Econ 101: Quiz 3 - Review

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1 Labor Market

1.1 Labor Demand

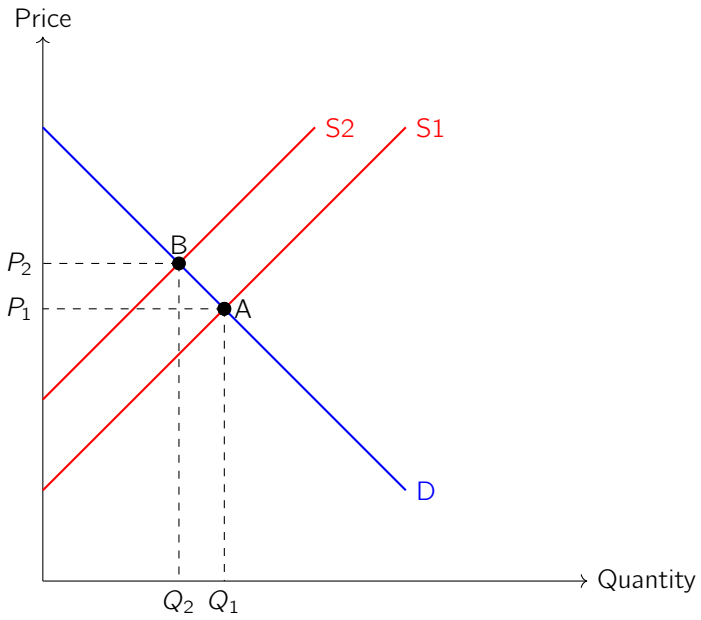
- **Marginal Product of Labor:** Extra production for each additional worker.
  - Marginal Benefit = Marginal Cost $\Rightarrow$ Marginal Revenue of Labor = Wage.
- **Shifts on Labor Demand:**
  - Changes in demand for your product. Ex.: In the summer, people want to buy more ice cream, so the ice cream stores hire more people.
  - Scale. Ex.: A larger firm has more capital (machines) and needs more workers to operate those machines.
  - Substitution Effect. Ex.: AI is substituting some workers.
  - Productivity. Ex.: If a firm buys a new machine, it needs another worker to operate this machine.
  - Non-Wage Benefits. Ex.: The firm has other costs besides the wage that it is paying to the worker.

1.2 Labor Supply

- **Substitution Effect:** Higher salaries make work more attractive.
  - The idea is that with higher salaries, you can compensate the disutility of working more.
- **Income Effect:** Higher salaries make you work less.
  - The idea is that since you also value leisure, if you have a higher hourly salary,you can work less and receive the same amount.
- **Shifts on Individual Labor Supply**
  - Other uses of time. Ex.: Instead of working, you decide to study.
  - Other sources of income. Ex.: You invest your money so you can retire early.
  - Need for more money. Ex.: Suppose you have a child, then you need more money.
- **Shifts in Market Labor Supply**
  - Increase in wages in other sectors. Ex.: If Data Science pays more than economics. Then some people will switch to the Data Science sector.
  - Changing number of potential workers.

