Labor Economics

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INTRODUCTION

- Economics provides powerful and surprising insights into individual and social behavior

- Labor Economics is the study of how employers and employees respond to the incentives of wages, prices, profits, and benefits

- There are two branches of economics in this class, positive economics and normative economics

    - **Positive economics**

        - An approach to economics that emphasizes facts, such as how the world works, or cause and effect relationships
        - The ideas economists examine are testable and their method of inquiry does not include value judgment
        - Positive economics can be described as telling the world the way it is

    - **Normative economics**

        - A perspective on economics that reflects normative, or ideologically prescriptive judgments toward economic development, investment projects, statements, and scenarios often based on the facts established using positive economics
        - Economists often make judgements on what the effect of a policy change will be
        - Normative economics can be described as telling the world the way it ought to be

- Before we dive into talking about the labor market, first we are going to go over basic terminology and facts about the United States labor market

1.1   Metrics to Evaluate the Labor Market

Figure 1.1: US Labor Force, 2019

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                          ┌─────────────────────┐
                          │     POPULATION      │
                          │    ~330 million     │
                          └─────────────────────┘
                         /                        \
              ┌──────────────────┐        ┌──────────────────────┐
              │   LABOR FORCE    │        │  NOT IN LABOR FORCE  │
              │   ~200 million   │        │     ~130 million     │
              └──────────────────┘        └──────────────────────┘
              /                \
   ┌──────────────────┐   ┌──────────────────┐
   │    EMPLOYED      │   │   UNEMPLOYED     │
   │  ~192.8 million  │   │   ~7.2 million   │
   └──────────────────┘   └──────────────────┘
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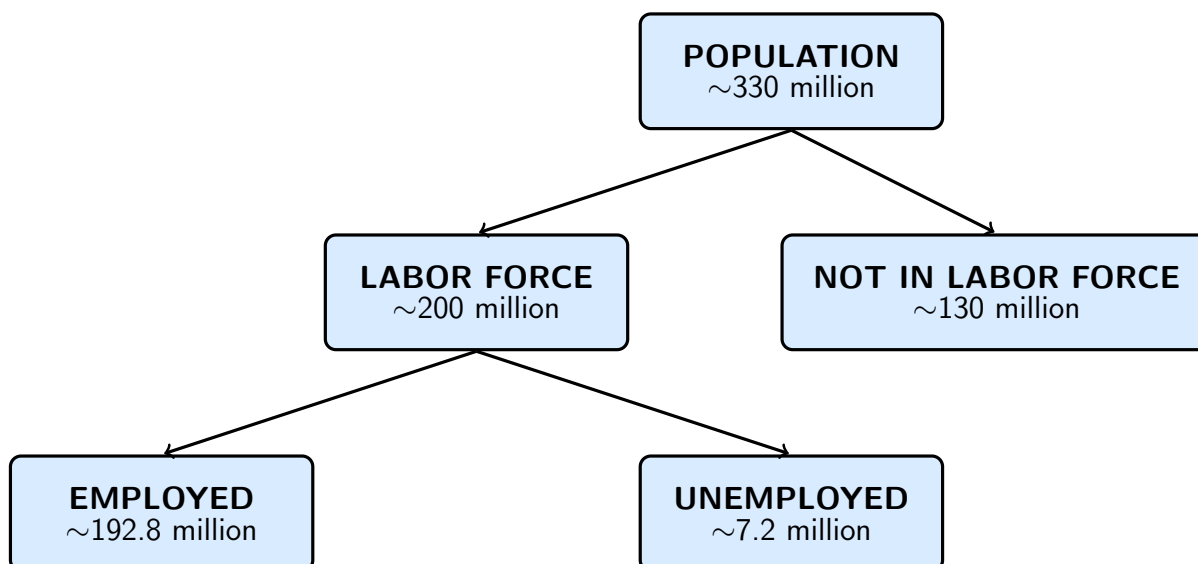
1.1.1   Unemployment Rate

- The most common metric that is reported to discuss the strength of the labor market is the <u>unemployment rate</u>

$$\text{Unemployment Rate} = \frac{\text{Unemployed}}{\text{Labor Force}} \tag{1.1}$$

- To be considered <u>unemployed</u>, you must not have a job but actively seeking work

- Sometimes people who are unemployed get discouraged when they cannot find a job and stop looking

    ○ We call these people <u>discouraged workers</u>

- When this happens, they are no longer considered unemployed because they are not actively seeking work, they have left the labor market

- For this reason, the unemployment rate can be misleading

    ○ The unemployment rate does not capture those not in the labor force who are discouraged

        – It is also important to note that those that are not in the labor force are also people who are retired and kids

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- If a discouraged worker leaves the labor force, then both the numerator and the denominator of the unemployment rate gets smaller, which will lower the unemployment rate, but that is misleading because that does not mean that there was an increase the number of people working

- While the unemployment rate is important and useful, it is also necessary to look at other metrics

Figure 1.2: Monthly Unemployment Rate, 1948–2021
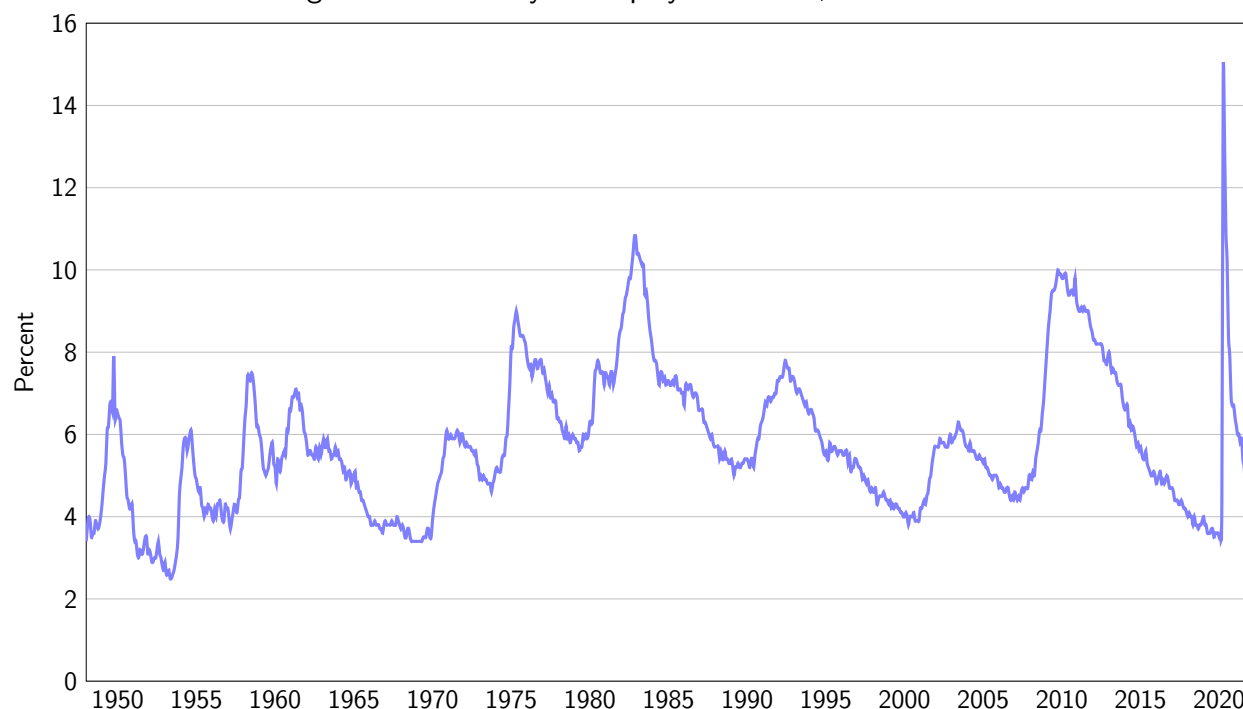
Source: Bureau of Labor Statistics via FRED.

1.1.2 Labor Force Participation Rate

- The labor force participation rate (LFPR) is calculated by comparing the actual labor force with the "potential labor force"

   - The "potential labor force" is any person who is eligible to work that is age 16 and older and not institutionalized (e.g., incarcerated, mental institution, or nursing homes)

$$\text{LFPR} = \frac{\text{Labor Force}}{\text{Potential Labor Force}} \tag{1.2}$$

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Figure 1.3: Monthly Labor Force Participation Rate, 1948–2021
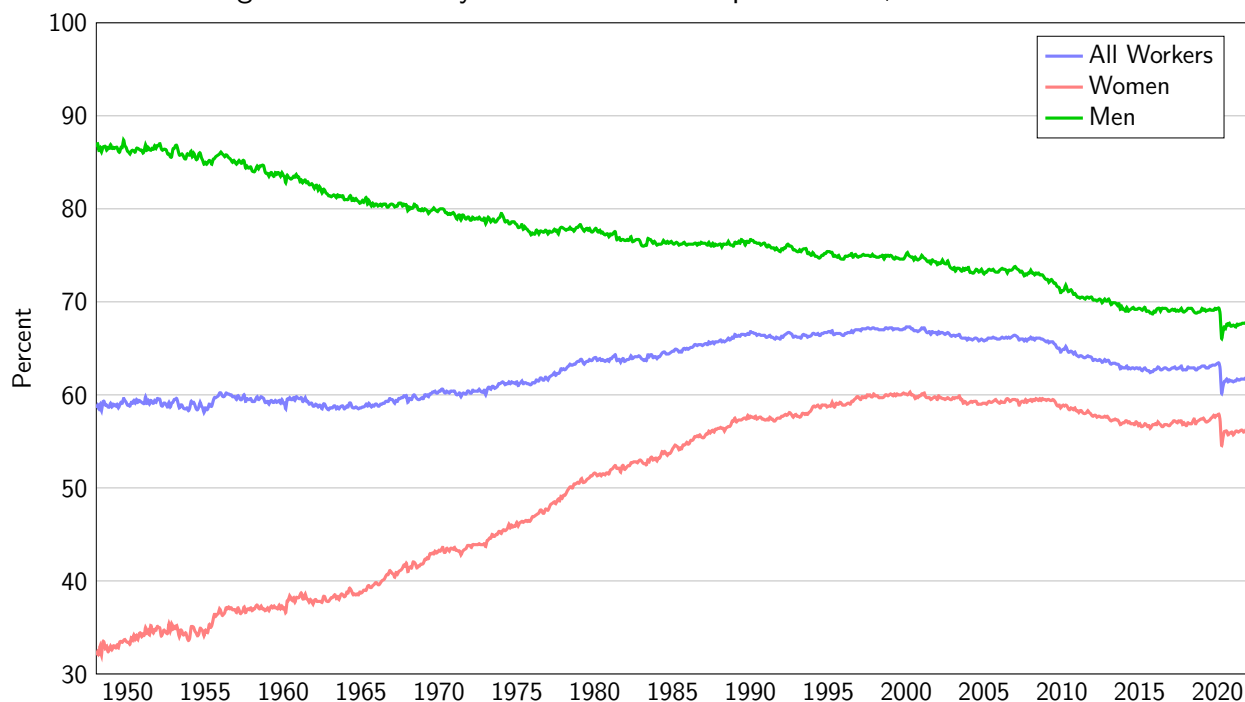
1.1.3 Employment-Population Ratio

- The employment-population ratio (EPR) measures the percent of the working age population (age 16-64) is currently employed

$$\text{EPR} = \frac{\text{Labor Force}}{\text{Working Age Population}} \tag{1.3}$$

- Because it takes into account the impacts of both labor force participation and unemployment, it is a useful summary measure when those forces place countervailing pressures on employment

- the employment-population ratio places employment in the context of a much broader group of potential workers, working age adults

Figure 1.4: Monthly Employment-Population Ratio, 1948–2021
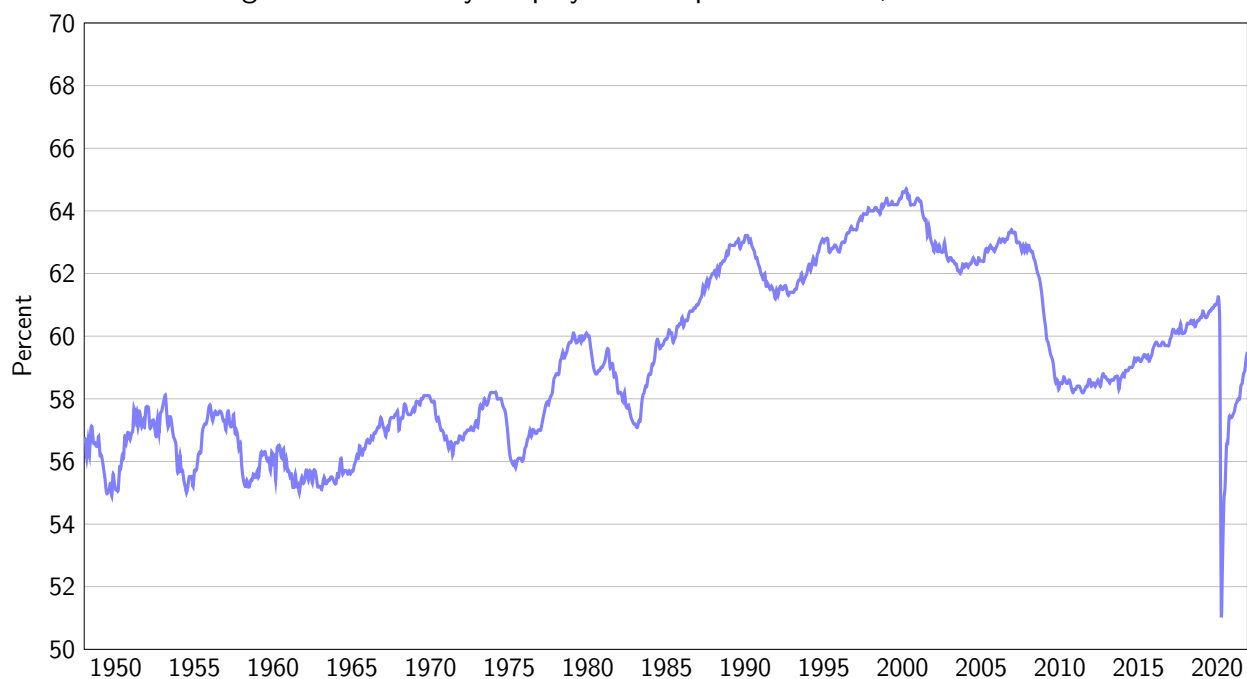
Source: Bureau of Labor Statistics via FRED.

1.2   Workforce Composition

Figure 1.5: Composition of US Workforce, 1948–2021

Source: Bureau of Labor Statistics via FRED.
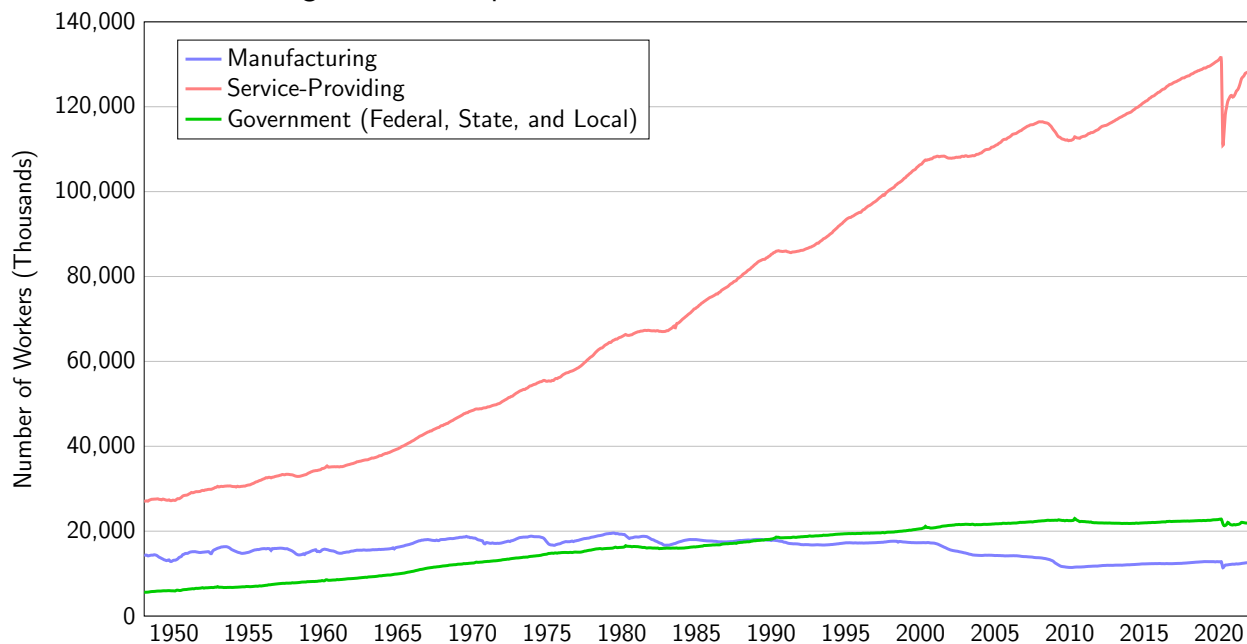
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LABOR SUPPLY

2.1 The Decision to Work

- Each person has $\sim$ 16 hours a day that they have to choose how to spend it

- We are going to start with the simple case of people having a choice between working for pay or enjoying leisure (we will add complications to this later)

- Every hour we work is an hour we could be having fun and enjoying leisure

- Every hour we work, we earn a wage that gives people purchasing power

- Therefore, there will be a trade-off between labor and leisure

  ○ The wage is the opportunity cost of one hour of leisure

- Each person has their own unique set of preferences that will determine their relative attitude towards work versus leisure which we can express in a utility function of the following form: $U(c, l)$

  ○ c is consumption spending from income

  ○ l is leisure hours

    – $l = T - h$ where h is hours worked and T is the endowment of time available each day (typically 16 hours)

- Figure 2.1 shows indifference curves graphically.

- Each person is going to try to achieve the highest level of utility possible, and therefore would want to be on the highest indifference curve.

- Therefore, a person will choose to work if they can achieve a higher level of utility (be on a higher indifference curve) than they can reach while not working.

Figure 2.1: Indifference Curves
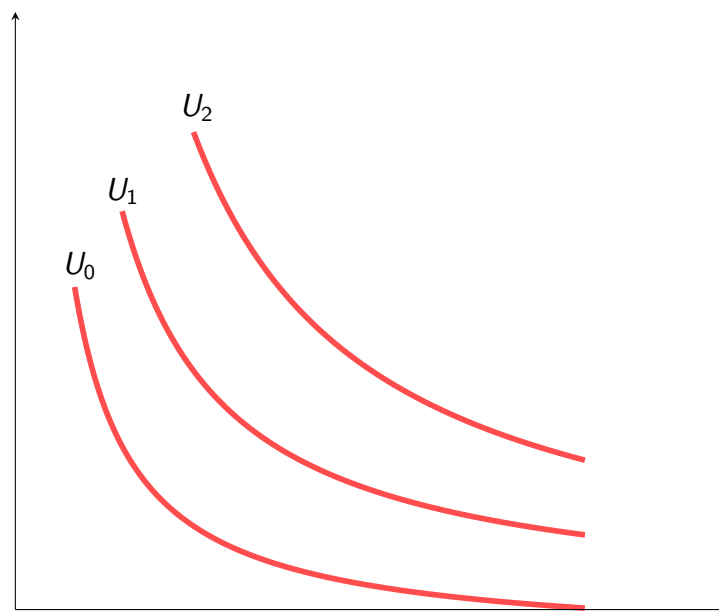
- However, we know that people cannot achieve infinite utility because we are all faced with constraints

- These constraints are defined by the <u>budget constraint</u>, which is given by: $c = m + wh$

  - m is non-labor income

    - Dividend or interest payments
    - Government transfers (unemployment, EITC, social security, SNAP, etc.)

  - w is the hourly wage

  - h is hours worked

- We can show the budget constraint graphically:

Consumption

$m + wT$

m

T Hours of Leisure
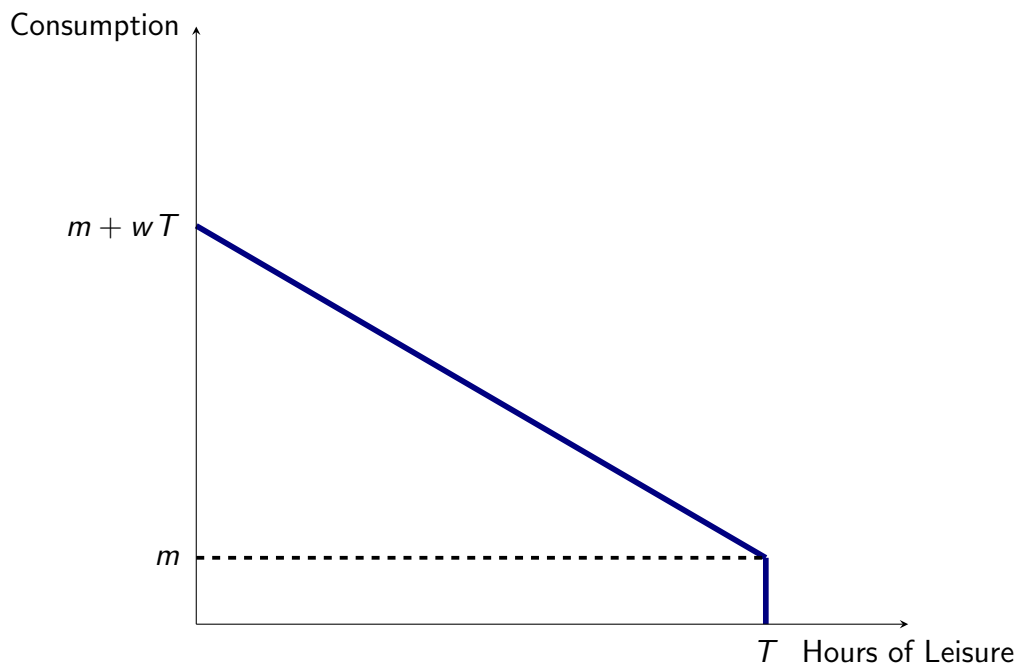
- For a person to determine the number of hours worked, they are going to seek to maximize their utility subject to their budget constraint

- This can be shown graphically by combining the indifference curve and the budget constraint:

Consumption

$m + wT$

c^*

U_1

m

h^* l_0 Hours of Leisure

$$\max\ U(c, l)$$

$$\text{s.t.}\quad c = m + wh$$

$$h = T - l$$
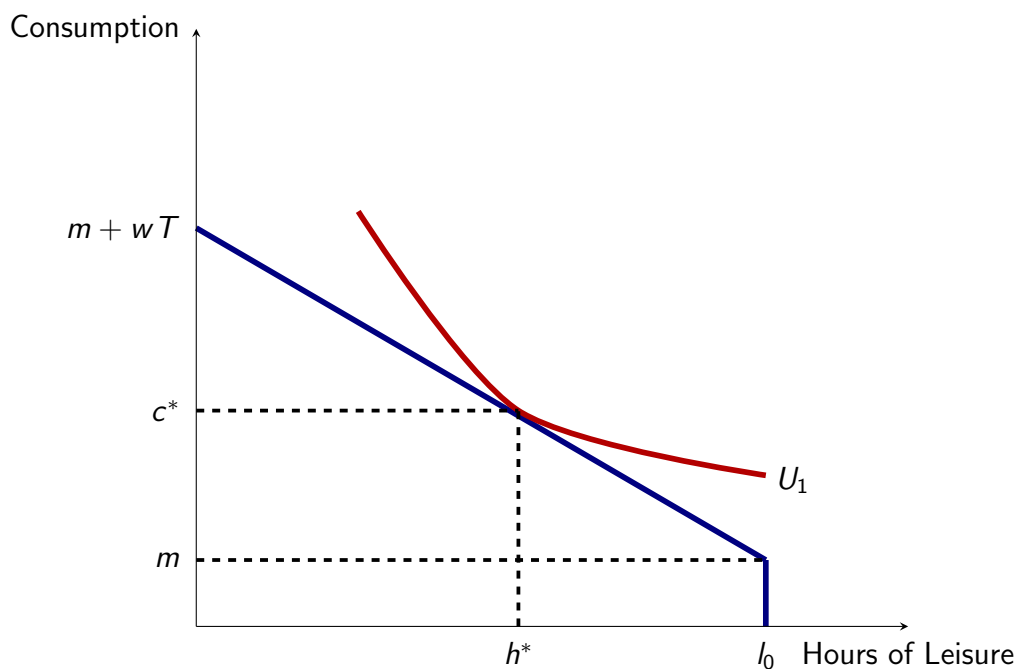
- If we solve this constrained optimization problem, we can calculate the optimal level of hours worked, h^*

- We can substitute $h = T - l$ into the budget constraint to get: $c = m + w(T - l)$

$$\max\ U(c, l)$$

$$\text{s.t.}\quad c = m + wT - wl$$

- To solve this constrained optimization problem, we need to set the marginal rate of substitution (MRS) equal to the wage

  ○ $MRS = \dfrac{dU/dl}{dU/dy}$

  ○ $\dfrac{dU/dl}{dU/dy} = w$

  ○ Substitute c from the budget constraint, solve for l^* and h^*

Example

$$\max\ U = c^{1/2} l^{1/2}$$

$$\text{s.t.}\quad c = m + wT - wl$$

- **Find MRS**

- $\dfrac{dU}{dl} = \dfrac{1}{2} c^{1/2} l^{-1/2}$

- $\dfrac{dU}{dc} = \dfrac{1}{2} c^{-1/2} l^{1/2}$

- $MRS = \dfrac{\frac{1}{2} c^{1/2} l^{-1/2}}{\frac{1}{2} c^{-1/2} l^{1/2}} = \dfrac{c}{l}$

- **Set** $MRS = w$

- $\dfrac{c}{l} = w$

- **Subsitute in the budget constraint**

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- $\dfrac{m + wT - wl}{l} = w$

- **Solve for l^***

- $m + wt - wl = wl$

- $m + wT = 2wl$

- $l^* = \dfrac{m + wT}{2w}$

- **Solve for h^***

- $h^* = T - l^* = T - \dfrac{m + wT}{2w} = \dfrac{wT - m}{2w}$

2.1.1   The Reservation Wage

- A <u>reservation wage</u> is the wage where people are indifferent between working and not working

- In other words, it is the lowest wage someone will accept to work

- The reservation wage, w^r, is given by the slope of the indifference curve where $l = T$ or $h = 0$

    - $0 = \dfrac{wT - m}{2w}$
    - $0 = wT - m$
    - $wT = m$
    - $w^r = \dfrac{m}{T}$

- If $w \geq w^r$, a worker will supply h^* hours of work

- If $w < w^r$, then $h^* = 0$ because the the the marginal value of leisure is greater the the opportunity cost of not working

- This assumes that worker doesn't have any minimum hours they need to work for their job

- In practice, most people have some kind of a limit because its hard to find a job where you can only work a few hours a week, so most people are constrained to either part-time or full-time work

- By imposing this constraint, it will increase the reservation wage

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2.2 Individual Labor Supply

- As the wage increases, the budget constraint will rotate upward around T

- However, the impact on the number of hours worked is ambiguous because there are two offsetting effects that occur when wage changes

- The Income Effect

    - If your wage increases and you work the same number of hours, your income goes up

    - As our income goes up, we feel richer, and will want to work less, or consume more leisure (if we assume leisure is a normal good)

    - If out income goes down, we will want to work more

- The Substitution Effect

    - If the wage goes up, the opportunity cost (price) of leisure increases

    - Since leisure becomes more expensive, we will consume less of it, increasing the number of hours we work

- If income effect $>$ substitution effect, then if the wage increases, the number of hours worked will decrease

- If income effect $<$ substitution effect, then if the wage increases, the number of hours worked will increase

- Generally, the substitution effect dominates the income effect, particularly for low-wage workers

- However, once the wage becomes sufficiently high, the income effect will dominate the substitution effect

- Because of this, every person has a backward bending supply curve

Income

C

B

U_3

U_2

A

U_1

h_2 h_1 h_3 Hours of Leisure

Income

C

Labor Supply

B

A

h_3 h_1 h_2 Hours of Work
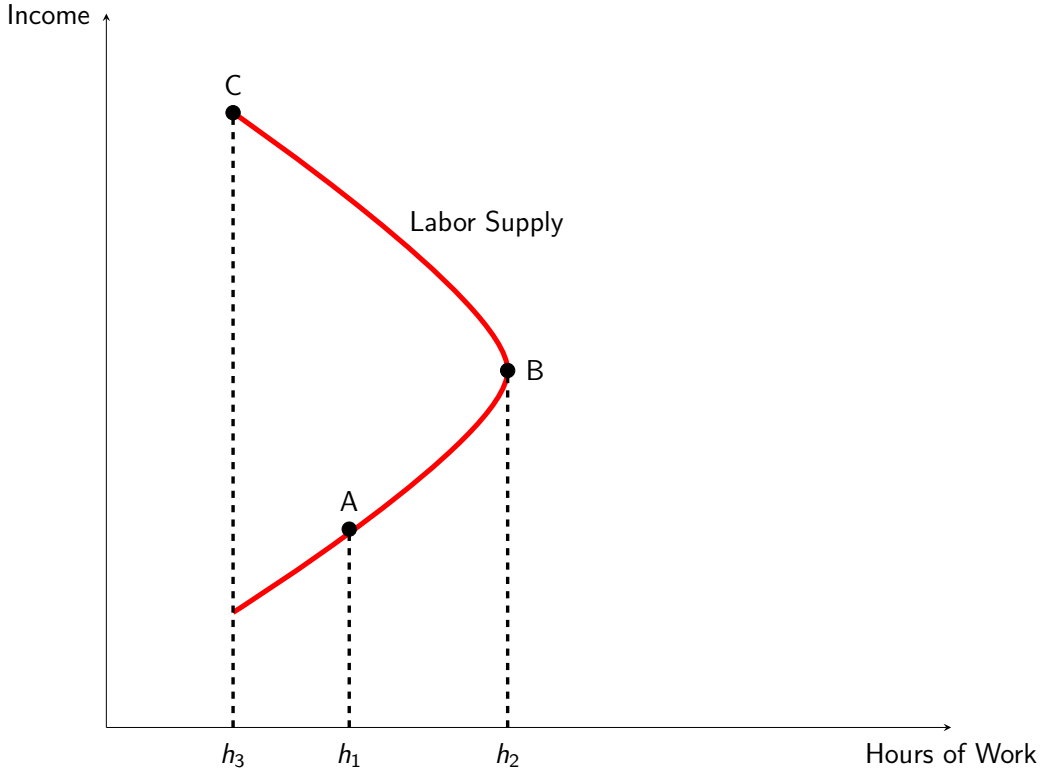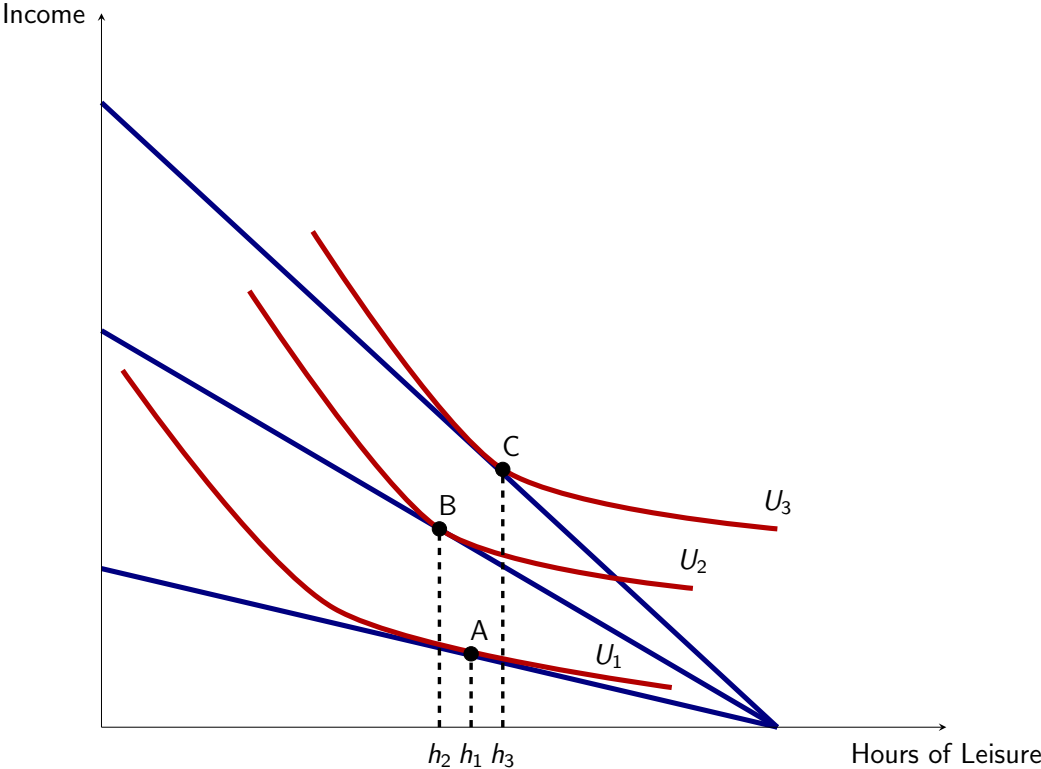
2.3   Aggregate Labor Supply

- The <u>aggregate labor supply</u> for the entire labor market or for a particular industry, region, or country can be found by summing all the individual labor supply curves which will combine all of the work that workers are willing to perform at each wage level

$$L^S(w) = f(w)$$

Figure 2.2: Aggregate Labor Supply
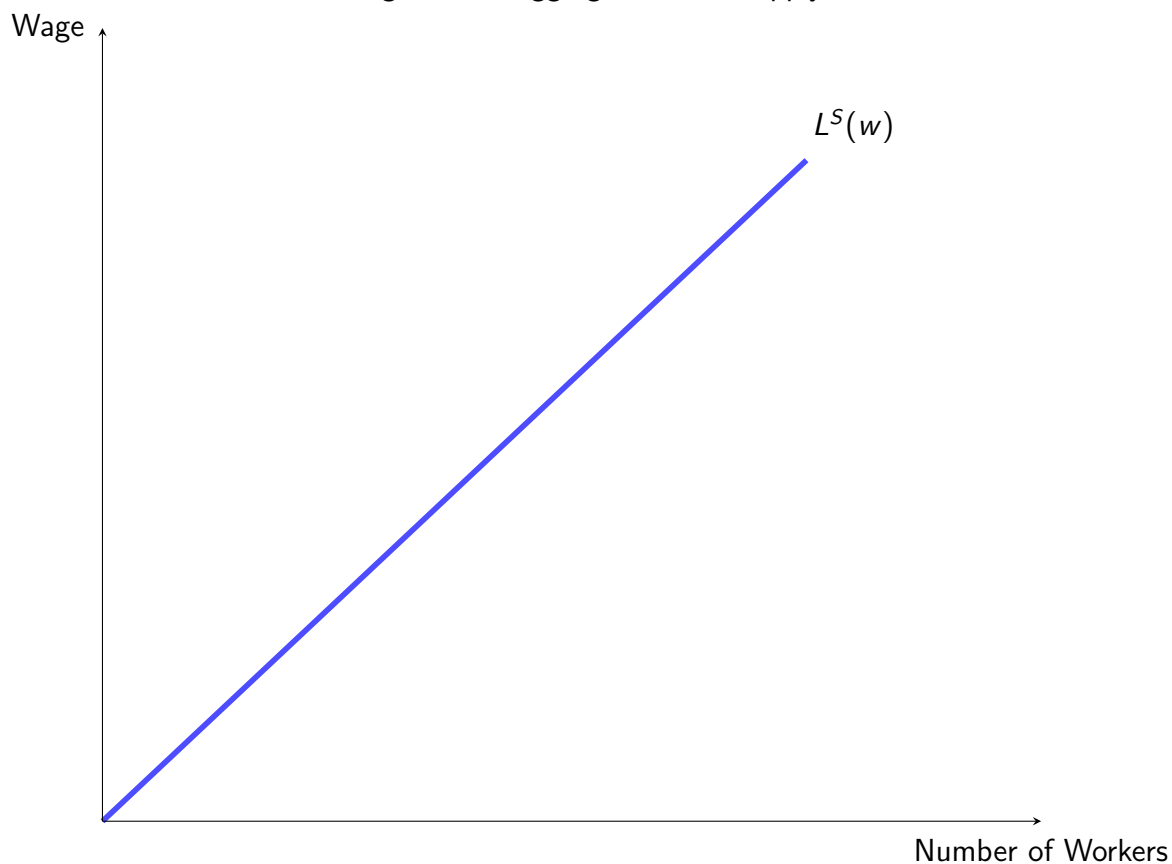
LABOR DEMAND

