmers.

**Scenario:** Congress passes an immigration bill reducing the number of foreigners with computer science degrees who can move to the United States. *What happens to the labor market for computer programmers?*





# Chapter 11 (5 of 5)

1. In a labor market, firms are the demanders, and you are the supplier of your labor.

2. Hire additional workers until  $\text{wage} = \text{marginal revenue product}$ .

3. Keep working until  $\text{wage} = \text{marginal benefit of leisure}$ .

4. Follow the three-step recipe.

1. Supply and Demand at Work

2. Labor Demand: Thinking Like an Employer

3. Labor Supply: How to Balance Work and Leisure

4. Changing Economic Conditions and Labor Market Equilibrium