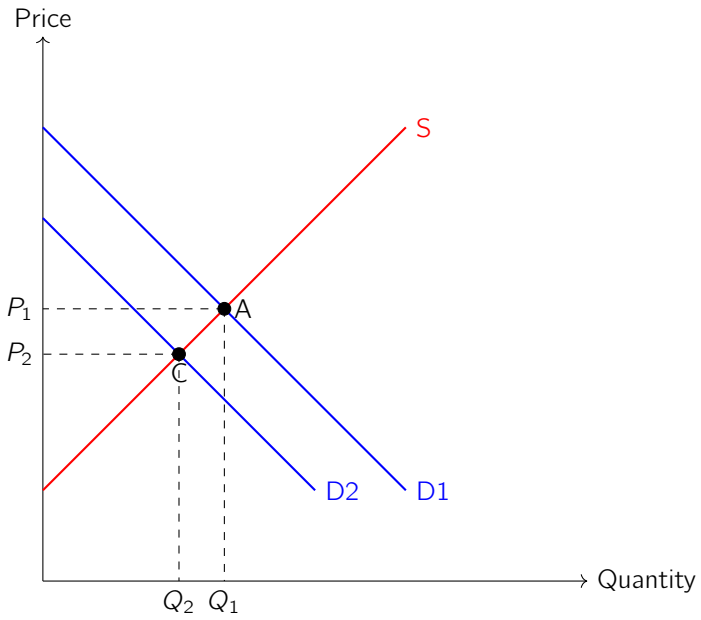
1.3 Equilibrium

Increase in Data Science wages



Less People wants to work in Economics

Lower Ice Cream Demand



Ice cream stores will hire less workers

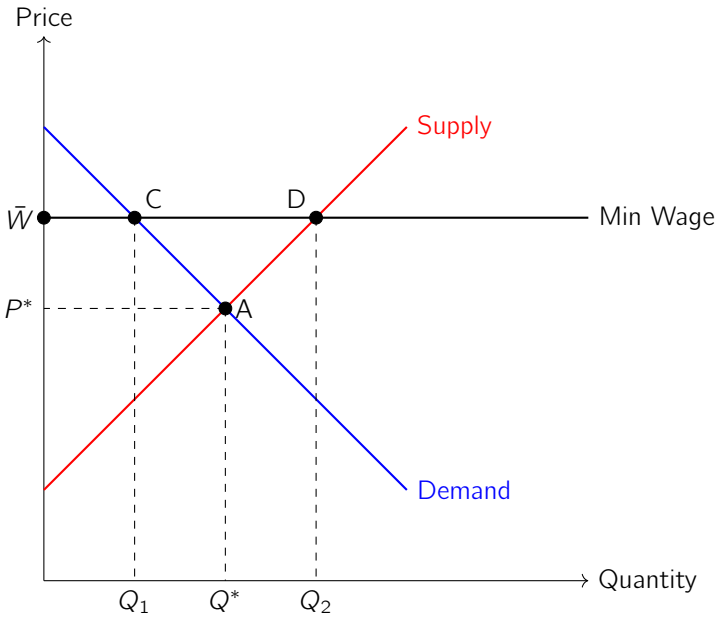
1.4 Compensating Differences

- Some jobs pay more to compensate undesirable aspects of the job
  - Working with X-ray machines can lead to health issues
- **Efficiency wages:** When the company hire someone they train the new worker to the job. To avoid losing the worker and having to train a new worker, th offer a high salary.

1.5 Occupational Licensing / Unions

- **Unions:** Unions advocate to increase the workers wage. The increase on wage increase the cost for the firms. Labor Demand Shift to the right resulting in less people being hired
- **Occupation Licensing:** This makes harder for other workers to enter the market resulting in the supply shifting to the left and increasing wages.

1.6 Minimum Wage

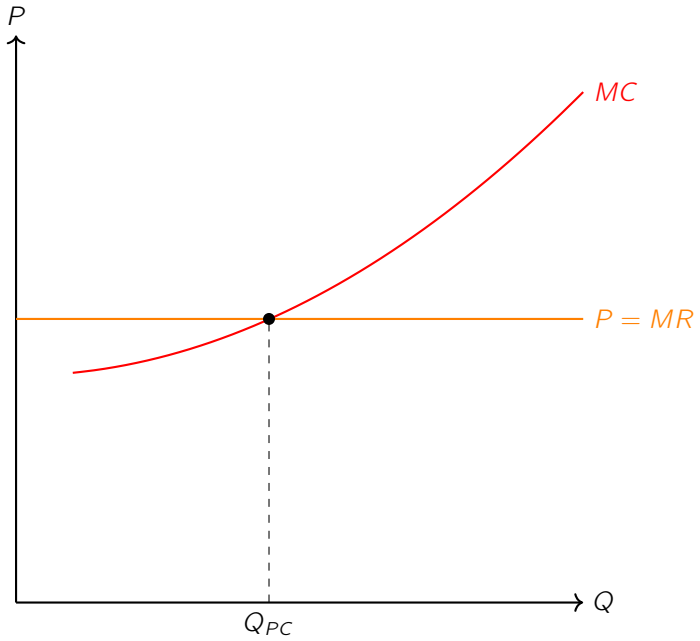


- Unemployment: $Q_2 - Q_1$

2 Market Structure

2.1 Perfect Competition

- Infinite number of buyers
- Infinite number of Sellers
- Price takers - Neither Firms or consumers can choose the price of the good
- **Demand is Perfect Elastic (Horizontal)**
- **Optimal:** Marginal Revenue - Marginal Cost $\Rightarrow$ Price = Marginal
  - Note since in this case firms are price takers. For every unit they sell they receive price P consequently Marginal Revenue = price