- Workers are hired for the contribution they can make for producing some good or service for sale

- In this section, we are going to derive the downward sloping labor demand function

- One assumption that is necessary to make is that firms, the employers of labor, seek to maximize profits

3.1   The Production Function

- The production function of a firm or industry shows the relationship between quantities of inputs and quantity of output

- Firms generally use two inputs to produce the goods and services they sell:

  - Labor (workers)
  - Capital (machines and equipment)

- Here is a graphical example of a simple production function that relates output to the number of workers a company has:
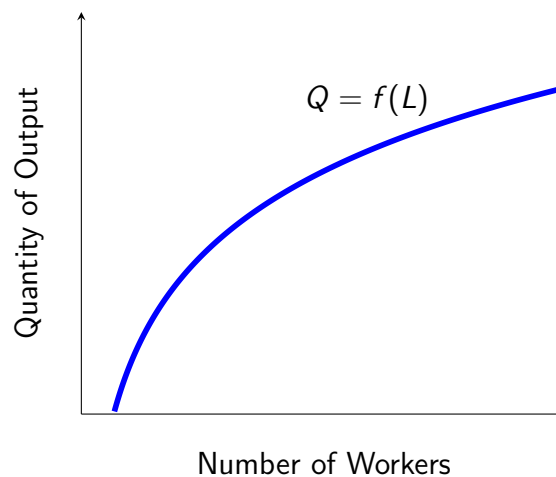
- You will notice the shape of the production function is concave, or that it does not increase until infinity

- Each additional input that is added has a smaller impact on output that the unit before it

- This is called <u>diminishing marginal returns</u>

- This means that a company cannot hire an infinite number of workers and produce an infinite amount of output

- Because of this, companies need to determine what is the appropriate number of workers to hire and capital to use

3.2 Marginal Product

- More generally, we can write the production function as follows: $Q = f(K, L)$

  Where,

  $Q =$ quantity of output

  $L =$ number of workers

  $K =$ quantity of capital A marginal product tells us what the additional, or incremental, output each additional worker adds to the total output (Q)

- We can calculate the marginal product for each input

3.2.1 Marginal Product of Labor

- The marginal product of labor (MP_L) is the additional output that is added if the company were to hire one additional worker

$$MP_L = \frac{\text{Change in Quantity}}{\text{Change in the Number of Workers}}$$

- We can formally express the MP_L as follows:

  ○ If $Q = f(K, L)$ then $MP_L = \frac{dQ}{dL}$

Example

Lay's produces potato chips using workers and heavy machinery. It's output per day is defined by the following production function:

$$Q = K^{1/2}L^{1/2}$$

Find the marginal product of labor.

$$MP_L = \frac{dQ}{dL} = \frac{1}{2}L^{-1/2}K^{1/2} = \frac{1}{2}\left(\frac{K}{L}\right)^{1/2}$$

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- We can use the MP_L to determine how many workers a company should hire if we know the current level of capital that is not changing and the number of workers a company is considering hiring

3.2.2   Marginal Revenue Product of Labor

- Each unit of output that is produced is sold at the market price

- We can build on the MP_L by not just looking at the amount of output each worker generates for a company, but the amount of revenue it generates as well

- We do this by calculating the Marginal Revenue Product of Labor (MRP_L):

$$MRP_L = MP_L \times Price$$

So using our example, if the price of a bag of Lay's Potato Chips is \$5, then:

$$MRP_L = \frac{1}{2}\left(\frac{K}{L}\right)^{1/2} \times 5 = 2.5 \left(\frac{K}{L}\right)^{1/2}$$

- If we have the number of units of capital and the number of workers, we can calculate the MRP_L for the last workers hired

3.2.3   Marginal Profit

- While all companies want to generate as much revenue as possible, what they are ultimately interested in is profit

- Profit = Revenue - Costs

- In this instance, the cost of hiring a worker is the wage they must be paid

- The marginal profit shows how much profit each worker adds to the company

$$Marginal\ Profit = MRP_L - Wage$$

- If $Marginal\ Profit > 0$, then the company can hire that worker

- If the $Marginal\ Profit < 0$, that means the last worker hired would cost more to pay than they would generate in revenue and the company should not hire them

- A company should hire the number of workers up until $Marginal\ Profit = 0$

- When $Marginal\ Profit = 0$, then $MRP_L = wage$

- We can use this relationship to determine the number of workers a company should hire

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From out example. Suppose Lay's uses 1,000 units of capital and pays its employees $12 per hour, how many workers should Lay's hire?

- $2.5 \left(\dfrac{1000}{L} \right)^{1/2} = 12$

- $\left(\dfrac{1000}{L} \right)^{1/2} = 4.8$

- $\dfrac{1000}{L} = 23.04$

- $L = \dfrac{1000}{23.04} = 43.4$

3.3   Deriving Labor Demand in the Short-Run

- From earlier, it is clear that firms only maximize profits when $MRP_L = w$

- We found that for a given wage and a specific level of capital, we could find how many workers a company should hire

- However, we can use this relationship more generally to plot the demand curve for a specific firm to show how many workers that firm should hire based on the wage rate

- Firms are typically slow to adjust the amount of capital they use, so in the short-run, we can assume that the level of capital is fixed

- From our previous example, we have that

$$MRP_L = 2.5 \left(\frac{K}{L} \right)^{1/2} = w$$

- If we assume that capital is fixed at 1,000 units in the short-run, then we can graph the MRP_L
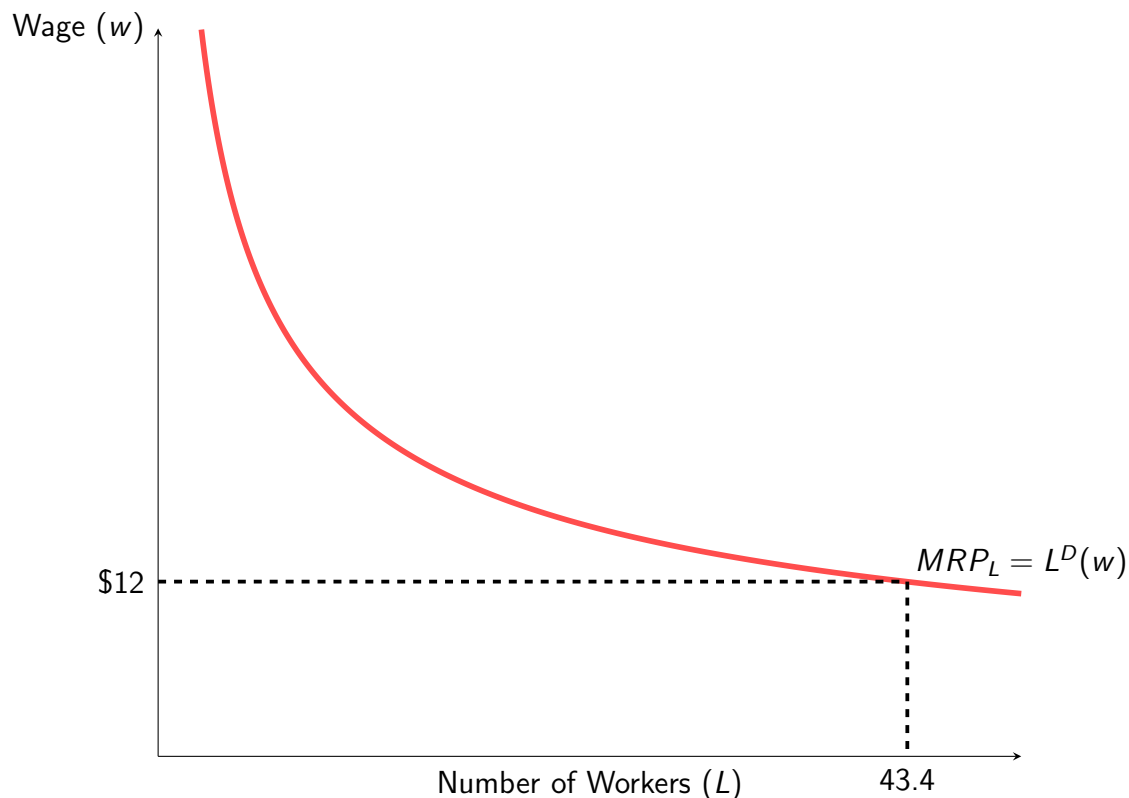
- The short-run labor demand curve for an individual firm is defined by the MRP_L, so $L^D = MRP_L$

- <u>Aggregate labor demand</u> can be found by summing the individual labor demand curves for each firm in an industry, region, or country

3.4   Marginal Product of Capital

- Just like with labor, a company needs to know how many units of capital it should use

- We can follow the same steps as we did with labor:

   - <u>Marginal Product of Capital</u>: $MP_K = \dfrac{dQ}{dL}$
   - <u>Marginal Revenue Produce of Capital</u>: $MRP_K = MR_K \times price$
   - <u>Marginal Profit of Capital</u>: $Marginal\ Profit = MRP_K - rental\ price$
      - We will assume that companies must pay rent to use capital
      - If we get into ownership, we have to deal with other costs such as maintenance and depreciation

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3.5   Labor Demand in the Long-Run

- Over time, wages increase, which increases the cost to a company

    ○ Companies usually pass this along by increasing prices of goods and services they sell
    ○ The law of demand states that as price increases, quantity demanded decreases
    ○ Therefore, a higher wage = higher price = fewer products purchased
    ○ When fewer products are purchased, firms reduce production and the number of employees
    ○ This is called the scale effect

- There is a degree of substitutability between labor and technology

    ○ Touch screen ordering vs cashier, robotics, etc.
    ○ As wages increase, labor is sometimes substituted for capital
    ○ This is called the substitution effect

- In the long run, firms need both labor and capital to operate

    ○ Some firms rely heavily on workers and are labor intensive
        – Landscaping
        – Restaurants
        – Agriculture
    ○ Some firms rely heavily on capital and are capital intensive
        – Oil production
        – Automobile Manufacturing
        – Transportation Services

- To maximize profits in the long run, firms adjust labor and capital so the that marginal product equals marginal profit for each

- Recall that $MP_L \times P = w$ for labor

- We can express this for capital as $MP_L \times P = r$

- Because both terms have P, the can be rearranged as follows:

$$P = \frac{w}{MP_L}$$

$$P = \frac{r}{MP_K}$$

- We can set them equal to each other to get the capital-labor ratio:

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$$\frac{r}{MP_K} = \frac{w}{MP_L}$$

- The capital-labor ratio can be solved so that $\dfrac{K}{L} = x$

- We can say that for every unit of labor, a firm uses x units of capital

- As the wage rate, w, and rental rate, r, change, firms will adjust x

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Example

Using the production function from our earlier example, $Q = K^{1/2}L^{1/2}$:

<u>Marginal Product</u>

$$MP_L = \frac{1}{2}L^{-1/2}K^{1/2} \qquad MP_K = \frac{1}{2}L^{1/2}K^{-1/2}$$

<u>Marginal Revenue Product</u>

$$MRP_L = \frac{1}{2}L^{-1/2}K^{1/2} \cdot P \qquad MRP_K = \frac{1}{2}L^{1/2}K^{-1/2} \cdot P$$

<u>Marginal Profit</u>

$$\frac{1}{2}L^{-1/2}K^{1/2} \cdot P = w \qquad \frac{1}{2}L^{1/2}K^{-1/2} \cdot P = w$$

<u>Capital-Labor Ratio</u>

$$\frac{w}{\frac{1}{2}L^{-1/2}K^{1/2}} = \frac{r}{\frac{1}{2}L^{1/2}K^{-1/2}}$$

$$\frac{w}{r} = \frac{\frac{1}{2}L^{-1/2}K^{1/2}}{\frac{1}{2}L^{1/2}K^{-1/2}}$$

$$\frac{K}{L} = \frac{w}{r}$$

3.6 Elasticity

- Before we can talk about the impact of public policy on labor markets, we need to understand how labor demand and labor supply change as the wage changes

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  ○ Understanding the slope of the labor supply and labor demand curves is instrumental to understanding how public policy changes may impact the labor market for a particular industry

- In Labor Economics, <u>elasticity</u> is a measure of how responsive labor supply and demand are to changes in wages

3.6.1   Own-Wage Elasticity of Demand

- The <u>own-wage elasticity of demand</u> for industry i is defined as the percentage change in labor demanded, L^D, from a 1% increase in the wage rage, w

$$\eta_D = \frac{dL_i^D}{dw_i} \times \frac{w_i}{L_i^D} \tag{3.1}$$

  ○ If $|\eta_D| > 1$, labor demand is <u>elastic</u>
    – This means that a 1% increase in the wage leads to a greater than 1% decrease in labor demanded
    – Labor demand declines faster than the wage rises
  ○ If $|\eta_D| < 1$, labor demand is <u>inelastic</u>
    – This means that a 1% increase in the wage leads to a less than 1% decrease in labor demanded
    – Labor demand declines slower than the wage rises
  ○ If $|\eta_D| = 1$, labor demand is <u>unit inelastic</u>
    – This means that a 1% increase in the wage leads to a 1% decrease in labor demanded
    – Labor demand declines at the same rate the wage rises

Example

Let's assume a firm has the following production function:

$$Q = \ln(K) + \ln(L)$$

From the production function, we can derive the labor demand curve. From the labor demand curve, we can calculate elasticity.

Find the Marginal Product of Labor:

$$MP_L = \frac{\partial Q}{\partial L} = \frac{1}{L}$$

Find the Marginal Revenue Product of Labor:

$$MRP_L = \frac{\partial Q}{\partial L} = \frac{1}{L} \cdot P = \frac{P}{L}$$

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Find the Marginal Profit:
$$\frac{P}{L} = w$$

Rearrange to get L by itself to get the Labor Demand Equation:

$$L^D = \frac{P}{w}$$

It may be helpful to think of this as: $L^D = Pw^{-1}$ when you take the derivative to calculate elasticity:

$$\frac{\partial L^D}{\partial w} = -\frac{P}{w^2}$$

$$\eta_D = -\frac{P}{w^2} \cdot \frac{w}{L^D}$$

Suppose $P = 5$, $w = 10$, and $L = 15$, you can plug those in to calculate η_D:

$$\eta_D = -\frac{5}{10^2} \cdot \frac{10}{15} = -0.03$$

Because $|\eta_D| > 1$, labor demand is inelastic at this point. However, when $P = 5$, elasticity will change as w and L change.

LABOR MARKETS AND PUBLIC POLICY

- We have learned that labor supply is upward sloping and labor demand is downward sloping

- How a firm determines the wage depends on the interaction of supply and demand as well as other factors the define the type of labor market

- In this section, we are going to talk about the market equilibrium in several types of labor markets and how public policy affects the decision to work, the decision to hire, and the equilibrium

4.1 Perfectly Competitive Markets

- A perfectly competitive labor market is a market where there are many firms and many workers

- Neither workers nor firms have the ability to set wages

- The market equilibrium sets the wage and determines the number of workers in that industry

- Individual firms take the wage from the market and hire a number of workers based on their own labor demand curve, which is derived from the MP_L

- We can solve for the labor market equilibrium mathematically by setting $L^D = L^S$ and solving for w^* and L^*

- Example

  - Suppose the labor market for the local fast food industry is defined by $L^D = 300 - w^2$ and $L^S = 2w^2$. What is the market wage, w^*, and how many workers are hired in this industry, L^*?
    - $300 - w^2 = 2w^2$
    - $14 = 3w^2$
    - $w^* = \sqrt{\dfrac{300}{3}} = 10$
    - Plug w^* into L^D or L^S to get L^*
    - $L^* = 2(10)^2 = 200$
    - $L^* = 300 - 10^2 = 200$

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Figure 4.1: Perfectly Competitive Labor Market
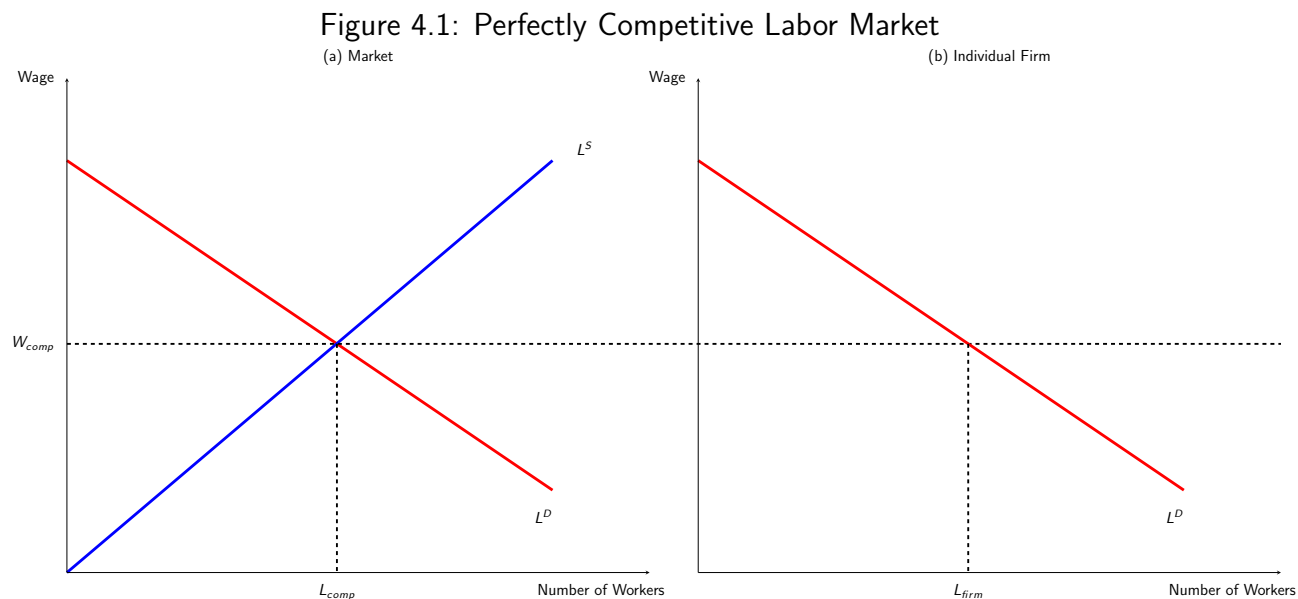
4.1.1 Changes in the Market Equilibrium

- Changes in labor demand, $L^D(w)$, and labor supply, $L^D(w)$, can influence the equilibrium market wage, w^*, and therefore the number of workers hired, L^*

- What causes changes in labor demand?

  ○ A change in the quantity demanded of the product that the labor produces

  ○ A change in the production process or technology that required the firm to use more or less labor

  ○ A change in government policy that affects the quantity of labor that firms wish to hire at a given wage

  ○ A change in workers' level of education and training

  ○ A change in the number of companies

  ○ A change in the availability and price of other inputs

- What causes changes in labor supply?

  ○ A change in attitudes toward work and leisure

  ○ A change in non-labor income

  ○ Cost of related goods and services

    – Child care
    – Recreational services

  ○ An increase in population increases the supply of labor; a reduction lowers it

  ○ A change in wages in related occupations

  ○ Change in entry requirements (e.g., licenses, education, and certifications)

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4.2   Monospony Labor Market

Figure 4.2: Monopsony Labor Market
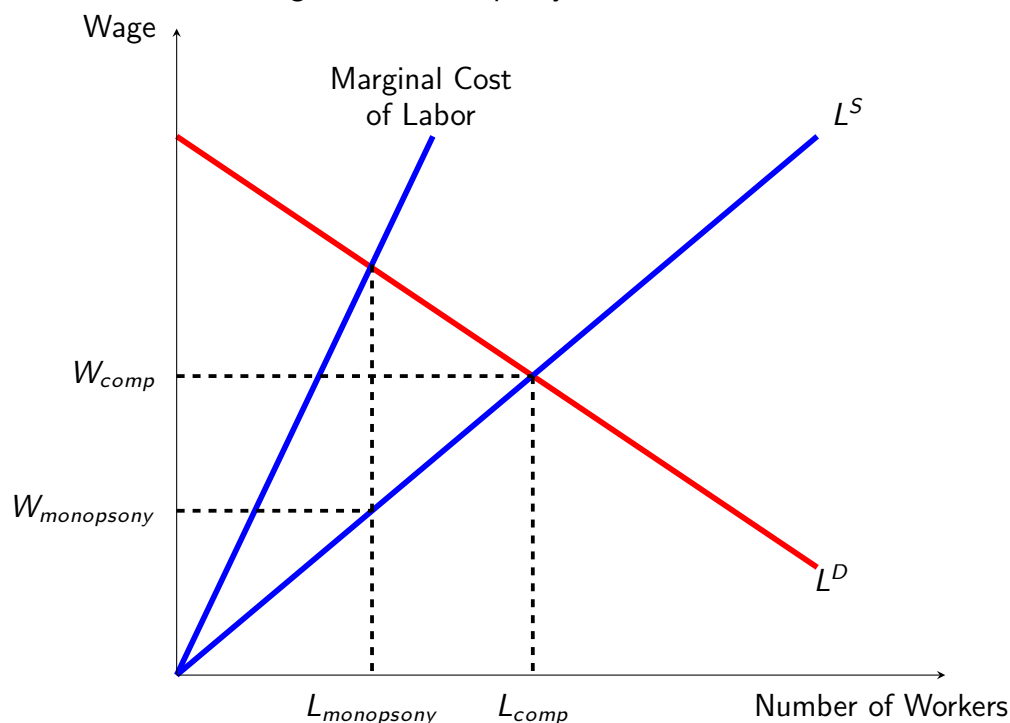
- A <u>monopsony</u> is a labor market where there is one or few firms that hire workers, giving them some degree of market power to set wages that would be different from the perfectly competitive wage

  - A coal mining town

  - A rural town with a college university

  - A town with a large factory or warehouse

- A monopsony can also exist if people do not view all jobs equally, even if the wage is the same

  - Some jobs are more difficult than others, require a commute, or a undesirable work culture

    - Construction, agriculture, landscaping, etc.

  - Firms that are more desirable may acquire monopsony power and have wage setting power

- A firm with monopsony power can set its own wage where the marginal cost of labor is equal to demand

- The wage is then determine based on labor supply, which is often below the perfectly competitive wage

- Let's look at a mathematical model of this

- Suppose you have the following information about a firm that sells its product for $2:

$$Q = 20L - \frac{1}{2}L^2 - K^2$$
$$C = rK + wL$$
$$L^S = \frac{1}{2}w$$

where,

   $Q = $ output

   $C = $ total cost

   $r = $ rental price of capital

   $w = $ wage rage

   $L = $ the number of workers

   $K = $ the quantity of capital

- The profit maximizing condition would be where $MP_L = MC_L$

- First, we need to substitute w from labor demand into the C

   ○ Rearrange L^s so that $w = 2L$
   ○ Plug into C: $C = rK + (2L)L = rK + 2L^2$

- Find MPR_L (and therefore L^D) and MC_L

   ○ $MP_L = \dfrac{dQ}{dL} = 20 - L$
   ○ $MRP_L = 2(20 - L) = 40 - 2L$
   ○ Therefore, $w = 40 - 2L$
   ○ Can rearrange to get $L^D = 20 - \dfrac{1}{2}w$
   ○ $MC_L = \dfrac{dC}{dL} = 4L$

- Set $MRP_L = MC_L$, solve for L

   ○ $4L = 40 - 2L$
   ○ $6L = 40$

- ○ $L = 6.67$

- To find the wage of the monopsonist, plug L into L^S

  - ○ $6.67 = \dfrac{1}{2}w$
  - ○ $w = 13.33$

- This means a firm in a monopsony labor market would hire 6.67 workers and pay them $13.33 per hour

- To find the wage if this were a perfectly competitive industry, set $L^S = L^D$, where $L^D = MP_L$, solve for L^* and w^*

  - ○ $40 - 2L = 2L$
  - ○ $40 = 4L$
  - ○ $L^* = 10$
  - ○ $w^* = 2(10) = 30$

- A perfectly competitive firm would hire 10 workers and pay them $30 an hour

4.3   Labor Market with Unions

- If workers collectively bargain to form a labor union, workers can negotiate their terms of employment

  - ○ Wages, working conditions, benefits, etc.

4.4   Social Insurance Programs

- The United States and many countries have social insurance programs

  - ○ Social Security
  - ○ Workers Compensation
  - ○ Disability Insurance
  - ○ Unemployment Insurance

- The basic concept behind these programs is to provide people with money if they are unable to work due to specific circumstances and to provide help to the lowest income earners

- This is sometimes referred to as the "social safety net"

- If we start with a utility maximization model where a workers optimal allocation is to work eight hours a day and receive wage, w^* and the equilibrium is at Point A

- If the worker were to lose their job, hours work drops to zero ($l = 16$), and the equilibrium would be at Point B as the utility level falls from U_1 to U_0

- Social insurance programs create a spike where $l = 16$ to provide income in the event of involuntary job loss

- If we assume that social insurance pays the same wage the worker was making before losing their job, w^*, then the new optimal allocation would be at Point C and the utility level would increase from to U_3

Figure 4.3: Utility Maximization with Social Insurance
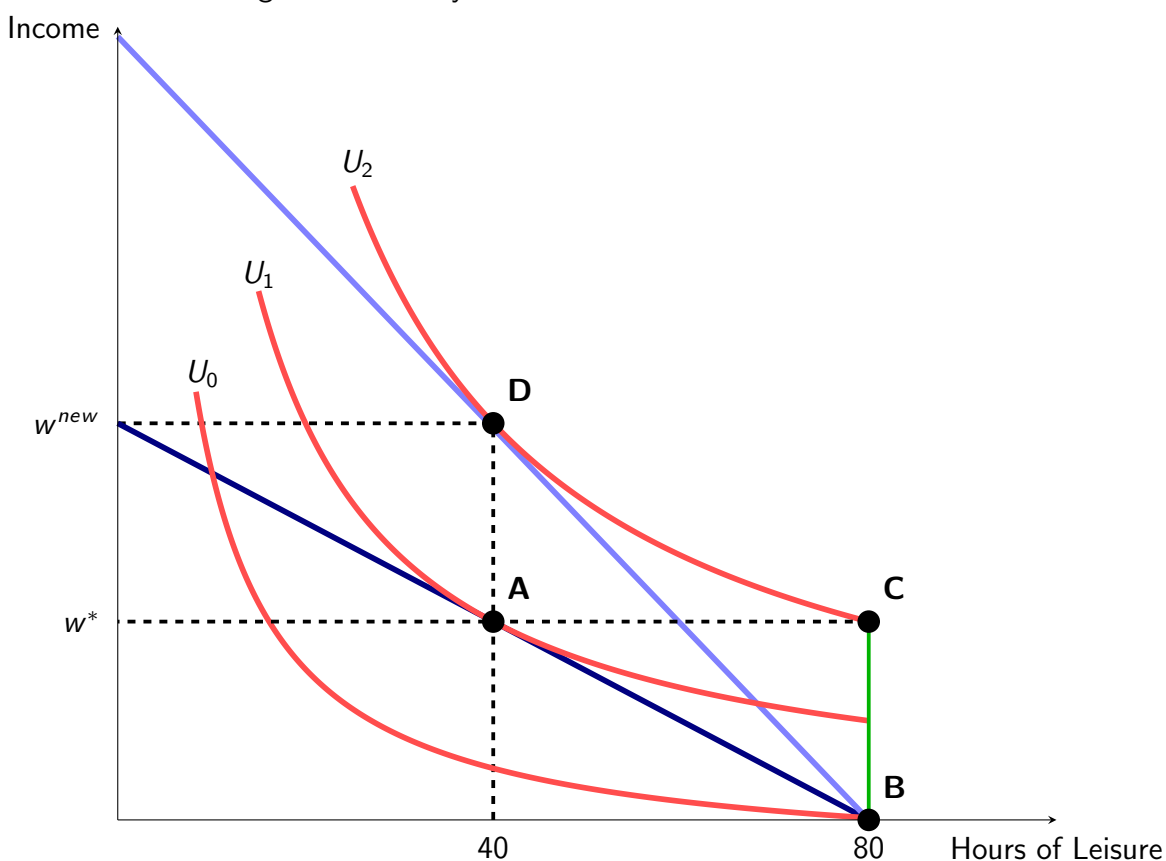
- Because $U_c > U_1 > U_0$, Point C is preferred to Point A, so even if the worker were to be offered a job at the original wage, w^*, the worker would not accept that job because their utility level would fall

- In order to make the worker indifferent between not working and collecting money through a social insurance program, the budget constraint would need to shift such that it is tangent to U_3 at Point D

- This means a wage rate of at least w^{new}, would need to be offered for the worker to return to work

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- **Solution**: Make the social insurance payment lower so that there is not a utility jump while on it and/or put limitations on collection (e.g., limited length of time, doctors authorization, income threshold, etc.)

4.5   The Earned Income Tax Credit (EITC)

Figure 4.4: Average Federal Individual Tax Rates, 2018

Source: https://www.cato.org/blog/average-tax-rates-income-group
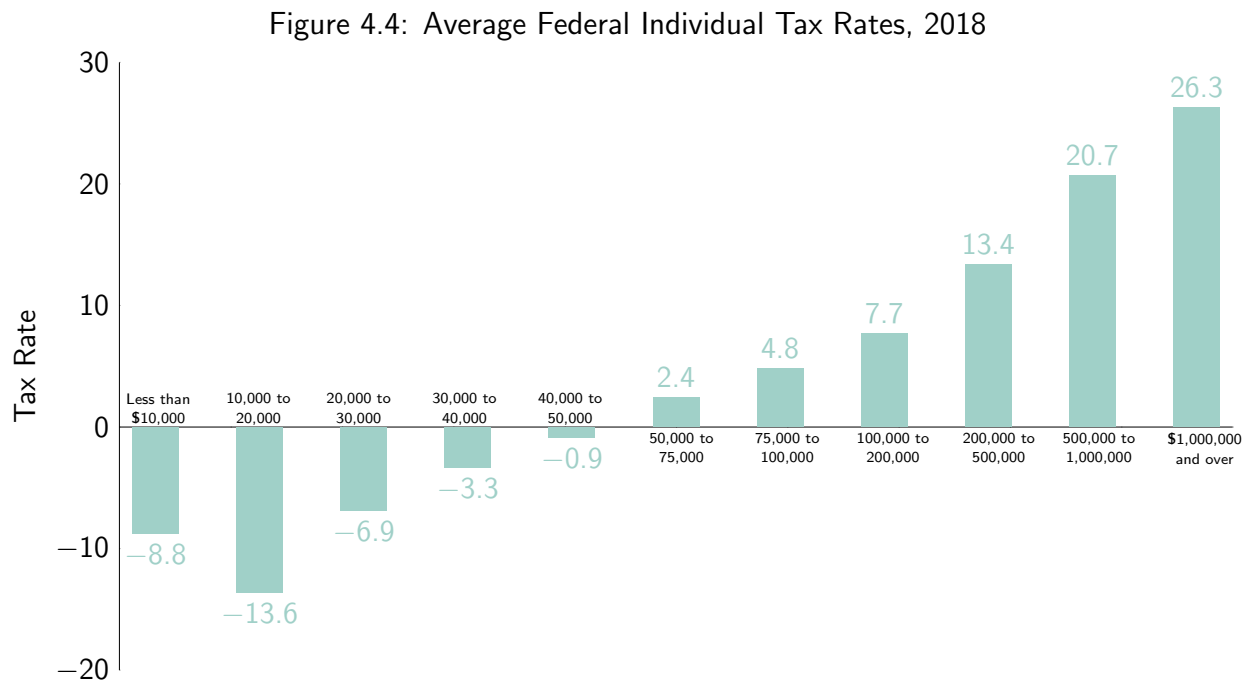
- The EITC is the largest cash-benefit entitlement program in the United States

    ○ $70 billion a year to low-income earners

- The EITC provides tax credits to households where at least one person is working

    ○ Tax credits reduce the households income tax

    ○ If tax credit exceeded total tax liability, the household gets a refund

- The EITC is also referred to as a Negative Income Tax

- The tax credit varies with earnings below $45,000

    ○ The EITC grants workers a 40% credit if they make less than $14,040 per year, up to $5,616

    ○ Households making $14,040-$18,340 per year receive $5,616

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○ The EITC phases out to for households making between $18,341-$45,007 per year

○ The EITC provides incentives for people to work making below $14,040 per year

- A study from the 1996 EITC reform showed labor force participation increased by 2.4%

Figure 4.5: Household Budget Constraint with EITC
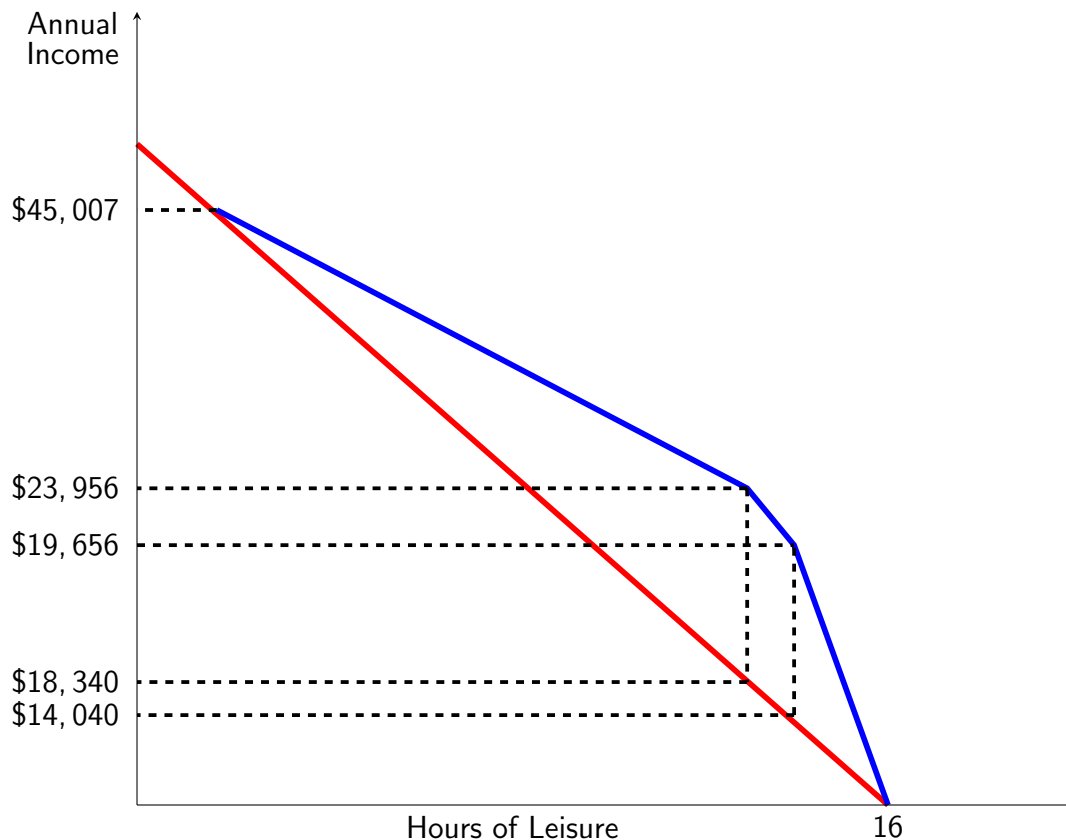
- The EITC is highly effective at distributing income to the lowest wage earners

- There is some evidence that for every $1 increase in the EITC, more goes to low-wage households than a $1 increase in the minimum wage (Burkhauser, Couch, and Glenn, 1996)

    ○ Some minimum wage earners are not the primary income earner in the household
        – Teenage child working
        – Spouse working as a supplemental income
    ○ Increases in the EITC may provide a greater benefit to lower-wage households
    ○ Implementation is practically difficult
        – Currently, households get one tax credit a year
        – Households would be better off with monthly payments
        – Tracking work from month to month can be difficult, especially for part-time workers, gig workers, etc.

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4.6   Minimum Wage

4.6.1   Perfectly Competitive Labor Market

- In perfect competition, there are many firms hiring and many people seeking work

- Firms do not have the ability to set wages, they must offer the market wage rate

    ○ If they try to offer a wage below the market rate, people will not work there and seek employment at one of the many other firms offering the market rate

Figure 4.6: Minimum Wage in Perfectly Competitive Labor Market
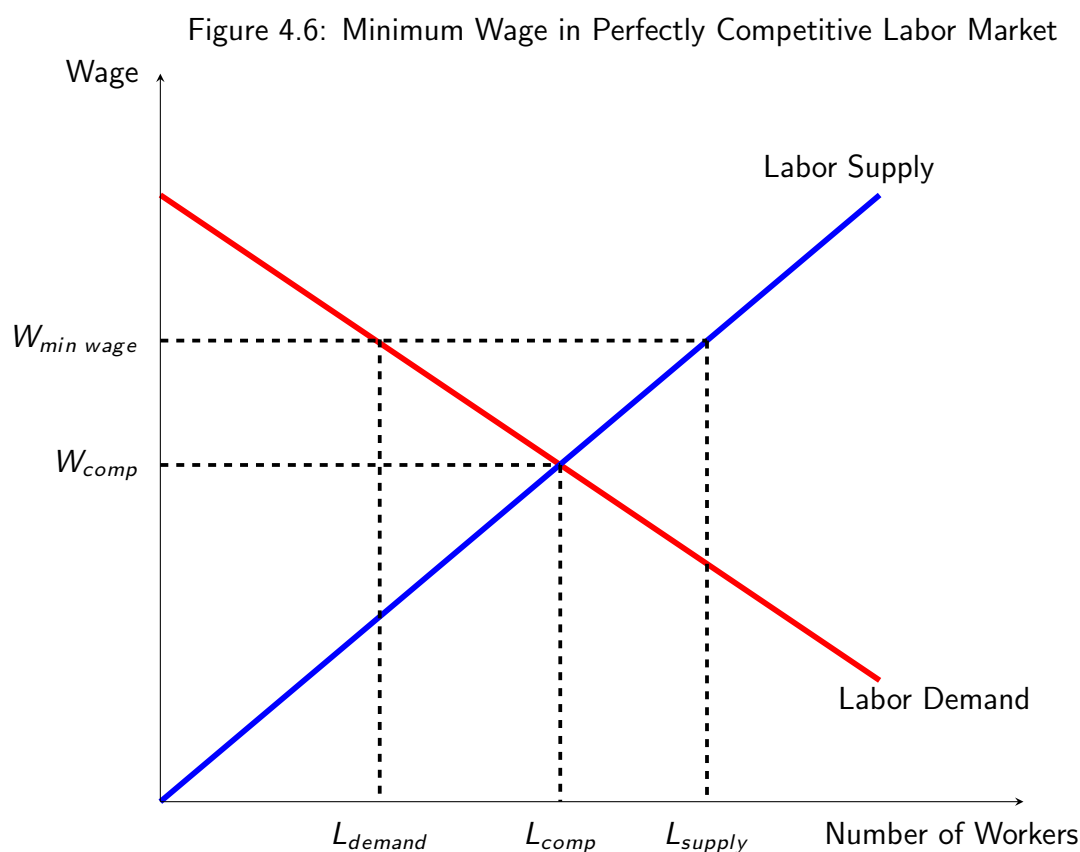
- When a binding minimum wage is implemented, firms will want to hire fewer workers and more people will be seeking work

- Labor supply becomes greater than labor demand, creating unemployment

- Can think of $L_{comp} - L_{demand}$ and the change in the number of jobs and $L_{supply} - L_{comp}$ as the number of new workers who enter this labor market, possibly because they had left the labor market, due to the higher wage

    ○ Total unemployment as a result of an increase in the minimum wage is $L_{supply} - L_{demand}$

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○ The size of the change in jobs and unemployment will depend on particular labor market and the elasticity of that markets labor demand and labor supply curves

4.6.2 Monopsony Labor Market

Figure 4.7: Minimum Wage in a Monopsony Labor Market
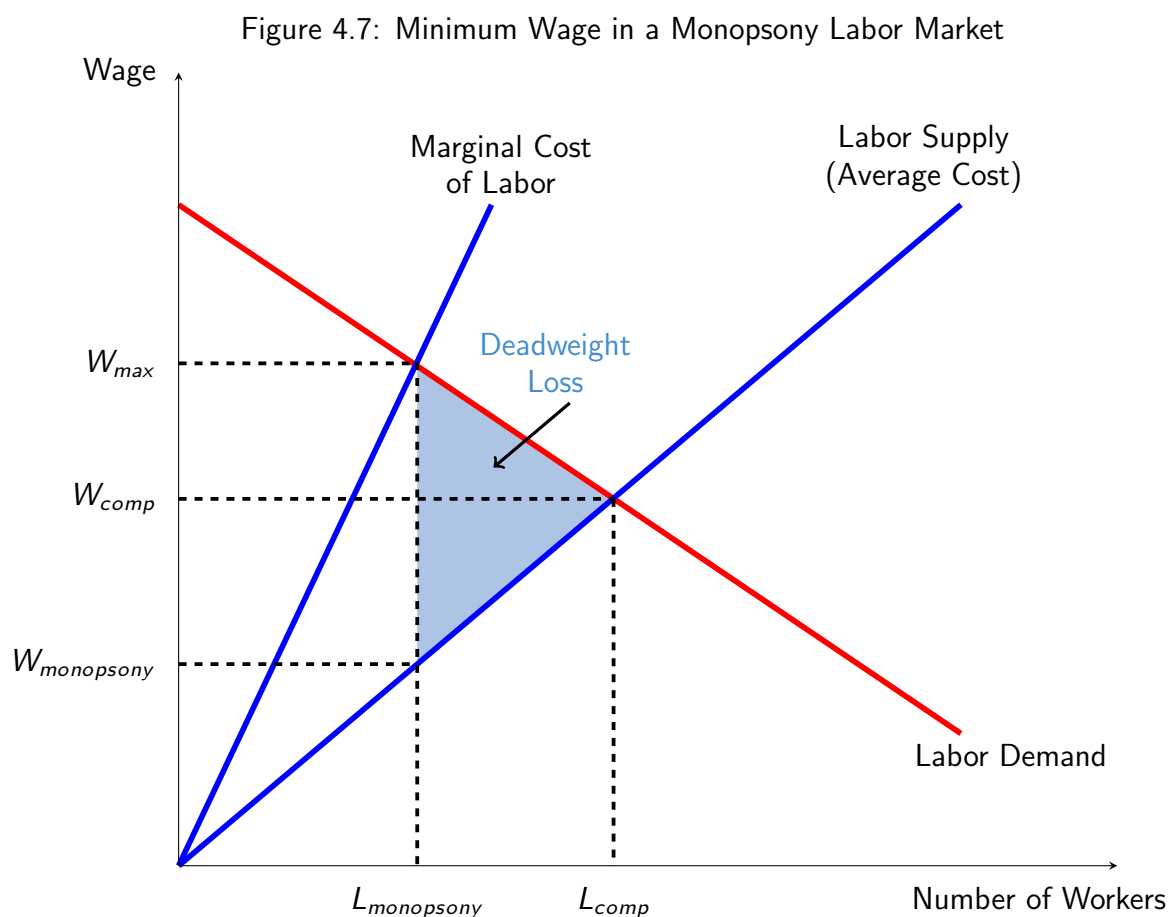
- Monopsony power in the labor market can often be found in more rural areas

  ○ A monopsony labor market exists if a firm has market power in hiring workers

  ○ This occurs when there is one of few companies hiring and many people seeking work

  ○ A firm will have power to set the number of workers it hires and the wage

- A monopsony can also exist if people do not view all jobs equally, even if the wage is the same

  ○ Some jobs are more difficult than others, require a commute, or a undesirable work culture

    – Construction, agriculture, landscaping, etc.

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  ○ Firms that are more desirable may acquire monopsony power and have wage setting
  power

• Increasing the minimum wage in a monopsony can increase wages *and* increase
  employment

  ○ A monopsony may have a smaller workforce because of a lack of supply of workers

  ○ Because it is paying a lower wage, it may not be able to fill every position it has

  ○ Increasing the minimum wage may attract workers that were previously unemployed
  or had left the labor market to fill vacancies

• If the minimum wage increase is large, above W_{max}, then the number of workers in a
  monopsony labor market will decline

4.6.3   Minimum Wage Historical Trends

Figure 4.8: Trends in the Minimum Wage, 1938-2020
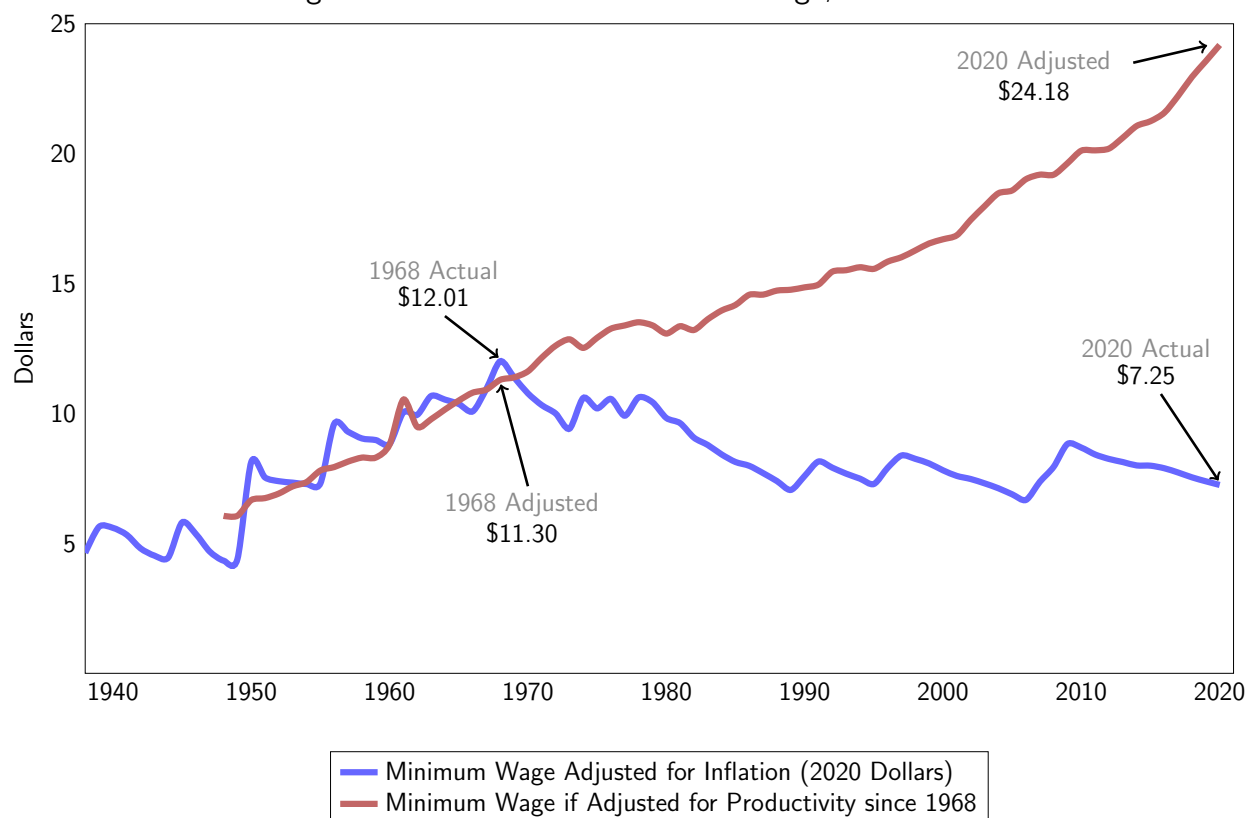
Source: Baker (2020), This is What Minimum Wage Would Be If It Kept Pace with Productivity

• In 1968, the minimum wage was $12.01 in 2020 dollars when adjusted for inflation

  ○ $24,981 per year

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- In 2020, the minimum wage is $7.25

  ○ $15,080 per year

4.6.4   Minimum Wage Increases and Changes in Employment

- As economists, we need to weight the trade-offs of an increase in the minimum wage

- Possible that employers will higher fewer or reduce the hours of low-wage workers

  ○ Lower-wage/lower-skilled workers are easily substituted by technology and high-wage workers

  ○ Some industries are easier to substitute workers with technology than others

  ○ If the demands for goods and services produced by minimum-wage workers is elastic, then employers cannot increase prices to offset costs of higher wages

- The impact on employment depends on the composition of the labor market

  ○ What percent of entire workforce is in monopsonistic competition vs perfect competition

  ○ What types of industries are impacted by an increase in the minimum wage (labor demand elasticity)

- The measure used to determine the impact of a minimum wage increase on employment is elasticity

- There are two measures of elasticity that are sometimes used

  ○ Minimum Wage Employment Elasticity (MWE)

  $$MWE = \frac{\%\Delta Employment}{\%\Delta Minimum\ Wage} \tag{4.1}$$

  ○ Own-Wage Employment Elasticity (OWE)
    - If the minimum wage binds for a particular industry, the MWE will be larger
      * The MWE is often analyzed for specific groups that may be impacted (fast food workers, teens, etc.)
    - The OWE normalizes the MWE to allow comparisons between different groups

  $$OWE = \frac{\left(\dfrac{\%\Delta Employment}{\%\Delta Minimum\ Wage}\right)}{\left(\dfrac{\%\Delta Average\ Wage}{\%\Delta Minimum\ Wage}\right)} \tag{4.2}$$

    - Cannot compare effects across studies if they do not report OWE or the Average Wage Elasticity (how the average wage of a group changes with respect to an increase in the minimum wage)

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– If $OWE = -1$, this implies that the increase in total earnings is cancelled out by job losses and the affected group sees no benefit from a minimum wage increase

– If OWE is small, say -0.1, this implies a small impact on employment

4.6.5   Minimum Wage Literature

- Typically, the change in employment from minimum wage increases is studied using a Difference-in-Difference Analysis (DID)

  ○ DID analyses compare groups that were impacted by a minimum wage increase to groups that were not impacted by a minimum wage increase before and after the policy change

- Minimum Wage Employment Elasticity (MWE)

  ○ The median $MWE = -0.05$ from 439 estimated elasticities for various low-age groups with respect to the minimum wage

    – The change in employment is much smaller than the change in the wage

  ○ Most of the groups studied are restaurant workers and teenage workers where around 40% of the workers earn the minimum wage

  ○ Estimates vary widely across studies because of the different groups studied

    – May not be representative of the minimum wage workforce as a whole

Figure 4.9: Distribution of MWE in Minimum Wage Literature
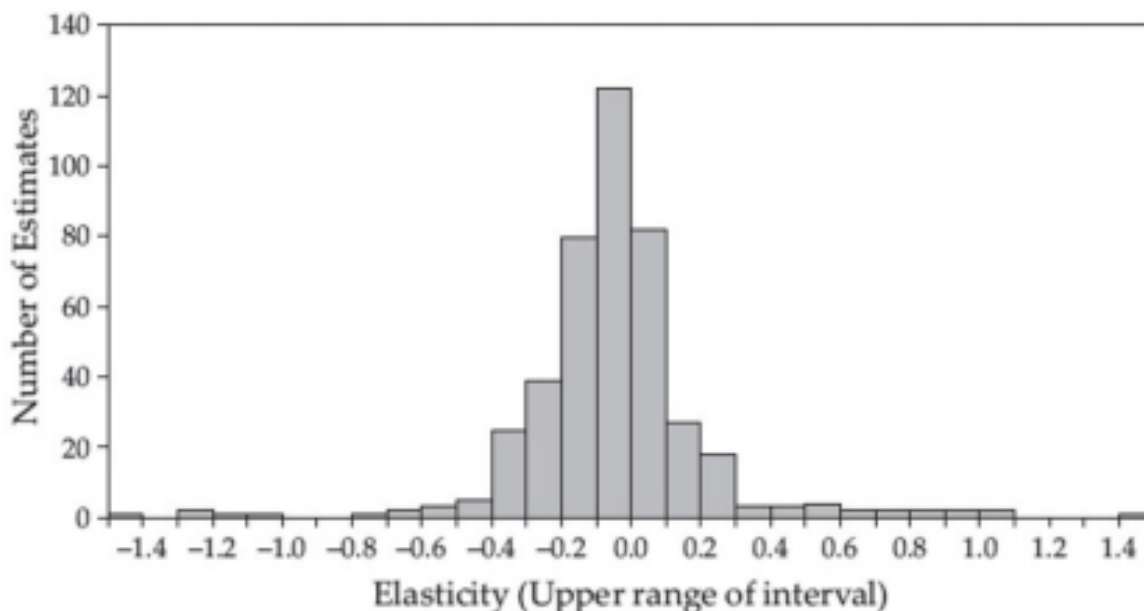
Source: Dube (2019), Preface to 2015 edition of Card and Krueger's Myth and Measurement, using data from Belman and Wolfson (2015)

- Own-Wage Employment Elasticity (OWE)

  ○ Pooling OWE estimates from 36 studies of the United States, the median $OWE = -0.17$

  ○ When just pooling studies that look at the overall impact on low-wage workers, the median $OEW = -0.04$

    – The change in employment is much smaller than the change in the wage

  ○ However, 26 of the 26 estimates elasticities come from narrow groups (which may be larger). The median OWE for this group is -0.19

Figure 4.10: OWE in Minimum Wage Literature
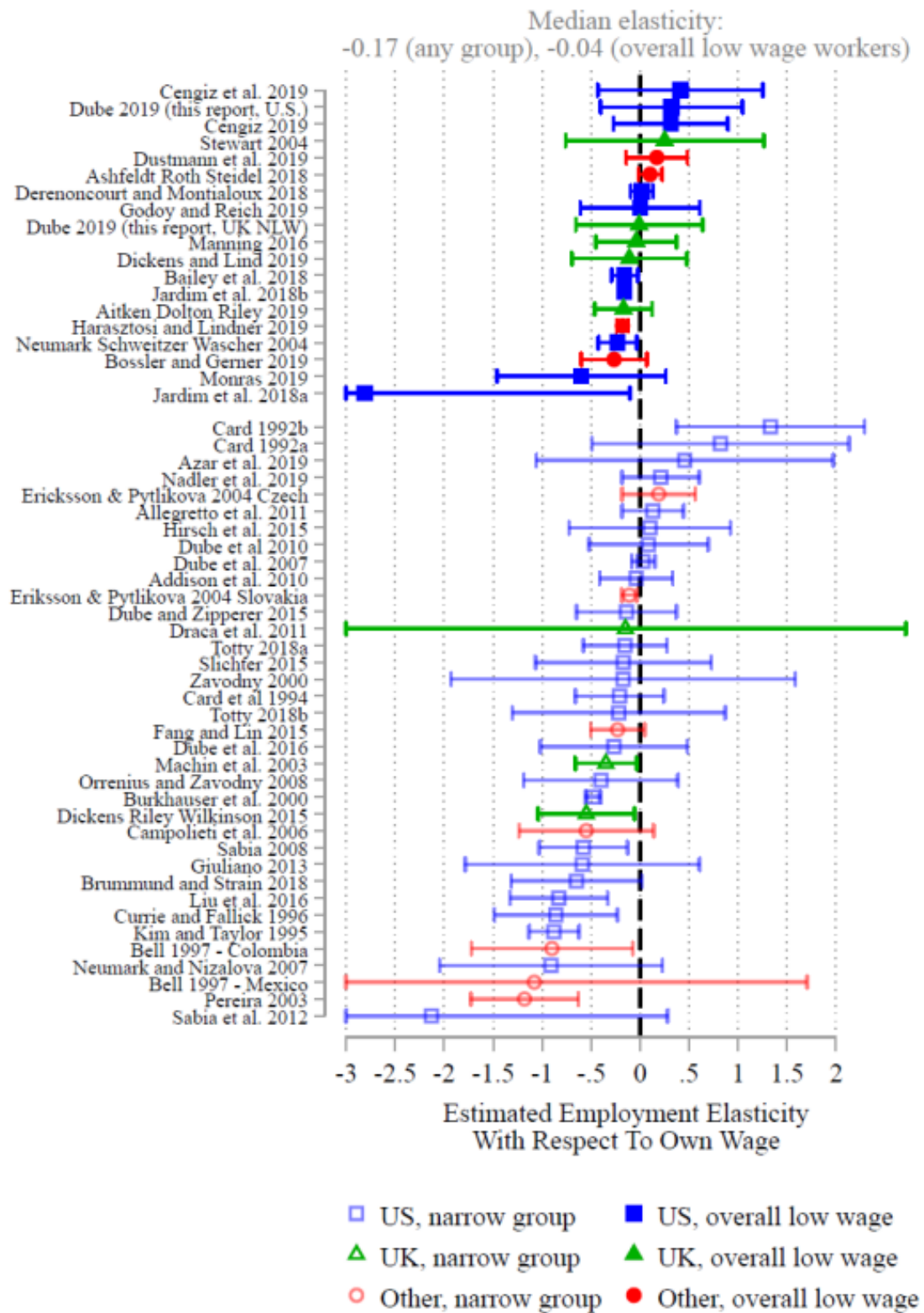
Figure 4.11: Effect of the Minimum Wage on Jobs throughout the Wage Distribution

EFFECT OF THE MINIMUM WAGE ON JOBS ACROSS THE WAGE DISTRIBUTION

CHANGE IN JOBS FIVE YEARS AFTER A CHANGE IN THE MINIMUM WAGE
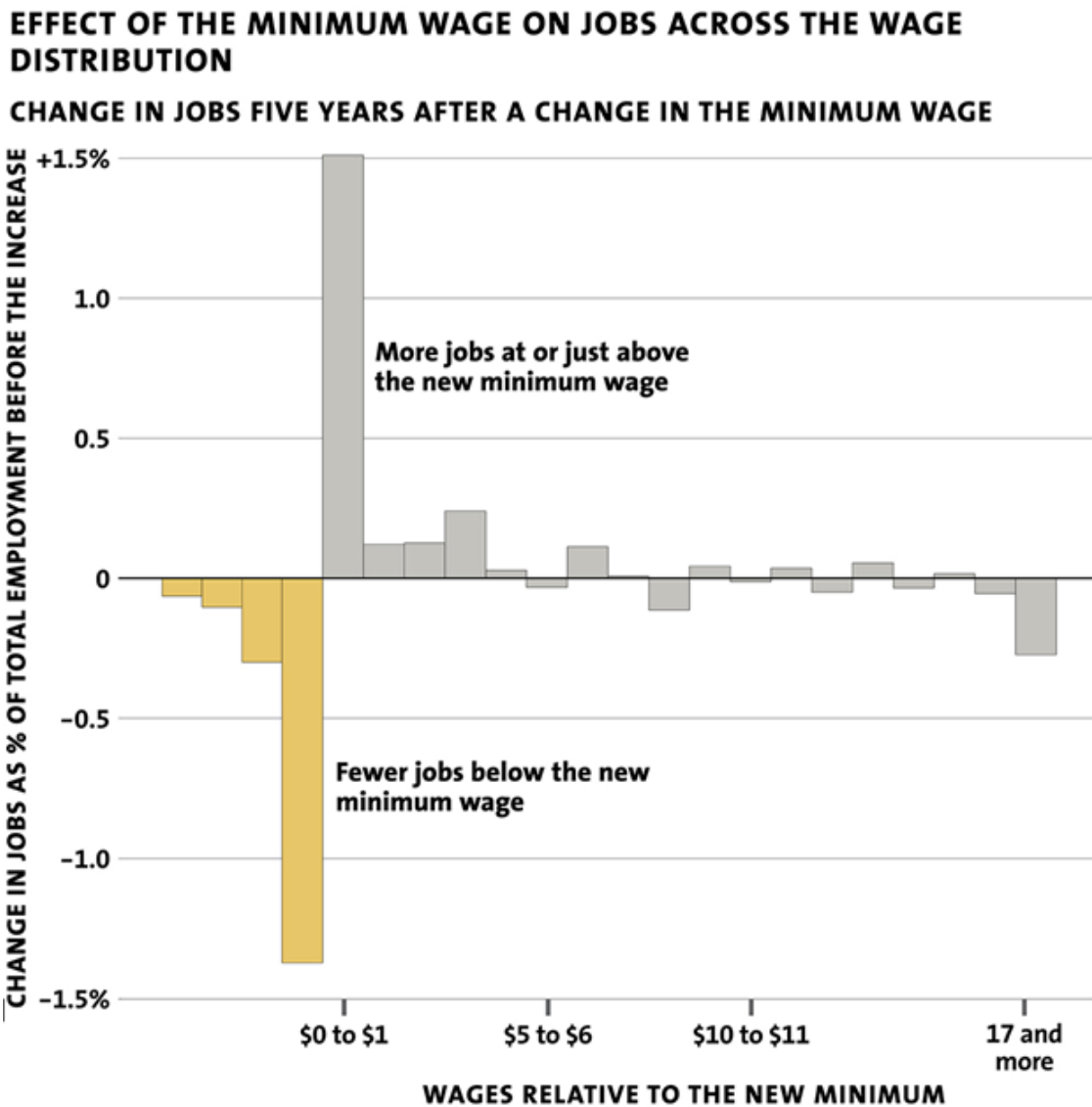
SOURCE: "The effect of minimum wages on the total number of jobs: Evidence from the United States using a bunching estimator," by Cengiz, Dube, Lindner and Zipperer (April 2017)

- Change in Employment Around the Minimum Wage Threshold

    ○ Large decrease in the number of jobs below the new minimum wage

    ○ Large increase in the number of jobs just above the new minimum wage

    ○ Overall, low wage workers saw a wage gain of 7% over 5 years with small changes in the number of jobs (Cengiz et al., 2019)

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4.6.6 Conclusions

- The change in the number of jobs due to an increase in the minimum wage depends on the type of industries affected and how many workers are in monopsonistic labor markets

- There likely will be some jobs lost or hours reduced due to increases in the minimum wage, but will be small relative to the increase in wages

- A large one-time increase in the minimum wage could have large negative impacts on employment

HOUSEHOLD PRODUCTION & JOINT LABOR SUPPLY

5.1   Household Production

- In a previous section, we talked about a simple choice between labor and leisure

- In reality, the choices that we make are more complex that that

- People can working for pay so they can buy <u>market goods and services</u>

  - Market goods and services are things people purchase: going out to eat, child care, maid service, etc.

- People also can combine their own time with some market purchased good to cook, clean, and provide child care, which we call <u>household production</u>

- So, people are choosing between working to buy market goods and services, household production, and leisure

- We can see how American's spend time each day by looking at the **American Time Use Survey Handout**

- We make these choices as individuals, but if there is a two person household, this decision becomes a joint decision

5.2   Joint Labor Supply Decision

- Being married or living with a partner effects each individual's decision between work for pay, household production, and leisure

- Each partner has their own set of preferences for how to spend their time and they <u>bargain</u> over the allocation of each others time

- When bargaining, typically the partner who would have more resources if the relationship were to end has more of an influence on the joint decision

- Partners often find it beneficial to <u>specialize</u> the work that must be done

- Often each partner will have specific tasks they are responsible for and others will be shared (and some services may be purchased so neither partner is responsible):

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- ○ Meal planning and cooking

- ○ Cleaning and laundry

- ○ Home maintenance and yard work

- ○ Child care

- How partners allocate their time towards these often depends on which partner is more productive engaging in household production and which partner is more productive working for pay

- The goal of the household is to maximize its resources and joint utility

  - ○ The opportunity cost of staying at home is the wage that could be earned

  - ○ One person may have a higher skill at child care and one person may be better at maintenance

- As long as one extra hour of market work by both partners creates the ability to buy more goods and services than are required to compensate for the lost hour of household time, they will both work

- If it is not, then they will consider household production

  - ○ The "steeper" the budget constraint, the more likely an individual is to work

---

Example

- Bob and Alice are married

- They need to decide how to allocate their time between working for pay to buy market goods and services and working from home on household production

- Suppose they each have 10 hours to day to allocate to those two things and any remaining time gets allocated to sleep and leisure

- Bob can make $20 per hour working for pay and the value of his household production is $10 per hour

- Alice can make $15 per hour working for pay and the value of her household production is $25 per hour

- Bob and Alice each have their own unique budget constraints

---

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(a) Bob

Market
Goods

200

100

Household Production

(b) Alice

Market
Goods

150

250

Household Production
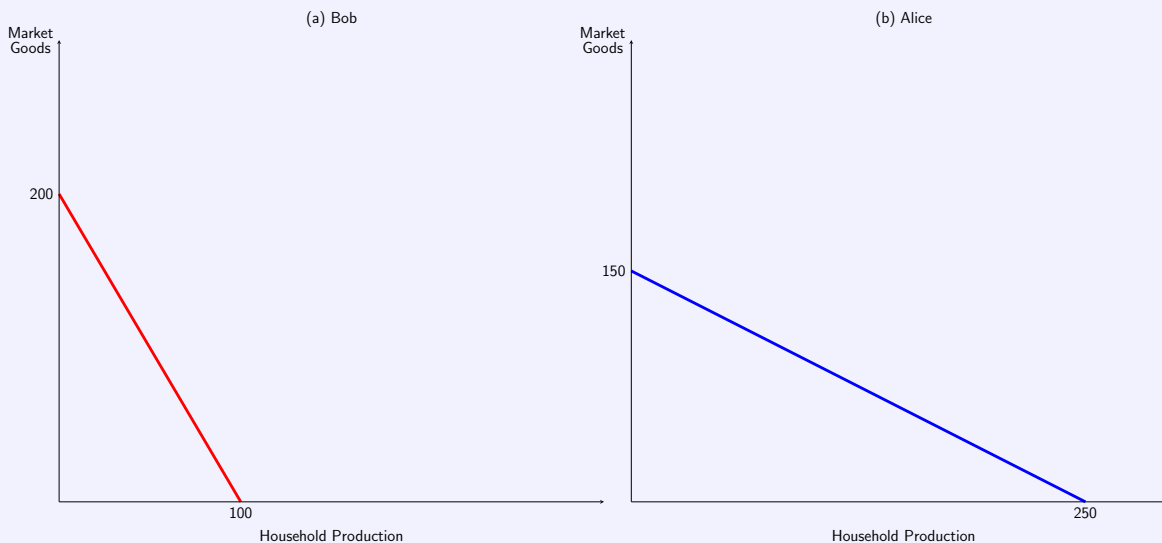
- Because Bob and Alice are married, we can combine their individual budget constraints into a joint household budget constraint

Market
Goods

350
326   A

Alice's Region

200   B

150

Bob's Region

44   C

40   100   250   328 350

Household Production
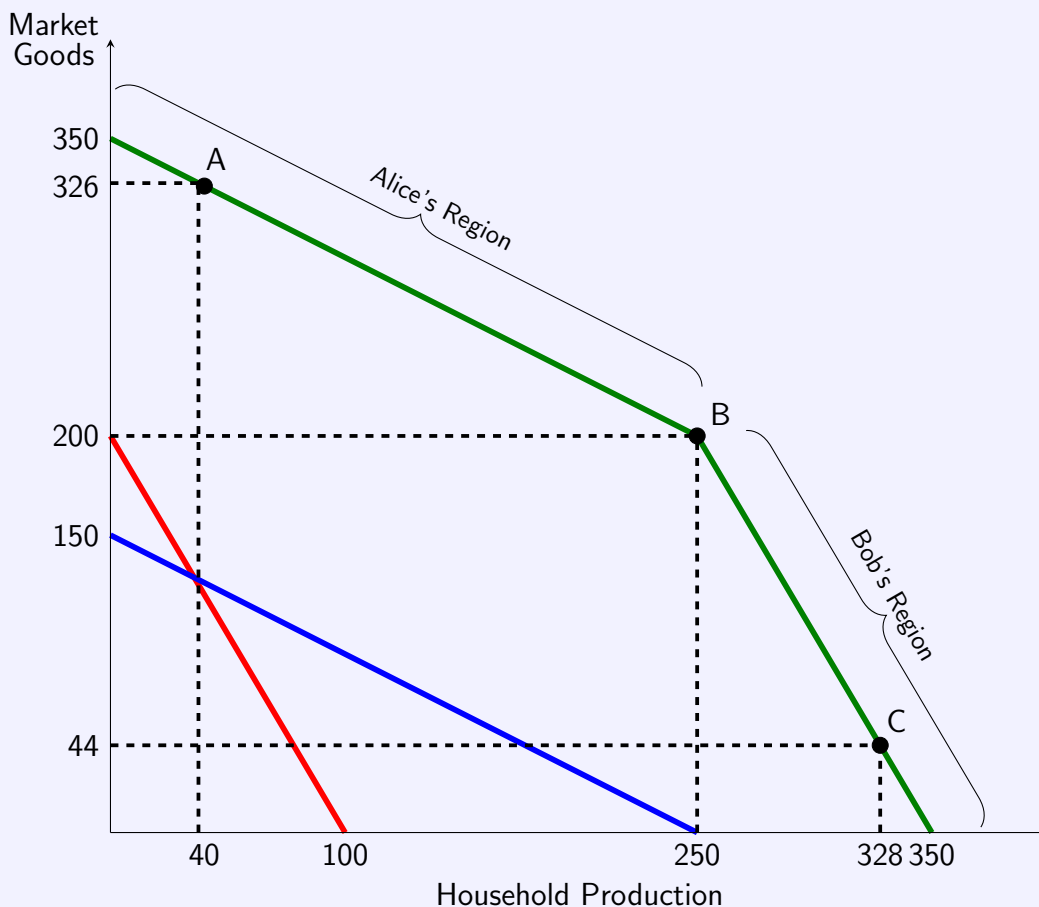
- If both Bob and Alice both work 10 hours a day, then the household will have $350

to spend on market produced goods and services and will contribute $0 worth of household production

- If Bob and Alice both work 0 hours a day, they will have $0 to spend on market produced goods and services and will contribute $350 worth of household production

- There are two region's on the joint household budget constraint:

  ○ Alice's region is her budget constraint shifted upward as part of the household budget

  ○ In order to be at any point in Alice's region, Bob must spend all 10 of his hours working and Alice must spend at least some of her 10 hours working for pay

    – This can be demonstrated at point A on the graph

    – At point A, the household has $326 to spend on market produced goods and contributes $40 worth of household production

    – In order to get $326 to spend on market produced goods, Bob would need to work 10 hours making $200 and Alice would need to work 8.4 hours to make $126. She would then have 1.4 hours left to contribute $40 worth of household production

  ○ Bob's Region is his budget constraint shifted out as a part of the household budget constraint

  ○ In order to be at any point in Bob's region, Alice must spend all of her 10 hours on household production and Bob must spend at least some of his 10 hours on household production

    – This can be demonstrated at point C on the graph

    – In order to generate $328 worth of household production, Alice must spend all 10 hours on household production at a value of $250 and Bob would need to spend 7.8 hours a day on household production valued at $78. He would then have 2.2 hours left to work for pay and generate $44 to spend on market produced goods and services.