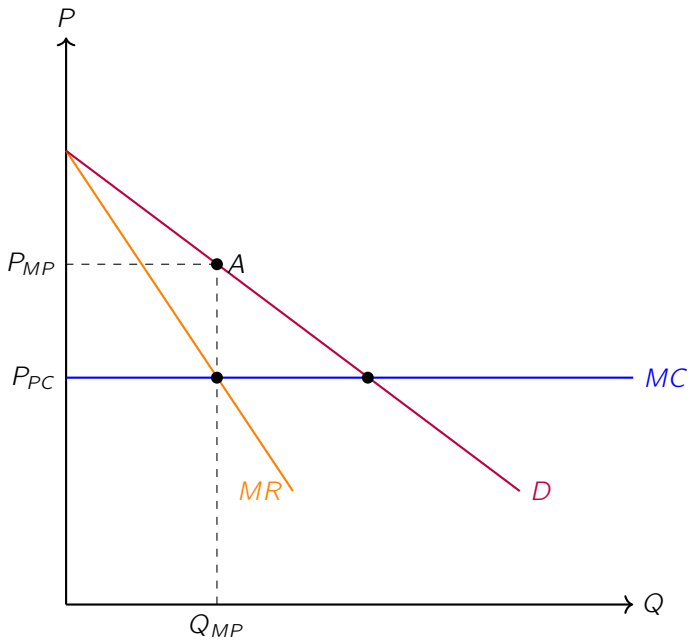


2.2 Monopoly

- Only one Seller
- **Price Taker**
  - All consumers buy the good from this company. So it can charge the price it wants

2.3 Oligopoly

- Few number of sellers
- **Market Power**
  - Since it is competing with only a few firms, it have market power. However, cannot define any price it wants
  - Higher Market Power leads to lower total surplus
    - Lower Consumer Surplus
    - Higher Producer Surplus
- **Demand have a negative slope**
- **Marginal Revenue > Price**
- How to calculate Marginal Revenue:
  1. Calculate the price (P_1) of producing Q_1 and generate the revenue $R_1 = P_1 * Q_1$
  2. Using $Q_1 + 1$ find the price (P_2) and the revenue $R_2 = (Q_1 + 1)P_2$
  3. Subtract $MR = R_2 - R_1$
  4. **or** $MR = P_2 - (P_1 - P_2)Q_1$



In Perfect Competition it should charge P_{PC} but with Market Power it charges P_{MP}

- **Math**

  1. Calculate the Quantity such that Marginal Revenue = Marginal Cost (Q_{MP})
  2. Apply Q_{MP} into the Demand Function to find the Price P_{MP}

- **HHI:** Sum of the squared market share. If there is only one firm, its market share is equal to 100, then HHI = 10,000. If there is infinite number of firms market share is equal to 0, then HHI = 0.

2.4 Other competitions

- **Cartel:** Group of firms agree to work together and act like a monopoly and share the monopoly profit
- **Monopolistic Competition:** Firms sell the same good but with small differences
  - Ex.: Streaming: Netflix, Max, Disney +. They all offer movies, however the movies available in each platform is different