  ○ Point B on the graph is the point where Bob would work for pay for all 10 hours generating $200 for market produced goods and services and Alice would will spend all 10 hours on household production for a value of $250

## 5.3 Influence of Social Norms on the Joint Household Decision

- Brown (1985) describes the above analysis as the neoclassical model

- In the neoclassical model, the household would seek to maximize their resources and household utility

- The point on the budget constraint that maximizes resources will depend on how much each member of the household can generate working for pay and the value of their household production

    - The decision to work for pay versus household production might come by comparing the costs of pay for a market service compared to the wage rate
    - For example, if the hourly cost of child care > the hourly wage rate, then it would be better for the household to have the member who is more productive at household production stay at home and watch the child

- Brown (1985) describes the institutional model which suggests that the above decision is not always based on who may be more efficient, but based on social norms

- Typically in the United States, women have been more likely to be a stay-at-home mom or make career sacrifices in order to work near their children's school

- Because historically, men make more than women (which we will discuss in a future section), this may be the optimal case for some households

- However, in some instances, it would be more optimal for the man to be a stay-at-home dad or to make career sacrifices because he is the more efficient household member at household production

- In instances where that is the case and the woman ends up staying at home or making career sacrifices, then the household is not maximizing their resources or household utility

EDUCATION AND HUMAN CAPITAL

- <u>Human capital</u> is the personal attributes of education, experience, and skills that individuals accumulate over their lifetime. Time and money spent on education and training are investments in human capital.

- There are three stages of human capital investment:

  1. **Early Childhood** – Parents and early schooling provide guidance and exposure to language, math, health, and culture.

  2. **Teenagers and Young Adults** – High school, college, and vocational programs.

  3. **Adults** – On-the-job training, night school, and informal job-specific training.

- In this section, we will use economic theory to understand how people decide to get an education and how many years of education they should choose. But first, lets look at some data regarding education.

Figure 6.1: Median Weekly Earnings by Education

Source: Bureau of Labor Statistics via FRED, Tim Murray.

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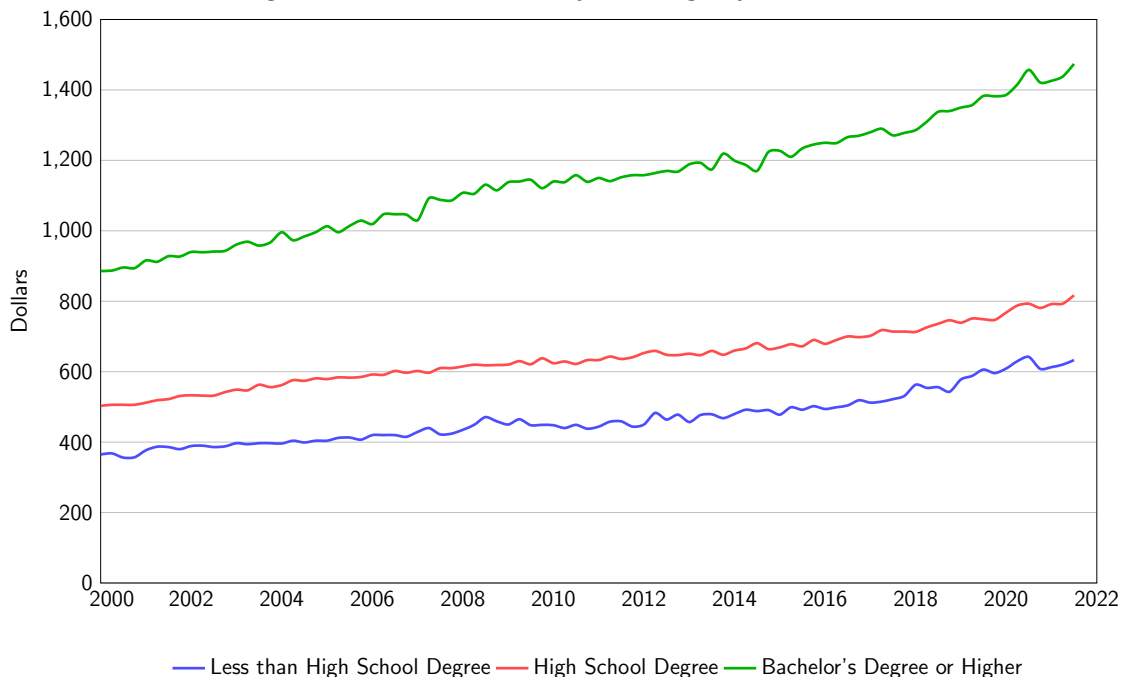
Figure 6.2: Labor Force Participation Rate by Education
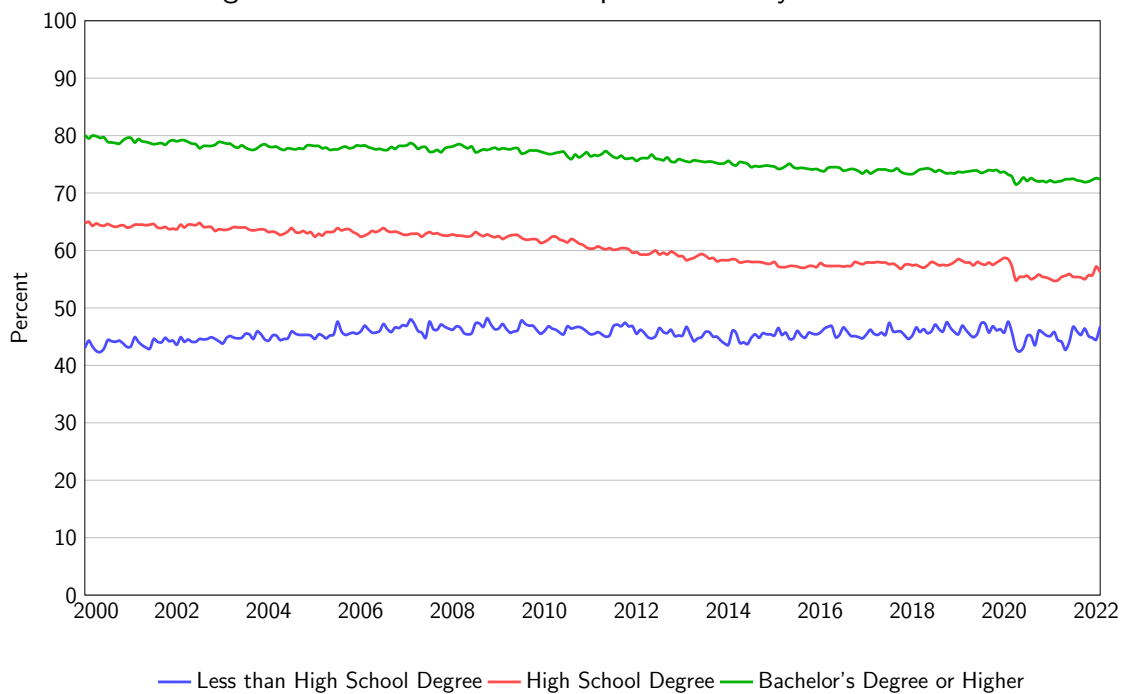
Source: Bureau of Labor Statistics via FRED, Tim Murray.

6.1   Human Capital Model of Education

- Going to college is expensive, not only in the cost of tuition, but in the opportunity cost of forgone wages

- On average, the wages for college graduates are higher than the wages of those who just have a high school degree

- The difference in earnings someone would receive after obtaining a college degree versus what they would earn with just a high school degree is the "benefit" of going to college

- Someone should choose to go to college if the benefits outweigh the cost

- The challenge is the how do you value the benefit of income in the future?

- In order to compare costs and benefits, we need to use discounting

  - Discounting is the process of valuing future dollar values in terms of the present

  - The discount rate is a metric showing how we value the present relative to the future that is usually between 0 and 1

  - The higher the discount rate, the more value an individual places on the present relative to the future

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Figure 6.3: Population Breakdown by Higher Education (in Millions)
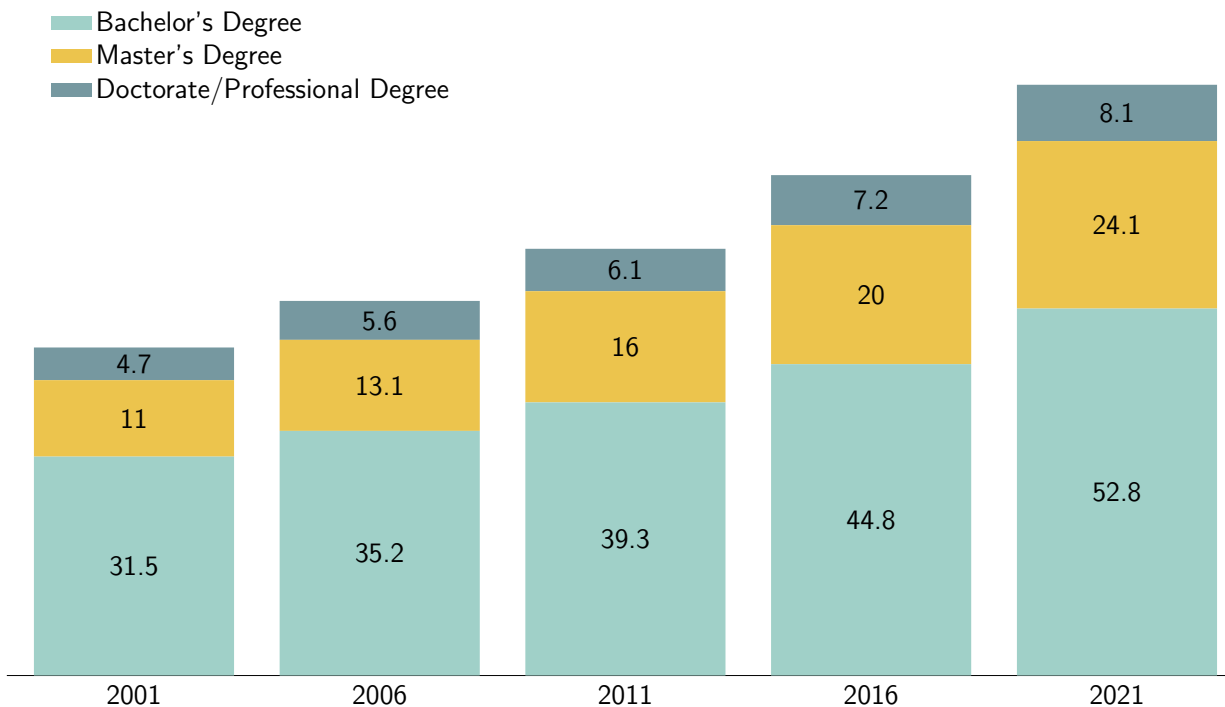
Source: US Census Bureau (2022), Tim Murray.

Figure 6.4: Percent of Population by Educational Attainment Age 25 and Older, 1940-2018
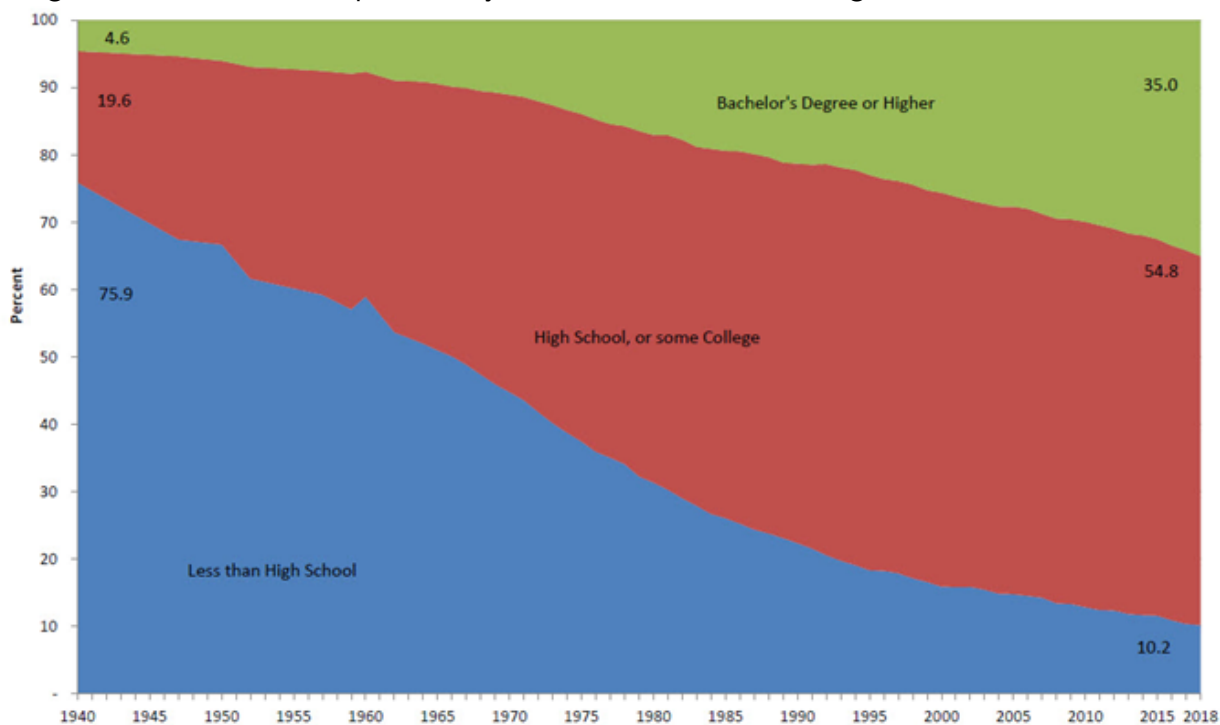
Source: US Census Bureau.
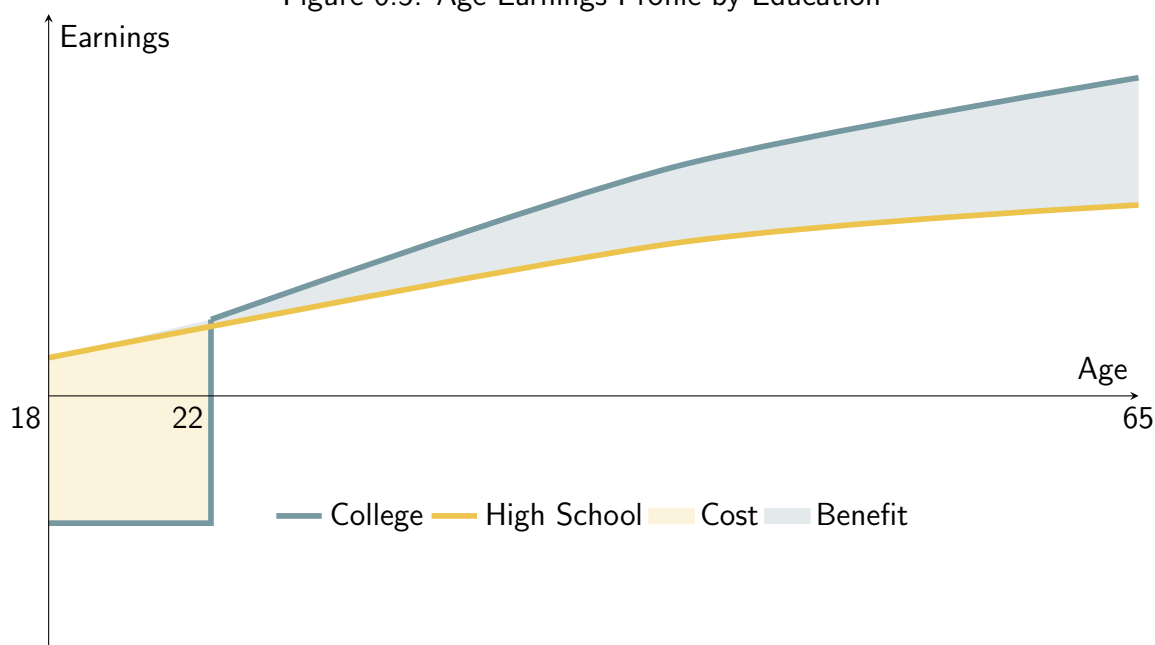
Figure 6.5: Age-Earnings Profile by Education

- The choice to go to college heavily depends on an individuals discount rate

    ○ People that have a lower discount rate are more likely to value the future benefits of going to college

- A person would choose to go to college if the discounted present value of the steam of benefits is greater than the discounted present value of the costs of college

$$PV_{cost} = C_0 + \frac{C_1}{1+r} + \frac{C_2}{(1+r)^2} + \frac{C_3}{(1+r)^3} \tag{6.1}$$

$$PV_{benefit} = \frac{B_1}{(1+r)^4} + \frac{B_2}{(1+r)^5} + \frac{B_3}{(1+r)^6} + \cdots + + \frac{B_n}{(1+r)^{n+3}} \tag{6.2}$$

- Where r = the discount rate and n = the number of periods

- If $PV_{cost} < PV_{benefit}$, then it would be a good decision to go to college

- For simplicity, if we assume that the costs (C_t) and benefits (B_t) remain constant, we can treat these as an annuity due, and use a simple formula for the calculations.[1]

---

[1] In practice, tuition will likely increase each year as will wages and the simple annuity formula would be insufficient to approximate a real world scenario. To add complexity, you could use a growing annuity formula which assumes C and B increase each year by a constant rate of g:

$$PVGA_{due} = \frac{C \text{ or } B}{r-g} \left[1 - \left(\frac{1+g}{1+r} \right)^n \right] (1+r)$$

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○ We can extend this to allow for the benefits and/or costs to grow using a growing annuity later

$$PVA_{due} = \frac{C \text{ or } B}{r} \left[1 - \frac{1}{(1+r)^n}\right](1+r) \qquad (6.3)$$

Example

Jaren is an 18 year old who is considering going to college for four years to get a bachelors degree. He currently has a job offer that will pay him $45,000 per year. Tuition would cost $20,000 per year and after graduation, he would make $52,000 per year. If his discount rate is 5% and he plans to retire at age 65, should he go to college or take the job offer?

- He would go to college from 18-22 (4 years) and the cost would be $20,000 + 45,000 = $65,000$
- He would work and receive the benefit of $52,000 - 45,000 = \$7,000$ from age 23-65 (43 years)

Cost

$$PVA_{due} = \frac{65,000}{.05}\left[1 - \frac{1}{(1.05)^4}\right](1.05) = \$242,011.10$$

Benefit

Since Jaren is 18, if he goes to college, he won't receive the benefit until age 23, after he graduates. The PVA_{due} formula does not allow us to start 4 years in the future, so we need to calculate the PVA_{due} as if he would receive he benefit from age 18-65 (47 years), and then subtract out the benefit from the 4 years of college.

$$PVA_{due} = \frac{7,000}{.05}\left[1 - \frac{1}{(1.05)^{47}}\right](1.05) = \$132,160.50$$

$$PVA_{due} = \frac{7,000}{.05}\left[1 - \frac{1}{(1.05)^4}\right](1.05) = \$26,062.74$$

$$Total\ Benefit = \$132,160.50 - \$26,062.74 = \$106,097.76$$

$$NetBenefit = 106,097.76 - 242,011.10 = -125,913.34$$

Because the Net Benefit of going to college is negative ($PV_{cost} > PV_{benefit}$), Jaren should not go to college.

- We established that a person will obtain education if the $PV_{cost} < PV_{benefit}$. However, that person needs to decide how many years of schooling is optimal. There are two models we can look at to help understand this decision.

○ The Wage-Schooling Locus

○ The Signaling Model of Education

6.2   The Wage-Schooling Locus

Figure 6.6: The Wage Schooling Locus
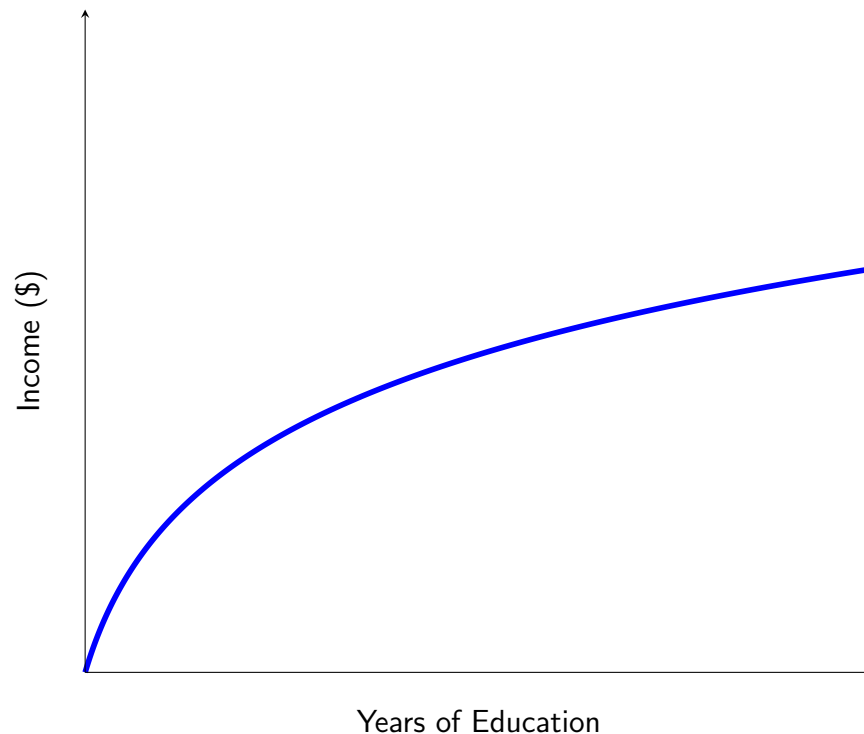
- The Wage-Schooling Locus (Figure 6.6) shows the relationship between years of education and income.

  ○ The Wage-Schooling Locus acts as a "production function" for human capital since education is the primary driver of human capital accumulation.

- The Wage-Schooling Locus exhibits diminishing marginal returns just like the production function.

- This means that each additional year of education has a smaller rate of return to income.

- We can find an individuals "demand for education" by calculating the Marginal Rate of Return to Schooling (MRR) by taking the first derivative of the Wage-Schooling Locus.

- Figure 6.7 shows the MRR. Because the Wage-Schooling Locus exhibits diminishing marginal returns, the MRR is downward sloping.

- An individuals will stop going to school when $MRR = r$. Therefore, an individual with discount rate r will go to s^* years of school.

Figure 6.7: Marginal Rate of Return to Schooling
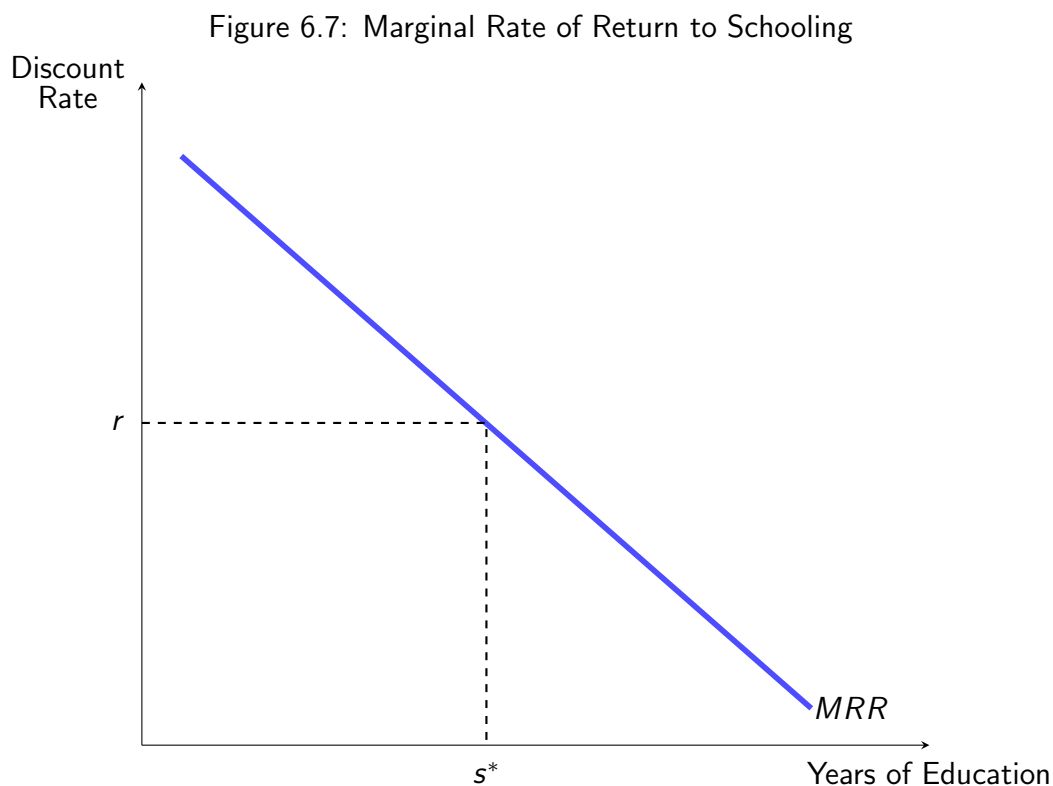
6.2.1   Differences in Ability

- Every individual has a different level of innate ability.

- People who have higher levels of ability typically earn a higher income than those with lower levels of ability at the same education level.

  - People with higher ability tend to be more productive.

  - People with higher ability also tend to go to more years of school because school is easier for them.

- Figure 6.8 shows the Wage-Schooling Locus for two people with different ability levels.

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Figure 6.8: The Wage Schooling Locus with Different Abilities

Figure 6.9: Marginal Rate of Return to Schooling with Different Abilities
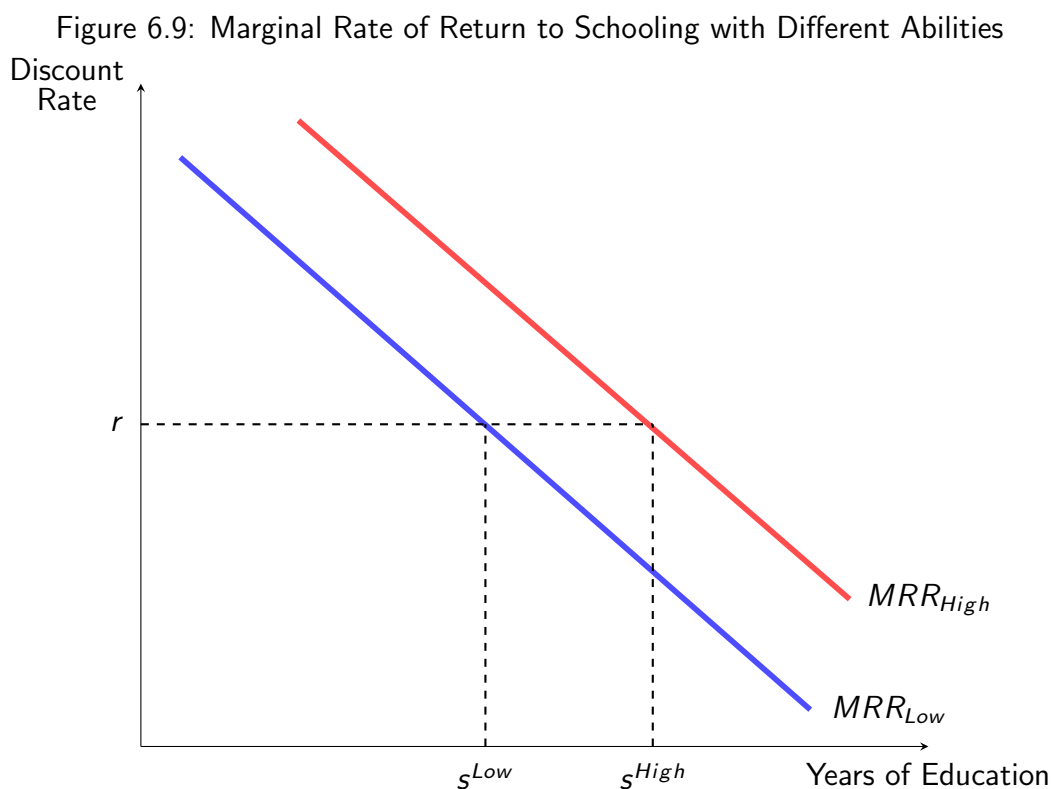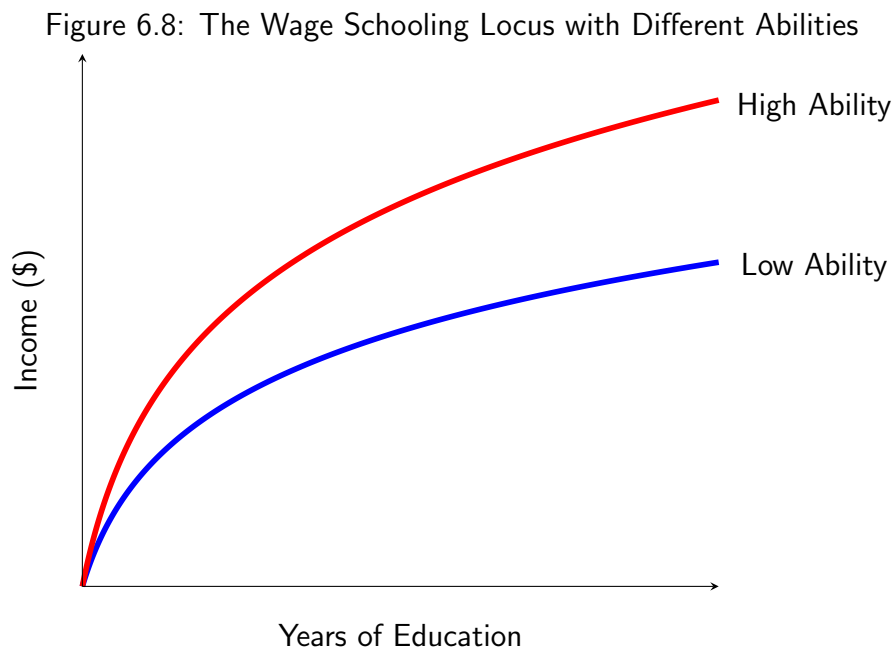
- The high ability and low ability person will therefore have different demands for education, or MRR, which can be seen in Figure 6.9.

- The high ability person will choose to go to s^{High} years of school and the low ability

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person will choose to go to s^{Low} years of school.

- The high ability person will therefore get a higher wage because they went to more years of school and because they have a higher ability.

6.3   Signaling Model of Education

An employer can observe your age, experience, and education but they cannot be completely sure of how productive a prospective worker is.

This makes it difficult to pay a worker based on their productivity level.

- Suppose an employer wants to pay high productive workers \$20/hour and low productive workers \$10/hour
- If the employer cannot see productivity, it may just assume that everyone is average and pay them \$15/hour
- **Problem**: Low productive workers are overpaid and high productive workers are underpaid
- This will cause the form to lose profits by not paying workers based on their productivity

A worker cannot choose their age, but they can choose their level of education.

Education can serve as a "signal" to an employer if they believe that X years of schooling after high school shows that an individual is highly productive.

Education only works as a signal if the cost of education is high enough that low productive workers would choose not to go to college.

Going to school is costly. These costs include tuition, opportunity cost of time, and the effort necessary to complete school.

It would likely take more time and more effort to go to school for a low productive worker compared to a high productive worker, so we can say that:

- $Cost_{low} = C$

- $Cost_{high} = \dfrac{1}{2}C$

Additionally, we know that an employer wants to pay a high productive worker more than a low productive worker:

- W^{high} = high productivity wage

- W^{low} = low productivity wage

An employer will assume a worker has low productivity until they have completed enough years of school after high school to "signal" they have high productivity, we will call the number of years necessary to send the signal x. Once the worker has completed x years of schooling, they will receive W^{high}, until then, they will receive W^{low}.

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Figure 6.10: The Signaling Model of Education
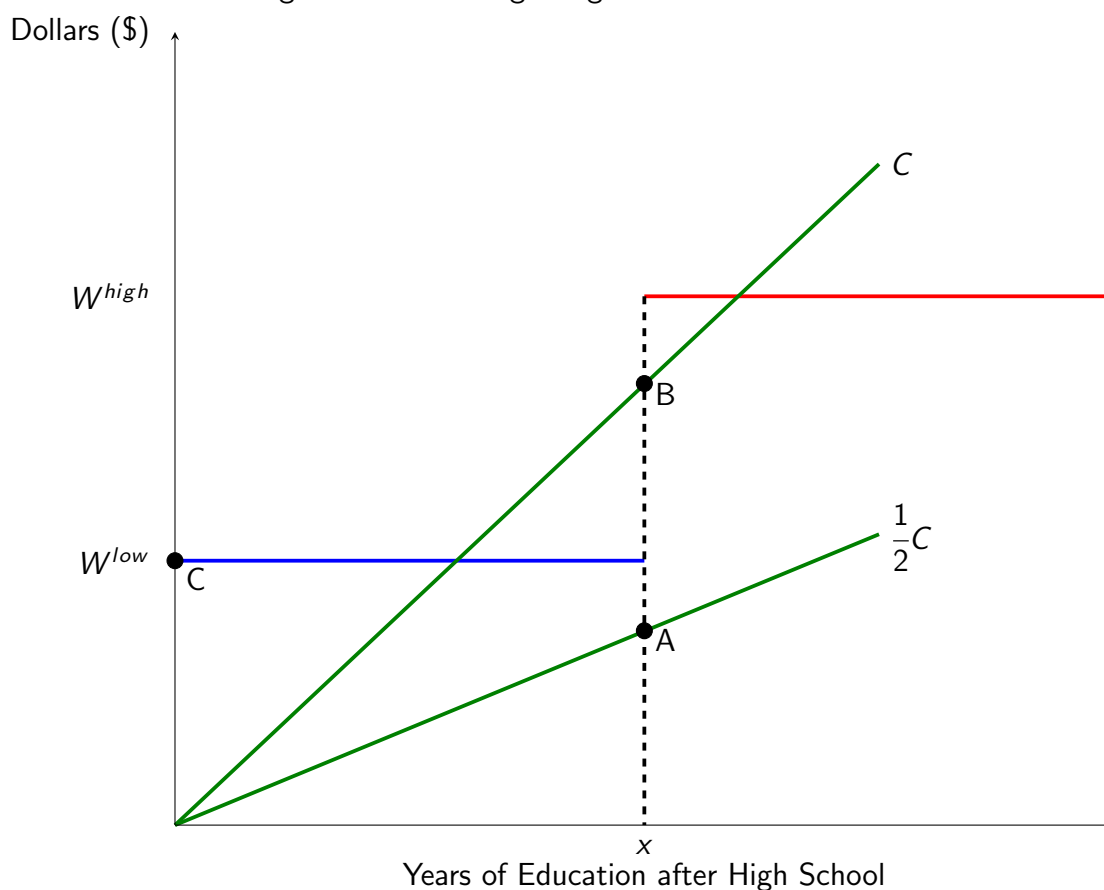
The cost of x years of school for a highly productive worker will be at point A. At point A, $W^{high} - Cost > W^{low}$, therefore the cost of college is not prohibitive.

The cost of x years of school for a low productive worker will be at point B. At point B, $W^{high} - Cost < W^{low}$, therefore they would be better off not going to college at accepting W^{low}.

If x years of schooling is necessary to send the signal and it is too costly for the low productive worker to obtain, they would be best off at point C and getting zero extra years of schooling. Any year of schooling greater than zero and less that x will incur costs, but the wage will still be W^{low}.

If the government were to reduce the cost of tuition, or make college free, then the slop of the cost lines would decrease, making it less costly to obtain x years of education.

If there is a significant increase in the number of people obtaining x years of education, then that signal no longer contains any information.

Employers would then need to increase the number of years of education in order to obtain a signal for a high productivity worker.

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> ### Example
>
> Alex has a productivity level of 1 and Simon has a productivity of 2. The cost of going to to x years of school is:
>
> $$c(x) = \begin{cases} x & \text{if productivity} = 1 \\ \dfrac{x}{2} & \text{if productivity} = 2 \end{cases}$$
>
> Alex and Simon have both applied to Gandalf Inc. Gandalf Inc. wants to pay workers with productivity of 2 a wage of \$15 and those with a productivity of 1 \$10. Gandalf Inc. uses a bachelors degree $(x = 4)$ to serve as a signal of productivity of 2 and uses the following wage schedule:
>
> $$w(x) = \begin{cases} \$3 & \text{if } x \geq 4 \\ \$6 & \text{if } x < 4 \end{cases}$$
>
> For Alex, the cost of going to school would be \$4. Because $W^{high} - Cost < W^{low}$ $(5 - 4 < 3)$, Alex would choose $x = 0$ years of schooling because anything less than 4 years of schooling pays the same wage and the cheapest option to get that wage is $x = 0$.
>
> For Simon, the cost of going to school would be \$2. Because $W^{high} - Cost > W^{low}$ $(6 - 2 > 3)$, Simon would choose $x = 4$ years of schooling to send the signal he has a productivity level of 2.

IMMIGRATION AND THE LABOR MARKET

- <u>Immigration</u> is when someone comes into another country to live permanently.

- <u>Emigration</u> is when someone leaves their current country to live elsewhere.

- Over the last several decades, the number of immigrant workers and their share of the United States labor force has substantially increased, which can be seen in Figure 7.1.

Figure 7.1: Foreign Born Population and Share of Labor Force, 1900–2020
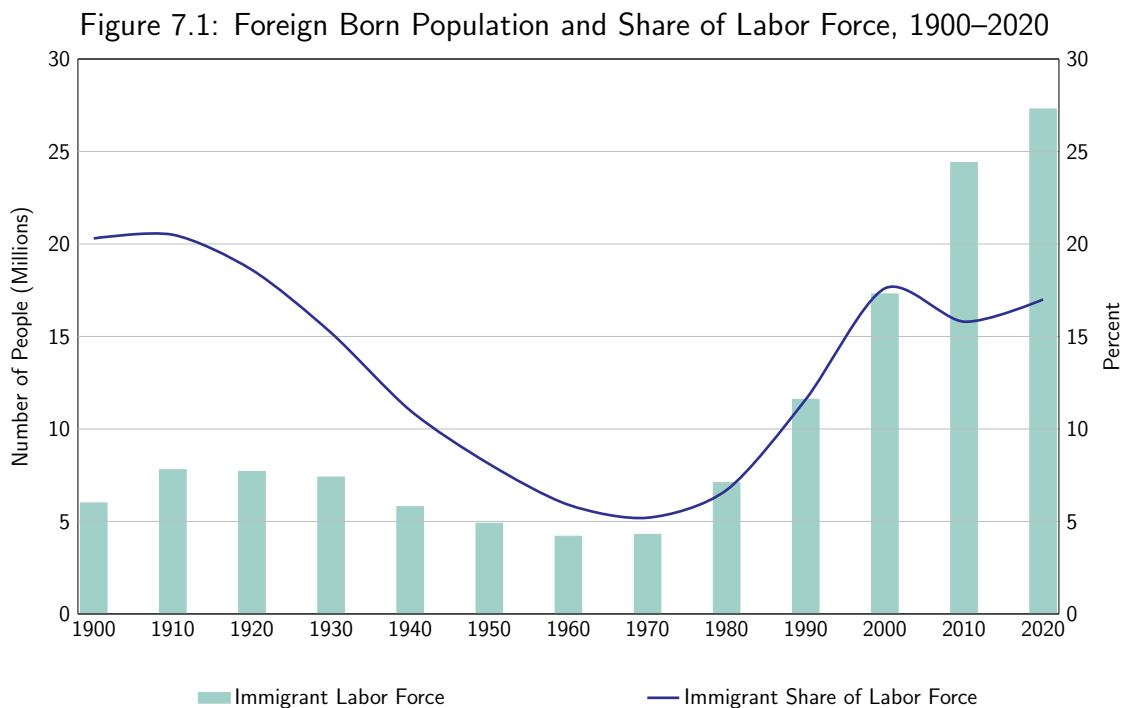
Source: US Census Bureau, Tim Murray.

- In this section, we will use economic theory to understand the decision to immigrate and the effects of immigration on the labor market.

- First, lets look at some data on immigration in the United States.

- <u>Net immigration</u> is the number if people the immigrate into the United States minus the number of people that emigrate to another country.

- Figure 7.2 show the number of net immigrants that have entered the United States since 2010.

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Figure 7.2: Net Immigration into the United States, 2010-2022
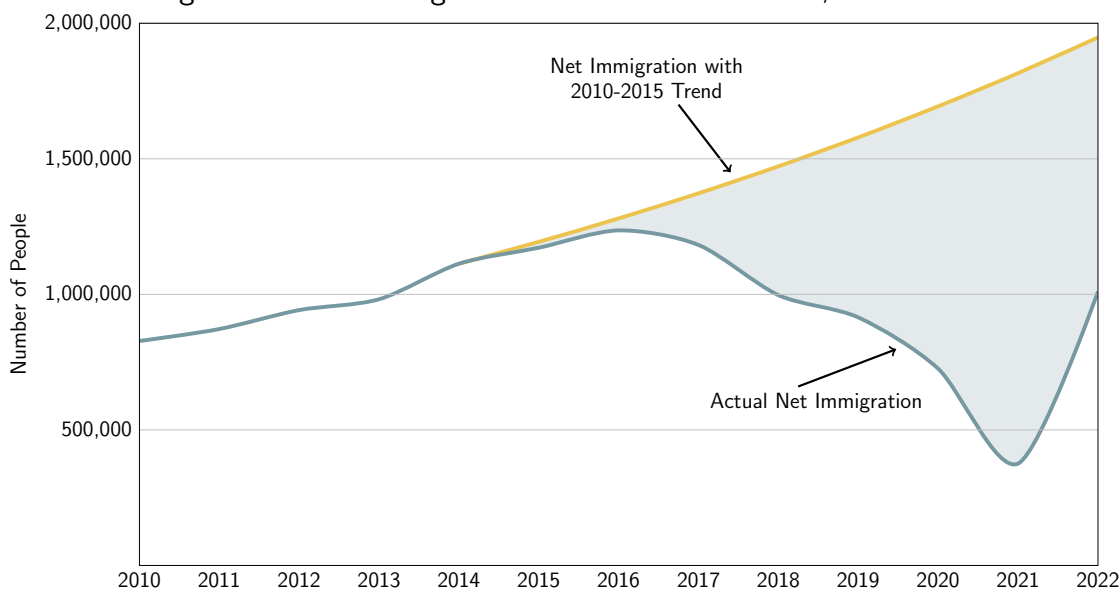
Source: US Census Bureau (2022), Tim Murray. **Notes:** 2022 is the US Census projection.

- Figure 7.3 shows the projected population growth by births minus deaths and immigration. Starting in 2042, it is projected that more people will die each year than are born. Therefore, without immigration, the US population would begin to decline.

Figure 7.3: Population Growth and its Underlying Factors, 2007–2053
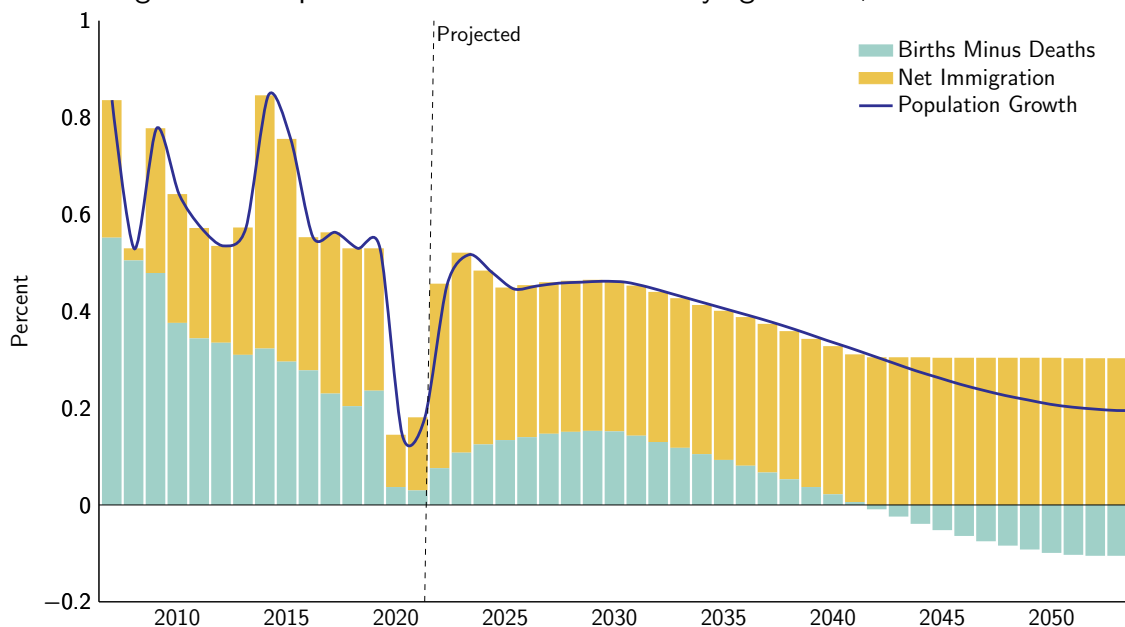
Source: White House Council of Economic Advisors (2023), Tim Murray.

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Figure 7.4: Number of Foreign Born Workers in the United States, 2007-2023
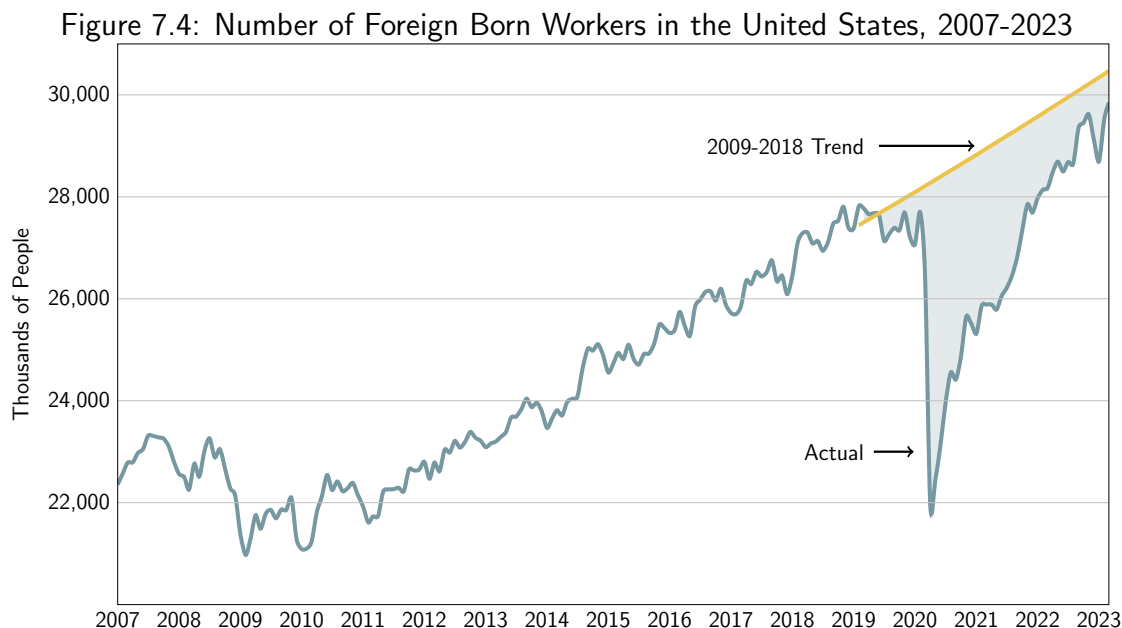
Source: US Bureau of Labor Statistics via Fred, Tim Murray.

- Figure 7.4 shows the number of foreign born workers in the United States from 2007-2023.

7.1   The Decision to Move

- Much like the Human Capital Model of education, migration can be viewed as an "investment" in which there are initial costs that are incurred with the hopes of obtaining an increase in benefits over a longer period of time.

- Therefore, an individual would only migrate/move to another part of their current country or emigrate to another country if the net present value of the benefits is positive.

- The net present value of the benefits to moving can be defined as:

$$NPV = \sum_{t=1}^{T} \frac{B_t}{(1+r)^t} - C \tag{7.1}$$

where,

    B_t is the increased utility in year t derived from moving.

    r is the discount rate.

    C is the disutility from moving (the physical and psychological costs of moving).

    T is the number of years expected to live at the new location.

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- There are a number of benefits that can increase the utility of an individual or household from moving:

  ○ Increased income.

  ○ Greater opportunity for upward mobility.

  ○ More desirable location to live.

  ○ Greater political stability and freedom.

  ○ Live closer to family.

- There are also a number of costs that are incurred from moving

  ○ Monetary costs of packing up and moving.

  ○ Time spent looking for a new job and new place to live.

  ○ Psychological costs of losing social network's and adopting a new culture and language.

- The longer an individual plans to stay in their new location, the greater the net present value will be.

- It is worth noting that people who choose to emigrate face substantial monetary and psychological costs in doing so. This says a lot about the opportunity that is drawing them to their new location.

7.1.1   Characteristics of Movers

- Between 15-20% of the United States labor force is comprised of immigrants workers. This means those workers moved from their home country to the United States.

- However, there is migration within the United States as well.

  ○ 1.5% of people in the United States moved to a different state between 2020-2021.[1]

  ○ About 50% of those who move to a different state are due to changing employers.[2]

- Studies suggest that most people move because they are attracted to better opportunities rather than being pushed out of current poor situation.

  ○ Place of origin is not a large factor into the decision to move.

  ○ Those who live in the poorest places may have a greater incentive to move, however, they also have the lowest levels of wealth, education, and skills.

  ○ This group of people tend to be those least willing to move.

---

[1]   U.S. Census Bureau, "Geographic Mobility: 2020-2021," Table 1.
https://www.census.gov/data/tables/2021/demo/geographic-mobility/cps-2021.html.
[2]   Bartel, A.P. 1979. "The Migration Decision: What Role Does Job-Mobility Play?" *American Economic Review*. 69: 775-786.

- Those who move tend to be younger. As people age, they tend to prefer to stay in their current location.

  - 9% of people in their 20's moved within the United States.

  - 6% of people in their 30's moved within the United States.

  - 3% of people in their 40's moved within the United States.

- Americans with a college degree are twice as likely to move compared to those without.

- 60% of those who move, move less than 500 miles. 35% of those who move, move less than 200 miles.

  - People with higher levels of education are more likely to move further as they are more likely to get relocation assistance from their employer.

7.2   Immigration and the Labor Market

- There are two categories of workers: high skilled and low skilled.

  - Skilled workers have some type of specialized training, typically higher education.

- High skilled and low skilled workers are not substitutes for each other. Instead, they are complements.

  - An increase in one group or workers can increase the demand for workers in other markets.
    - If there is an increase in high skilled workers, they will go out to eat, will go shopping, etc. There will therefore be an increase in the demand for low skilled workers to work in the restaurant and retail industries.
    - If there is an increase in unskilled workers, there will be a need for more managers, police officers, lawyers, accountants, etc.

7.2.1   Labor Market for Low Skilled Workers

- We will focus first on the market for low skill workers because as we saw in the data above, many immigrants come from Mexico and many of them have a high school degree or less.

- Figure 7.5 shows the labor market for low skill workers with immigration.

- L^S_{native} is the labor supply of native born workers. Labor supply for native workers tends to be more inelastic than labor supply for foreign workers because native workers are less responsive to changes in the wage rate.

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Figure 7.5: Labor Market for Low Skilled Workers
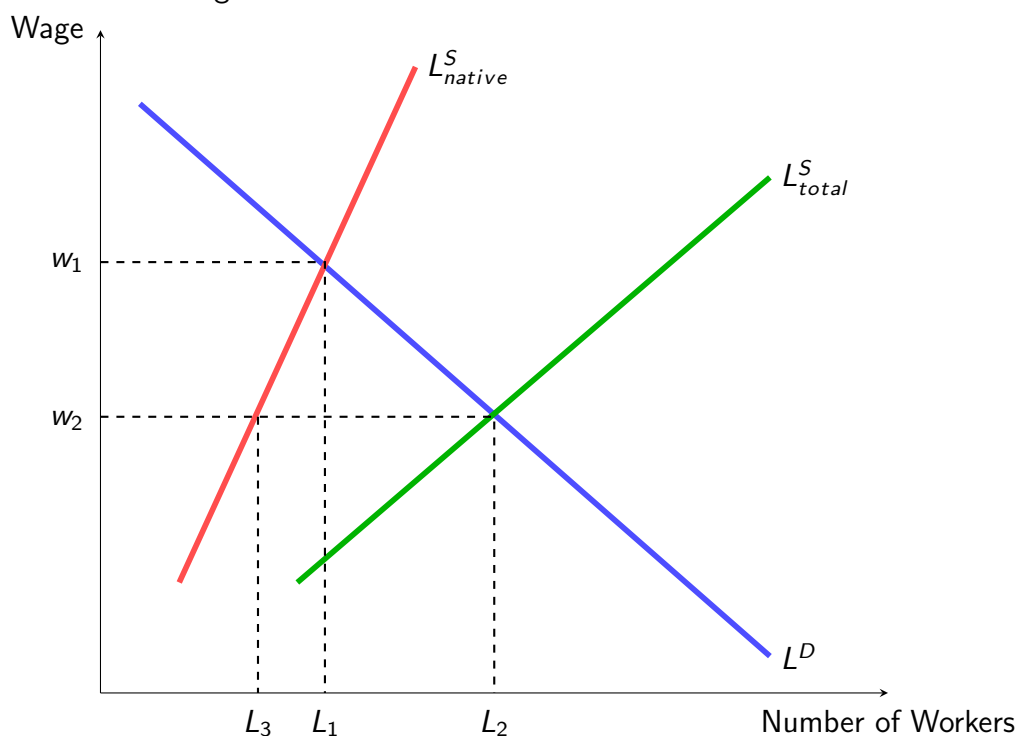
- ○ If there were no foreign born workers, then there would be L_1 workers hired making wage w_1.

- L_{total}^S is the labor supply of all workers, native and foreign. When including all workers, labor supply will be "higher" and more elastic.

  - ○ Immigration will shift the labor supply curve to the right.

  - ○ This will increase the number of workers hired to L_2 and will decrease the wage to w_2.

  - ○ Because native workers tend to have a higher reservation wage, some of these workers will leave the industry. The number of native workers in the low skill labor market will decrease from L_1 to L_3.

  - ○ The number of immigrant workers will be $L_2 - L_3$.

- With fewer the 10% of Americans having less than a high school degree and many immigrants having less than a high school degree, this suggests that the demand for low skill workers is higher than native supply.

- Would more Americans be willing to work in the low skill labor market? Yes! As long as the wage were high enough.

- We know the number of native workers decreases from L_1 to L_3. Does this mean they become unemployed? No. Many of these workers move to adjacent industries and take

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more complex jobs that pays a higher wage rate.[3]

- Low skill immigrants are imperfect substitutes for low skill native workers.
    - Some low skill jobs require more education and the ability to speak English and therefore some immigrants may not be able to work these jobs.

7.2.2 Labor Market for High Skilled Workers

- We noted earlier that high skill workers and low skill workers are not substitutes (i.e., one cannot be hired to do the job of another). Instead, they are complements.

- When there is an increase in the number of low skill workers, there will be an increase in the demand for high skill workers.
    - There will be an increased demand for police, firefighters, managers, lawyers, doctors, teachers, etc.

- Figure 7.6 shows the impact of low skill immigration on the labor market for high skill workers.

- The increase in demand for high skill workers will cause wages to increase from w_1 to w_2 and the number of workers to increase from L_1 to L_2.

Figure 7.6: Labor Market for High Skilled Workers
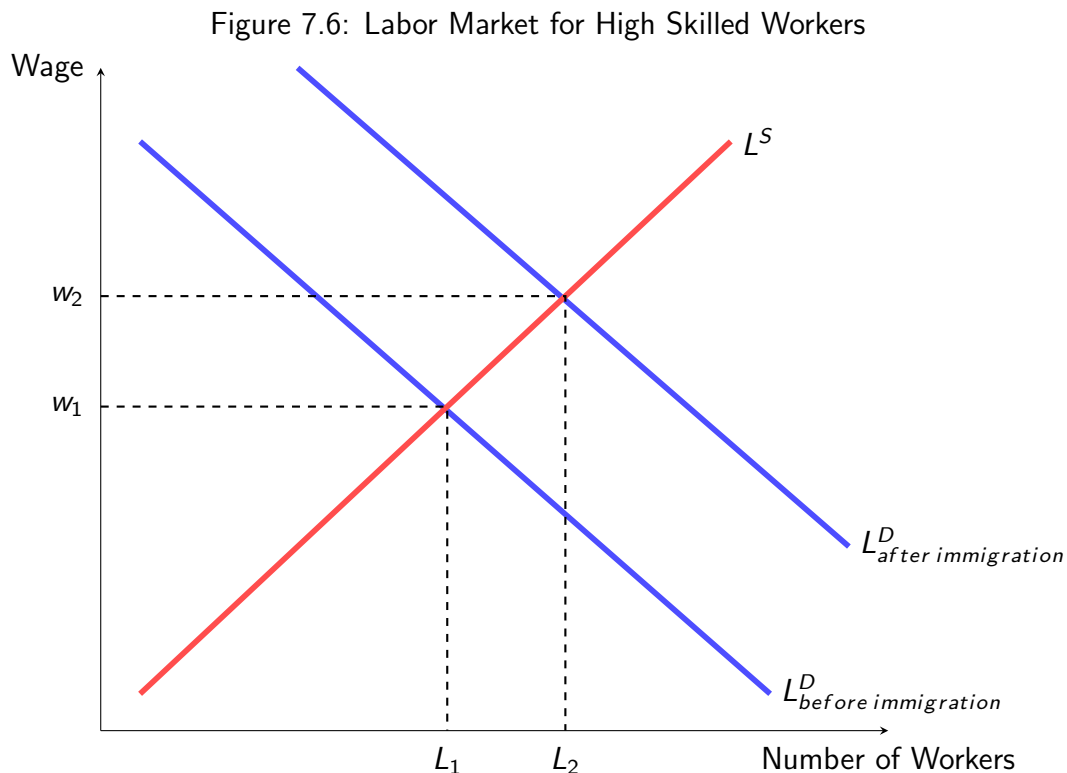
[3] Foged, M. and Peri, G. 2016. "Immigrants' Effect on Native Workers: New Analysis on Longitudinal Data." *American Economic Journal: Applied Economics*. 8(2): 1-34.

- You will notice that an increase in low skill immigration decreases the wages for low skill workers and increases the wages for high skill workers.

- We will discuss this in a later section, but this is a factor in income inequality as wages for high skill workers (those more likely to have a college degree) has increased over the last several decades and wages for low skill workers have not.

7.3 Immigration in the United States

Figure 7.7: Authorized versus Unauthorized Immigration, 2017
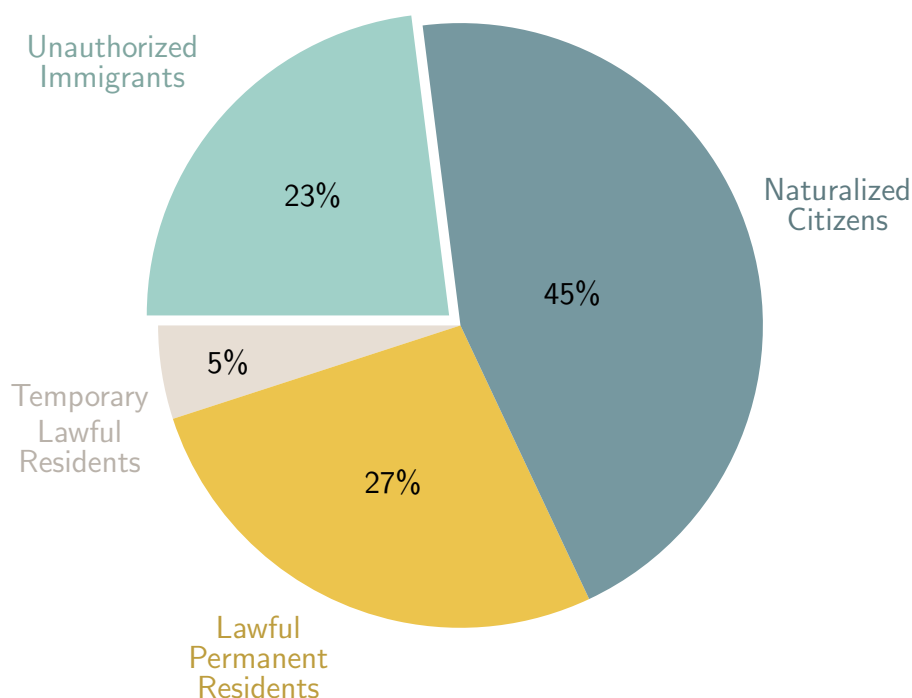
Source: Passell and Cohn (2019)

- There are $\sim$ 46.5 million people in the United States that were born in a foreign country.[4]

  - $\sim$ 35.7 million are either naturalized citizens, lawful permanent residents with a green card, or temporary lawful residents with a visa or refugee status.

  - $\sim$ 10.6 million are undocumented immigrants.

- Figure 7.7 shows the breakdown of the foreign born population in the United States as of 2017.

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[4] US Bureau of Labor Statistics. April 12, 2023. "Population Level - Foreign Born [LNU000073395]," retrieved from FRED: https://fred.stlouisfed.org/series/LNU00073395.

Figure 7.8: Top Birthplaces for Immigrants in the US (in Millions), 2017
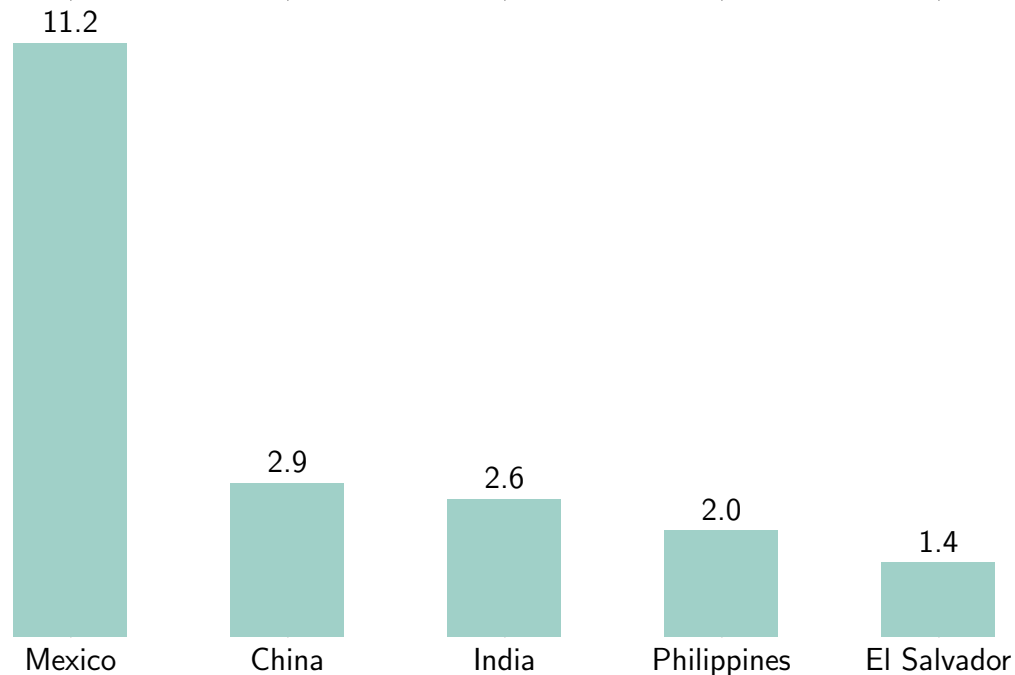
Source: Budiman (2020)

- Figure 7.8 shows the top birthplaces for immigrants in the United States. Mexico is the top origin of the United States immigrant population.

- However, the top country of origin for the last decade has been China and India.

- 53% of immigrants are proficient in English.

- 45% of immigrants live in California (24%), Texas (11%), and Florida (10%).

  - 64% of immigrants lived in the top 20 major cities, with New York City, Los Angeles, and Miami being the top 3.[5]

- Figure 7.9 shows the educational attainment of US born workers and foreign born workers.

  - A higher percentage of immigrants have less than a high school degree than US born workers, however, the percent of immigrants and US born workers who have a college degree is about the same.

    - Nearly half of immigrants from Mexico and Central America have less than a high school degree.
    - Nearly half of immigrants from Europe, Canada, the Middle East, and Asia have a bachelor's degree or higher.

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5   Budiman, A. 2020. "Key findings about U.S. immigrants." *Pew Research Center.*
https://www.pewresearch.org/fact-tank/2020/08/20/key-findings-about-u-s-immigrants/.

Figure 7.9: Educational Attainment Among US Immigrants, 2017

	Less than High School	High School Graduate	Some College	Bachelor's or Higher
All US Born	9%	28%	31%	32%
All Foreign Born	27%	23%	19%	31%
Mexico	54%	26%	13%	7%
Central America	46%	26%	17%	11%
Caribbean	23%	32%	24%	21%
South America	14%	27%	26%	33%
Sub-Saharan Africa	12%	20%	28%	40%
Europe/Canada	10%	22%	24%	44%
Middle East	12%	20%	19%	49%
South and East Asia	15%	16%	17%	52%

■ Less than High School ■ High School Graduate ■ Some College ■ Bachelor's or Higher

Source: Budiman (2020)

- Figure 7.10 shows the percent of workers in each industry that is born in the United States, is a lawful immigrant, and an undocumented immigrant.

  ○ Farming, construction, and food service are the top three industries where immigrants are most likely to work.

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Figure 7.10: Percent of U.S. Born and Immigrant Workers by Industry, 2017

U.S. Born   Lawful Immigrants   Undocumented Immigrants
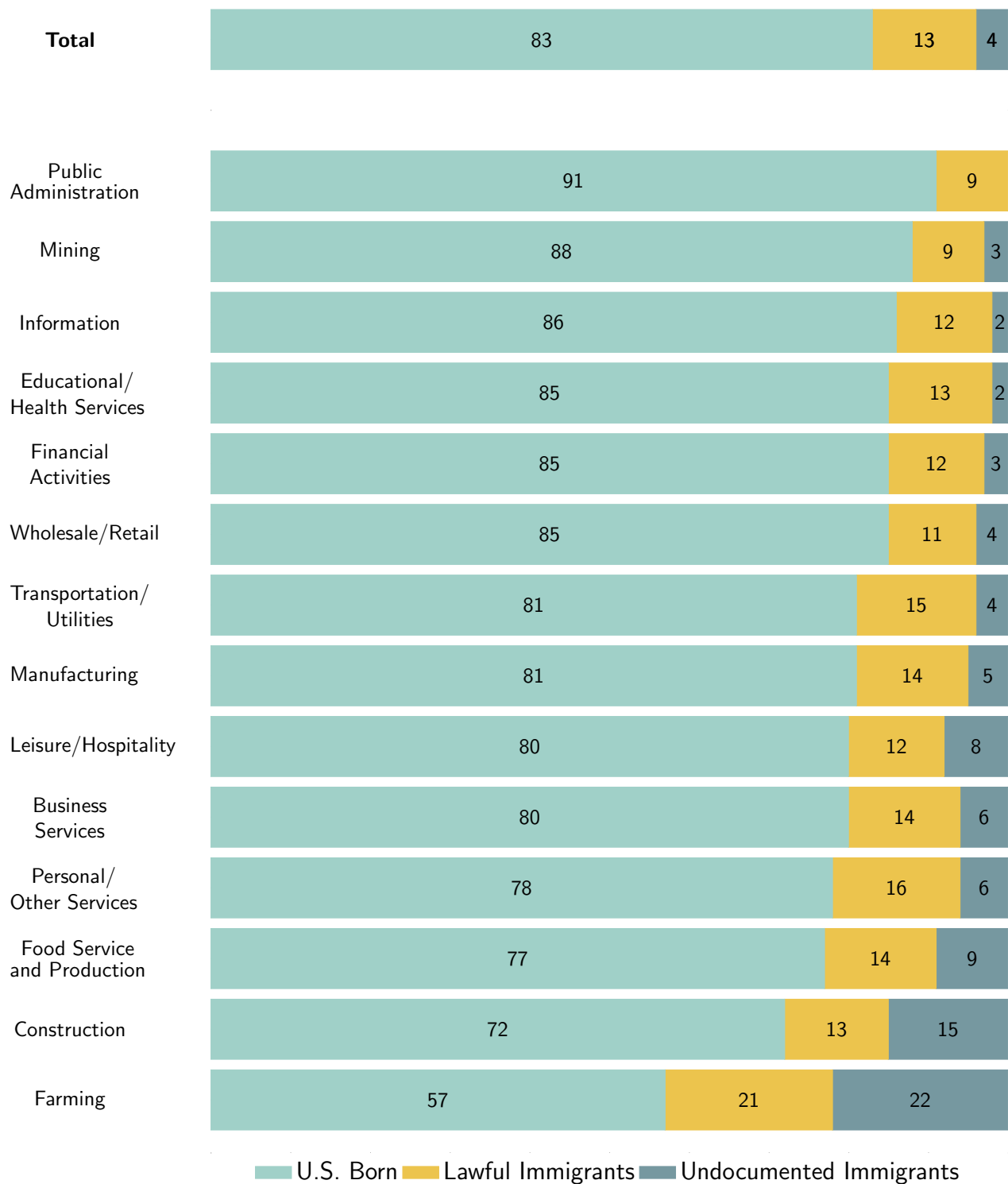
Source: Krogstad, Lopez, and Passel (2020)

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7.3.1   How Immigrants get to the United States

7.3.1.1   Lawful Immigration

- There are over 100 different types of visas issued by the US State Department split into two main categories:

  - <u>Nonimmigrant visas</u>: for temporary visits for tourism, business, study, or work.
  - <u>Immigrant visas</u>: for permanent residence in the United States

- The majority of *immigrant visas* are for family based immigration.