3 Profit and Pricing

3.1 Types of Profit

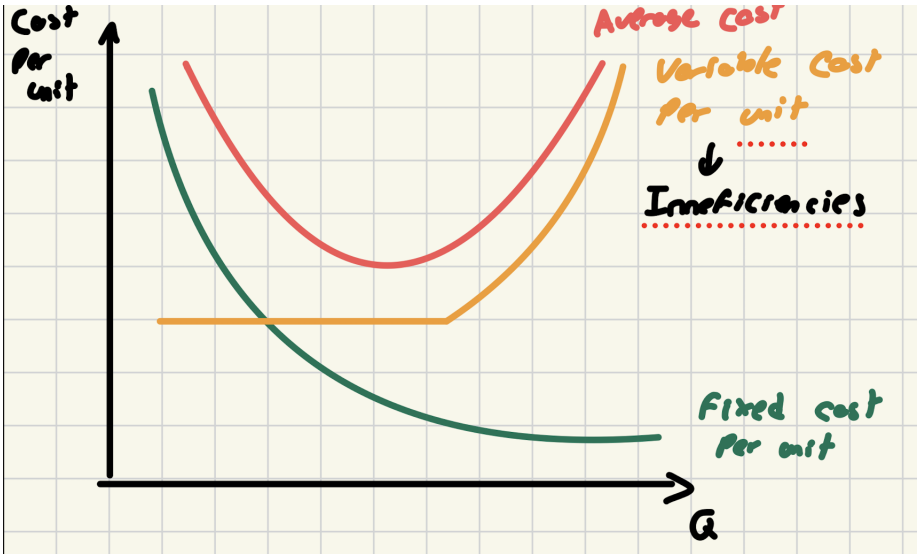
- **Accounting Profit = Total Revenue - Explicit Costs**
  - Total Revenue: "The Firm generate a revenue of $200,000"
  - Explicit Costs: "The company hires 1 engineer for $100,000"
- **Accounting Profit = Total Revenue - Explicit Costs - Implicit Opportunity Cost**
  - Implicit Opportunity Cost: "To open the company, the owner abdicated from a salary of $500,000"

3.2 Types of Cost

- **Total Cost = Variable Cost + Fixed Cost**
  - Variable Cost: For each additional unit you need to pay it. Ex.: To produce one bottle of water the company needs to buy one bottle
  - Fixed Cost: Cost that does not change with the Quantity. Ex.: Rent - It does not matter if you are producing 1,000 or 100, the rent is the same
- **Average Cost**

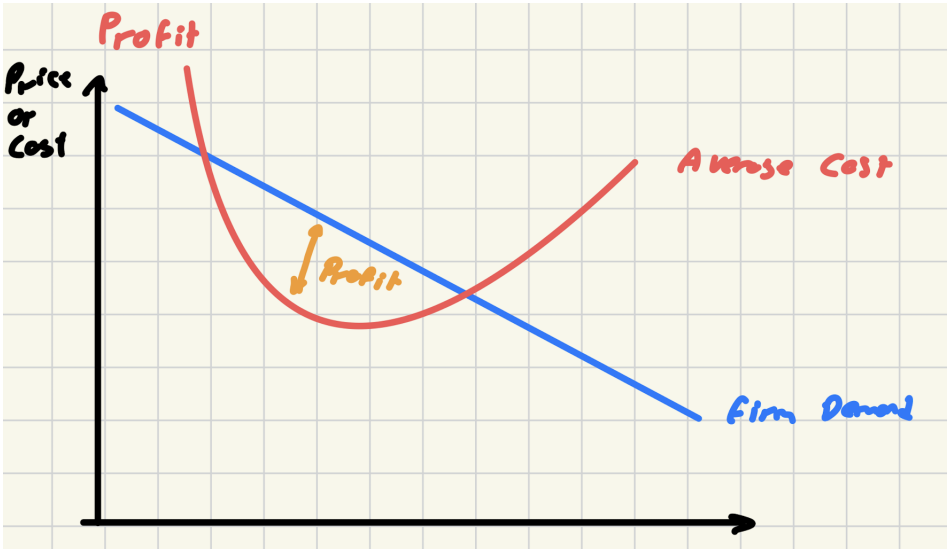
$$\text{Average Cost} = \frac{\text{Total Cost}}{Q} = \frac{\text{Variable Cost}}{Q} + \frac{\text{Fixed Cost}}{Q}$$

- **Marginal Cost:** Cost to produce one additional unit
  - Since Fixed cost does not change with the quantity, then the marginal fixed cost is equal to 0
- Ex.: Suppose the Total Cost is $2q^2 + 8$
  - Fixed Cost: 8
  - Variable Cost: $2q^2$
  - Average Cost: $2q + \frac{8}{q}$