  - A foreign citizen seeking to live in the United States must be sponsored by an immediate relative who is at least 21 years old and a US citizen or a green card holder.
    - US citizens can sponsor a spouse, child, parent, or sibling.
    - A green card holder can only sponsor a spouse or unmarried child.[6]

- There are a number of *nonimmigrant* visas that can be obtained for employment.

  - H-1B visas are for people in a specified professional or academic field who have specialized expertise with a college degree or higher.[7]
    - Must have an employer to sponsor the visa.
    - Limited to three years, but is renewable.
  - H-2A visas are for temporary/seasonal agricultural workers and are for less than 12 months.[8]
  - H-2B visas are for temporary/seasonal non-agricultural workers are are for less than 12 months.[9]
  - H-3 visas are for those seeking training in any endeavor except for graduate school.
    - This visa is intended for people who want to train in the United States but want to pursue a career in another country.
  - I visas are for members of the foreign press and include news reporters, editors, and film crews.
  - O visas are for those with extraordinary and exception abilities.
  - P visas are for those who excel in athletics or performance (e.g, professional athletes, actors, or artists).

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[6] US State Department. "Family Immigration."
https://travel.state.gov/content/travel/en/us-visas/immigrate/family-immigration.html.
[7] U.S. Department of Labor. "H-1B Program." https://www.dol.gov/agencies/whd/immigration/h1b.
[8] U.S. Citizenship and Immigration Services. "H-2A Temporary Agricultural Workers." https://www.uscis.gov/working-in-the-united-states/temporary-workers/h-2a-temporary-agricultural-workers.
[9] U.S. Citizenship and Immigration Services. "H-2B Temporary Non-Agricultural Workers." https://www.uscis.gov/working-in-the-united-states/temporary-workers/h-2b-temporary-non-agricultural-workers.

- ○ R visas are for for religious workers who are coming to work in the United States for that denomination or an associated non-profit.

- ○ EB visas are preference-based employment visas for non-citizens of "extraordinary" ability in the sciences, arts, education, business, or athletics through sustained national acclaim and professors or researchers with at last three years of teaching or research experience wishing to pursue a tenure-track or research position at a university or private employer.[10]

  - – There are 140,000 of these available each year.

- There are additional *nonimmigrant visas* for students

  - ○ F-1 visas are for students enrolled at an accredited academic institution.

    - – Students with an F-1 are allowed to work in the United States with certain restrictions.[11]

7.3.1.2 Undocumented Immigration

- When a visa expires, there is a "grace period" to exit the United States. The length of the "grace period" varies for each visa type.

- The primary source of undocumented immigration into the United States has been for people to enter the country using a temporary *immigrant visa* and then to remain in the country past its expiration date.

- 62% of undocumented immigrants overstay their visa and 38% enter the country illegally.[12]

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[10] U.S. Citizenship and Immigration Services. "Employment-Based Immigration: First Preference EB-1." https://www.uscis.gov/working-in-the-united-states/permanent-workers/employment-based-immigration-first-preference-eb-1.

[11] U.S. Citizenship and Immigration Services. "Students and Employment." https://www.uscis.gov/working-in-the-united-states/students-and-exchange-visitors/students-and-employment.

[12] Warren, R. 2019. "US Undocumented Population Continued to Fall from 2016 to 2017, and Visa Overstays Significantly Exceeded Illegal Crossings for the Seventh Consecutive Year." *Center for Migration Studies.* https://cmsny.org/publications/essay-2017-undocumented-and-overstays/.

LABOR MARKET DISCRIMINATION

The American labor force has gone through a period of demographic change in recent decades.

- Cultural changes around expectation for women around household production and work-for-pay

- Legal protections for race and gender

- Immigration

- Globalization

- Varying birthrates among different racial and ethnic groups

This section will discuss the differences in earnings by race and gender, with a special attention to understanding discrimination. Understanding these differences is important to help determine what policies, if any, might help address these pay gaps.

First, it is helpful to understand the difference in labor market outcomes by race and gender and how they have evolved over time.
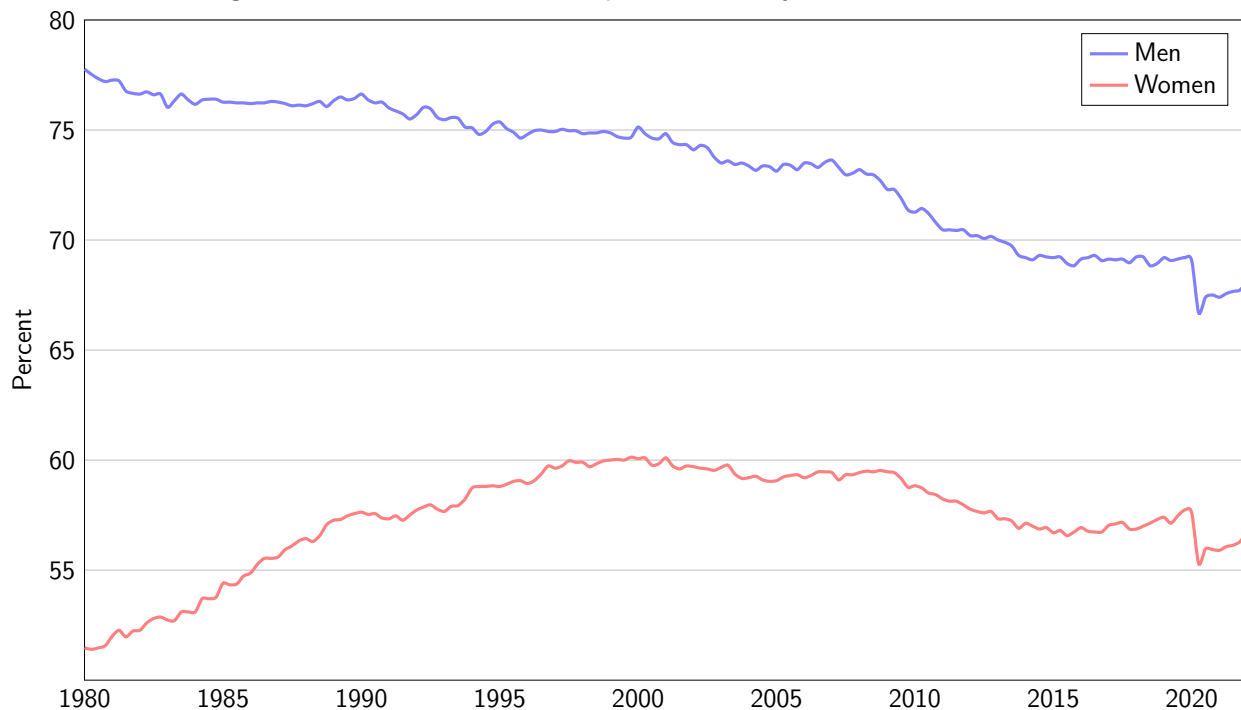
- Figure 1 shows the labor force participation rate by race

- Figure 2 shows the labor force participation rate by gender

- Figure 3 shows annual median earnings by race and gender

- Figure 4 shows the earnings for White Women, Black Men, and Black Women as a share of the earnings of White Men

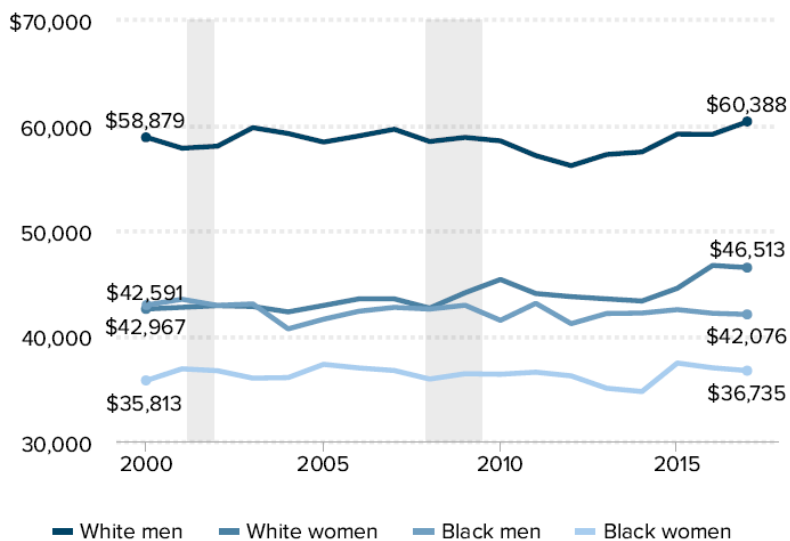Figure 8.1: Labor Force Participation Rate by Race, 1980-2022
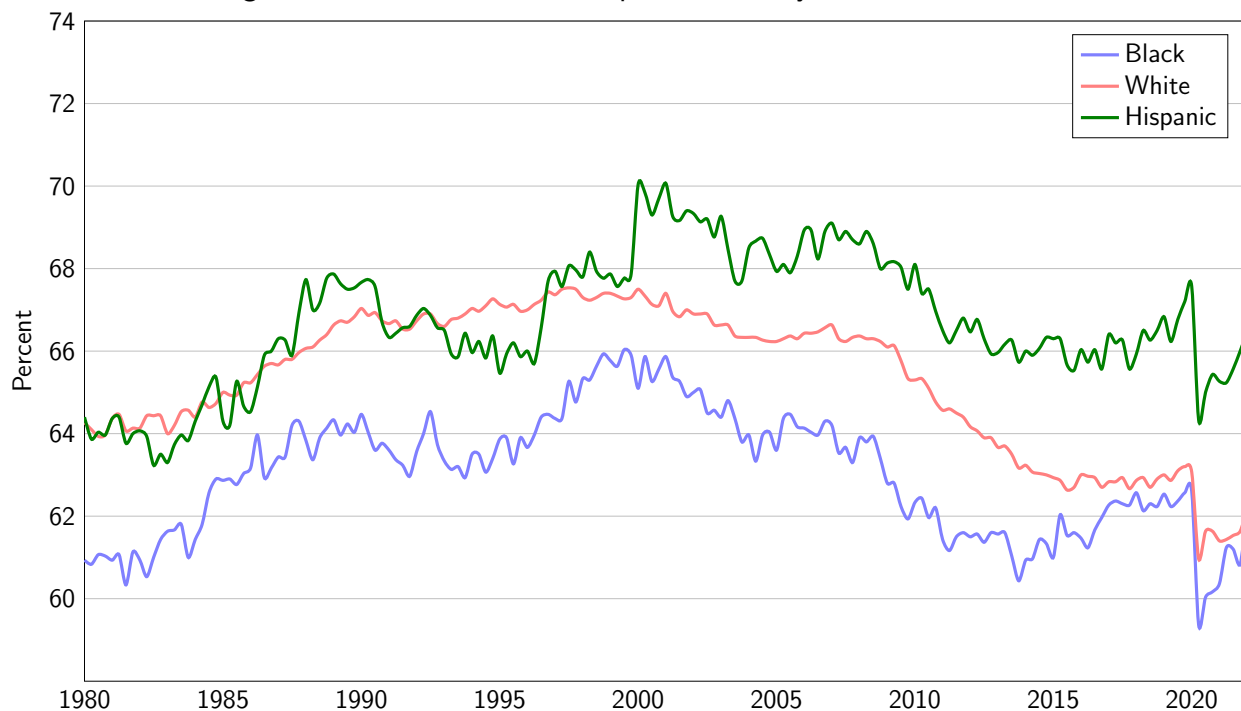
Source: Bureau of Labor Statistics via FRED.

Figure 8.2: Labor Force Participation Rate by Gender, 1980-2022

Source: Bureau of Labor Statistics via FRED.

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Figure 8.3: Real Median Earnings for Full-Time Workers, by Race and Gender 2000-2017

Notes: Earnings are wage and salary income. White refers to non-Hispanic whites; black refers to blacks alone. Because a redesign of the CPS ASEC in 2013 did not directly affect earnings, the data for 2013 are an average of the new and old series. Shaded areas denote recessions.

Source: EPI analysis of Current Population Survey Annual Social and Economic Supplement (CPS ASEC) Historical Income Tables (Table P-38)

Economic Policy Institute

Figure 8.4: Earnings as a Percent of White Men
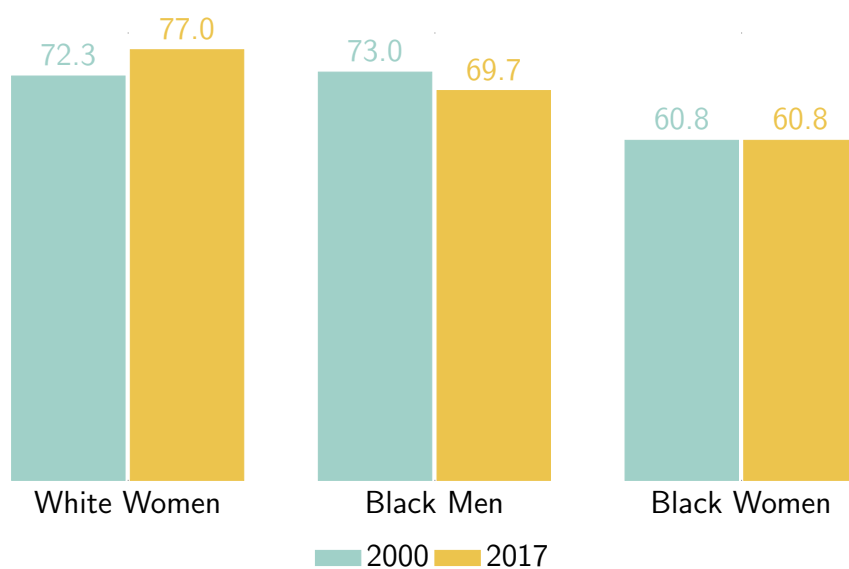
Source: Economic Policy Institute

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8.1   Theories of Labor Market Discrimination

If economists and policymakers want to create policy that limits discrimination in the labor

market, we need to first understand the sources of discrimination

8.1.1   Employer Discrimination

- Suppose <u>employers</u> are prejudice against women and minorities, but customers and employees are not

- Also suppose that women and minorities have the same *productive characteristics* as White men

- When and employer has a bias in favor of White men, then they discount the actual productivity of women and minorities

From earlier in the semester,
$$Wage(W) = MRP_L \tag{8.1}$$

If there is no bias for White men, then

$$W_m = MRP_L \tag{8.2}$$

However, if there is employer discrimination, then women and minorities MRP_L is discounted from White men

$$W_f = MRP_L - d \tag{8.3}$$
$$W_f + d = MRP_L \tag{8.4}$$

Where d will vary from employer to employer and represents how much an employer discounts productivity of women and minorities. If no discrimination, $d = 0$ and $W_m = W_f$.

However, we know that since we know that because there is no differences in productive characteristics, then the MRP_L would be the same

$$W_m = W_f + d \tag{8.5}$$

If employers devalue the productivity of women and minorities, they must offer their services at a lower wage than White men

$$W_f = W_m - d \tag{8.6}$$

If employers are non-discriminatory, then they hire N_0 women/minorities where $W_f = MRP_L$

Number of Women and Minority Workers
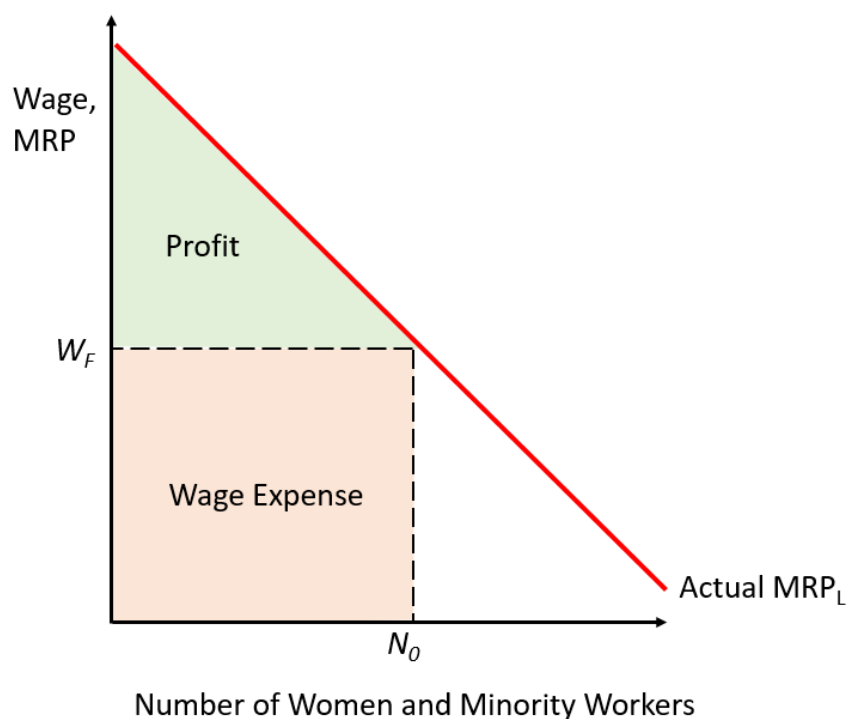
However, if employers discriminate, they will hire N_1 workers where $MRP_L = W_f + d$

- Because the wage is not at its equilibrium (W_f), there is deadweight loss in the labor market

- To indulge in discrimination based on gender or race, companies maker lower profits and introduce inefficiency into the market

- Pay-gap with employer discrimination, $W_f = W_m - d$

  ○ The value of d depends on the "level" of prejudice from each individual employer

  ○ Not every employer in the labor market discriminates

  ○ Some do, so on average, women and minorities earn less than White men

- Employers who discriminate attempt to maximize their utility by satisfying their prejudicial preferences instead of maximizing profits

  ○ How do employers who discriminate compete with non-discriminatory employers if they have lower profits by practicing wage discrimination?

  ○ Employer discrimination is most likely to exist when managers do not have to maximize profits to stay in business

    – Especially strong among government regulated monopolies (Black and Strahan, 2001)

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Number of Women and Minority Workers
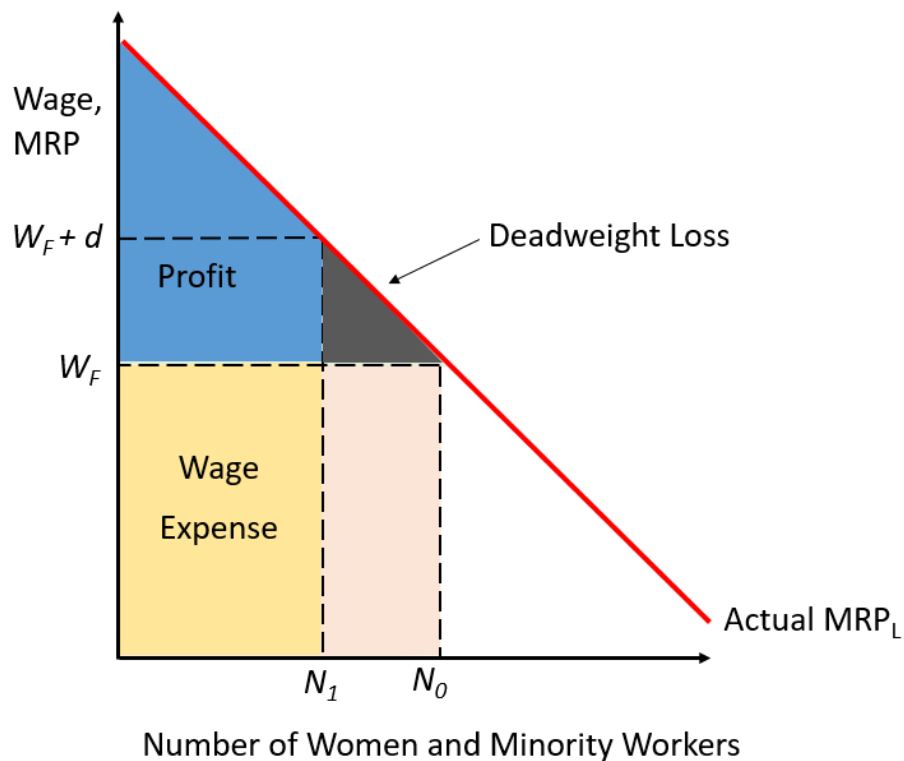
8.1.2   Customer Discrimination

- Customers can prefer to be served by White men instead of women or minorities

- This can lead to *occupational segregation* in occupations with high customer contact

- This can lead to a racial composition of a company that reflects its customers

  - Kanazawa and Funk (2011) find that TV viewership for NBA games was higher when more white players played
  - White players had higher salaries that Black players of similar skill sets

- Women and minorities must either take less money or be more qualified that White men

8.1.3   Employee Discrimination

- White men employees may avoid situations where they have to work with women or minorities

- Discriminatory employees will often quit jobs that have non-discriminatory hiring practices or if they have a women or a minority as a boss

8.2   Earnings Differences by Gender

To analyze the differences in the pay gap, we must first look at the potential sources of these differences. Some of these we can measure, others we can not.

8.2.1   Age and Education

Education and age are two sources that can lead to higher earnings. Until 2015, a higher percentage of men had college degrees than women. This will account for some of the gender pay gap historically.

Figure 8.5: Percent of Population with Bachelors Degree, by Gender 1980-2020
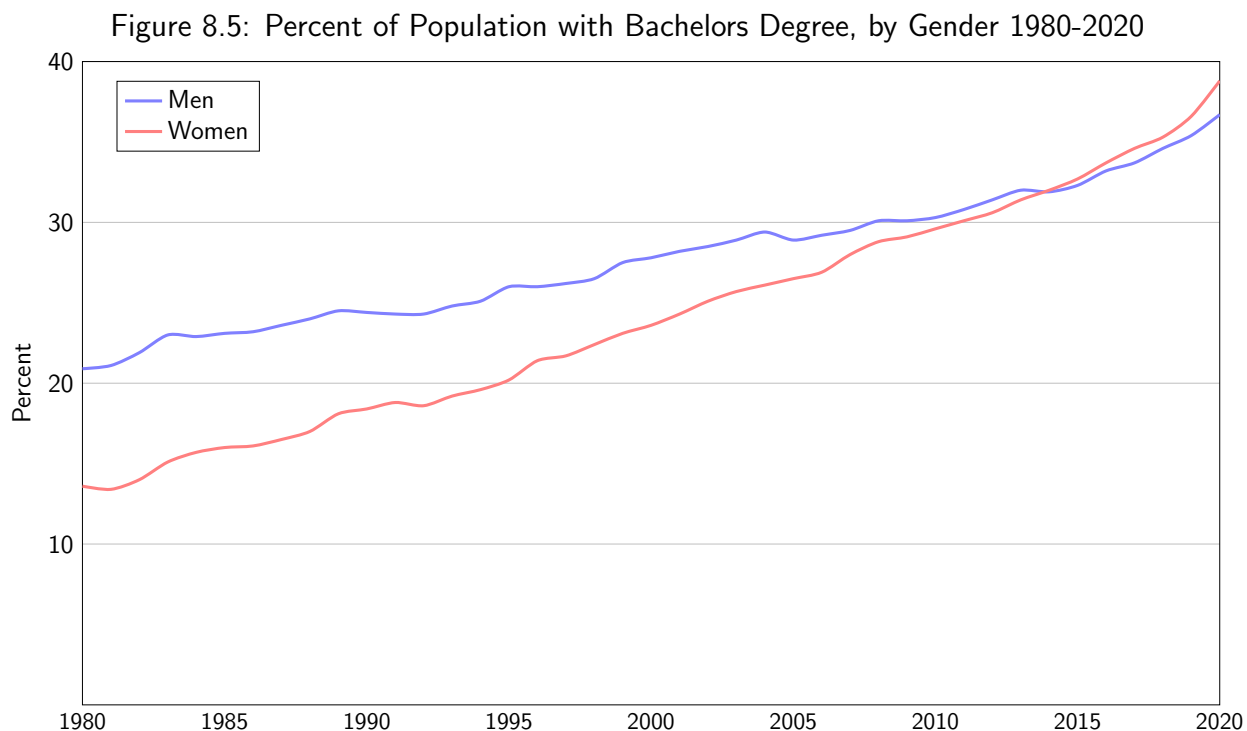
Source: US Census Bureau, Statistista

However, we can control for the gap in education by comparing wages of men and women with the same level of education.

Table 8.1: Women's Earnings as a Percentage of Men's Earnings, by Age and Education, 2014

Age	High School Graduation(%)	Bachelor's Degree (%)	Masters Degree (%)
25–34	78	78	71
35–44	73	69	68
45–54	70	66	61
55–64	73	72	63

US Census Bureau, Current Population Survey Tables for Personal Income, Personal Income: PINC-03, 2014; Ehrenberg and Smith (2018)

- When comparing levels of education, women still make less than men

- This gap gets bigger with higher levels of education and gets bigger over age

- This suggests that women have flatter lifetime earnings profile relative to men

- There will be a reading assignment that will explore this further.

Figure 8.6: Age-Earnings Profile for Men and Women
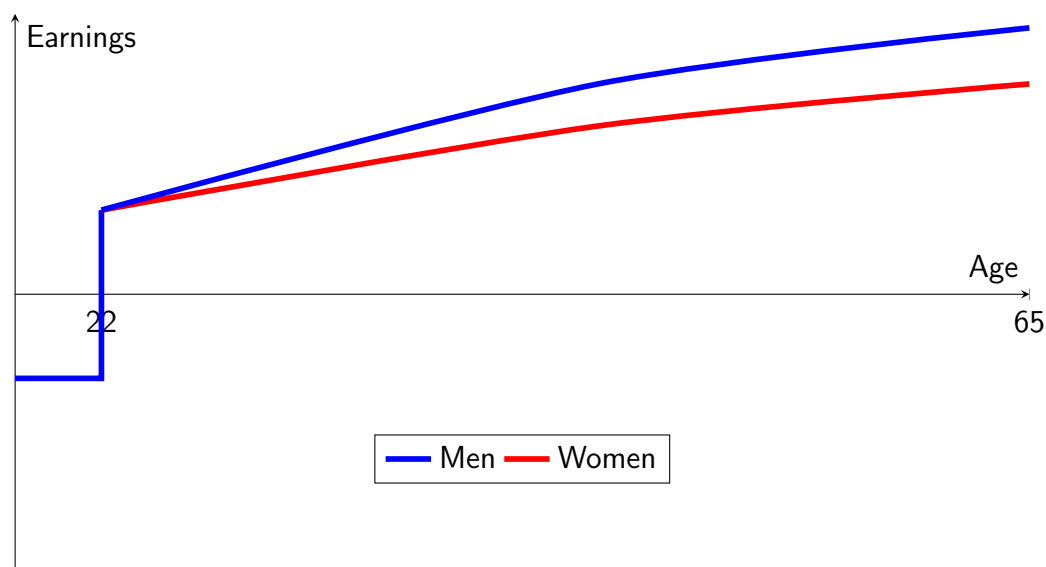
8.2.2   Occupation

Another factor that can help explain part of the gender wage gap is if men and women work in different occupations.

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Table 8.2: Women/Men Earnings Ratio and Percentage of Women Jobholders, 2015

	Percent Women in Occupation	Women-to-Men Earnings Ratio
High-Paying		
Chief executives	27	0.82
Computer systems managers	27	0.86
Lawyers	37	0.90
Pharmacists	52	0.86
Low-Paying		
Cashiers	69	0.86
Cooks	38	0.94
Food Preparation	52	0.94

Source: US Bureau of Labor Statistics, *2015 Employment Earnings Online*, Annual Average Household Survey Data, Table 39; Ehrenberg and Smith (2018)

Women tend to make up a higher portion of low-paying jobs relative to men.

- Some of this can be attributed to historical levels of education, as many high-paying jobs require a college degree

- Some of this can be attributed to historical societal norms and women and men may self-select into certain occupations because of this

- Some of the differences in the gender pay gap can be attributed to the difference in selection of occupations, but even within occupations, women still make less than men do

8.2.3   Hours and Experience

We learned that experience and on-the-job training can also be a factor that contributes to an increase in earnings throughout the life-cycle. However, we see that women tend to work 1–5

Table 8.3: Hours of Work, by Gender 2015

	Women	Men
Management, business, and financial	42.4	45.9
Professional speciality	40.8	43.3
Office/Administrative Support	39.8	41.6
Sales	40.9	44.4
Installation and repair	41.6	42.9

Source: US Bureau of Labor Statistics, Current Population Survey; Ehrenberg and Smith (2018)

fewer hours per week than men do, depending on the occupation. This can be for a variety of reasons, including that women often are the ones who take care of children. Over time, fewer hours leads to less experience, which can lead to slower pay growth. This can also play a role in getting promotions as well, the reading assignment will go into detail over this.

8.2.4   Unexplained Differences

We have some measurable factors that influence the gender pay gap, but there are some things we cannot measure.

- Individual and households preferences for work-from-home and work-for-pay

- The influence of societal norms and pressure

- Direct gender discrimination in the labor market

8.3   Discrimination

Labor market discrimination exists if workers who have identical productive characteristics (e.g., education, experience, natural ability, etc.) are treated differently because of the demographic characteristics.

- Part of the gender pay gap can be attributed to observable characteristics

  ○ Some of these differences can be attributes to discrimination *before* entry in the labor market

- Part of the gender pay gap can be attributed to direct labor market discrimination

8.3.1   Wage Discrimination

Wage discrimination is when wages paid by employers differ for members of different demographic groups with the same productive characteristics.

8.3.2   Occupational Discrimination

- Men and women have different occupational distributions

- Preferences vs discrimination

  ○ If men and women choose different jobs because of their individual preferences, then the labor market is working and efficient

  ○ If there are factors that influence these preferences before they enter the market, *pre-market differences*, then the market is not working and inefficient

    – Different treatment by parents for men and women
    – Society points women towards lower paying jobs or to household pursuits

The challenge is trying to measure occupational and wage discrimination.

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8.3.3   Measuring Occupational Discrimination

In recent decades, there has been improvement in the gender pay gap. Some are due to changes in observable characteristics. But we try to quantify discrimination by comparing the existing distribution of men and women in occupations with a distribution that would exist if job assignment were random with respect to gender.

- **Index of Dissimilarity**

    ○ Assuming workers of one gender remain in their jobs, this index indicates the percentage of the other gender that would have to change occupations for the two genders to have equal occupational distributions

    ○ If all occupations were completely segregates, index = 100

    ○ If there is equal distribution, the index = 0

Figure 8.7: Index of Dissimilarity. 1970-2011
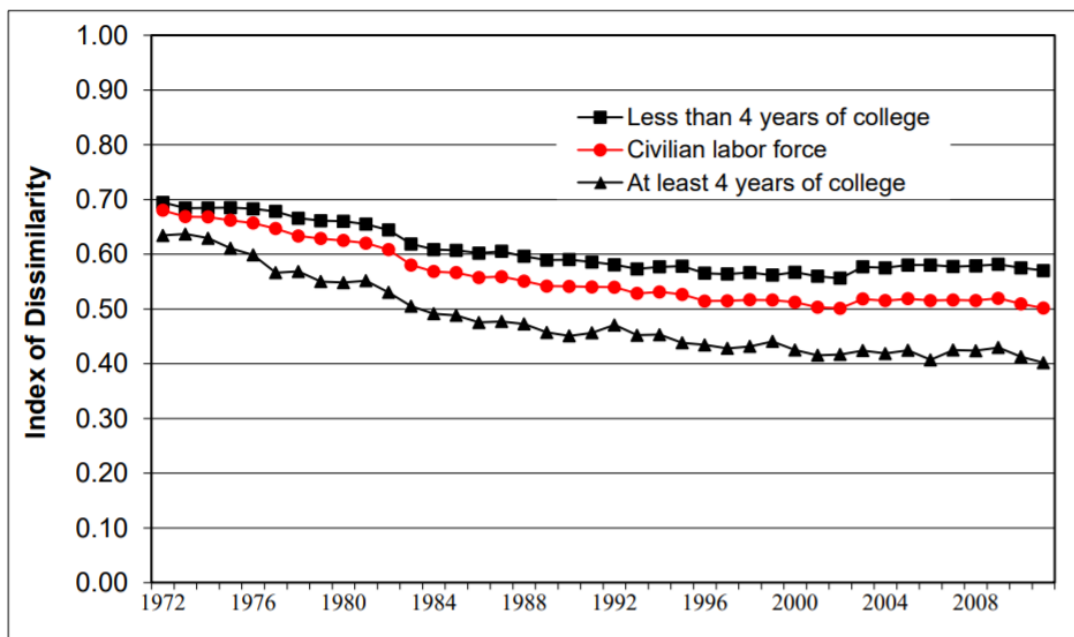
Source: Hegewisch and Hartman (2014)

- While there has been a decline, studies generally find that this has a large impact on women's wages

- It is estimated that if women with their level of education and experience had the same occupations as men, their wages would increase by as much as 3–10%

- Important to note, not all gender segregation in the labor market is directly related to discrimination

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  - ○ Individual preferences

  - ○ Some studies show women are more risk averse than men, likely to avoid occupations where pay is negotiable or related to performance

- Better measures of occupation segregation help us sort out what might be discrimination and what might not be

8.3.4   Measuring Wage Discrimination

- In practice, it is very difficult to measure what is the exact extent *pre-market discrimination* impacts choices in the labor market

- We don't have enough data on pre-market variables

- Hard to decipher what is choice vs discrimination

- If we can account for X% in regression analysis, the remaining portion can be generalized to discrimination, IF we have all the data on *pre-market discrimination*.

- Another difficult question: what does discrimination and social norms factor into pre-market characteristics (e.g., parenting, education, industry selection, etc.)
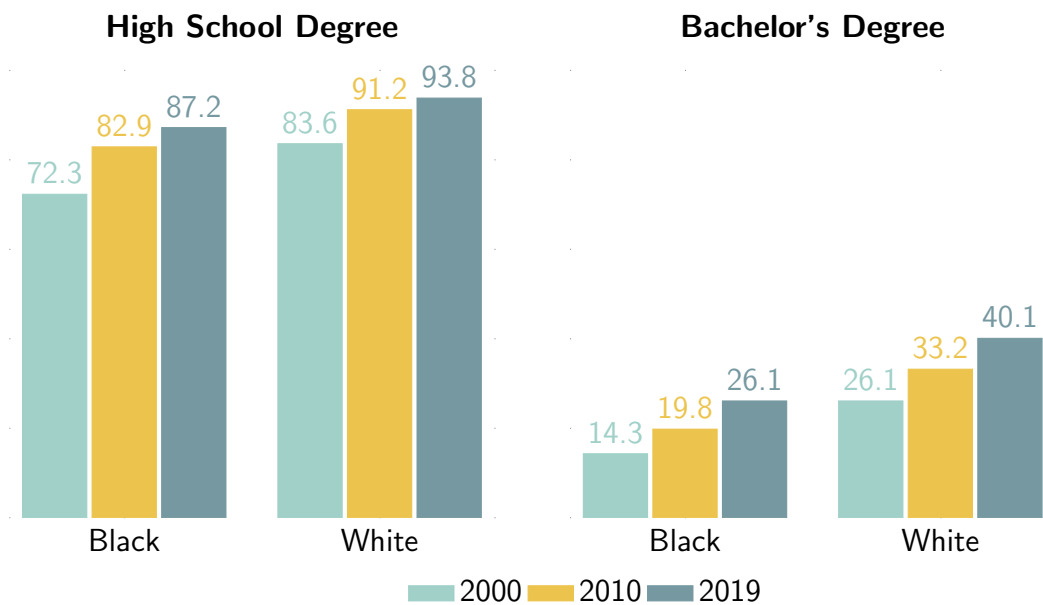
8.4   Earnings Differences by Race

Figure 4 shows that Black men earn 69.7 percent as white men and Black women earn just 60.8 percent.

- The Black-White earnings gap grew larger in 1980's

- Narrowed in the 1990's

- Was steady in the 2000's

- Great larger in the 2010's

8.4.1   Education

Figure 8.8: Educational Attainment by Race. 2019

Source: U.S. Census Bureau

As discussed in previous sections, higher levels of education typically lead to higher earnings.

- Predominately non-White school districts receive an average of $2,226 less per student than a predominately White school distinct (Lombardo, 2019)

- K-12 funding is largely through property taxes. Predominately Black neighborhoods have lower property values (due to redlining) which leads to less taxes and less funding for schools

- Less funding means fewer resources and lower graduation rates

- Lower graduation rates means fewer people go to college

- During recessions, the unemployment rate for Blacks has a larger increase than for Whites

- This greater sensitivity obsessionally shows that Blacks are typically the last hired and the first fired

8.4.2   Employment

- The employment-population ratio shows the percent of a particular demographic group that is employed or seeking work

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- Fewer Blacks work than Whites. "Discouraged" workers are typically less educated workers.

- Unemployment rate consistently higher for Blacks than Whites

- This is true even when controlling for education, age, and experience

8.4.3   Occupational and Wage Discrimination

- Occupational segregation

  ○ About half as severe between Blacks-Whites as it is Men-Women
  ○ Index of Dissimilarity around 25 (Weeden, 2019)

- Wage discrimination

  ○ Pre-market differences explain a portion of the Black-White wage gap (education, experience, occupation, etc)
  ○ One key pre-market characteristic is that is important is cognitive achievement
    – Black Americans have lower SAT scores that Whites
    – Directly related to poorer-quality schools and home/neighborhood characteristics (housing segregation, incarceration rates, etc.) (Card and Rothstein, 2007)
  ○ Lang and Manove (2011), find that *two-thirds* of the Black-White Wage Gap can be accounted for by observable characteristics
  ○ 11 percent of the pay gap could not be explained at all
    – Direct discrimination in the labor market?
    – Segregation and discrimination in pre-market characteristics?
    – Hard to determine exactly the source of the unexplained pay gap

8.5   Policies on Discrimination

- The federal government has taken two, somewhat conflicting, approached to combat the causes and effects of employer discrimination

  ○ Non-discrimination
    – Mandate that race, ethnicity, or gender should not factor into the process of hiring, promoting, or compensating workers
  ○ Affirmative Action
    – Employers are required to be conscious of race, ethnicity, and gender in their personnel decisions
    – Must ensure that protected groups are not underrepresented

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8.5.1 Equal Pay Act of 1963

- Prior to 1960's some states had laws that officially sanctioned discrimination based on gender. For an example of these laws see US Department of Labor (1936)

  ○ Limited the total weekly hours women could work

  ○ Prohibited women from working at night

  ○ Prohibited women from working during pregnancy

  ○ Prohibited women from lifting heavy objects

- This law was not an anti-discriminatory law

  ○ Law did not require equal opportunity in hiring and promotions

  ○ From our employer discrimination model: If prejudice against women from any source, employers treat women as less productive/more costly to hire than men

  ○ With discrimination, market response is for women's wages to fall below men's

  ○ *Problem:* Since law did not require equal opportunity in hiring and promotions, reduced the number of jobs available to women (Neumark and Stock, 2006)

8.5.2 Title VII of the Civil Rights Act

- Unlawful for any employer "to refuse to hire or discharge any individual, or otherwise to discriminate against any individual with respect to his compensation, terms, condition, or privileges of employment because of such individuals race, color, religion, sex, or national origin."

- Enforced by the courts, and plaintiffs are allowed to file *class action lawsuits*

  ○ Disparate Treatment Standard

    – If individuals a treated different based on race, color, religion, sex, or national origin

    – Policies that appear to be "neutral" with respect to race can perpetuate effects of past discrimination

      * Example: Work of mouth recruiting (a seemingly neutral policy) in a company with a primarily white workforce would be suspect under Title VII, even if hiring was done on a non-discriminatory basis

  ○ Disparate Impact Standard

    – This standard is all about the result, not the approach

    – Policies that appear to be neutral but lead to different effects by race, gender, etc. are prohibited under Title VII

    – Courts have become interested in the race and gender composition of those selected for employment, promotion, and termination compares to the pool of workers available for selection

      * *Challenges:* Who should be included in a companies pool of available workers? What is a statistically acceptable difference?

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8.5.3   Effectiveness of Federal Anti-discrimination Programs

- Programs are largely concentrated on within-firm discrimination

- What to do about occupational segregation?

- Ratio of Black-White incomes has decreased since the 1960's, but has not since 2000

- Labor force participation for Blacks and Women still below that of White Men

- Educational attainment and quality of schooling has played a huge role

8.6   Policy Reform Activity

It has been decades since any major legislation has been passed to address these issues. Using what we have covered in class, answer the following questions:

1. Currently, what are the major issues impacting the gender pay gap and Black-White pay gap?

2. Do you feel the current policies are adequate? Why or why not?

3. Using your answers to Question 1, what policy reforms, new policies, or targeted expenditure could help address the gender pay gap?

4. Using your answers to Question 1, what policy reforms, new policies, or targeted expenditure could help address the Black-White pay gap?

5. Using your answers to Questions 3 and 4, what political obstacles need to be overcome to implement your ideas?

INCOME INEQUALITY

- Workers care about their level of income and their dispersion of income.

- Level of income measures how many goods and services people can consume and enjoy.

- Dispersion of income measures where an individuals level of income is relative to others in society (i.e., a ranking).

- Figure 9.1 shows the distribution of different dispersions of income.
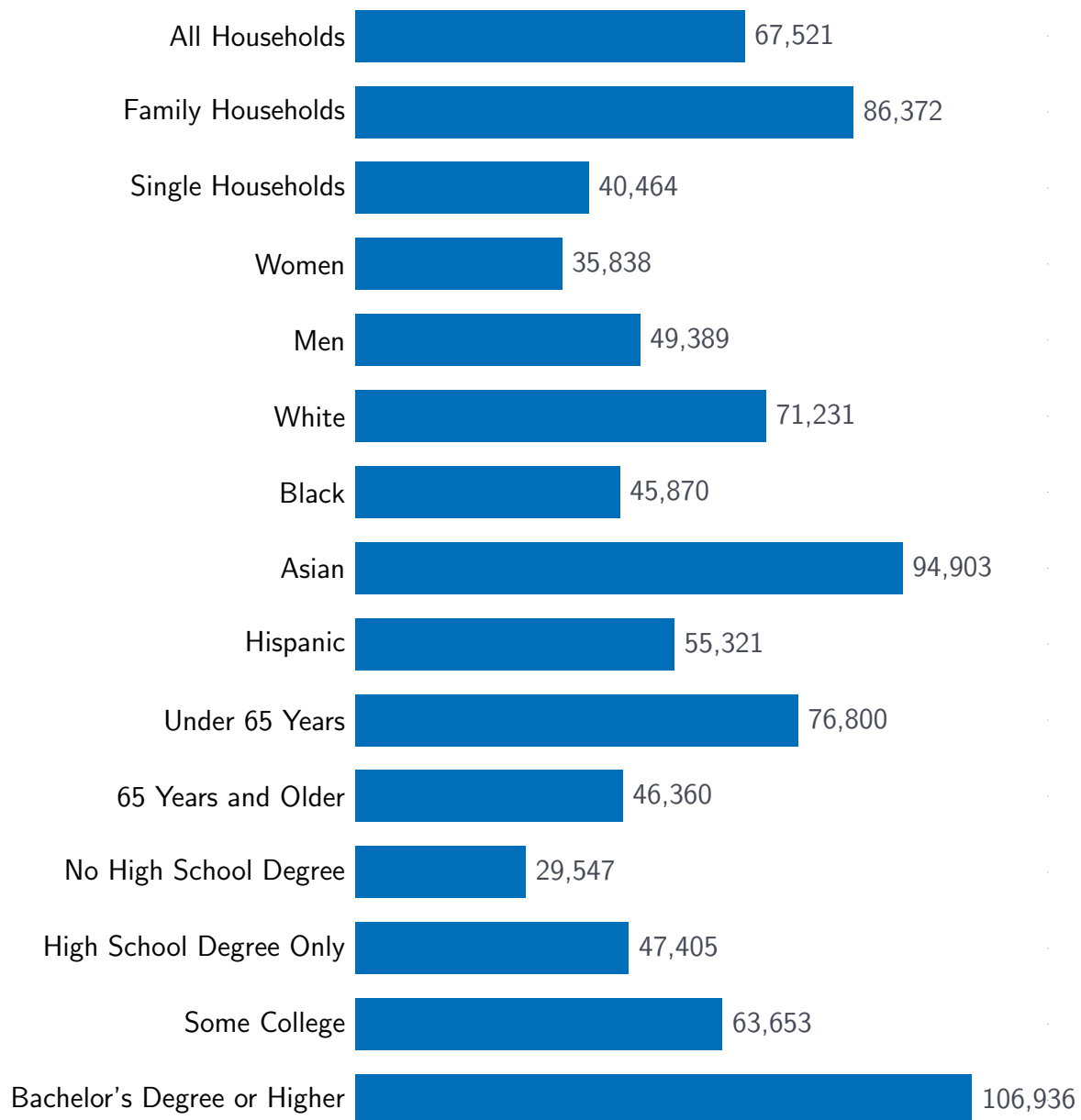
Figure 9.1: Income Dispersion
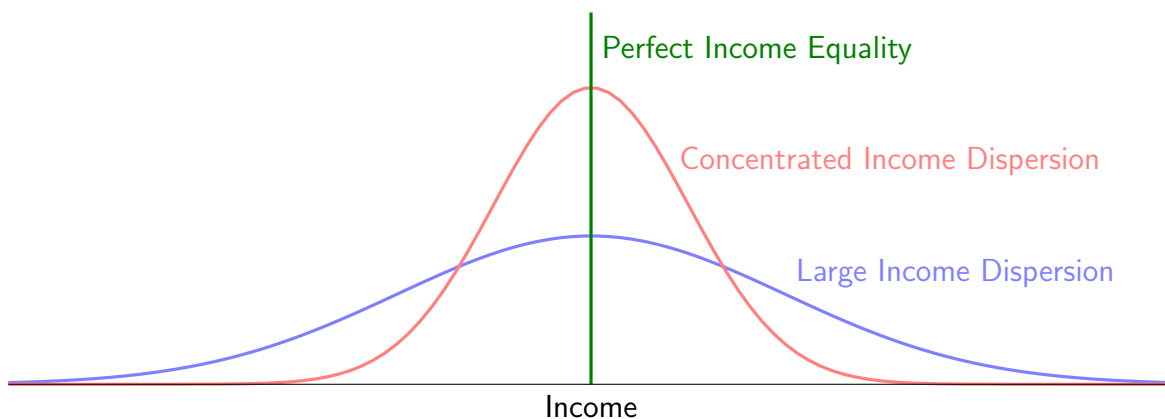
- Economists care about making sure that the level of income increases as worker productivity increases and to cover cost of living increases.

- Economists also care about the dispersion of income.

  ○ If income is too equal, there is no incentive to work hard because no matter how hard someone works, the cannot increase their income.

  ○ If income is too unequal, there is no incentive to work hard because the gap between the rich and the poor is so large, no level of effort would allow someone to increase their income into another bracket.

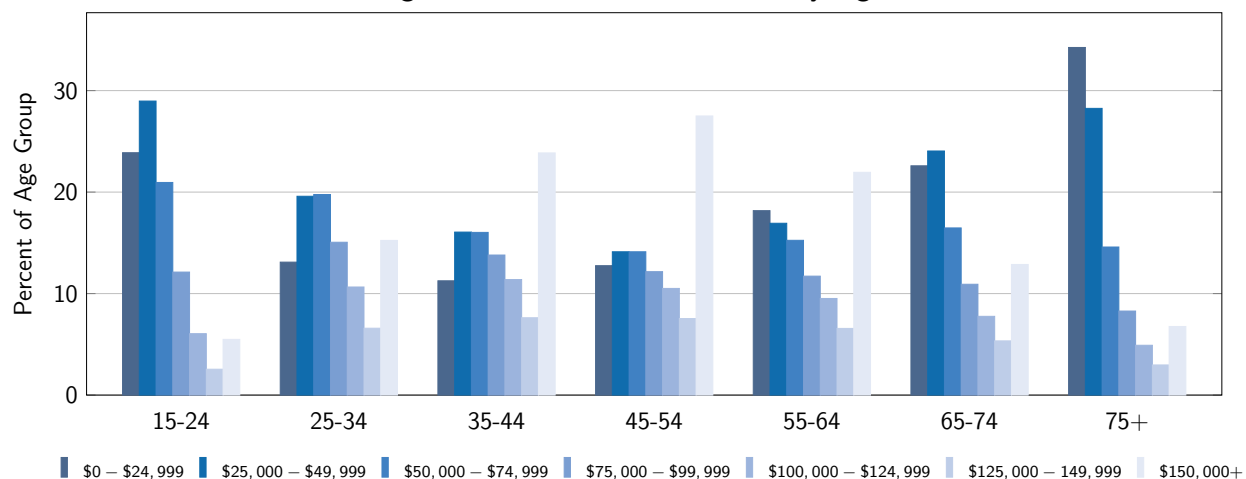   – When this happens there is often social unrest.

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9.1 Income in the United States

Figure 9.2: Median Household Income by Selected Characteristics, 2020

Characteristic	Median Household Income
All Households	67,521
Family Households	86,372
Single Households	40,464
Women	35,838
Men	49,389
White	71,231
Black	45,870
Asian	94,903
Hispanic	55,321
Under 65 Years	76,800
65 Years and Older	46,360
No High School Degree	29,547
High School Degree Only	47,405
Some College	63,653
Bachelor's Degree or Higher	106,936

Source: US Census Bureau (2021)

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Figure 9.3: Income Distribution by Age

Source: U.S. Census Bureau (2021), Tim Murray.

# 9.2   Measuring Income Inequality

9.2.1   The Lorenz Curve

- To measure income inequality, we need to arrange every individual income in the United States from smallest to largest.

- Then we need to split this into equal groups.

   - The most common number of groups is five.

   - These groups are called income quintiles.
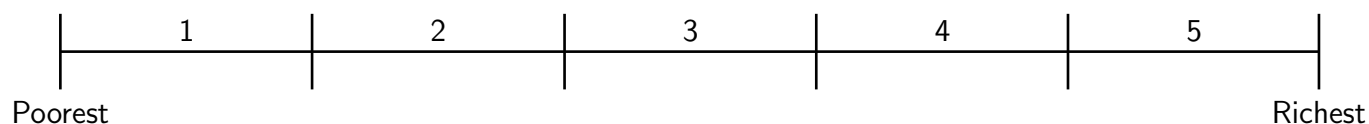
- Each quintile contains 20% of the population.

   - Quintile 1 contains the lowest 20% of income earners.

   - Quintile 3 contains the middle 20% of income earners.

      - This is the "middle class."

   - Quintile 5 contains the highest 20% of income earners.

- One metric that is used to measure income inequality is the Lorenz Curve.

- The Lorenz Curve is a graphical representation of the distribution of income.

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   ○ It what percent of total income (the y-axis) is made by the bottom x% of the
     population or specific income quintiles (the x-axis).

Figure 9.4: The Lorenz Curve
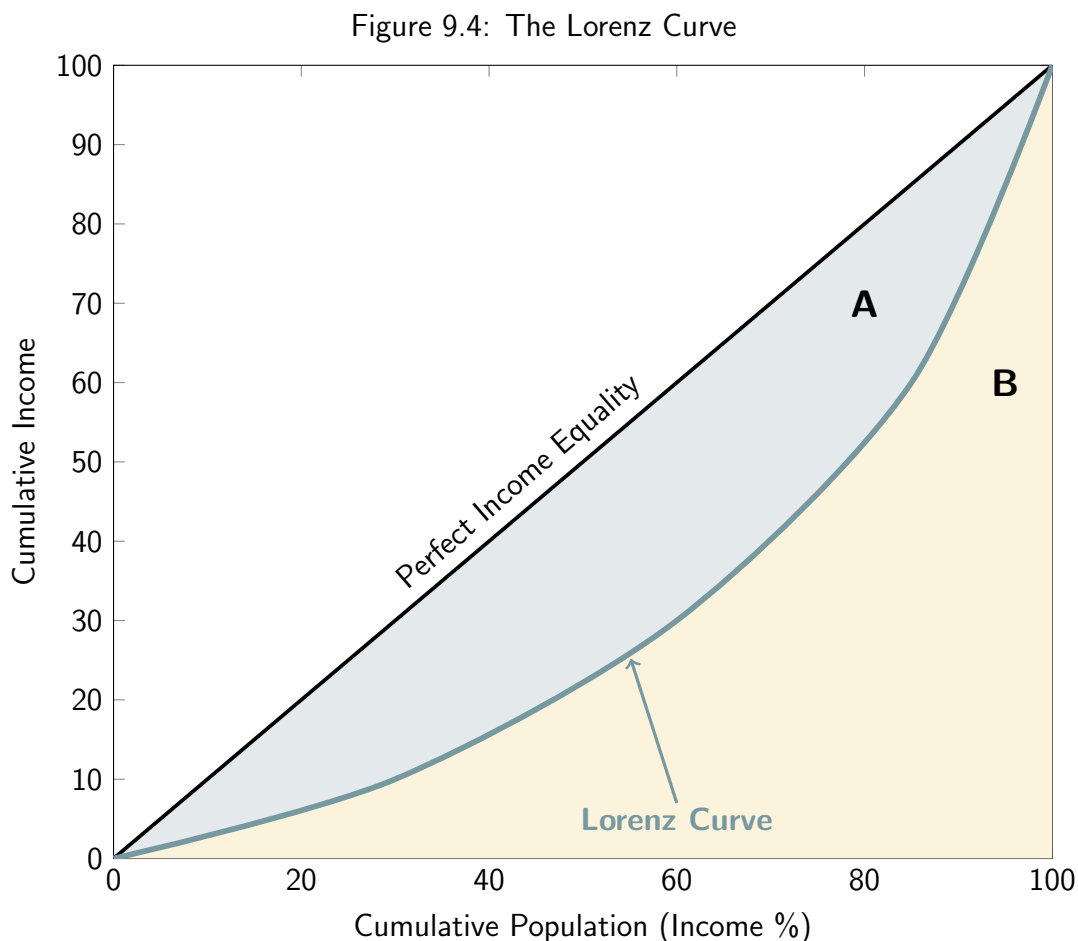
- The 45° line represents perfect income equality (i.e., every person makes the same
  income).

- The Lorenz Curve shows how far away a county is from perfect income equality.

   ○ It can also show if income is very heavily skewed to certain income quiltiles.

- The further the Lorenz Curve is from the 45° line of perfect income equality, the larger
  more spread out income is or that a larger share of total income is earned by fewer people.

9.2.2   The Gini Coefficient

- Another metric that is commonly used to measure income inequality is the Gini
  Coefficient.

- The Gini Coefficient ranges from 0 to 1.

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○ 0 means that there is perfect income equality (everyone has the same income).

○ 1 means that all the income is earned by just one person.

- The Gini Coefficient can be calculated using the areas from the Lorenz Curve seen in Figure 9.4:

$$Gini = \frac{A}{A+B} \tag{9.1}$$

9.2.3 The Lorenz Curve and Gini Coefficient for the United States

- We can use data from the US Census Bureau to draw the Lorenz Curve and show the Gini Coefficient for the United States.

- Figure 9.1 shows the income qunitiles for the United States.

Table 9.1: Income Quintiles for the United States, 2021

Quintile	Lower Threshold	Upper Threshold
Lowest	$0	$28,006
Second	$28,007	$54,999
Middle	$55,000	$89,743
Fourth	$89,744	$149,130
Highest	$149,131	∞
Top 5%	**$286,304**	∞

Source: US Census Bureau (2022)

- Table 9.2 shows the percent of the total income earned in the United States by income quintile.

○ For example, in 2020, the bottom 20% of income earners earned 3.4% of all the income in the United States while the top 20% earned 50.8%.

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Table 9.2: Percent of Total Income by Quintile

| Quintile	1967	1980	2020
Lowest	4.0	5.2	3.4
Second	10.8	11.6	8.9
Middle	17.3	17.3	14.5
Fourth	24.2	24.0	22.4
Highest	43.8	41.9	50.8

Source: Shrider, Kollar, Chen, and Semega (2021)

- Using the data from Table 9.2, we can draw the Lorenz curves for the United States, seen in Figure 9.5.

Figure 9.5: Lorenz Curve for the United States
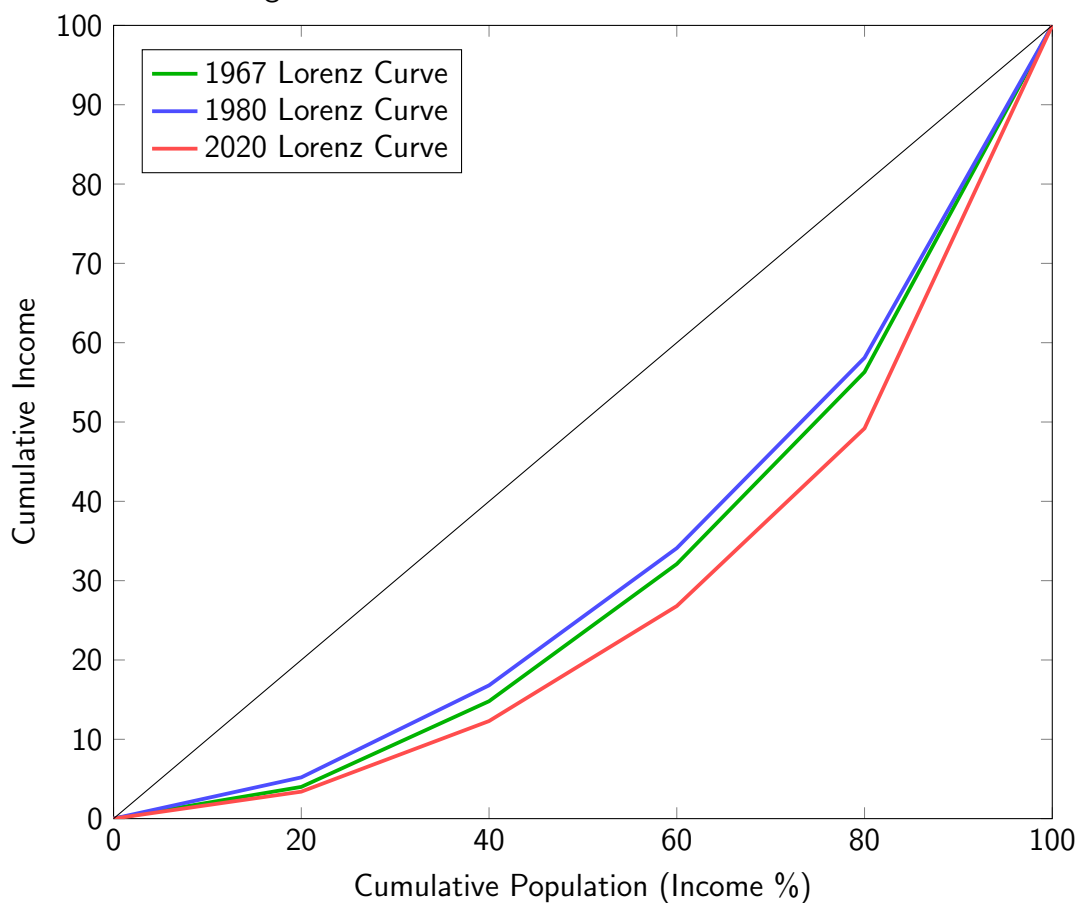
- Figure 9.6 shows the Gini Coefficient for the United States.

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Figure 9.6: Gini Coefficient for the United States, 1980–2022
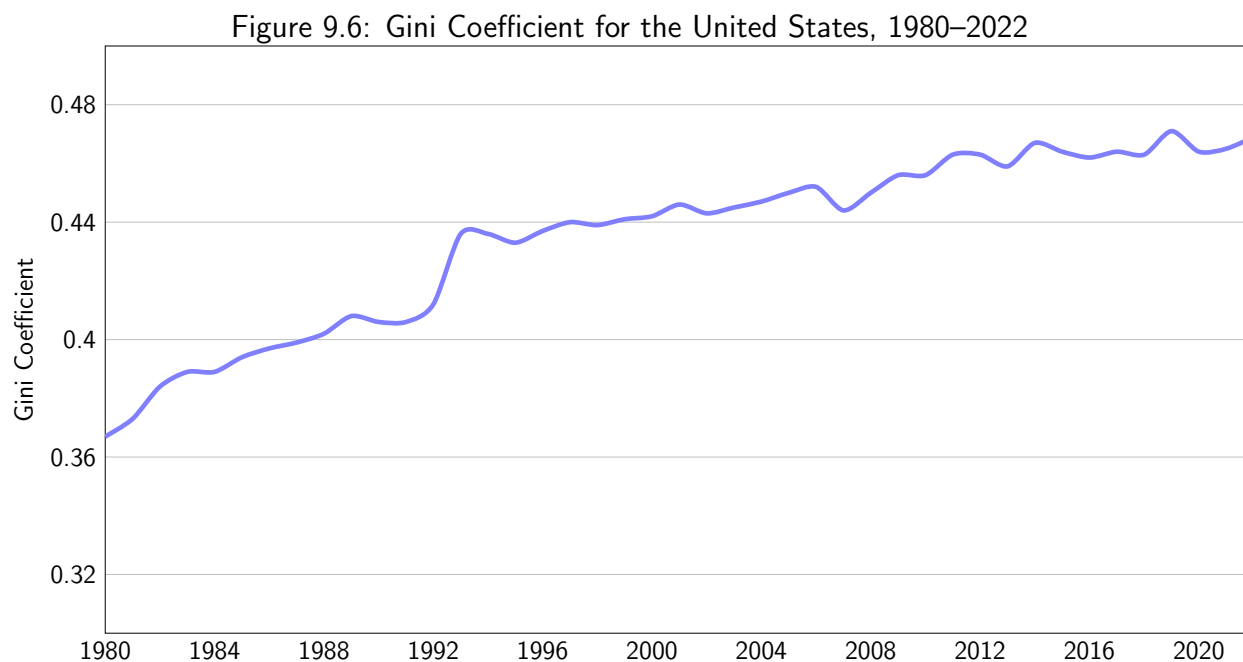
Source: US Census Bureau (2021), Tim Murray.

- Both the Lorenz Curve and the Gini Coefficient show that income inequality has been increasing in the United States over the last several decades.

9.3   Drivers of Income Inequality in the United States

9.3.1   Education and Technology

- Earlier, we showed that those with higher amounts of human capital have higher earnings.

- Over the last several decades, there has been an increase in the demand for high-skill workers as technology has advanced.

- Employers want to hire workers who know how to use that technology and college educated workers are more likely to be able to do so.

- Figure 9.7 shows that this increase in demand will lead to an increase in wages and Figure 9.8 shows that this is true when looking at data for the United States as real wages have increase for workers with a Bachelor's degree or higher but have remained stagnant for those with a high school degree.
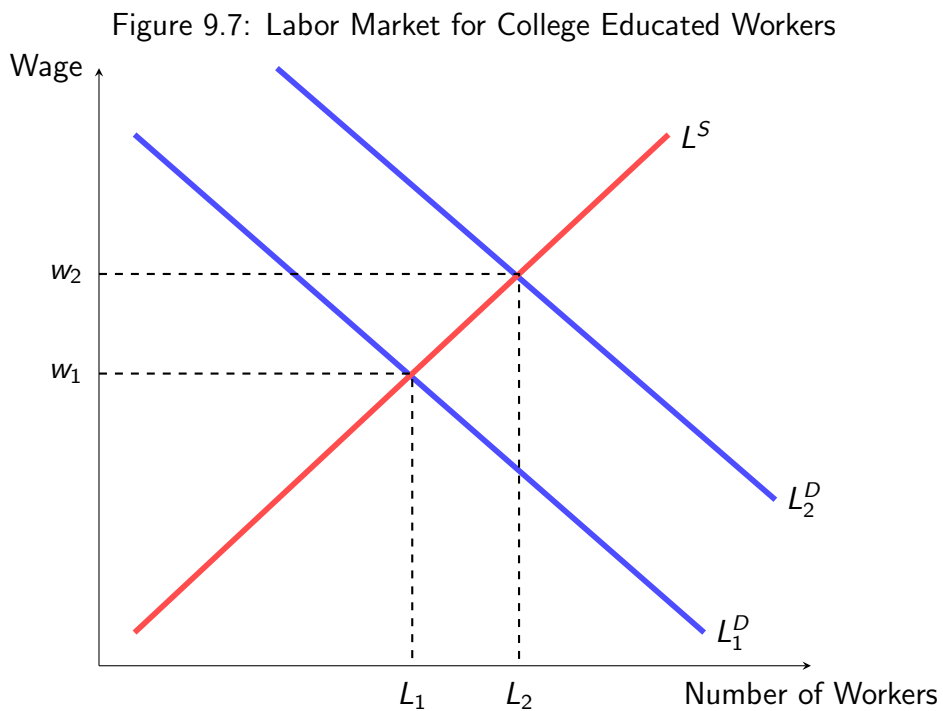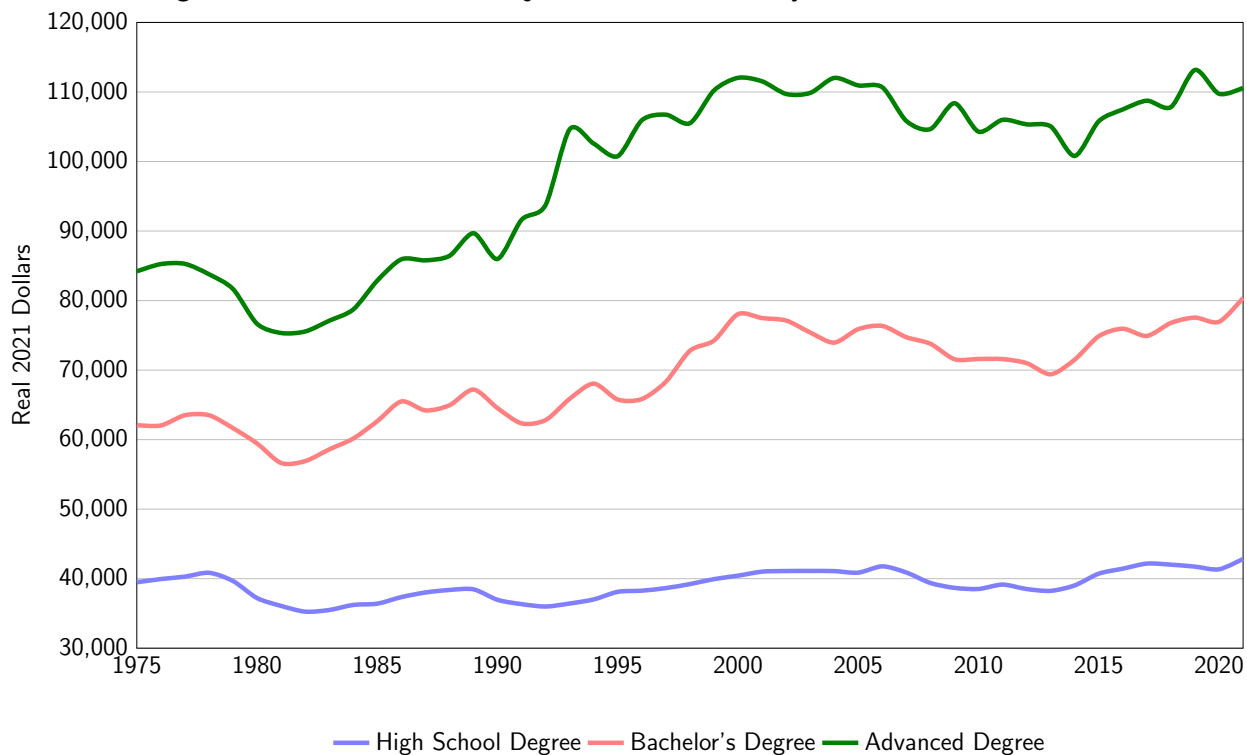
Figure 9.7: Labor Market for College Educated Workers

Figure 9.8: Mean Income Adjusted for Inflation by Education, 1975–2021

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9.3.2   Immigration

- There are multiple reasons why real wages for high school educated workers have remained flat since the 1970's.

- One cause of this is the increase in low skill immigration.

- As we showed earlier, an increase in immigration increases the supply of low skill workers will lower the wage in the low skill labor market, in which high school graduates are most likely to participate in.

- If the increase in supply roughly keeps up with the increase in demand for low skill workers, then over time there will not be a change in the wage.

- It is important to note that immigration is only one of the reasons real wages have remained flat for high school graduates. Many immigrants that come to the United States are highly educated not all low skill workers see decreases in wages due to immigration, as we noted in a previous chapter.

9.3.3   Changes in Institutional Forces

- There are two other factors that are likely also factors in real wage stagnation for high school graduates.

  - There has been a decline in unionization of the last several decades.
  - Minimum wage increases have not kept up with productivity increases and wage increases for the rest of the wage distribution.