3.3 Short Term

- The number of firms is fixed, then the firms have market power, what leads to a profit greater than 0

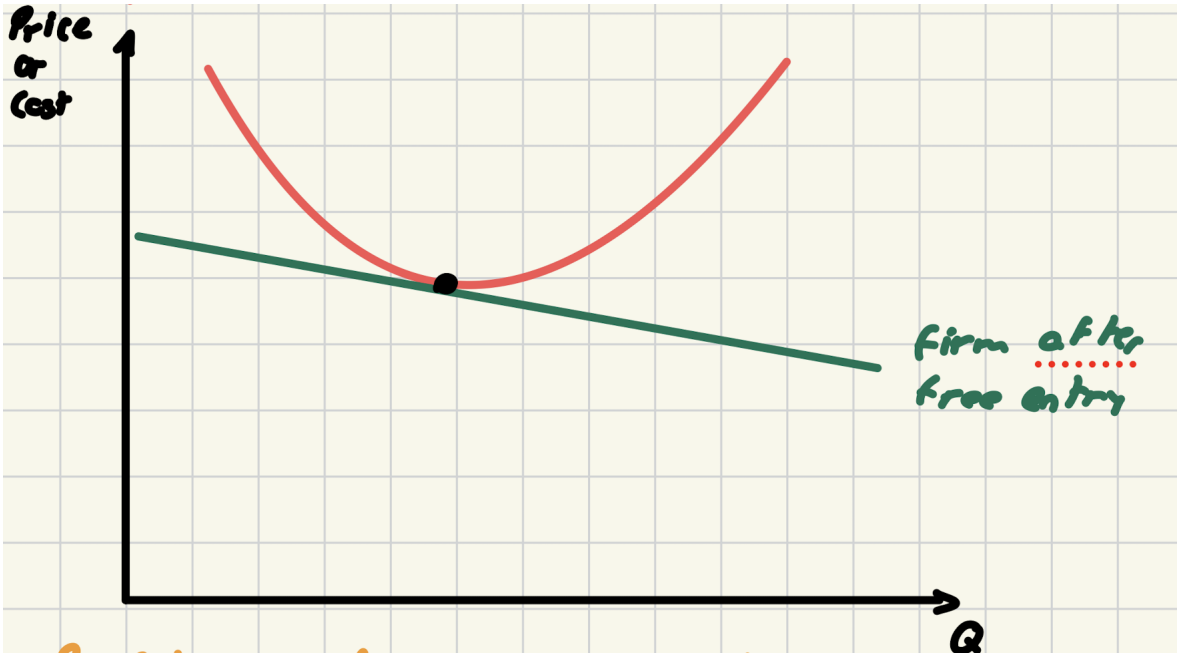


- How to Find the Profit

  1. Find Q^* such that Marginal Revenue = Marginal Cost
  2. Find P^* plug-in Q^* into the demand function
  3. Find C^* plug-in Q^* into the average cost function
  4. Calculate Total Revenue = P^*Q^* and Total Cost = C^*Q^*
  5. Profit = Total Revenue - Total Cost

3.4 Long term

- In the long term new firms can entry the market
- Profit > 0 $\Rightarrow$ More firms in the market $\Rightarrow$ Lower Market Power $\Rightarrow$ Profit = 0



3.5 Price Discrimination

- **Perfect:** Every consumer pays a different price
- **Group:** Different groups pay different prices. Ex.: Young kids pay less in the theater
- **Hurdle:** Offering lower prices only to buyer who ae willing to overcome some obstacles. Ex.: Buying something before it is launch
- For price discrimination all the consumer surplus is transferred to the producer. So we have the same total Surplus as competition, but all the consumer surplus goes to the producer.

4 Game Theory

4.1 Prisioner's Dilemma

		Player 2	
		Confess	Lie
Player 1	Confess	$2, 2$	$-1, 3$
	Lie	$3, -1$	$0, 0$

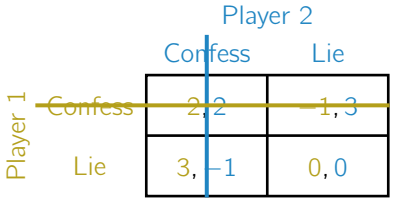
- A Game is defined by the following aspects:
  - 2 players
  - Payoff: Utility of each result. Ex.: If Player 1 chooses Confess and Player 2 chooses Lie, then Player 1 has payoff of -1 and Player 2 has payoff 3.
- **Nash Equilibrium:** To find the Nash Equilibrium we can use the best response argument
  - If Player 1 chooses Confess: Player 2 decides between Confess (Payoff = 2) or Lie (Payoff = 3). Since he wants to maximize the payoff he would choose Lie
  - If Player 1 chooses Lie: Player 2 decides between Confess (Payoff = -1) or Lie (Payoff = 0). Since he wants to maximize the payoff he would choose Lie
  - If Player 2 chooses Confess: Player 1 decides between Confess (Payoff = 2) or Lie (Payoff = 3). Since he wants to maximize the payoff he would choose Lie
  - If Player 2 chooses Lie: Player 1 decides between Confess (Payoff = -1) or Lie (Payoff = 0). Since he wants to maximize the payoff he would choose Lie

		Player 2	
		Confess	Lie
Player 1	Confess	$2, 2$	$-1, \underline{3}$
	Lie	$\underline{3}, -1$	$\underline{0}, \underline{0}$

  - Hence, the Nash Equilibrium is (Lie, Lie)

- Another way of finding the Nash Equilibrium is using the Strict Dominant Strategy (However, this method might not work in some cases since you need to have strict inequalities)
  - For Player 2 the payoff of choosing Lie are (3, 0) and for choosing Confess are (2,-1). Since $3 > 2$ and $0 > -1$ he will always choose Lie

  - Player 1 knows that Player 2 will always choose Lie. Hence, he will decide between confess (payoff = -1) or Lie (payoff = 0). Hence, the will choose Lie



  - Consequently, the Nash Equilibrium is Lie, Lie
- Note that in this case the two players receive payoff of 0. However, if they cooperated and both confessed they could receive 2.
  - If the game is played only one time the players will choose Lie, Lie
  - However, if the game is repeated infinitely they could achieve (Confess, Confess) by cooperating and imposing a penalty if the other tries to deviate
    - **Grim Reaper:** If one deviates from the cooperating you will never cooperate again. They will play (Lie, Lie) forever
    - **Tit-for-tat:** If one deviates from the cooperating you will not cooperate in the next round. They will play (Lie, Lie) in the next round
- **Maxmin strategy:**
  - If Player 1 chooses Confess the worst for Player 2 is to Confess (payoff = 2)
  - If Player 1 chooses Lie the worst for Player 2 is to Confess (payoff = -1)
  - If Player 2 chooses Confess the worst for Player 1 is to Confess (payoff = 2)
  - If Player 2 chooses Lie the worst for Player 1 is to Confess (payoff = -1)
  - The maximum of the worst strategy is both players confessing

4.2 Other types of Games

- **Coordination Games:** James and Mary want to meet today in the mall. However, both of them forgot about their cellphones and didn't define the place where they would meet.

		Mary	
		Food Court	Entrance
James	Food Court	$\underline{2}, \underline{2}$	$0, 0$
	Entrance	$0, 0$	$\underline{2}, \underline{2}$

  - In this case the Nash Equilibrium are (Food Court, Food Court) and (Entrance, Entrance)
  - This game is called Coordination Game because both Nash Equilibrium are the same strategy for both players

- **Anti-Coordination Games:** Chris and Jack are deciding between buying a TV or buying a Sofa. However, they don't know what the other is going to buy. Consequently, if both buy a TV they won't have a place to sit and watch the TV

		Jack	
		TV	Sofa
Chris	TV	$-1, -1$	$\underline{2}, \underline{3}$
	Sofa	$\underline{3}, \underline{2}$	$-3, -3$

  - In this case the Nash Equilibrium are (Sofa, TV) and (TV, Sofa)
  - This game is called Anti-Coordination Game because both Nash Equilibrium are the opposite strategy for both players