9.4   Tax Policy in the United States

One of the ways to address income inequality is through taxes. Before we can talk about different ways the tax code could be used for this, we need to discuss how the tax system in the United States works. Federal, state, and local governments collect taxes in a variety of ways

- Income taxes – Taxes paid on income

- Capital gains taxes – Taxes paid on long-term capital gains

- Consumption taxes (sales taxes)

- Estate taxes (inheritance taxes) – collected at death

- Wealth taxes – Taxes on net wealth (assets–debts)

- Corporate taxes – taxes on corporate profits

- Payroll taxes – Tax that funds Social Security and Medicare, paid by employers and employees

- Property taxes – taxes houses, cars, boats, etc.

- Excise taxes – taxes levied on the sale of specific goods (gas, tobacco, marijuana, etc.)

- Topics in this section:

  ○ Understanding average tax rates

  ○ Exploring tax policy with historical context

  ○ Tax policy options in the 21st century to combat growing income inequality

9.5   Average Tax Rates

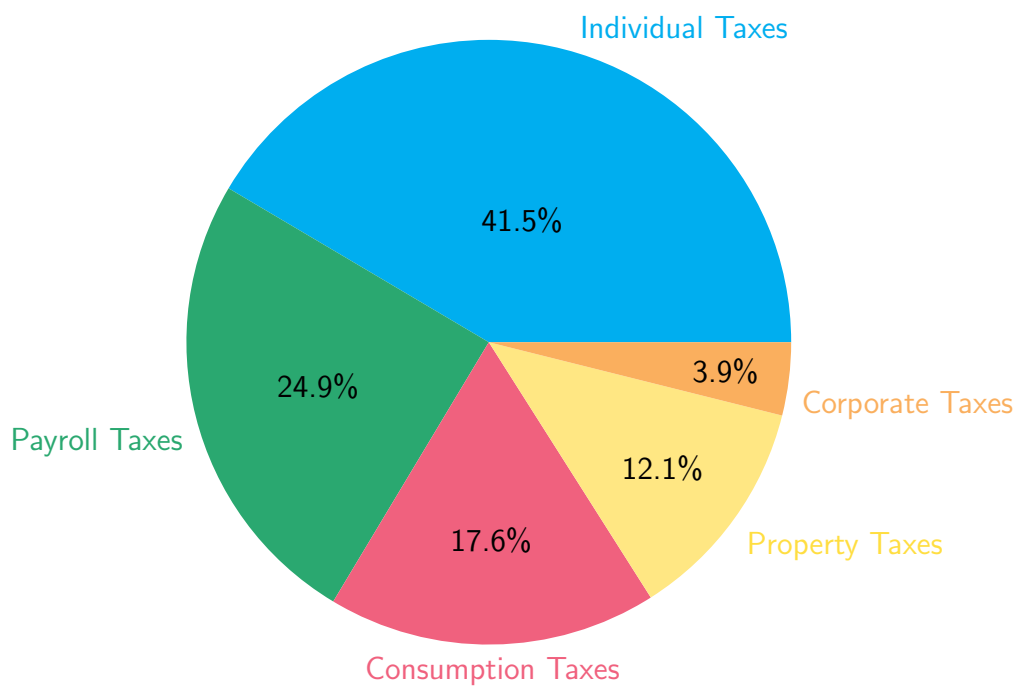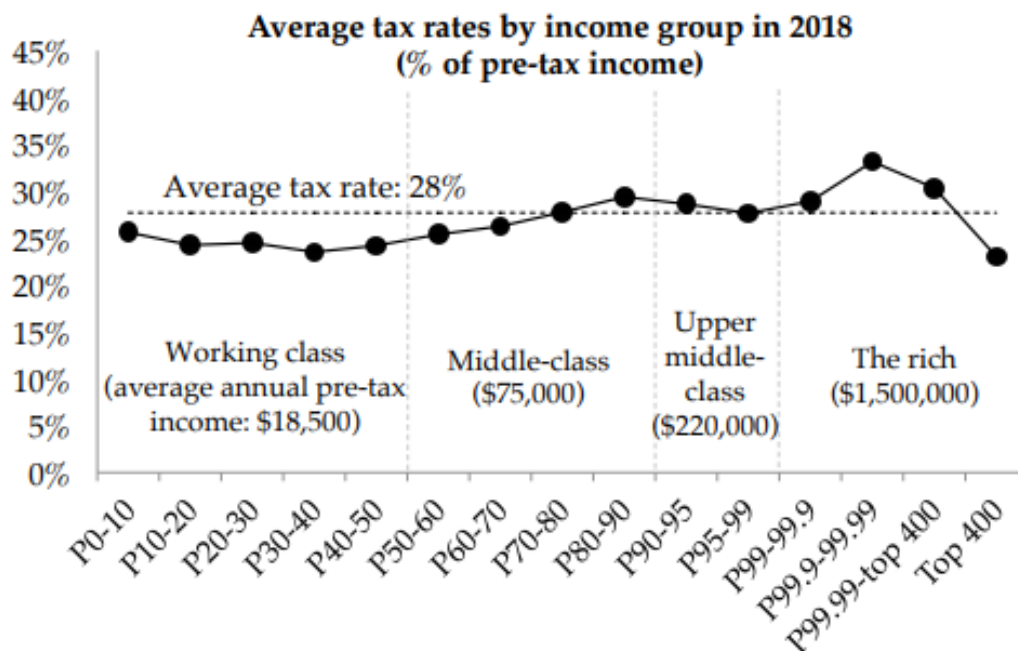Figure 9.9: Sources of Tax Revenue for Federal, Local, and State Governments, 2019
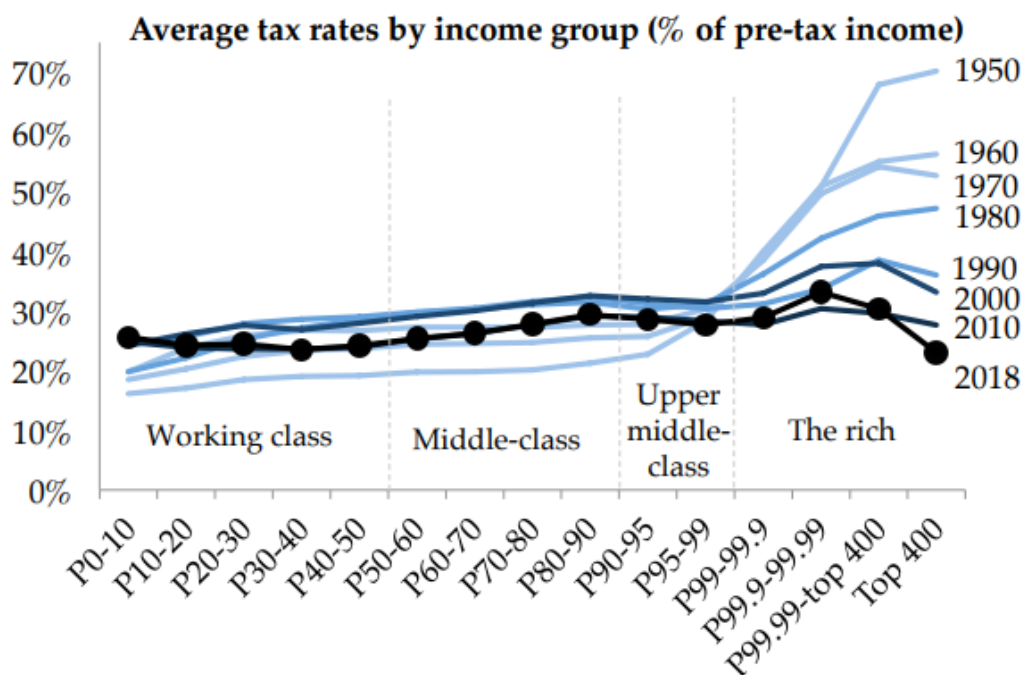
Figure 9.10: Average Tax Rates in the United States, 2018

Average tax rates by income group in 2018
(% of pre-tax income)

Average tax rate: 28%

Working class
(average annual pre-tax
income: $18,500)

Middle-class
($75,000)

Upper
middle-
class
($220,000)

The rich
($1,500,000)

P0-10 P10-20 P20-30 P30-40 P40-50 P50-60 P60-70 P70-80 P80-90 P90-95 P95-99 P99-99.9 P99.9-99.99 P99.99-top 400 Top 400

Source: Saez and Zucman (2019)

Figure 9.11: Average Tax Rates in the United States, 1950-2018

Average tax rates by income group (% of pre-tax income)

1950
1960
1970
1980
1990
2000
2010
2018

Working class

Middle-class

Upper
middle-
class

The rich

P0-10 P10-20 P20-30 P30-40 P40-50 P50-60 P60-70 P70-80 P80-90 P90-95 P95-99 P99-99.9 P99.9-99.99 P99.99-top 400 Top 400

Source: Saez and Zucman (2019)

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Figure 9.12: Average Tax Rates in the United States for Top Earners, 1960-2018
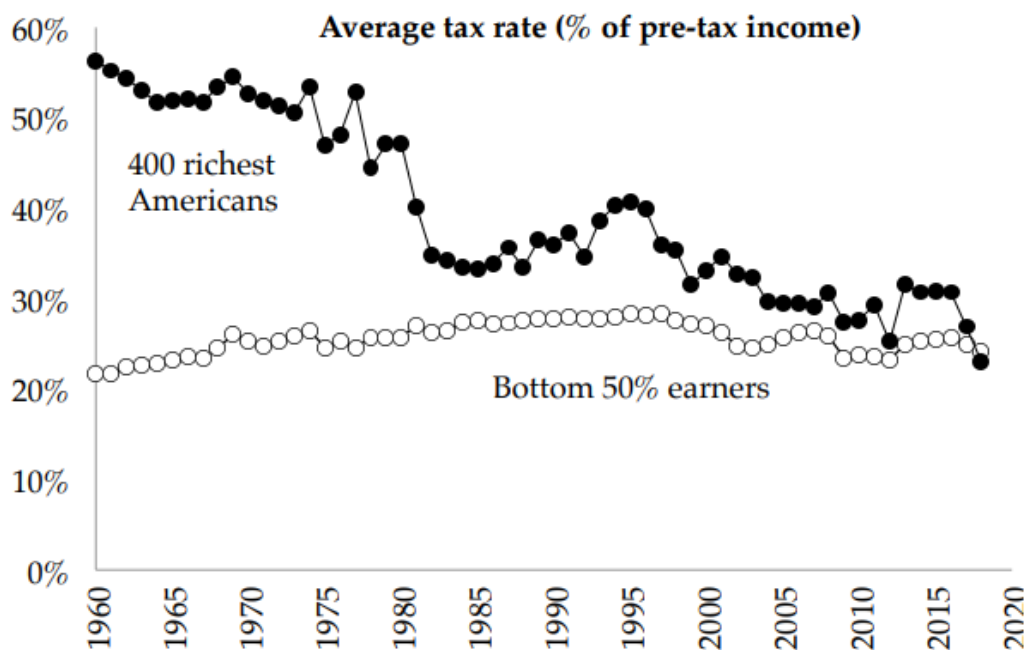
Source: Saez and Zucman (2019)

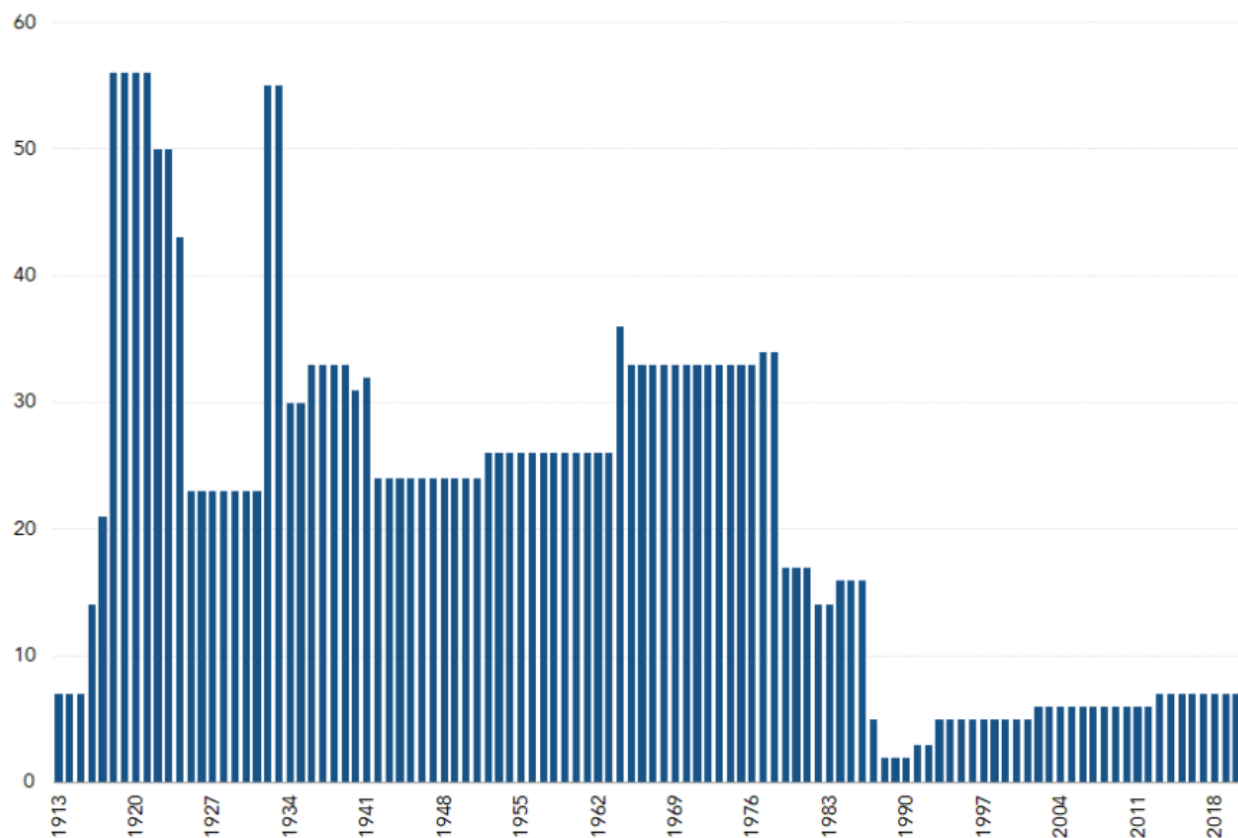## 9.6   Income Taxes

Table 9.3: Marginal Tax Rates in the United States (Individual), 2020

If Taxable Income is Between:	The Tax Due Is:
0–$9,875	10% of taxable income
$9,876–$40,125	$987.50 + 12% of amount over $9,875
$40,125–$85,525	$4,617.50 + 22% of the amount over $40,125
$85,526–$163,300	$14,605.50 + 24% of the amount over $85,525
$163,301–$207,250	$33,271.50 + 32% of the amount over $163,300
$207,351–$518,400	$47,367.50 + 35% of the amount over $207,250
$518,400 and above	$156,235 + 37% of the amount over $518,400

Source: IRS

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Figure 9.13: Number of Tax Brackets in the United States, 1913-2020

Source: Tax Policy Center

- Tax code is progressive in the sense that people that have higher incomes pay a larger portion of their incomes in taxes

  ○ The tax code today is less progressive than in the past

- The number of tax brackets was over 30 in the 1970 compared to 7 today

- The top marginal tax rate has decreased substantially over time

- Many wealthy households do not make all of their money from income taxes, therefore their average tax rate is often lower making the tax code regressive in nature

Figure 9.14: Highest Marginal Tax Rate in the United States, 1913-2020

Source: Tax Policy Center
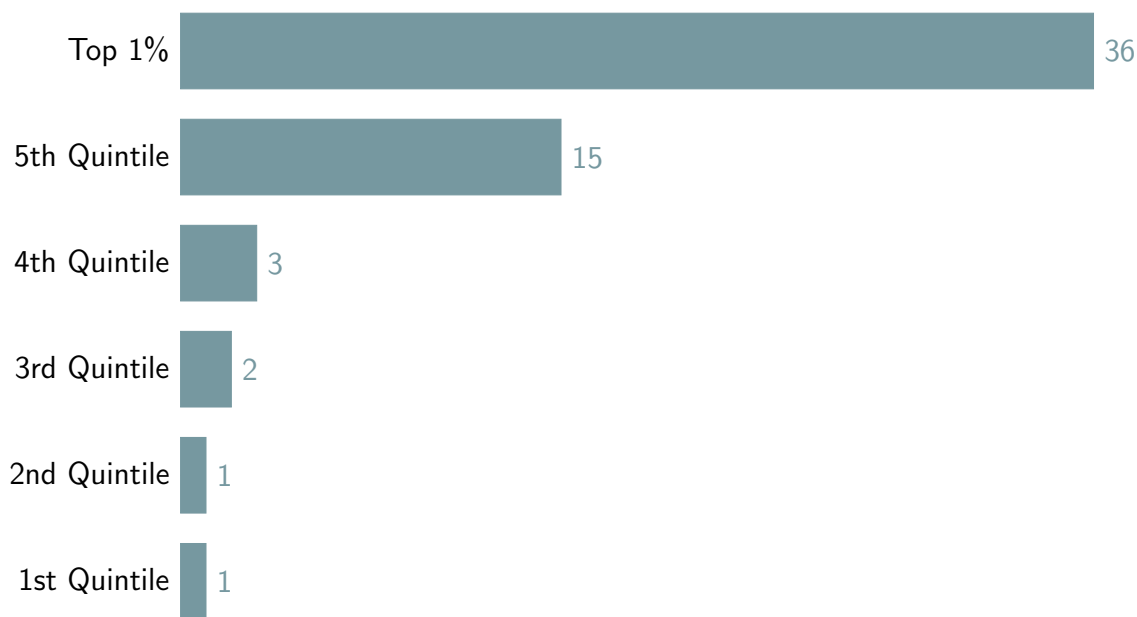
9.7   Capital Gains Taxes

- A capital gains tax is a tax on the growth in the value of investments incurred when those investments are sold on assets held more than one year

- Short-term profits from the sale of investments that have been held for less than one year are taxed as ordinary income

- Capital losses can be rolled forward in subsequent years to reduce income and lower tax burden

Table 9.4: Capital Gains Tax Rates in the United States (Individual), 2020

If Income is Between:	Tax Rate:
0–$40,000	0%
$40,001–$441,450	15%
$441,451 and over	20%

Source: IRS

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Figure 9.15: Percent of Total Income from Capital Gains

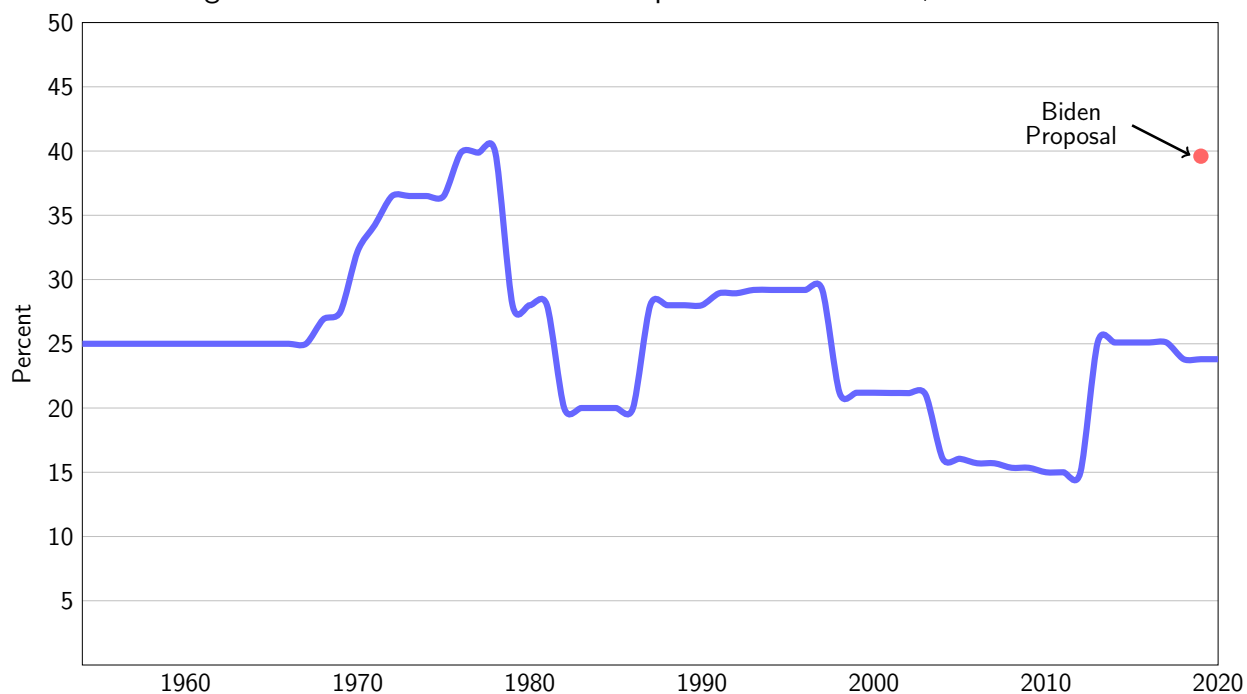| Category	Value
Top 1%	36
5th Quintile	15
4th Quintile	3
3rd Quintile	2
2nd Quintile	1
1st Quintile	1

Source: Congressional Budget Office

Figure 9.16: Mean Income by Quintile (Adjusted for Inflation), 1967-2019
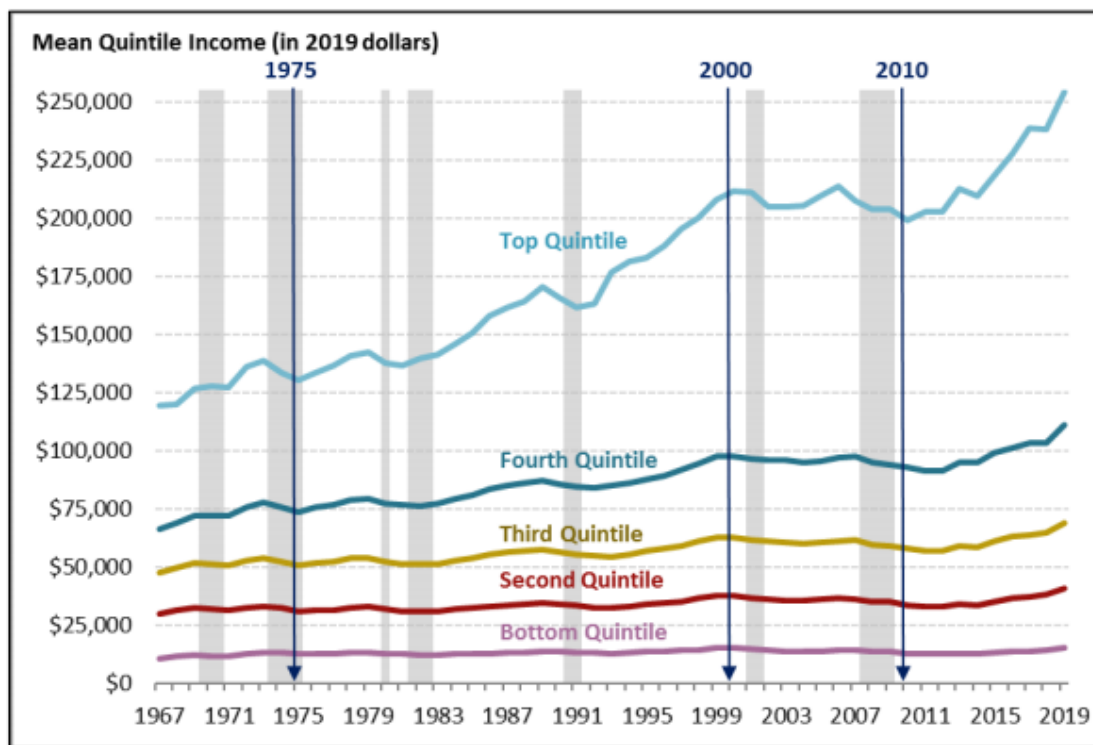
Source: Congressional Research Service

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Figure 9.17: Historical Maximum Capital Gains Tax Rate, 1954-2020

Source: U.S. Department of the Treasury, Authors Calculations

**Note:** The maximum tax rate includes the 3.8 percent tax on net investment income starting in 2013

- Biden capital gains tax proposal

  ○ For households with income over $1 million, increase the capital gains rate to 39.6%

Table 9.5: Biden Capital Gains Tax Proposal

If Income is Between:	Tax Rate:
0–$40,000	0%
$40,001–$441,450	15%
$441,451 $1,000,000	20%
$1,000,001 and over	39.6%

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9.8   Consumption Taxes

Figure 9.18: Sales Tax Rates by State, 2020
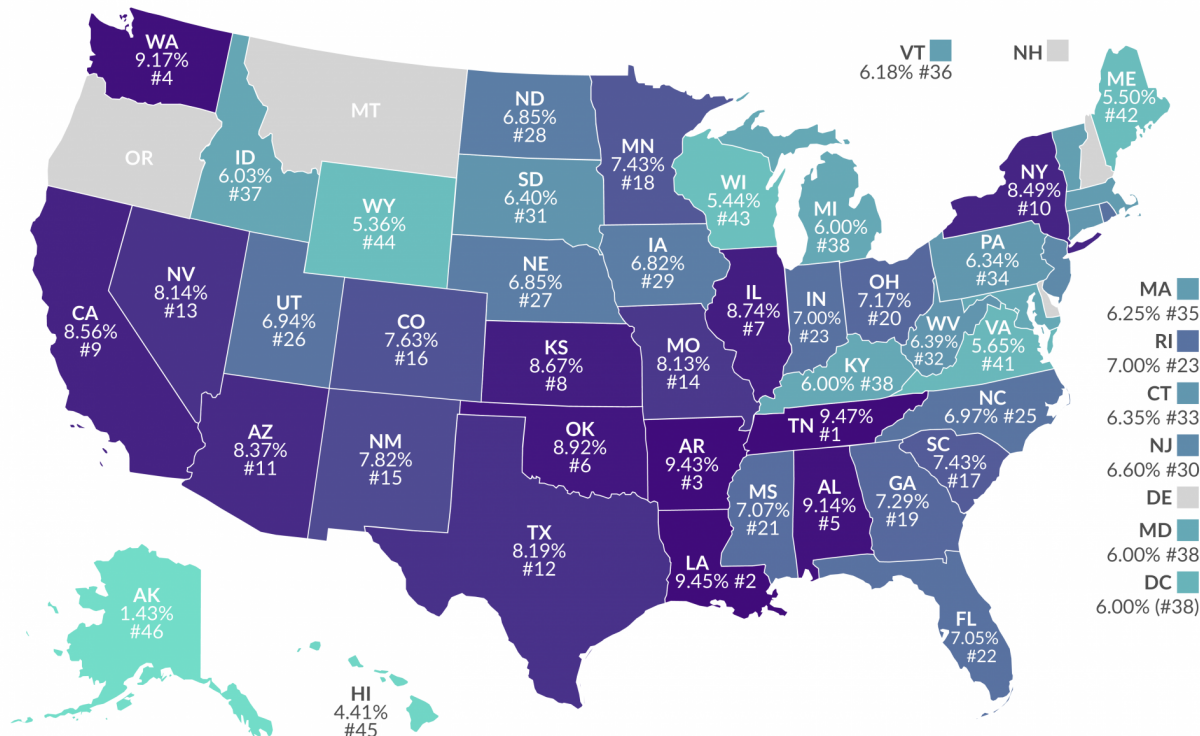
Note: City, county, and municipal rates vary. These rates are weighted by population to compute an average local tax rate. Three states levy mandatory, statewide, local add-on sales taxes at the state level: California (1.25%), Utah (1.25%), and Virginia (1%); we include these in their state sales tax. The sales taxes in Hawaii, New Mexico, and South Dakota have broad bases that include many services. Special taxes in local resort aresas are not counted here. Salem County, N.J. is not subject to the statewide sales tax rate and collects a local rate of 3.3125%. New Jersey's local score is represented as a negative. D.C.'s rank does not affect states' ranks, but the figures in parentheses indicate where it would rank if included.

Source: Sales Tax Clearinghouse, Tax Foundation calculations, State Revenue Department websites

Source: Tax Foundation

- Sales taxes are collected at retail level at time of the final sale

- Value Added Tax (VAT) is a tax that is collected by sellers at each stage of the supply chain

- They are a tax on what you buy instead of what you make

- The United States does not have a federal consumption tax, but many states and local government do

- Consumption taxes can be regressive

  ○ Lower-income households tend to spend a higher proportion of their income and therefore more of their income gets taxed

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- Some economists propose a national VAT on certain items

9.9   Wealth Taxes

- An annual tax on net wealth (total assets - debts)

- Property taxes and estate taxes are a form of wealth tax

  - Property taxes imposed by local governments
  - Estate taxes imposed by federal government at death

- Saez and Zucman (2019) proposal:

  - 2% wealth tax above $50 million
  - 3.5% wealth tax above $1 billion
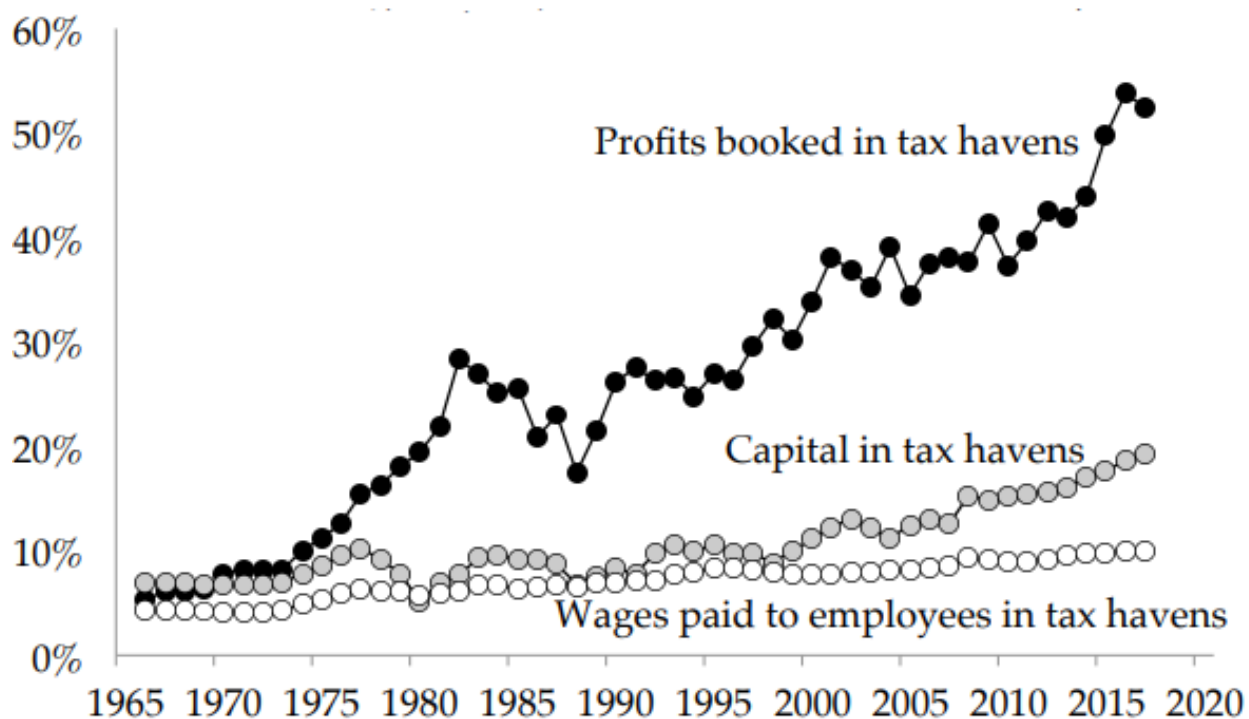 - Would only affect top 1% of income earners, around 70,000 people

Figure 9.19: Average Tax Rates with Saez and Zucman (2019) Proposal
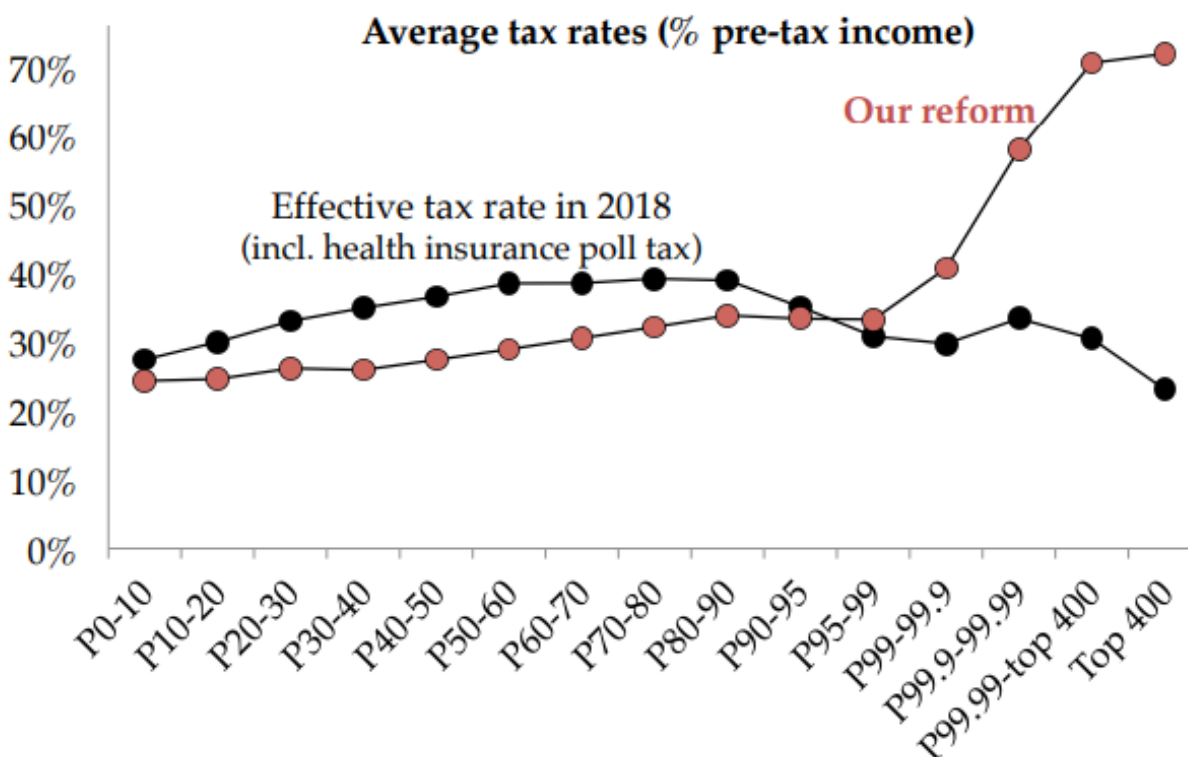
Source: Saez and Zucman (2019)

- Criticism and challenges for wealth taxation

    ○ Difficult to enforce, would require increased work from IRS to ensure accurate reporting

    ○ The existence of tax havens and shelters

    ○ Reforming the capital gains tax make accomplish many of the goals of a wealth tax and be easier to implement

Figure 9.20: Income in Tax Havens, 19565-2020

Source: Saez and Zucman (2019)